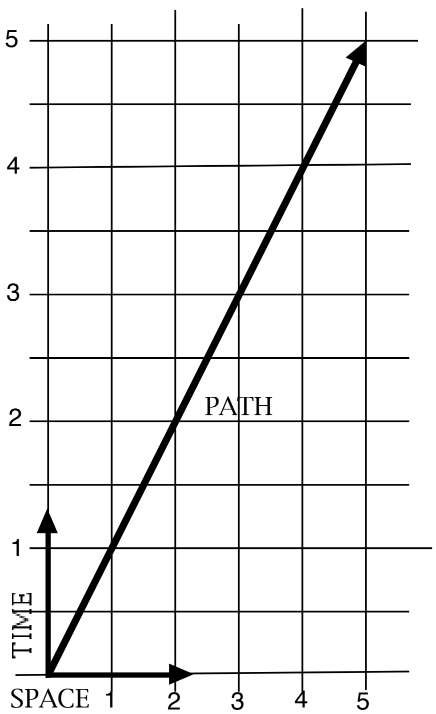
Cancelling Gravity

C. Wayne Macleod – January, 2015

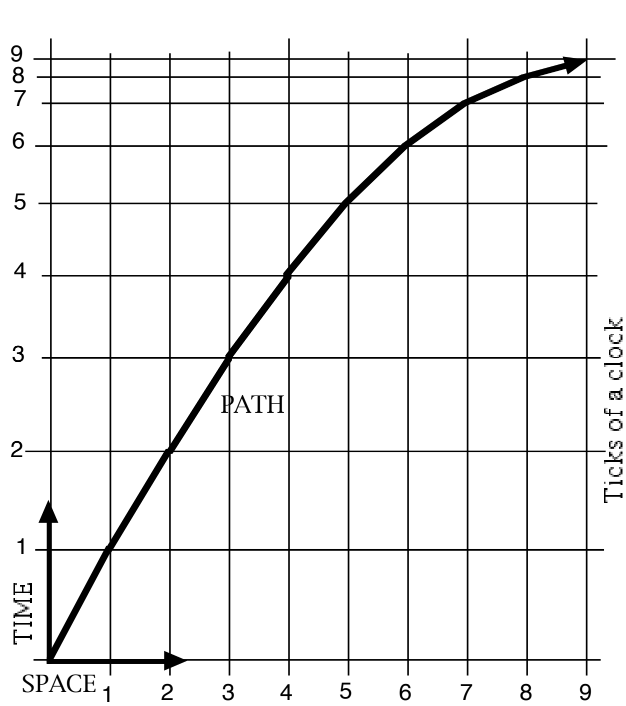
Theory:

General Relativity tells us that gravity is the effect of spacetime curvature. To cancel gravity we therefore have to make spacetime ‘flat’ around a considered object. The object would then experience the spacetime of empty space although immersed in the spacetime of Earth. How can such an artificial spacetime be created?



GRAPH A

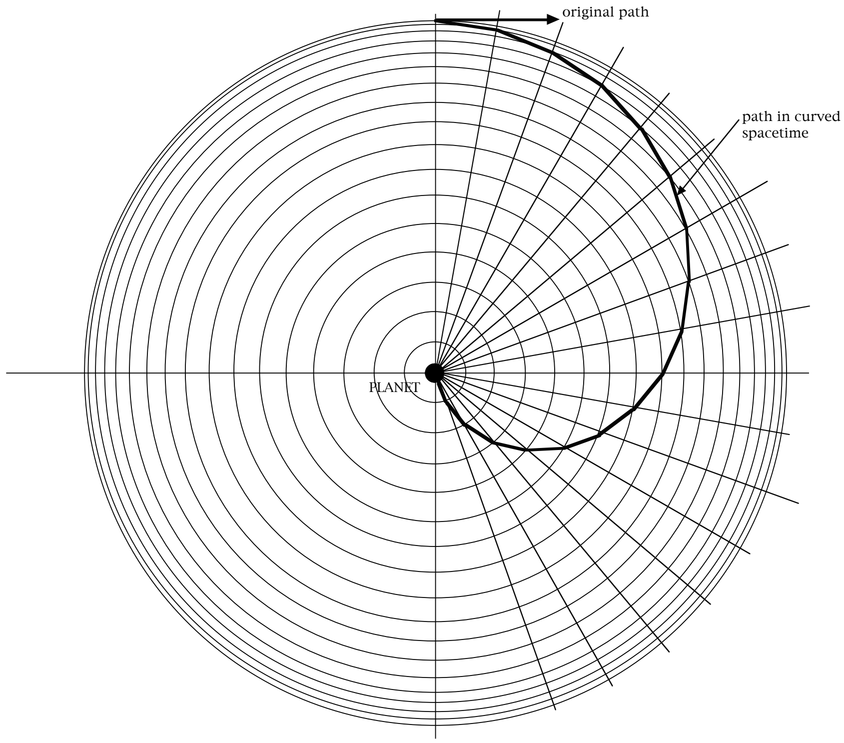
In empty space (flat spacetime) an object can continue on a straight path. At time 1 it is at position 1, at time 2 at poition 2 and so on in a straight line.



GRAPH B

The spacetime near a planet is curved. Increments of time expand near a region of dense mass-energy. An object thrown into the air must follow a curved trajectory.

We know from Special Relativity how relative space and time can be different between observers. We also learn how space and time are inseparable and to change one changes the other. Therefore to change spacetime we need only think about changing relative time. We cannot change relative time without changing relative space. Just as relative time and space are calculated with respect to the speed of light, which is a universal constant, we also must consider a universal constant to neutralize gravity. In this case the constant is electron *angular momentum,* or ‘spin,’ determined to be $h/(4\pi)$ where h is Planck’s constant. From the expression we see that electron ‘spin’ is a universal constant.

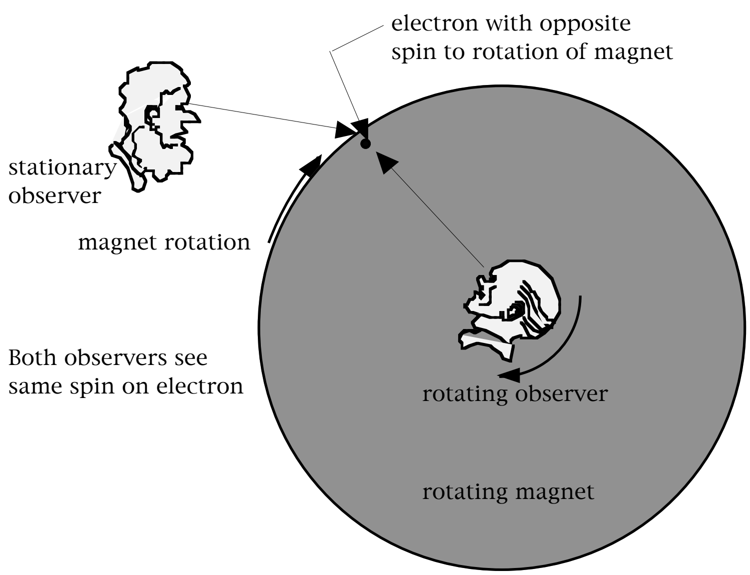


The concentric circles represemt time, the radial lines represemt space. Increments of time expand near the planet. As time slows the increments are delayed.

"A more accurate way of summarizing the lessons of General Relativity is that gravity does not *cause* time to run differently in different places (e.g., faster far from the earth than near it). Gravity *is* the unequable flow of time from place to place. It is not that there are two separate phenomena, namely gravity and time and that the one, gravity, affects the other. Rather the theory states that the phenomenon we usually ascribe to gravity are actually caused by time's flowing unequably from place to place." (Time, Gravity, and Quantum Mechanics, page 4 - Prof. W. G. Unruh, U. B. C.)

Of course, electron 'spin' is not an actual rotation, as the name implies, the electron being a quantum particle with its 'spin' having no physical analogy to our macro world. Nevertheless, atomic particles *do* possess dipole magnetism. They *do behave* as spinning particles with magnetism the same as would an electrically charged, rotating steel ball. The ball would have a magnetic north and south pole, and so do electrons due to their 'spin'. Atomic particles also display the property of *precession,* like a spinning top. It is this property of atomic protons that makes MRI scans possible. The theory presented here is therefore based on *observed behavior*. Although quantum 'spin' cannot be an actual physical rotation, if the macro property of rotation can analogously explain the magnetism and precession of a quantum particle there is reason to suspect the analogy can explain a possible macro property *as if* quantum 'spin' were a physical rotation. That macro result is *time dilation,* and the means for developing it is a *rotating* magnetic field although magnetism itself is *not* a universal constant.

Let us consider a magnetized plate with large face polarity. Its magnetization means that an abundance of unpaired electrons have their 'spins' all in the same direction. With rotation of the plate we would ordinarily expect an observer rotating with the plate to see a different 'spin' on the electrons than seen by a stationary ground observer, as would happen with an ordinary object like a rotating steel ball attached to the plate. In that case we would expect the plate observer to see the rotation of the ball being faster or slower than seen by the ground observer, depending on whether the plate's rotation was with or against the ball's rotation. But in the case of electrons their 'spin' is a universal constant, like the speed of light. *Both* observers see the *same* electron 'spin' regardless of plate rotation. Something must be different between the observers and it would be *time,* the same as speeds close to the speed of light give relative time dilation explained in Special Relativity. If both electron and plate rotations are in the same direction the stationary ground observer sees time running faster relative to the plate observer, and if both 'spins' are in opposite directions the ground observer sees time running slower relative to the plate observer (see Appendix B) and we have the natural time difference between Earth and empty space. For a levitating device we therefore want the 'spins' of electrons and plate in opposite directions. If the passage of time of the rotating plate observer is faster as seen by the stationary ground observer, the rotating plate observer would be in the spacetime of empty space although still immersed in the Earth's gravity field. That observer would be free of Earth's gravity when in the same energy regime of the plate electrons. This is the hypothesis that must be tested.



We would think that if cancelling gravity were so simple as rotating a magnetic field that experimenters would have discovered the connection between gravity and magnetism long ago. Undoubtedly this has been due in large measure to experimenters thinking of gravity as a force, whereas General Relativity explains gravity as a time phenomenon, described above. Consequently, efforts have concentrated on magnetism as having a connection with gravity (since it produces a force) instead of a possible time dilation effect produced by electrons. In association with the gravity-as-a-force concept, "free" energy has been postulated, whereas in this theory the energy associated with cancelling gravity is anything but free.

Here the energy of weight is considered the difference in energy between the gravity of Earth and empty space: $\Delta E = - GMm/\mathrm{R} - 0 = - GMm/\mathrm{R}$ [where *G:* gravitational constant (Newton m^2/k_g^2); *M:* mass of Earth (k_g); *m:* mass of object to be levitated (k_g); R: radius of Earth (m). To be noted is that the kilogram (k_g), meter (m), second (sec) system is used for calculations. Some measurements are in inches (”).] A levitating device must lose all this energy, but because gravitational energy is negative, $E_e - (-\Delta E) = E_e + \Delta E = E_o$ (where E_e: energy seen in empty space, or alternatively the rotating frame of reference, E_o: energy seen in a gravitational field, or in this experiment by the stationary observer), a levitation device seen from the ground is a *generator*. Because gravitational energy is negative its subtraction from the time regime of empty space means its addition as seen from the gravitational field in which the device is immersed. It is that *generated* energy (from the time regime of the rotating electrons) that is *excess* energy over what the device would have in empty space, and must be *lost*. By losing that excess energy the device is left with the gravitational energy it would have in empty space, which is zero, although still in a gravity field. In effect the device would lose its energy of weight, and an object with no energy of weight has no weight.

Cancelling gravity is not easy because that energy is considerable. Substituting values from Physics, the gravitational energy of one kilogram of any mass is:

$$\frac{G\ M\ m}{\mathrm{R}} = \frac{(6.67 \text{ x } 10^{-11})(5.98 \text{ x } 10^{24})(1)}{6.38 \text{ x } 10^{6}} = 6.25 \text{ x } 10^{7}\ \textit{Joules}$$

which is nearly twice the chemical energy in one kilogram of gasoline:

$$\frac{1.3 \text{ x } 10^{8}\ \textit{Joules}/\text{US gal}}{3.782\ \ \text{kg}/\text{US gal}} = 3.4 \text{ x } 10^{7}\ \textit{Joules}$$

An objection to any gravity neutralizing theory has always been that such a theory would unavoidably introduce perpetual motion, which is impossible. But this theory presents the intrinsic *need* for energy loss, with no force implied just as no force is implied in General Relativity. Energy loss is integral to this gravity neutralizing theory and therefore it cannot be said to contradict laws of established Physics for that reason. This need for energy loss can be understood by analogy with a weight rolling down an incline that takes longer to reach the bottom than if it slid. The explanation is that part of its gravitational energy goes into rotation, leaving less for falling, whereas in sliding the total use of that energy is for falling. In the case of a levitating device *all* its gravitational energy must be lost by means other than falling, by radiating off its generated energy from the same magnetic field of the rotating electrons giving time dilation. Although a magnetic field is not universally invariant, while in a rotating system its time regime must follow the time regime of its generating electrons, and the energy generated must be of the same time regime of those electrons. To equal the gravitational energy an object would have in empty space, which is zero, this energy must be lost.

It may also be thought that no physically rotating system could have sufficient rotational speed to give the relative time difference sought, forgetting the accumulative effect of trillions of electrons. In the same way, to produce magnetism in a wire electrons only have to move at the pace of a walking man, not move at relativistic speeds, due to the vast number of electrons in the wire.

Experiment:

Of interest, then, would be a proof-of-concept experiment to see if the energy loss requirement for gravity cancellation in fact gives that cancellation. Our first impulse for an experiment is to make it as simple as possible, and this impulse would be satisfied in the following Case I using light emitting diodes (LEDs) to dissipate the energy generated. An unfortunate consequence of the large amount of energy to be dissipated is that a large number of LEDs are required by this method, too many for a reasonable budget, but the description is included regardless, in the possibility that a professional in the field of light emission might have a solution. Where that is not forthcoming we have Case II presented for the inclusion of radiation plates and their secondary equipment. This is the arrangement that would be used for commercial purposes, but would be impractical for an experimental device where the required plates and inverter might be avoided using LEDs.

Case **I**: The source of magnetism in a proof-of-concept experiment would not be a single magnetized plate (page 3) but several magnets available on the market. These are visualized in a circular arrangement on a 1/2" steel plate (item c, pages 7 and 12), free to rotate on each side of a flat, 3/8" thick horizontal copper plate armature (item d, pages 8 and 12), with their collective magnetic fields cut by the copper 'spokes' between slots in the armature. Important is that the magnets do the rotating, not the armature. With magnetic field B and magnetic field area A_B, in the time t by Faraday's Law the voltage V generated is:

$$\mathrm{V} = -\mathrm{n}\frac{\Delta \mathrm{B}\,\mathrm{A_B}}{\Delta t} \qquad \mathbf{1}$$

The negative sign is from Lenz's Law and plays no part in this theory. 'n' is the number of copper 'spokes' x number of magnet locations. Since all calculations begin from $t = 0$, the 'Δ' can be ignored. Since power P = energy/time, the energy E generated is:

$$E = \mathrm{P}\,t_\mathrm{C}$$

where t_C = time per revolution of magnet plate rotation. Equating with the energy of weight (page 3):

$$-\frac{G\,M\,m}{\mathrm{R}} = \mathrm{P}\,t_\mathrm{C}$$

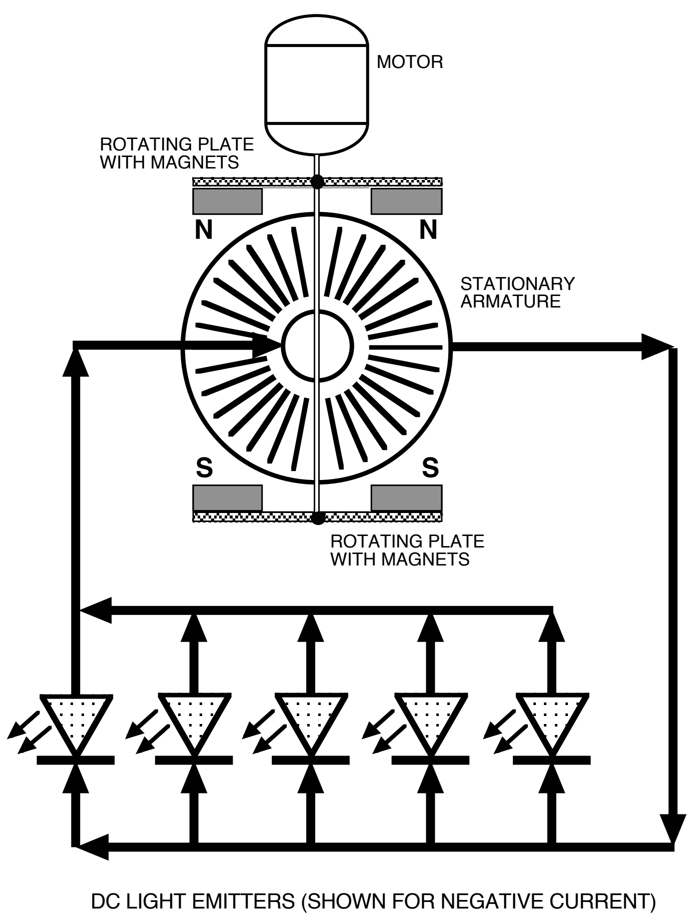
$$m = -\left(\frac{\mathrm{R}}{GM}\right)\mathrm{P}\,t_\mathrm{C}$$

Substituting values:

$$m = -\left(\frac{6.38 \text{ x } 10^{6} \text{ m}}{(6.67 \text{ x } 10^{-11}\,\frac{\text{Newton m}^2}{\text{k}_\text{g}^2})(5.98 \text{ x } 10^{24}\,\text{k}_\text{g})}\right)\left(\mathrm{P}\,\frac{\text{Newton m}}{\text{sec}}\right)(t_\mathrm{C} \text{ sec})$$

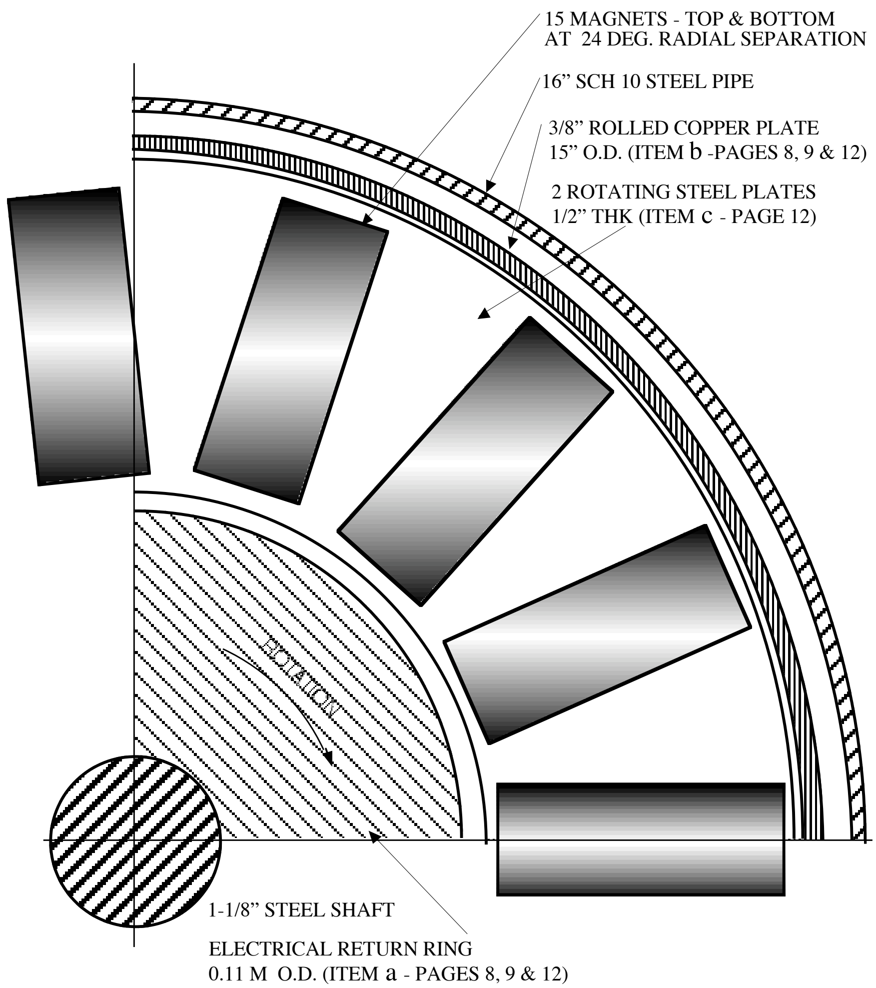
$$m = -\left(1.60 \text{ x } 10^{-8}\right)\mathrm{P}\,t_\mathrm{C}\quad \text{k}_\text{g} \qquad \mathbf{2}$$

With these few equations we can begin to develop a proof-of-concept experiment. In Schematic **I** a copper armature is sandwiched between two rotating steel plates containing magnets. Important is that the lower face of each top magnet above the armature be N, the upper face of each bottom magnet below the armature be S, and the magnet bearing plates rotate in a *clockwise* direction seen from the top. This is a requirement due to the important relationship of rotation to electron 'spin'. Electron 'spin' is therefore opposite plate rotation as required. Current (shown here to be electron flow, not conventional positive current) in the armature, considering *magnet* movement (not armature movement), will be generated from its inner rim to its outer rim. This direction is desirable because of the smaller circumference of the inner rim that would build charge to impede current if flow were opposite. DC current is conducted to light emitting diodes (LEDs) to immediately radiate off the energy generated. Levitation is made possible by the source of energy in the alternate time of the rotating electrons being expended to equal the gravitational energy of that alternate time regime. Since an object has no energy of weight in empty space, its energy of weight while in a gravitational field must be expended. Since the LEDs are the interface between the two time regimes, they should be placed at the bottom-most part of the device to gravitationally isolate anything directly above them.



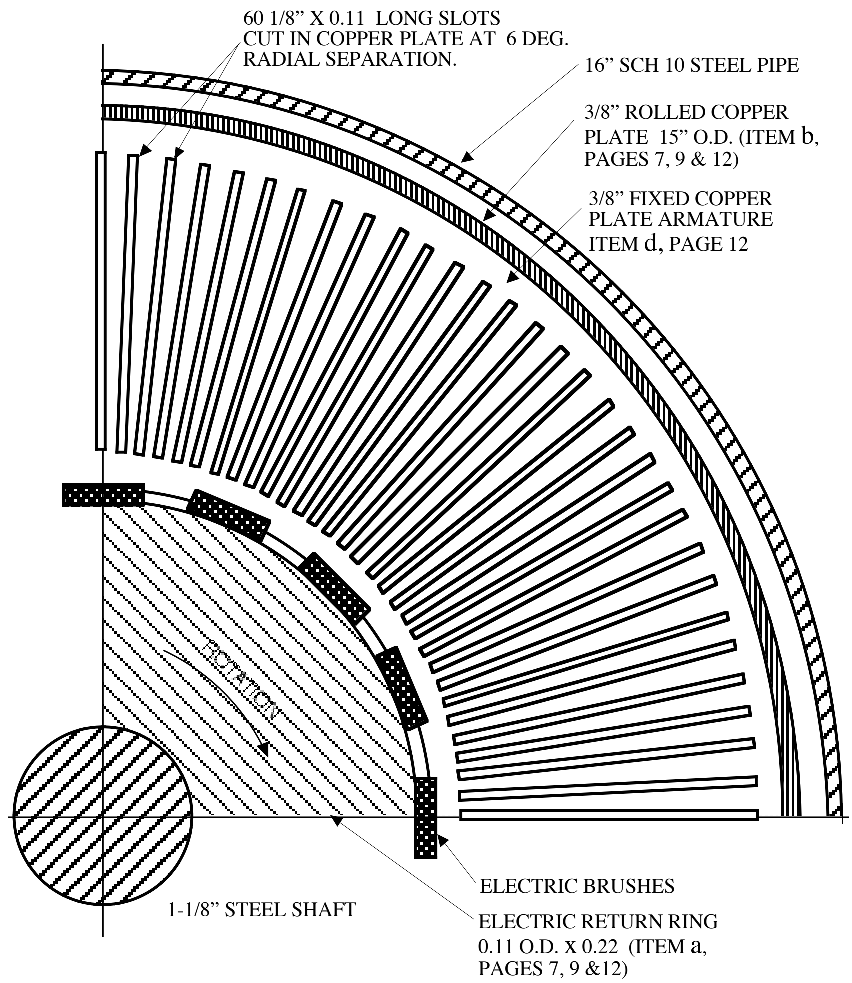
SCHEMATIC I

Following is Quarter Plan **A** showing the arrangement of magnets housed within a 16 inch, schedule 10 steel pipe, inside of which is a rolled copper, cylindrical plate 3/8" thick, 15" = 0.381 m O. D. This copper cylinder serves as the electrical supply from the armature to the DC light emitters. The magnets **[**K & J Magnetics, Ltd. stock number BZXOXO8 (www.kjmagnetics.com)**]** have dimensions 4" x 1" x 1/2" each, surface field 3424 *Gauss* which at an estimated distance 1/8" produces 740 *Gauss* **[**by Internet calculation: (www.arnoldmagnetics.com/*Gauss*_ Output_of_a_Rectangular_Magnet.aspx)**]** or 0.074 *Tesla*. These magnets have large face polarities, and since there are two magnets on each side of the armature, B ≈ 2 x 0.074 = <u>0.148</u> *Tesla*. 15 of these 4" x 1" magnets at 24^{o} radial separation are fitted within a 16" schedule 10 pipe housing, giving a total magnetic field area: A_B = 15 (4" x 1") = <u>0.0387</u> m^2. These magnets are bolted to two rotating 1/2" thick steel plates placed horizontally to sandwich the armature. 30 magnets are used in total, 15 on each side of the armature with unlike polarities facing each other, N on the top row of magnets facing down and S on the bottom row facing up. These magnets are rotated to produce the magnetic fields cutting the 'spokes' of the uncut metal between slots of the armature plate (see following Quarter Plan **B**, page 8, and 1/2 Cross Section, page 12).



QUARTER PLAN **A** – MAGNET-BEARING ROTATING STEEL PLATE
(No Scale)

The following Quarter Plan **B** is of the stationary armature plate, consisting of a 3/8" thick copper plate with 1/8" wide slots x 0.11 m long cut radially into the copper, to extend across the length of the magnets. With a 6° separation arrangement between slots, this leaves a minimum width of 0.0037 m copper separation between slots for carrying the generated current. At 6° there are 360°/ 6° = 60 slots and 60 copper 'spokes' on the armature. Generated Current (negative, not conventional) flows to the rolled copper cylinder (item b) surrounding the armature, to the light emitters and returns by the rotating electrical return ring (item a) heat shrunk onto the rotating steel shaft. Electric brushes transfer current from the rotating return ring to the armature plate.



QUARTER PLAN **B** - STATIONARY ARMATURE WITH CUT SLOTS
(No Scale)

With 60 1/8" wide slots in the armature the minimum copper width of the 'spokes' between the slots is 0.0037 m, and with 3/8" = 0.0095 m thick copper plate the cross sectional area of one armature 'spoke' is: $A_X = (0.0037)(0.0095) = 3.52 \times 10^{-5}$ m^2. The magnets are 4" ≅ 0.10 m long, requiring slot lengths of at least $\ell_1 = 0.11$ m. The resistivity of copper is $\rho = 1.72 \times 10^{-8}$ *Ohm*-m, so from Physics the resistance *r* of one copper 'spoke' is:

$$r = \rho\left(\frac{\ell_1}{A_X}\right)$$

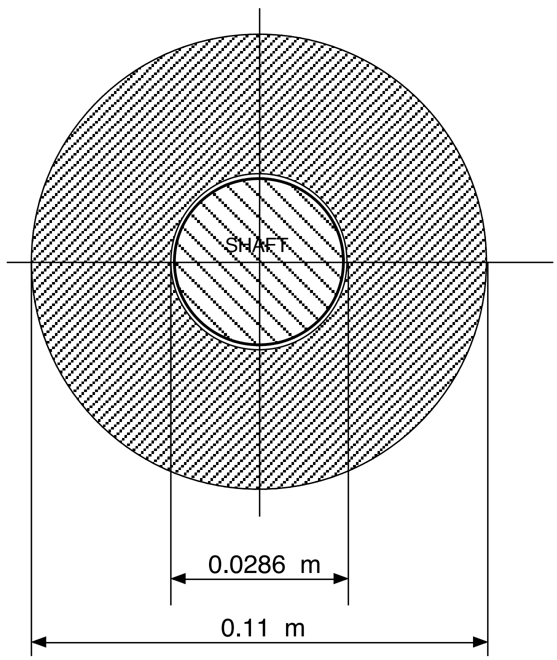
$$= (1.72 \text{ x } 10^{-8})\ \frac{0.11}{3.52 \text{ x } 10^{-5}}$$

$$= 5.375 \text{ x } 10^{-5}\ \textit{Ohms}/\text{'spoke'}$$

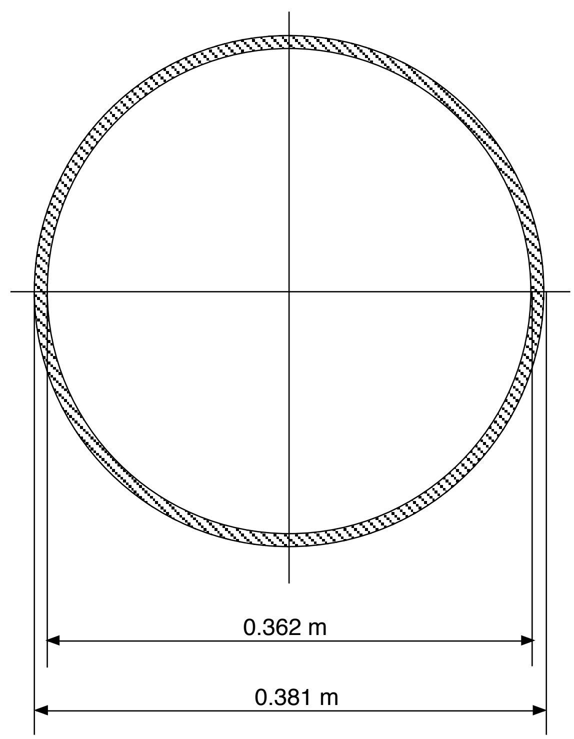
Since the 60 armature ‘spokes’ are electrically parallel, the total internal resistance of the generator ‘spokes’ is:

$$r_1 = \frac{5.375 \text{ x } 10^{-5}}{60}$$

$$= 8.96 \text{ x } 10^{-7}\ \textit{Ohms}$$



Electrical Return Ring
Item a - pages 7, 8 & 12
(no scale)



Electrical Supply Ring
Item b - pages 7, 8 & 12
(no scale)

Other generator resistances are of the electrical return and supply to and from the armature. These are two copper cylinders, one around the drive shaft and the other surrounding the armature and rotating magnets (see drawings above). If we keep resistances of these in the same low order of 10^{-7}, then the major energy loss is through the light emitters and lost as light radiation rather than as heat. The electrical return ring is heat shrunk onto a 1-1/8” = 0.0286 m drive shaft, so by making the outside diameter of the ring 0.11 m the cross sectional area of the return ring is:

A_X (return ring) $= \pi\dfrac{0.11^2}{4} - \pi\dfrac{0.0286^2}{4} = \pi/4\,(0.0113) = 0.00886\ \mathrm{m}^2$. Assuming electrical length $\ell_2 \approx 0.22$ m the electrical resistance of the return ring is: $r_2 = \rho\dfrac{\ell_2}{A_X} =$ $(1.72 \times 10^{-8})\ \dfrac{0.22}{0.00886} = 4.27 \times 10^{-7}$ *Ohms*. Similarly for the supply ring, assuming a plate thickness of 3/8” = 0.0095 m, for a 15” = 0.381 ring, the cross sectional area of the supply ring is: A_X (supply ring) $= \pi\dfrac{0.381^2}{4} - \pi\dfrac{0.362^2}{4} = \pi/4\,(0.0141) = 0.0111\ \mathrm{m}^2$. Assuming electrical length $\ell_3 \approx 0.15$ m electrical resistance of the supply ring is: $r_3 = \rho\dfrac{\ell_3}{A_X}$ $= (1.72 \times 10^{-8})\ \dfrac{0.15}{0.0111} = 2.32 \times 10^{-7}$ *Ohms*. All these internal resistances are in series so their combined resistance $r = 8.96 \times 10^{-7} + 4.27 \times 10^{-7} + 2.32 \times 10^{-7} = 1.55 \times 10^{-6}$ *Ohms*.

Additionally in the external circuit there are two plates carrying the current to the LEDs (see cross section, page 12). These can be of any plate thickness to make *r* of the same order of magnitude (10^{-6}). Therefore let us assume a total ***r*** of about $\underline{5.00 \times 10^{-6}\ \mathit{Ohm}}$.

For most commercial LEDs we will assume a voltage of V = 24 *Volts*. Since there are 60 ‘spokes’ cut in the armature and 15 magnet locations, n = 900. Substituting values for B and A_B from page 7, the theoretical RPM needed, from equation **1** is:

$$24 = 900\,\frac{(0.148)(0.0387)}{t_C}$$

$$= \frac{(5.155)}{t_C}$$

$$t_C = \frac{(5.155)}{24}$$

$$= 0.215\ \text{sec/rev}\quad (\approx 280\ \text{RPM})$$

The power needed for the LEDs is (from Physics):

$$P = \frac{V^2}{\boldsymbol{r}}$$

$$= \frac{24^2}{5.00 \times 10^{-6}}$$

$$= 1.15 \times 10^{8}\ \mathit{Watts}$$

Therefore from equation **2** the gravitational mass (weight) loss *m* is:

$$m = -\,(1.60 \times 10^{-8})(1.15 \times 10^{8})(0.215) = -\,0.40\ \ k_g \quad (\approx 7/8 \text{ lb.})$$

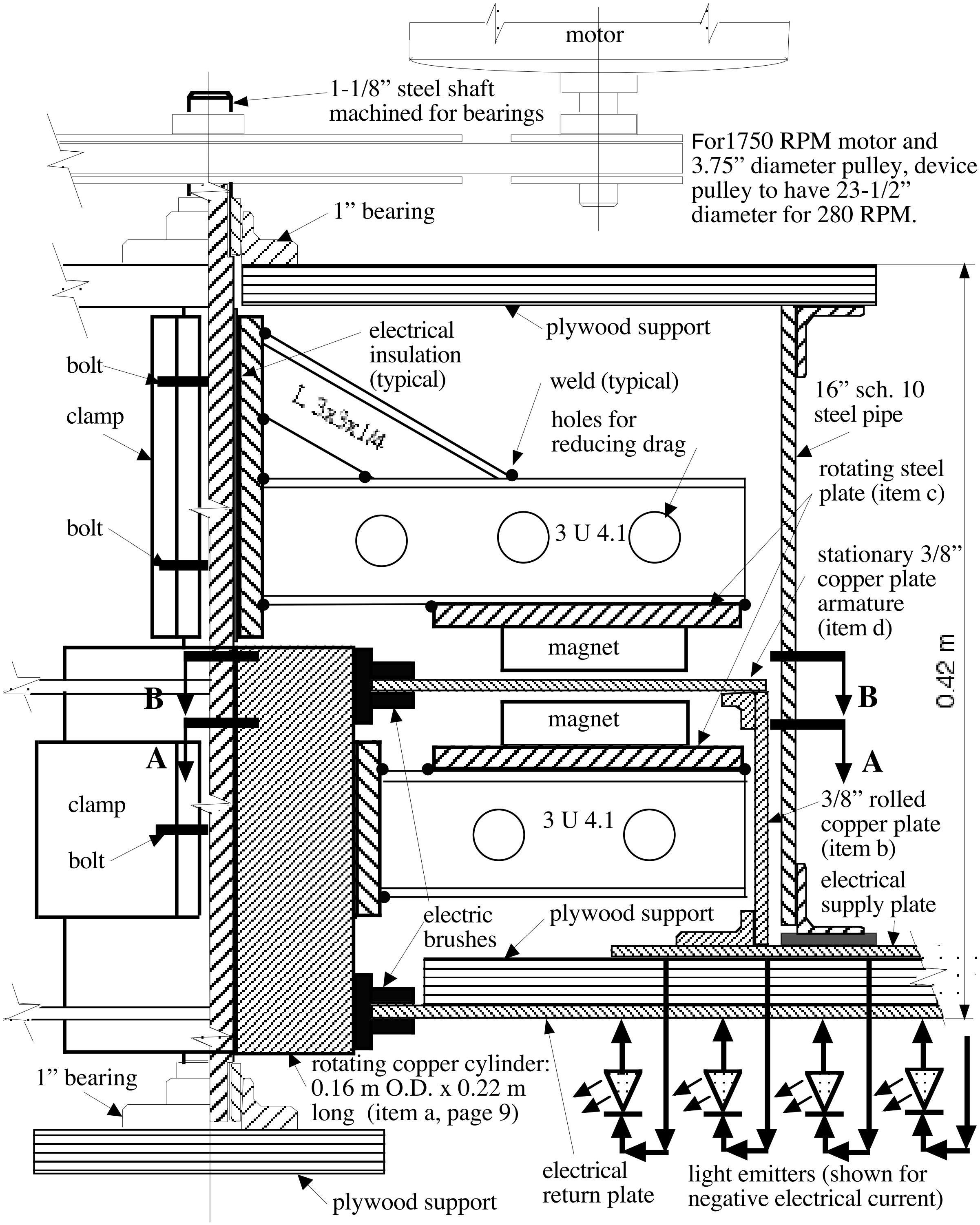
which is sufficient for a proof-of-concept result.

In summary: the voltage generated is 24 *Volts* at 280 RPM and power is 1.15×10^{8} *Watts* to levitate 0.40 k_g. For commercial devices much improved levitation is possible, described in Case **II**.

Assumed for the above proof-of-concept experiment was a voltage V = 24 *Volts* generated to accommodate market light emitters needed to burn off that energy. LEDs of 300 *Watts*, 24 *Volts* are available on the market, but required are:

$$\frac{P}{300} = \frac{1.15 \times 10^{8}}{300} = 3.83 \times 10^{5}\ \text{ LEDs}$$

that is: 383 *thousand* LEDs! This is a minimum, which does not take efficiency into account. Efficiency is an important consideration because it is electromagnetic energy alone that is postulated having a relationship with gravity (see Appendix D), whereas there is no necessary relation of gravitational energy to *heat*. Assuming 60% efficiency, the total number of LEDs is 6.4×10^{5} or well over half a *million* LEDs. Here we have another possible reason for experimenters never having discovered the relation between gravity and rotating magnetic fields, and also poses a limitation on this experiment.

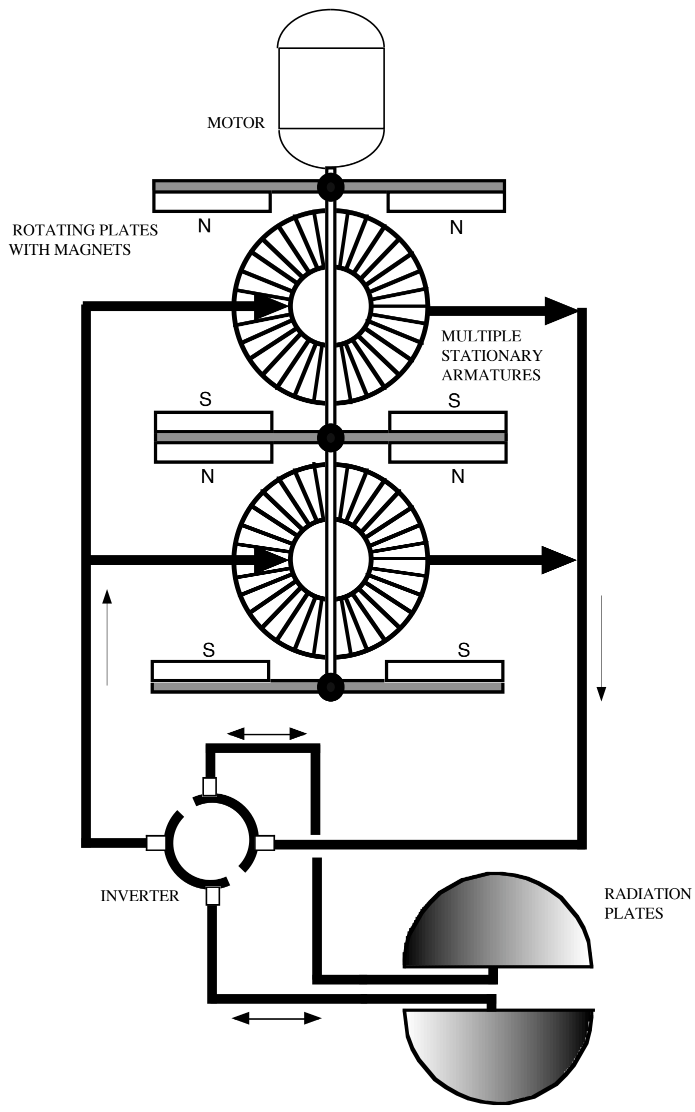


Case I: EXPERIMENTAL DEVICE 1/2 CROSS SECTION

FOR QUARTER PLANS **A** AND **B** SEE PAGES 7 AND 8

(No scale)

<u>Case **II**</u>: Regardless of LED efficiency the enormous energy generated and the consequent exorbitant number of these devices required make them an impractical means of energy dissipation. Instead, radiation plates are required and of such size to handle the frequency that is dependent on the amount of power dissipated. This is the subject of Appendix A. The following example demonstrates the improved result over Case **I** of using liquid nitrogen cooled copper conductors with more powerful magnets and the required radiation plates.



SCHEMATIC II

Schematic **II** shows a more commercial conceptual arrangement than Schematic **I** that was limited in its power generation to hold LEDs to a limited number for an experiment. With the radiation plates of Schematic **II**, the amount of radiation is unlimited and power generation need only be confined by design requirements. Its disadvantage is the inverter needed for the large DC current changed to AC at high frequency.

The general outline for a commercial gravity-cancelling device follows the same mentioned for the proof-of-concept experiment. Important is that the lower face of each top magnet above the armature be N facing down, and the upper face of each bottom magnet below the armature be S facing up, and the magnet bearing plates rotate in a *clockwise* direction seen from the top. This is a requirement due to the important relationship of rotation to electron 'spin'. Electron 'spin' is therefore opposite plate rotation as required. Current (considered in all diagrams to be negative electron flow, not positive current) in the armature, considering *magnet* rotation (not armature movement), will be generated from its inner rim to its outer rim. This direction is desirable because of the smaller circumference of the inner rim that would build charge to impede current if flow were opposite. The difference from Schematic **I** is that DC current is changed to AC by an inverter, conducted to plates that serve as electromagnetic radiators, the same as a dipole antenna. Levitation is made possible by the source of energy in the alternate time of the rotating electrons being expended to equal the gravitational energy of that alternate time regime. The radiation plates are the interface between the two time regions – of the rotating magnetic fields and gravity. They should therefore be placed at the lowest position of the device to gravitationally isolate anything immediately above them. In reaction to the rotation of the magnets these and the entire housing will rotate in the opposite direction from conservation of angular momentum.

For a commercial levitator 32 magnets from the K & J Magnetics, Ltd. Internet catalogue can be used, stock number BZXOYOYO-N52. These are 4" x 2" x 2" neodymium magnets with large face polarities, surface field 5884 *Gauss* which at the distance of approximately 1/8" is 2127 *Gauss* (by Internet calculation, see page 7) so that B = <u>0.2127 *Tesla*</u>. 16 of these magnets at 22.5° radial separation can be fitted within a 24" sch 10 pipe housing in the same configuration as Quarter Plan A. Only one tier is necessary to show levitation capability. The area of one magnet[1] is 4" x 2" = 0.00516 m^2, so for 16 magnet locations A_B = 16(0.00516) = <u>0.0826 m^2</u>. The armature is 1/4" copper plate with 180 1/8" slots cut at 2° radial separation, so that with 16 magnet locations n = 16(180) = <u>2880</u>. The current generated is transferred to a 23" = 0.582 m O.D., 1/4" copper plate cylinder. This DC current is changed to AC (see Appendix A) by an inverter, conducted to the radiation plates and returns via a 0.16 m diameter copper cylinder heat shrunk onto a 1-1/8" diameter rotating steel shaft. Electric brushes convey the returning current to the stationary armature. For simplicity the same overall resistance is assumed for the current as for the experimental device, i.e., $\boldsymbol{r} \approx 5.00 \times 10^{-6}$ *Ohms,* but in this case resistance will be reduced by cooling the copper to the temperature of liquid nitrogen (–196° C). Since the resistivity of copper at room temperature is $\rho_R = 1.72 \times 10^{-8}$ *Ohm*-m and the temperature coefficient of copper is $\alpha = 0.0039$, restivity from Physics is:

$$
\begin{aligned}
\rho_N &= \rho_R\,[1 + \alpha\,(T - T_O)] \\
&= (1.72 \times 10^{-8})\,[1 + 0.0039\,(-196 - 20)] \\
&= 2.71 \times 10^{-9}\ \mathit{Ohm}\text{-m}
\end{aligned}
$$

---

[1] Price/magnet is \$518.33, therefore total magnet price is 32 x \$518.33 = \$16,586.56.

In Case **I** circuit resistance $\boldsymbol{r} = 5.00 \times 10^{-6}$ *Ohms* was used. From Physics:

$$r = \rho\left(\frac{\ell}{A_X}\right)$$

The $\left(\frac{\ell}{A_x}\right)$ ratio is therefore:

$$\left(\frac{\ell}{A_x}\right) = \frac{\boldsymbol{r}}{\rho}$$

$$\approx \left(\frac{5.00 \times 10^{-6}}{1.72 \times 10^{-8}}\right)$$

$$\approx 291$$

Using the same $\left(\frac{\ell}{A_x}\right)$ for copper cooled with liquid nitrogen, the approximate total circuit resistance $\boldsymbol{r}_N$ is:

$$\boldsymbol{r}_N = \rho_N \left(\frac{\ell}{A_x}\right)$$

$$= (2.71 \times 10^{-9})\ (291)$$

$$= 7.89 \times 10^{-7}\ \textit{Ohms}$$

Since there are 180 ‘spokes’ and 16 magnet locations, n = 2880.

With this criteria, what RPM is required to levitate 300 k_g (660 lb.)?

From equation **1**:

$$V^2 = \left(\frac{n\ B\ A_B}{t_C}\right)^2$$

From Physics:

$$P = V^2/\boldsymbol{r}_N$$

$$= \frac{\left(\frac{n\ B\ A_B}{t_C}\right)^2}{\boldsymbol{r}_N}$$

$$= \frac{n^2\ B^2\ A_B^2}{t_C^2\ \boldsymbol{r}_N}$$

$$= \frac{(2880)^2\ (0.2127)^2\ (0.0826)^2}{t_C^2\ (7.89 \times 10^{-7})}$$

$$= \left(\frac{3.245 \text{ x } 10^{9}}{t_{C}^{2}} \right)$$

Substituting into equation **2** for P:

$$|300| = (1.60 \text{ x } 10^{-8}) \left(\frac{3.245 \text{ x } 10^{9}}{t_{C}^{2}} \right) t_{C}$$

$$= \left(\frac{52}{t_{C}} \right)$$

$$\therefore \quad t_{C} = \frac{52}{300} = 0.174 \ \frac{\text{sec}}{\text{rev}}$$

The rotary velocity needed for levitation is therefore <u>347 RPM</u>.

In summary, for a levitation device using <u>liquid nitrogen</u> cooled copper conductors, <u>32 magnets</u> of <u>0.2 *Tesla*</u> each, and rotary velocity of approximately <u>350 RPM</u>: 300 $\underline{k_g}$ can be levitated. Much more gravitational mass (weight) can be lost using more powerful magnets, additional magnets in multiple tiers, increased rotary velocity and superconducting material with much decreased electrical resistance.

Appendix A: Radiation Frequency

Ordinarily for general use radiation plates will be used to radiate off the enormous energy loss requirement of a levitation device. Schematic II (page 13) shows the conceptual arrangement for commercial purposes. Knowing the radiation frequency delivered to the plates for proper burn-off is therefore necessary.[2] To calculate the frequency we begin with the average Poynting expression S = $F_e^{\,2}/(2\,c\,\mu_o)$, where F_e is the electric field (*Volts*/m); μ_o is the permeability constant (*Tesla*-m/*Amp*) and c is the speed of light (m/sec). S quantifies the average rate of energy flow per unit area radiated upon a surface. Let us imagine a surface of the same area very close and parallel to the radiator upon which its energy radiates. The amount received by that surface will be the same as the amount radiated and we can use the Poynting expression to estimate that amount.

The gravitational energy that must be lost is:

$$E_o - E_e = -\frac{GMm}{\mathrm{R}} = -\frac{(6.67 \text{ x } 10^{-11})(5.98 \text{ x } 10^{24})\,m}{6.38 \text{ x } 10^{6}}$$

$$= -\,(6.25 \text{ x } 10^{7})\,m \quad \textit{Joules}$$

The gravitational constant G (N m^2/kg^2) is calculated with *Newtons,* that is, in kg m/sec^2, so the time unit to calibrate power is the second. When lost in one second the power dissipated is (6.25 x 10^7)(- m) *Joules*/sec or *Watts*. Over one meter of area using the average Poynting expression this is:

$$\frac{E_o - E_e}{\mathrm{A_P}} = \frac{F_e^{\,2}}{2\,c\,\mu_o}$$

or:

$$\frac{(6.25 \text{ x } 10^{7})(-m)}{\mathrm{A_P}} = \frac{F_e^{\,2}}{2\,c\,\mu_o}$$

Where $\mathrm{A_P}$ is the radiation surface area. From Physics:

$$F_e = \frac{\sigma}{\varepsilon}$$

where σ: surface charge density (*Coul* /m^2) and permittivity constant ε = 8.85 x 10^{-12} (*Farad* /meter).

$$\therefore \quad \frac{(6.25 \text{ x } 10^{7})(-m)}{\mathrm{A_P}} = \frac{\left(\dfrac{\sigma}{\varepsilon}\right)^2}{2\,c\,\mu_o} = \frac{\sigma^2}{2\,c\,\mu_o\,\varepsilon^2}$$

From Physics: $\sigma = q/\mathrm{A_P}$ where q is electrical charge (*Coulomb*). Therefore:

[2] The accuracy of this development should not reflect on the Cancelling Gravity theory. Although loss of gravitational energy is an integral part of this theory, formulation on *how* that loss is to be achieved is not.

$$\frac{(6.25 \text{ x } 10^{7})(\Delta m)}{\mathrm{A_P}} = \frac{\left(\frac{q}{\mathrm{A_P}}\right)^2}{2\, c\, \mu_o \varepsilon^2} = \frac{q^2}{2\, c\, \mu_o \varepsilon^2\, \mathrm{A_P^2}}$$

$$(1.25 \text{ x } 10^{8})(\Delta m) = \frac{q^2}{c\, \mu_o \varepsilon^2 \mathrm{A_P}}$$

From Physics: $q = i_{\mathrm{P}}\, t_{\mathrm{C}}$ where i_{P} (*Amp*/sec) is the current within the radiation plate and t_{C} is the time of one cycle in seconds. Therefore:

$$(1.25 \text{ x } 10^{8})(\Delta m) = \frac{(i_{\mathrm{P}}\, t_{\mathrm{C}})^2}{c\, \mu_o \varepsilon^2 \mathrm{A_P}}$$

Substituting values $c = 3.00 \text{ x } 10^8$ m/sec, $\mu_o = 4\pi \text{ x } 10^{-7}$ *Tesla* m/*Amp*, $\varepsilon = 8.85 \text{ x } 10^{-12}$ *Farad*/m:

$$(1.25 \text{ x } 10^{8})(\Delta m) = \frac{i_{\mathrm{P}}^2\ t_{\mathrm{C}}^2}{(3.00 \text{ x } 10^{8})(4\pi \text{ x } 10^{-7})(8.85 \text{ x } 10^{-12})^2 \mathrm{A_P}} = \frac{i_{\mathrm{P}}^2\ t_{C}^2}{(2.95 \text{ x } 10^{-20})\ \mathrm{A_P}}$$

$$\therefore \quad (3.69 \text{ x } 10^{-12})(\Delta m) = \frac{i_{\mathrm{P}}^2\ t_{\mathrm{C}}^2}{\mathrm{A_P}}$$

Effective AC = 70.7% DC, so weigh loss is proportionately less than given by DC:

$$(3.69 \text{ x } 10^{-12})(\Delta m) = \frac{(0.707\ i)^2\ t_{\mathrm{C}}^2}{\mathrm{A_P}}$$

$$= \frac{0.5\, i_{\mathrm{P}}^2\ t_{\mathrm{C}}^2}{\mathrm{A_P}}$$

$$(7.38 \text{ x } 10^{-12})(\Delta m) = \frac{i_{\mathrm{P}}^2\ t_{\mathrm{C}}^2}{\mathrm{A_P}}$$

From Physics $t_{\mathrm{C}}^{\ 2} = 1/f^2$. Also, the time is only the time required for electrical waves to travel half a plate, so that the area in question is half: $\mathrm{A_P}/2$. However, radiation is also from both sides of the plate, doubling the area considered:

$$(7.38 \text{ x } 10^{-12})(\Delta m) = \frac{i_{\mathrm{P}}^2 \left(\frac{1}{f}\right)^2}{2\left(\frac{\mathrm{A_P}}{2}\right)}$$

$$= \frac{i_{\mathrm{P}}^2}{\mathrm{A_P}\, f^2}$$

$$\therefore \quad f^2 = (1.36 \text{ x } 10^{11})\, \frac{i_{\mathrm{P}}^2}{\mathrm{A_P}\,(-m)}$$

This expression agrees with dimensional analysis and with expectation: as $|\,m\,|$ increases $-m$ decreases, and with the inverse proportionality f also increases. Squaring both sides:

$$f^4 = (1.84 \text{ x } 10^{22})\, \frac{i_{\mathrm{P}}^4}{\mathrm{A_p^2}\,(-m)^2}$$

To account for direct proportionality the function $f^4 \equiv 1/m^2$ must be inverted around $f = f^4 = m = m^2 = 1/m^2 = 1$ (see graph) to give:

$$f^4 = (1.84 \text{ x } 10^{22})\, \frac{i_{\mathrm{P}}^4}{\mathrm{A_p^2}} \left[2 - \frac{1}{m^2} \right]$$

Therefore the modified function f_{P} for $-\,m$ is:

$$f_{\mathrm{P}} = (3.68 \text{ x } 10^5)\, \frac{i_{\mathrm{P}}}{\sqrt{\mathrm{A_p}}} \left[2 - \frac{1}{m^2} \right]^{1/4} \qquad \mathbf{3}$$

To be noted is that equation **3** is valid only for $m > 0.707$. Less m gives an irrational result that is undefined.

We can see what the 300 $\mathrm{k_g}$ loss (page 15) would require using radiation plates. Assuming two semi-circular radiation plates of radius $\mathrm{r_P} = 2$ m, their combined area $\mathrm{A_P} = \pi\,\mathrm{r_P}^2 = \pi\,(2)^2 = 12.6\ \mathrm{m}^2$. From Physics the electrical current delivered to these plates is:

$$\mathrm{I} = \frac{\mathrm{V}}{\boldsymbol{r}_{\mathrm{N}}}\ \mathit{Amps}$$

so from equation **1** and the values found on page 14 and 16:

$$\mathrm{V} = 2880\, \frac{(0.2127)(0.0826)}{0.174}$$

$$= 291\ \mathit{Volts}$$

Since $\boldsymbol{r}_{\mathrm{N}} = 7.89 \text{ x } 10^{-7}$, found on page 15:

$$\mathrm{I} = \frac{291}{7.89 \text{ x } 10^{-7}}$$

$$= 3.70 \text{ x } 10^8\ \mathit{Amps}$$

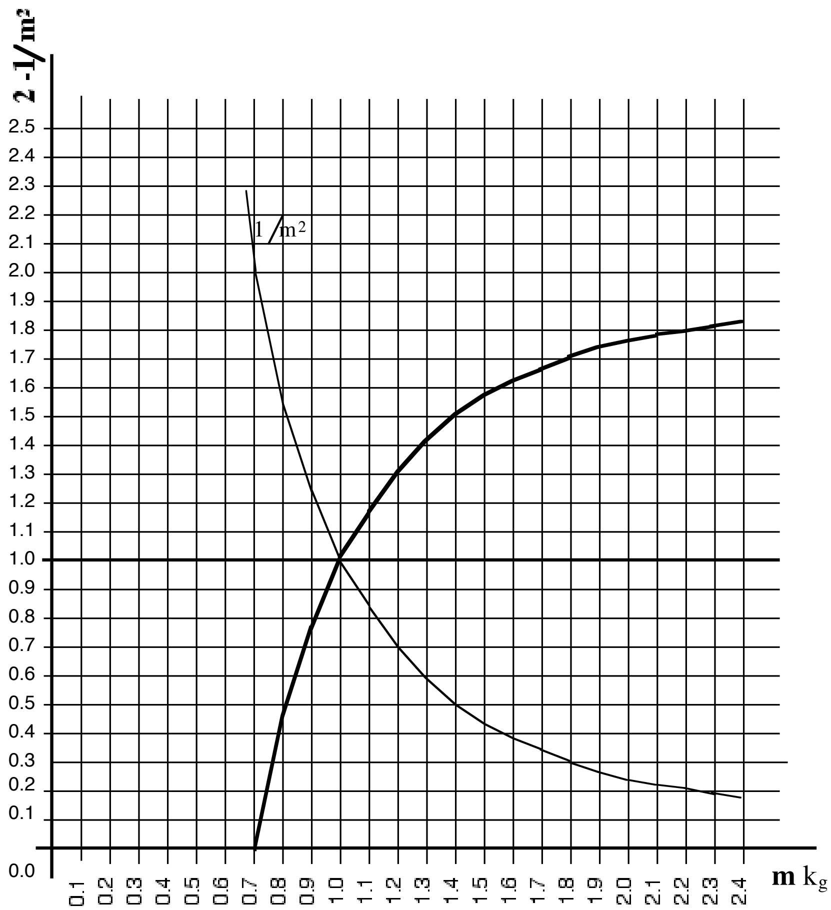
The frequency required is therefore, using equation **3**:

$$f_P = (3.68 \text{ x } 10^5)\ \frac{3.70 \text{ x } 10^8}{\sqrt{12.6}} \left[2 - \frac{1}{300^2}\right]^{1/4}$$

$$= (3.84 \text{ x } 10^{13})\ (1.19)$$

$$= 4.56 \text{ x } 10^{13} \text{ cycles/sec}$$

This frequency is in the infrared range of the electromagnetic spectrum.



RADIATION PLATE FREQUENCY CHART FOR LOW *m*

Appendix B: DIRECTION OF MAGNET ROTATION

Let us imagine a wheel spinning on an arm, like a child's propeller toy, but with the arm also rotating. The planes of both rotations are parallel, that is, their mathematical normals are parallel but in opposite directions since the arm rotates in a direction opposite to the spin of the wheel. We consider the rate of spinning of the wheel from the point-of-view of two observers, one observer is stationary on the ground, the other observer is rotating with the arm. Obviously the two observers will not see the same rate of rotation on the wheel. Because the arm is rotating opposite the rotation of the wheel, its rotation must be subtracted from the wheel rotation as seen by the stationary ground observer. This is not true of the observer rotating with the arm, who will see the rotation of the wheel as if there were no arm rotation.

That would be the normal expectation. But suppose both observers see the *same* rate of rotation on the wheel. Something would have to be different between the two observers and that would be *time*. Using designations:

t_G : time seen by the ground observer
t_A : time seen by the arm observer
ω_A : arm rotational velocity
ω_W : wheel rotational velocity
θ_A : angular distance traveled by arm
θ_W : angular distance traveled by wheel

The time ratio between the ground and arm observers is as follows. Since $\theta = \omega t$:

$$t_G = \frac{\theta_W - \theta_A}{\omega_W}$$

$$= \frac{\omega_W t_A - \omega_A t_A}{\omega_W}$$

$$= t_A - \left(\frac{\omega_A}{\omega_W}\right) t_A$$

$$= t_A \left(1 - \frac{\omega_A}{\omega_W}\right)$$

$$\Rightarrow \quad \frac{t_G}{t_A} = 1 - \frac{\omega_A}{\omega_W} \qquad \mathbf{4}$$

To be noted in equation **4** is that time for the ground observer is less than time for the arm observer when wheel rotation is opposite arm rotation. This is the natural time relation between a gravity field and empty space. If both rotations were in the same direction it would be more.

Appendix C: $E_e = -MC^2$

Due to $1/c^2 \approx 0$ the Schwarzchild spacetime interval can be abbreviated to:

$$(\Delta\tau)^2 = \left(1 - \frac{2GM}{rc^2}\right)(\Delta t)^2$$

where *G:* gravitational constant, *M:* mass of a large object like Earth, *c:* speed of light, *r:* distance from the gravitational center of Earth, *τ:* time near Earth and *t:* time at a distance in space with little mass-energy. Although General Relativity describes gravity as a spacetime phenomenon the usefulness of time flow difference as its major component is apparent. This equation expressed:

$$\frac{\Delta\tau}{\Delta t} = \sqrt{1 - \frac{2GM}{rc^2}}$$

with its square root binomially expanded becomes:

$$\left(1 - \frac{2GM}{rc^2}\right)^{1/2} = 1 - \frac{GM}{rc^2} - \frac{1}{2}\left(\frac{GM}{rc^2}\right)^2 + \ldots$$

$$\Rightarrow \quad \frac{\Delta\tau}{\Delta t} \approx 1 - \frac{GM}{rc^2}$$

That is, for Earth:

$$\frac{\Delta t\ (\text{Earth})}{\Delta t\ (\text{empty space})} \approx 1 - \frac{GM}{Rc^2} \qquad \textbf{5}$$

To be noted from equation **5** is that time runs slower on Earth than in empty space.

Let us now consider Appendix A and make an analogy of the wheel and arm to electrons and plate. The electrons take the place of the wheel and the rotating plate containing the electrons takes the place of the rotating arm. In addition there is a magnetic field applied to the plate in such manner that it orients the 'spin' of its electrons in the opposite direction to plate rotation. Using designations:

t_0 : time seen by a stationary observer (sec)
t_e: time seen by an observer in a rotating frame of reference (sec)
ω_r: rotational velocity of the rotating frame of reference (rad/sec)
ω_e: electron property corresponding to rotational velocity (rad/sec)
m: mass, the weight of which is to be neutralized (kg)
E_o: gravitational energy seen by a stationary observer (joule)
E_e: gravitational energy seen by an observer in the rotating frame of reference (joule)

To be noted is that t_0 is analogous to t_G in the wheel example and t_e is analogous to t_A :

$$\frac{t_o}{t_e} \equiv \frac{t_G}{t_A}$$

For an object to achieve weightlessness, the ratio of time seen by a ground observer to time seen by an observer in the rotating frame must be the same as the ratio of time seen on Earth to that seen in empty space. That is, using equation **5**:

$$\frac{t_o}{t_e} = 1 - \frac{GM}{Rc^2} \qquad \mathbf{6}$$

To be noted also is that ω_r is analogous to ω_A in the wheel example and ω_e is analogous to ω_W :

$$\frac{\omega_r}{\omega_e} \equiv \frac{\omega_A}{\omega_W}$$

Therefore, analogous to equation **4**:

$$\frac{t_o}{t_e} = 1 - \frac{\omega_r}{\omega_e} \qquad \mathbf{7}$$

$$\Rightarrow \quad 1 - \frac{\omega_r}{\omega_e} = 1 - \frac{GM}{Rc^2}$$

$$\frac{\omega_r}{\omega_e} = \frac{GM}{Rc^2} \qquad \mathbf{8}$$

Time and energy are reciprocal, as in KE = 1/2 $L\omega$ = 1/2 $L(\theta/t)$. Therefore, equating the ratios of time and gravitational energy using equation **7**:

$$\frac{t_o}{t_e} = \frac{E_e}{E_o} = 1 - \frac{\omega_r}{\omega_e}$$

$$\Rightarrow \quad \frac{E_o}{E_e} = \frac{1}{1 - \frac{\omega_r}{\omega_e}} \approx 1 + \frac{\omega_r}{\omega_e}$$

$$E_o = \left(1 + \frac{\omega_r}{\omega_e}\right) E_e$$

$$\Rightarrow \quad \Delta E = E_o - E_e = \left(1 + \frac{\omega_r}{\omega_e}\right) E_e - E_e = \left(\frac{\omega_r}{\omega_e}\right) E_e \qquad \mathbf{9}$$

For weightlessness an object in a gravity field must shed its energy of weight – *GMm*/*R*, and since this is the relative energy difference:

$$\Delta E = \left(\frac{\Delta\lambda_r}{\lambda_e}\right)E_e = -\frac{GMm}{R}$$

Substituting equation **8**:

$$\left(\frac{GM}{Rc^2}\right)E_e = -\frac{GMm}{R}$$

$$\therefore \quad E_e = -mc^2 \qquad \textbf{10}$$

In other words, gravitational energy intrinsically (considering only mass and electromagnetism) is negative mass energy. Could gravity be the reason for negative mass, which must have been created at the origin of the universe, not existing in the universe today but rather having become the energy of gravity?

Appendix D: ENERGY OF MAGNETIC FIELD ≡ ENERGY OF GRAVITY

Of interest is to know whether the energy E_e generated by a rotating magnetic field is the same as the energy of gravity. Since electric current $i = \mathrm{V}/r$, where V: voltage (*Volt*) and r: resistance (*Ohm*), from Physics the power generated is:

$$\mathrm{P} = \frac{\mathrm{V}^2}{r}$$

Substituting equation **1**:

$$\mathrm{P} = \frac{\left(\frac{\mathrm{B\ A_B}}{t}\right)^2}{r} = \frac{(\mathrm{B\ A_B})^2}{t^2\ r}$$

Since power = energy/time, the energy generated is:

$$E = \frac{(\mathrm{B\ A_B})^2}{t\ r}$$

In the reference frame of a ground observer this is:

$$E_o = \frac{(\mathrm{B\ A_B})^2}{t_o\ r} \qquad \textbf{11}$$

Remembering that $t_o \equiv \Delta t$ (Earth) and $t_e \equiv \Delta t$ (empty space), from equation **6**:

$$t_e = \frac{t_o}{1 - \frac{GM}{Rc^2}}$$

The energy seen from the rotating magnets considering equation **11** and relativistic symmetry is:

$$E_e = \frac{(\mathrm{B\ A_B})^2}{t_e\ r}$$

Substituting for t_e:

$$E_e = \frac{(\mathrm{B\ A_B})^2}{\left(\frac{t_o}{1 - \frac{GM}{Rc^2}}\right) r}$$

$$= \frac{(\mathrm{B\ A_B})^2 \left(1 - \dfrac{GM}{Rc^2}\right)}{t_o\ r}$$

$$= \frac{(\mathrm{B\ A_B})^2 - (\mathrm{B\ A_B})^2 \left(\dfrac{GM}{Rc^2}\right)}{t_o\ r}$$

$$= \frac{(\mathrm{B\ A_B})^2}{t_o\ r} - \frac{(\mathrm{B\ A_B})^2}{t_o\ r} \left(\frac{GM}{Rc^2}\right)$$

or, using equations **8** and **11**: $$E_e = E_o - E_o \frac{\tau_r}{\tau_e}$$

We want to know the relative energy difference $\Delta E = E_o - E_e$, that is:

$$\Delta E = E_o - \left(E_o - E_o \frac{\tau_r}{\tau_e}\right)$$
$$= E_o \frac{\tau_r}{\tau_e}$$

or in the reference frame of the rotating magnets, considering relativistic symmetry once again, it is:

$$\Delta E = E_e \frac{\tau_r}{\tau_e}$$

which is the same evaluation as equation **9**. Since equation **9** was derived purely from the time ratio of equation **5** and the basic premise of this theory, the implication is that the energy generated by a rotating magnetic field is intrinsically the energy of gravity. Since the premise of this theory is the need to lose energy $\Delta E = -GMm/\mathrm{R}$, this energy loss is most appropriately electromagnetic energy.

Personal Reflections:

Given the importance of cancelling gravity during our space age we have to wonder why we hear so little about research into it, although billions are spent on rockets that can never make space access possible on a practical scale. Rather, such research is discouraged by academic fear generated over the loss of professional reputations if the subject of "antigravity" is even mentioned. The subject seems taboo, although the association of gravity with atomic particle 'spin' was discovered over forty years ago by experimenter Henry Wallace, described in his U.S. Patent #3626605 – "Method and Apparatus for Generating a Secondary Gravitational Force Field" awarded on Dec 14, 1971. In his experiments Wallace produced and measured a gravity field in materials with an odd number of nucleons when given high rotation. The effect is similar to the Barnett Effect in which a body of any substance given high rotation becomes magnetized. The effect is explainable from this gravity cancelling theory as it would be due to precession of the nucleons to give *positive* alignment with rotation of the material. What he found is the relationship of *all* atomic particle 'spin' to gravity, since the atomic spin of all particles, whether protons, neutrons or electrons, is universally invariant and therefore capable of producing a gravitational time difference. In more recent years experimenters have discovered unexplained gravitational effects associated with rotating magnetic fields, disclosed in reports such as "Experimental Research of the Magnetic-Gravity Effects," by V. V. Roschin and S. M. Godin, Institute for High Temperatures, Russian Academy of Science. Other experimenters also have suspected a connection between rotating magnetic fields and gravity, with no theory to explain their findings because all theoretical effort has concentrated on the magnetic fields, which have only an indirect relationship to gravitation. The direct connection is in the time dilatation property of electron spin. That a civilization like ours, that can contemplate quantum computers, does not have the technology to neutralize gravity seems anomalous, although we have had a theory of gravity since 1916 in Einstein's General Theory of Relativity.

No doubt that anomaly can be partly explained by the cost of innovation and the natural conservatism of people reluctant to go beyond the next mountain. The Wright Brothers had the airplane invented in 1903 yet it did not become accepted until 1908, with unbelief and derision, including from the most scientifically educated of their time, filling those five years. It was not until World War I that the potential of the airplane was recognized. Frank Whittle is regarded as the father of the jet engine, receiving his first patent in January 1930, England, but could not get official support for its study and work due to the obstructionism of British scientists. That soon changed during WWII when it was found that Germany had invented the same. Marconi was told by the scientists of his day that radio waves could not be heard across the Atlantic at sea level. If anything, scientists have been an *impediment* to technological progress. A sad fact of human history is that *war* has given major impetus to invention. In the world of the near future this motive may quickly become apparent, only expressed as the *need* for space colonization. As the world's population expands and resources shrink, the fate of minority populations will become more dire. If determined to survive, a technologically capable minority will be able to develop a space colonization strategy, so again this advancement will probably follow the usual historical pattern of human conflict.