rexresearch.com

James BARE

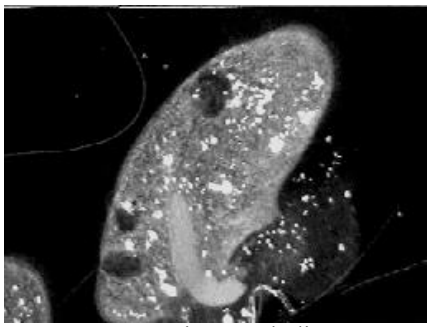
Resonant Frequency Therapy

http://www.rifetechnologies.com/

A BRIEF INTRODUCTION TO RESONANT FREQUENCY THERAPY

by

James E. Bare, D.C.



Paramecium exploding

The device discussed on the website is protected under one or more US and International Patents : US Patents # 5908441, # 6221094. UK patent # GB 2,336,318, PCT approved # US98/00217, W098/31418, Other US Patents Pending.

Over the past 15 years, the author has been involved in the development and dissemination of information about the application and use of frequencies for a variety of applications. The book "Resonant Frequency Therapy - Building the Rife/Bare Device" , is no longer available. The video tape is also no longer available.

A wonderful web site which has a significant amount of video tape of benign micro organisms being affected by a Rife/Bare device can be found here:
http://www.skidmore.edu/academics/music/aholland/PlasmaTwo.htm

There are also videos of the effects of the device on Google Video. Simply do a search using the terms Rife/Bare.

For those looking for a book on the use of frequency instruments for therapeutic purposes, The Rife Handbook of

Frequency Therapy by Dr. Nenah Sylver is the premiere source of information.
http://www.nenahsylver.com/

This web site will remain as an information source for those interested in frequency devices. The authors research and developments have been oriented towards improvement of a frequency device first created and tested in the 1930's by Dr. Royal Rife, and then lost to humanity for the next 65 years. This web site references a lot of material and data that the author has collected over the years. Much of this is from disconnected sources, each source has revealed and contributed a small amount of information. As a summation, the information thus available becomes one of the foundation of a new science. It is the authors intent that this web site may help provide an insight to the discovery of answers as yet unknown.

The Rife/Bare instrument utilizes patented methods and techniques to produce a modern day recreation of a relatively unknown therapy device. A device first created and tested in the 1930's by Dr. Royal Rife, and then lost to humanity for the next 65 years. Most readers have arrived at this web site looking for information relating to health. There is much more to frequency devices than this singular application.
It is the authors belief that the future of frequency devices does not lie merely in the manipulation of human physiologic processes. The worlds human population continues to expand at a rate which is swamping carrying capacity . Overpopulation has resulted in the destruction of habitats and extinction of other life forms that share our fragile home. Frequency devices offer the potential of ; increasing the productivity of existing lands by significantly increasing crop yields , the widening of growing seasons so that extra crops or more varied crops can be grown , increasing the production of natural fibers used for clothing, the protection of stored crops from spoilage, improvement in the living conditions of penned livestock within their barns, increased production of foods made from molds and bacteria, increased fermentation rates, increased production of antibiotics, and increased production rates of biofuels just to name some of the more prominent potential uses. Water treatment and purification is yet another use for frequency devices. By combining the correct frequency, field strength, and field emissions, one can significantly affect the future of our planet. There is a wealth of published papers detailing the effects of pulsed EM fields on these processes. As an example - by using a high power Rife/Bare instrument with an ozone and UV producing plasma tube, one can effectively treat mold infestations and purify water. Water treatment with UV is not new, but use of UV and ozone emitting tubes that are driven at hundreds, if not thousands of watts of power offer is new , and offers an untapped potential.

To return to Rife. Clinical applications and success with Dr. Rife's machine extended through the 1930's, with treatment of a wide variety of micro organism based diseases. The late 1930's witnessed the founding of the Beam Ray Company to commercially produce the "Rife Ray" device. By the mid 1940's, the technology behind Dr. Rife's device was essentially lost. The Beam Ray Company had self destructed, and the scientific accomplishments of Dr. Rife became more urban legend than fact. Dr. Rife's legacy exists in the estimated 400,000 frequency devices that are presently in use here in the USA. Some of these instruments are very effective with a wide range of applications, others have very limited capabilities .

The many intervening decades from Dr. Rife's time to our present day has seen the discovery of many new cellular physiologic mechanisms. It was not possible until the past few years to explain how Dr. Rife's instrument functioned and produced physiologic effects. Some people claim that Dr. Rife was able to "blow up" or explode cells and micro organisms. This concept of mechanical resonance - "shake it till it breaks" is highly limited and the actual mechanisms behind the effects of frequency devices are quite biologically complex. This knowledge has led the author to improve upon the original device, and to obtain patents. Patents which protect the unique methods, electrical concepts, and abilities to create cellular physiologic manipulation, of the modern day Rife/Bare device.

Dr. Rife's Device or as some call it, a " Rife Machine " is a highly misunderstood instrument. This misunderstanding has arisen in part due to what people expect of the electronics, and the reality of how the device operates . Another set of misunderstandings have arisen from Dr. Rife's intentions for his device. Dr. Rife focused upon the destruction of micro organisms and viruses. The concept of physiologic manipulation using frequencies to affect disease processes was not Dr. Rife's focus or intent. The original Rife Instruments used a radio transmitter to excite a gas plasma formed within a glass tube. The emissions from the plasma inside the tube were what produced the devices capabilities. In other words there are two important aspects to the device. First, there is the driving electronics, and secondarily, yet most important , the plasma tube. Both the plasma tube and the electronics play a crucial role in the ability of the device to create physiologic effects .

Rife RF Plasma Instruments have been in production, and introduced into Interstate Commerce since the mid 1930's. Several different versions were produced in the mid 1930's through the late 1940's. These units saw use within medical offices and clinics in several different states. The latest discovery, a unit made in 1938, was found in an attic in 2008. Only a small number of pictures , and an even smaller number of machines have survived to this modern date. You can see these units here:

Rife Units In Interstate Commerce --
http://www.rifetechnologies.com/Commercial_Rife_Units.htm

Evidence based medicine is a developing science. If the reader has a biological background, and wonders how to integrate frequency devices into existing practice, they may find this hypothesis of interest.

Pulsed Field Assisted Chemotherapy --

http://www.rifetechnologies.com/Pulsedfield.html

As a society, we are primarily oriented towards a chemical explanation of biological processes. Various theories, and applications of those theories, have been applied to the explanation of life, health, and disease. The use of biochemical solutions to disease has served us well. Many people (including the author!) owe our lives and well being to the use of medications developed using the biochemical model. In spite of successes, the biochemical model is fraught with philosophic traps which have lead to treatment dead ends, and all to often, toxic side effects for the patient. Something very important has been forgotten in our present biochemical health delivery model . That is, the idea that treatment should promote a cure. Instead of a cure, treatment is directed towards long term symptom palliation and case management . It is possible that the solution to this conundrum may be found in the study of BioElectroChemistry.

On a fundamental level, all biochemical reactions are Electro Magnetic. Atoms and molecules are composed of charged particles which are in constant motion and vibration. Atomic, Molecular, and bond orbitals are just a way of saying that electrical charges are moving about an axis, within certain distance parameters set by the energetics of the system. Increases of energy within the system produces a corresponding increase of bond vibrational rates and can institute a variety of what are known as chemical reactions. Overlooked, is that charged particles are actually interacting, and charged particles, through the laws of electromagnetism, can easily be manipulated. The energies emitted via the interaction of " Chemical Bonds " are emitted as forms of electromagnetism. Heat, light, explosive energies, and so on are all forms of electromagnetism. Recognition of these laws, and their application within our bodies can, and already have, yielded new theories, new medications, and new treatments of human illness.

As an introduction, the author is going to discuss a few principles of electricity. When read, please begin thinking in terms of the body. Our bodies are a complex matrix of various electrical components. These components include; conductors, semiconductors, resistors, capacitors, inductors, and charge carriers. Charge carriers in our bodies are ions, proteins, colloids, and crystals. All charges depend upon some sort of conduction system in order for the charges to move. In our bodies, charged particle flow may occur in association with cells, blood vessels, lymphatic ducts, inter and extracellular fluids, or any other biological analog of what might be considered a wire. When one discusses electricity, what one is really talking about is the movement of electrons. Electrons can be gained or lost from an object leaving the object with a net negative or positive charge. These charges can be relative. That is, an object may be negative due to a loss of electrons, but considered as positive in relation to the overall negative charge of it's surroundings. By gaining or loosing electrons, our bodies utilize many different charge carriers. For example, metallic ions such as K, Na, Mg, and Hyrodgen act as positive charge carriers. Negative charge carriers would be Cl, hydroxal ions, phosphates, sulphates, and electrons to name few.

When electrons or any charged particles flow along a conductor, an electrical current is produced. This electrical current gives rise to what is known as an electrical field. The higher the number of charges flowing in the conductor, the higher the current. As these charges move in the conductor, a magnetic field is also produced. In short, a charged particle that moves creates both an electrical and magnetic field. The force or push behind the charges moving in the conductor is known as the potential, or as it is more commonly called, the voltage. The higher the voltage, the higher the push or force on the charges. In summation, high voltages give rise to high electrical fields, and high currents give rise to high magnetic fields. The reverse is also true, a high magnetic field can create a large current in a conductor, and a high electrical field can create a high voltage in a conductor.

On an atomic level, the basis of understanding of biochemical reactions lies in an understanding of electrons. Electrons are of primary importance in the establishment of a particular atoms or compound's chemical properties. These properties are often expressed as the ionization potential and electron affinity. That is, how easily an atom will gain or lose electrons. In context of this discussion, the application of an external electrical or magnetic field to the body will directly effect all the electrical properties and electrical component (semiconductors resistors, capacitors etc.) analogs of the body. The end result will be an effect upon the bodies chemical, and thus physiologic activities.

Well established Scientific methods known as Electrokinetics, utilize the electrical properties of various compounds and charged ions to manipulate and analyze them. A few well known methods are Zeta Potential, pH, Isokinetics, Isoelectrics, Electrophoresis, Dielectrophoresis, Dynamic Eletrophoretic Mobility, Magnetophoresis, Electroacoustics, Magnetoacoustics, Streaming Potential, Sedimentation Potential, Electrostatics, Dynamic Mobility, Entrainment, Coherence, and Resonance (Magnetic, acoustic, electrical, mechanical) . There are several electrokinetic methods which are of significant importance to the use of frequency type devices. Some of these are Electro-Osmosis , Electroendocytosis , Electronic Sonic Amplitude , Electro Conformational Coupling, , Ion Vibration Potential, Colloid Vibration Potential, and Electrostatics.

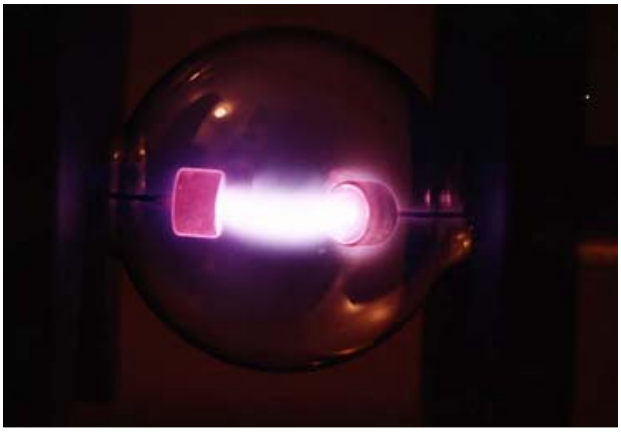
The scientific foundation for the utilization, application, understanding, and further development of Electrical, Magnetic, Electro-Magnetic, and Acoustic based frequency devices is very solid. A large wealth of published papers exists on the ability of externally applied EM fields to manipulate body and cellular physiology. A review of some of the papers found on the EMF-PORTAL -- http://www.emf-portal.org/ -- will certainly be a good way to read more about EMF effects. Application of these known principles to treatment has yielded empirical outcomes and results which are so common as to make the use of frequency devices a growing world wide phenomenon. A phenomena with an estimated 400,000 frequency devices and another 600,000 electrical therapeutic devices in usage just here in the USA. Usage that for the most part, is entirely outside the mainstream medical/pharmaceutical system.

So what was Dr. Rife's Device , or as some call it, a " Rife Machine " ? Dr. Rife's device used a radio transmitter with either

a fixed or it is thought in some units, a variable carrier frequency , that output a pulsed transmission. There are several important methods that are utilized to achieve energetic coupling. One technique Dr. Rife used to make the wave of his machine couple to the body was through the use of a special antenna. Instead of using a metal antenna, Dr. Rife's instrument coupled the pulsed output from the radio transmitter to a gas filled, glass tube with closely opposed electrodes. This special tube is technically known as a Phanotron Diode. The pulsed output energy from the radio transmitter (the RF wave) caused the gas to form a plasma and then glow when in operation. The close spacing of the electrodes, coupled with a gas at high pressures results in a phanotron tube being useful for pulse rates well into the MHz regions. One should think of a neon sign tube that is turned on and off, many thousands or millions of times a second for a comparison. The Phanotron Diode was filled with an inert gas (typically Helium), or mixture of gasses such as argon, neon, and helium. Different gasses give off different colors or spectra. For example, Neon is orange, Argon is purple mauve, and Helium is pinkish white-gray.

For treatment purposes, Dr. Rife separated the phanotron tube from the rest of the devices equipment, and placed it about 8 to 12 inches from the patient. One of Dr. Rife's discoveries was that the Phanotron tube was made part of the carrier frequency oscillator circuit. By placing the tube close to the patient, a resonant coupling would occur, and the oscillation frequency of the devices carrier wave would adjust to the electrical properties of the patient.

Modern Phanotron tube, made in the Ukraine by Econika, for use with the device.
http://www.odeconica.narod.ru/listeng.htm



The authors patented instrument, like Dr. Rife's, utilizes a radio energy excited gas plasma tube as an antenna. A few of the manufacturers web sites making plasma tubes for the device can be found on the Links page. Dr. Rife's device was a near field instrument, that is, the tube had to be placed within 8 to 12 inches of the patient. The authors patented discoveries have created a device which is a far field instrument, the tube is generally used about 6 feet(two meters) from the patient. There is evidence, that the wave emitted from the plasma tube of the authors device, if un-impeded by walls, has an effective radius in excess of 30 feet.

The effective field of up to 30 feet (9 meters) , makes the device usable for simultaneous exposures of all objects within the effective field area. This is the only device in the world capable of such large area exposures. Dr. Rife's commercial machines, being near field instruments, were capable of only treating one person at a time.

The effects of the authors device are entirely non thermal in nature. That is, no heating of tissue occurs in normal operation. As to safety considerations, a well made device easily meets FCC requirements for RF emission safety levels.

There is a lot of misunderstanding about the plasma tubes used in a Rife/Bare device !! Gas plasma tubes are not primarily RF antennas ! Gas plasma tubes as used in a Rife/Bare device are RF energy converters. A plasma tube converts pulsed RF into other forms of pulsed energy radiation. This energy is expressed in many different forms. These forms include; acoustic waves that can extend into the ultrasound regions, light - from near Ultra Violet to well into the Far Infra Red regions and the generation of heat. It has been posited that the plasma tube is a very strong emitter of Terrahertz radiation. Some tubes are created specifically to create ozone, and if mercury is added to a quartz envelope tube, UV radiation may be created. The amount of RF emitted from a well made device is less than 1 % of the input power to the tube ! A 150 watt transmitter may create less than 1/2 watt of RF emission. Most of this RF is very broad band extending well into the microwave region, and thus, as in the 150 watt device example, the RF energy in any one harmonic is very minimal. This device is used at a distance of 6 feet, where the measured RF field is almost non detectable.

In order to understand how the device works it is necessary to discuss a few laws of physics and chemistry. There are multiple manners that the energy emitted from the plasma tube can be absorbed by the body. It must be remembered that the emissions from a plasma tube are very complex and broadband. The plasma tube is not primarily an RF antenna. The concept of RF wavelength matching between a radiative source and some absorber of that source emission as the only method of energy transfer or physiologic influence is antiquated. Those that might dismiss the ability of a Rife/Bare device to produce physiologic effects using solely an RF wavelength method, are making a simplistic error, for as has been pointed out, almost all RF energy that is input to a plasma tube, is converted into other forms of EM radiation.

There are several methods of energy transfer that occur with a Rife/Bare device. When energy is emitted from some the plasma tube antenna, it can be absorbed by an object when impedances match. Impedance is a measure of resistance - so when the impedance of the wave emitted from the plasma tube, and that of some part of the body match, energy is transferred or coupled. Impedance is a function that is related to frequency. The device produces not one frequency, but through the phenomena of harmonics, creates many thousands of frequencies simultaneously. Thus, energy transfers easily into a person, and does so through user defined selectivity. That is, by choosing different fundamental operational (modulation) frequencies, the user chooses and creates different impedances.

There is a substantial E field around a plasma tube used in a Rife/Bare device . As previously mentioned, when a quartz plasma tube is utilized, this e field is powerful enough to generate ozone. The pulsed fields emitted from the plasma tube used in a Rife/Bare device are emitted as evanescent waves. Evanescent wave coupling can occur between two resonant circuits that are tuned to a fraction of each others wavelength. Closely allied to quantum tunneling, closely coupled resonators are being utilized to transfer power between a transmitter and receiver by inducing standing waves in the an inductor found within the receiver. As discussed earlier, cells, and the human body have electrical component qualities to them, and one of these qualities is that of inductance. Shifts in the transmitters pulse output rate (the modulation frequency) can create selective oscillations and standing waves within resonant objects within the body. This effect is often felt physically by the person undergoing exposure to the device. People often will respond that they can feel a particular frequency in an area of their body where there is some sort of difficulty. Only specific frequencies produce this response.

There is more to the transfer of energy between coupled oscillators, this involves the process of Entrainment. Entrainment is a Law of Physics, and can be produced through gating the audio frequency of the device. What a fast gate rate does is to induce the effect of entrainment. Entrainment can be defined as :

“ The tendency for two oscillating bodies to lock into phase so that they vibrate in harmony. It is also defined as a synchronization of two or more rhythmic cycles. The principle of entrainment is universal, appearing in chemistry, pharmacology, biology, medicine, psychology, sociology, astronomy, architecture and more”.

Entrainment is associated with the phase of oscillation of an object. That is to simplistically say, as an object oscillates, it is moving up and down at some particular rate. At a particular point in time, the object can be up, down, or or somewhere in between. Entrainment forces two objects to be in phase so that they move in synchrony. That is, they are up at the same time and down at the same time. When the phase of two resonant oscillations match (in phase), energy will transfer and summate to the resonant receiver of the transmitted energy. If the phases do not match, (are out of phase) the energies of the transmitter and receiver will cancel each other out! Even though they are resonant.

In other words - if one targets an area of the body, or infectious organism with a frequency that they are resonant to, lacking entrainment, that frequency may be ineffective. The reason is this.; the area of the body or infectious organism has a different phase of oscillation than that of the (frequency) being generated. The two are not “dancing” (to use an analogy) in beat to the same frequency! If the external frequencies entrainment rate lacks adequate intensity, or adequate rate, there will be no entrainment by the body or organism to that external frequency ! Recent experiments by the author with entrainment have shown this to be a very powerful effect. Entrainment is often linked with another type of resonance known as Stochastic Resonance.

Another term has been coined to explain the electromagnetic waves emitted from an RF pulsed plasma tube . This wave is called a "pseudo sonorous" wave. A soliton wave produced from the ionic discharge of the tube.

When one uses frequencies to produce physiologic manipulation, the output sequence of the frequencies is important. One must be careful of creating a damping effect by starting at a high frequency and trying to work downwards to lower frequencies. One can "force" a resonant response with enough energy, and then maintain the energy delivered by using a higher Hz frequency to continue forcing effects. Forced resonance is not a true resonance, but rather a response based upon the application of enough energy to set the oscillator in motion. Think of a child on a swing, one may push faster and faster to force the swing to oscillate higher and at a faster rate. But if the swing is moving very fast and then all you do is push slower, and then slower yet, the swing will be damped in it's range and height of oscillation.

A Rife/Bare device creates many thousands of different frequencies through the use of an AM type radio transmitter that is severely overmodulated. That is to say excessive amounts of audio are put onto the carrier wave. Normally such excessive audio, when demodulated would create distortion. By modulating a square audio wave, no demodulation distortion will occur. The demodulated wave form will be identical to the modulated wave form. Overmodulation creates a pulse of RF energy which is electrically shaped so that the rise and fall time of the pulse is very fast (1 millionth of a second in the OM-1 transmitter!). The plasma tube acts like an electrical mixer which creates harmonics, overtones, and heterodyne products . In a manner, a plasma tube is very much akin to a musical instrument. A string can be set to vibrate at a certain note, but how that note sounds is dependent upon the instrument the string is attached to. The string could be in a piano, a violin, or a guitar and all will sound different even though they play the same note. This difference between the instruments is due to the generation of frequencies(harmonic - overtone - heterodyne) different from that of the fundamental note.

Although RF energy is a very minor emission of a plasma tube. Something very special occurs to that RF energy. Due to the shape of the plasma tube -i.e. a cylndrical or round radiator, the traditional hertzian RF wave radiated by a metal antenna, is converted into what is known as a Zenneck Wave. A Zenneck wave is a non hertzian RF wave whose field strength typically drops off as the square root of distance from the tube (antenna). Published research has shown that the

Zennick wave emitted from the tube exists as a non dispersive soliton. Energy is transferred more as a conductance and does not adhere to the inverse square law. This may have effects related to energy transfer via closely coupled oscillators.

You can read more about Zenneck waves at these web sites.

Zenneck Waves --
http://www.tfcbooks.com/articles/tws4.htm

Electromagnetic Surface Waves --
http://web.mit.edu/redingtn/www/netadv/zenneck.html

Once a Zenneck wave has coupled to the body, the audio energy in the wave can be demodulated or stripped off the carrier wave. Think of tuning a radio to 100 on the AM dial, to listen to music. The radio recieves the 1 MHz signal, then demodulates the music. This is what happens in the body. Demodulation can occur at several different places in the body, such as at cell or organelle membranes, interstitial spaces, areas of adjacent but different impedances, and so on. What is important is that the demodulated audio will produce an electrical signal (voltage) local to the point of demodulation! If the point of demodulation is a cell membrane, then the electrical charge will occur across the cell membrane. Exposure times at each modulated audio frequency are in minutes. Thus the demodulated voltage is present for at the site of demodulation for minutes at a time! The physiologic consequences of an externally induced electrical charge at the cell membrane can be significant, and is an area of current main stream research.

The authors device, as did Dr. Rifes', relies upon the phenomena of resonance in order to produce many of it's physiologic effects. Most people think of resonance in terms of a glass breaking when exposed to an audio frequency. A resonant response by an object does not have to be just from stimulation with acoustic frequencies. There are many other types of resonances that can occur. There are resonances to light, radio waves, magnetic waves (such as used in MRI), X-Rays and other forms of ionizing radiation. The fundamental physical law that relates to the operation of the device is known as Kirchoff's Principle. Kirchoff's principle states: " The frequency of energy absorbed by a molecule is equal to the frequency of the energy emitted by the molecule ". Kirchoff's principle is the basis of spectrographic analysis. Spectrographic analysis is used to show the resonant response of chemicals, bacteria, viruses, and objects to a frequency range of vibration. For example, how a molecule or object responds to a range of audio frequencies is known as an acoustic spectrograph. A spectrograph can be made using frequencies from those of the audio region through those of frequencies associated with Radio waves, light, and up through ionizing radiation (X-Rays, etc.). Once the energy of the wave emitted from the plasma tube is in the body, it can create physiologic effects by matching the spectral absorption/emission frequencies that the molecules and tissues of the body produce.

The significance of Kirchoff's Principle is that the wave emitted from the plasma tube of the device produces spectra that includes those of electrical and magnetic fields, acoustic, RF and light. Simply by changing tubes, gasses, RF carriers, pulse rates and other variables, it is possible to tailor the spectral output of the device to a cell or tissues specific specific spectral resonant point. As a practical application, the system utilizes tubes and RF emission that create extremely wide bandwidths of frequencies. Only the audio modulation frequency is varied. One may thus simultaneously influence multiple resonance frequencies of a cell or organism across many different bands of frequencies!

The pulsed energy radiated by the plasma tube, and resultant demodulated electrical/audio pulse is produced by applying different square wave audio frequencies to the transmitter. Audio frequencies are those frequencies that are in the range of our hearing. In fact, the device, although it lacks a loudspeaker, actually sings and audibly emits the audio tone that is being input to it.

Demodulation can occur at several different places in the body, such as at cell or organelle membranes, interstitial spaces, areas of adjacent but different impedances, and so on. What is important is that the demodulated audio will produce an electrical signal (voltage) local to the point of demodulation! If the point of demodulation is a cell membrane, then the electrical charge will occur across the cell membrane. Exposure times at each modulated audio frequency are in minutes. Thus the demodulated voltage is present for at the site of demodulation for minutes at a time! The physiologic consequences of an externally induced electrical charge at the cell membrane can be significant, and is an area of current main stream research.

The demodulated wave from the device can produce an acoustic wave, and thus mechanical resonance effects! The various membranes (plasma, nuclear, mitochondrial, etc.) of the cell are analogous to a capacitor and will collect electrical charges. A voltage applied across a cell membrane will change the tension and thus curvature of that membrane. A pulsed voltage at a specific frequency will cause the membrane to oscillate as it contracts and relaxes between each electrical pulse. The outer plasma membrane will collect electrical charges that are no shorter than 1 microsecond in length. The intra cellular membranes of the various organelles will continue to collect electrical charges into the low nanosecond range. The pulses produced by the device are generally in the millisecond range, thus ensuring that electrical charges accumulate both on the exterior and interior of the cell.

The outer membrane of the cell is connected to the cells interior through a tensegrity matrix which is akin to the wires that hold up a suspension bridge. In this case the " wires " support the internal components of the cell. Oscillation of the outer membrane will cause internal oscillation of the cell via the tensegrity matrix . Thus, pulsed electrical signals can produce a mechanical resonance effect. Mechanical resonance is created when a small periodic stimulus of the same natural vibration

period of a cell, tissue, or even a molecule, is used to produce a large amplitude vibration of the cell,tissue, or molecule. If the induced resonant vibration is intense enough, the cell, tissue, or molecule will be shattered.

Mechanical stimulation and resonance effects on the interior of cells should have a direct action upon the many different enzymes found within cells. Enzymes rely upon an activation energy in order to initiate catalytic reactions. This activation energy is kinetically based, and may be enhanced through mechanical stimulation of the cell. The rates of enzymatic cellular reactions depend upon the frequency with which an enzyme collides with its substrate. Mechanical stimulation of a cell will produce a mixing of the molecules within a cell and thus increase the number of molecular collisions per unit time. It is also possible that mechanical stimulation may have a " detangling " effect on the folded conformation of proteins.

Plasma Membranes maintain an electrical charge, which is important when discussing infectious disease. Disruption of the normal plasma membrane potentials can lead to upregulation of virulence genes in bacteria, increased susceptibility to infection in the host cells, replication of viruses inside of host cells, activation of dormant viruses, and even reaction/susceptibility to bacterial toxins by host cells. The charging of plasma membranes by an externally applied field may be one of the key aspects of understanding how the Rife/Bare device produces physiologic effects. This is a hypothesis which can be easily evaluated. One could easily test for pre and post exposure membrane potentials, decrease of any increased potential over time, frequency response effects, susceptibility to infection, up and down regulation of virulence genes in pathogenic organisms and so on.

Present development of the authors device allows for the passage of frequencies over 200,000 Hz! Frequencies above 20,000 Hz are known as ultrasonic. It is possible some dynamic physiologic effects may be found through use of the device in the ultrasound regions.

So similar is the authors patented device to the operation of Dr. Rife's machine, that those who have used it, have given the name of the Rife/Bare or R/B device. The author did not name the device such. This name has grown out the respect and benefit the many tens, if not hundreds of thousands of people worldwide, have had from exposure to the device.

Frequencies for the device come from a variety of sources. Many are empirically derived. That is, from observed responses based on application. A series of spread sheets has been developed that allow one to calculate frequencies using known principles of physics. Please see this link for the free downloads.

Spread Sheet Calculators --
http://www.rifetechnologies.com/calcul.html

Other frequencies come from a patent pending theorem discovered by Charlene Boehm. There have been significant positive responses to the utilization of Ms. Boehm's theorem with the Rife/Bare device. Ms. Boehm has written short explanation of her theorem for the public.

DNA-RNA Based Frequency Theorem --
http://www.dnafrequencies.com/

One of the methods via which the device produces effects is called electroendocytosis. Electroendocytosis is the electrical enhancement of endocytosis through the application of very weak electrical fields. This process occurs with very weak field strengths of only 20 to 70 volts per centimeter! What this means, is that a local electrical field of only a few tens of millivolts needs to be applied across cell membranes to cause effects. Endocytosis is the process whereby cells fold a piece of their outer plasma membrane forming a vesicle around molecules that are too large to be transported across or through the membrane to thus bring the molecule inside the cell. Exocytosis is the process whereby the vesicle once it has released it's enclosed molecule returns to and reforms with the plasma membrane. If the process of endocytosis far exceeds the process of exocytosis, the cell will run out of enough plasma membrane to support itself and fail/die.

Electro-osmosis is the electrical field enhanced action of osmosis. One should think of this as related to active transport of charged ions across the cell plasma membranes. Excessive voltage at the cell plasma membrane will tend to create a reorganization of of the charges that are normally present and cause a flow of ions into or out of the cell. Cells normally maintain a 60 to 100 mv voltage potential between the inner and outer plasma membrane. A cancer cell has only a potential gradient of from only 20 to 30 mv! By adding charges to the cell membrane, the abnormal physiology that cancer cells need to exist and function will become disrupted.

Electro-osmosis and electroendocytosis seem to be responsible for the reports of enhanced effects from the use of the device concomitantly with chemotherapeutic regimens. There have been very consistent positive reports of the use of the device with low dosage chemotherapy. This is a subject worthy of extensive clinical investigation.

Traditionally, when the physiologic effects of RF are determined, the scientific community thinks mainly in terms of the field strengths of the electrical and magnetic waves produced by the RF transmitter. RF waves are actually motional magnetic and electrical waves. Each wave (E & M) creates a line of force, this line (an axis) of force is known as a vector. The combination of the vectors created by EM fields is known as the Poynting vector. Only a few within the scientific community have considered the effects of demodulation of EM waves and their vector resultant at a local (cellular) level . The Poynting Vector is analogous to what is known as the Lorentz Force. Cells are filled with charged particles, which, as previously mentioned, can be set in motion through mechanical stimulation of the cell membrane. A

charged particle, when in motion produces a magnetic field that rotates around the axis of displacement of the particle . The Lorentz force, is the force exerted on a charged particle moving with a certain velocity within an Electro Magnetic field.

The Poynting vector (Lorentz Force) may result in an effect known as Fluctuation Driven Transport (FDT). FDT is a process whereby an external oscillating or fluctuating/pulsed electric field, substitutes for the energy derived by ATP hydrolysis in cells. Inside a cell, FDT can result in actuation of the vectoral transport mechanisms of molecular motors and ion pumps.The use of extreme overmodulation by the transmitter of the device produces a very intense demodulated signal. This intense demodulated signal is the basis of the authors patents, and the method which produces physiologic effects.

As the resonance targeted micro organisms or abnormal tissue cells are exposed to the minutes long effects of the demodulated wave, they can break apart and create a debris. This debris can often be noticed as a discolored or highly odorous urine. One may also notice a difference in the color and smell of ones stools as the body detoxes. It is thought that this cellular debris acts as a stimulant to the immune system. The debris may act as an antigen causing the production of antibodies. In effect, a form of immunization against the disease may occur.

Another important method through which the device functions is known as Voltage Dependent Ion Gating (VDIG). The ion channels in many types of cells,(especially nerves and muscles) can be opened through the presence of an external voltage . The author presently believe this is the primary manner in which the device produces many of the observed physiologic effects on the nervous system. By creating a charge differential on the cell plasma membranes, the device has been able cause pain relief. VDIG occurs in an electrical field of only 1/10 the intensity necessary to produce electroporation.

The voltage differential created by the device is thought to produce a gradient flow of ions, primarily calcium, potassium, and sodium, across the cell wall. This results in an imbalanced osmotic pressure which may cause the cell to slowly swell and finally shatter . Shatter just like the picture of the paramecium found at the top of this page.

Voltage Dependent Ion Gating is frequency dependent, and closely allied with the cells Zeta potential and pH. pH may be manipulated electrically through the process known as EChT or ElectroChemical Treatment. EChT is used to treat tumors through the insertion of needle electrodes into the tumor. A migration of ions ensues, with disruption of cellular membrane potentials, and changes in local pH. This causes the cell to necrose or undergo apoptosis.

Very fast pulse Rise and Fall times impacts the resonant cells in a more effective manner. This is because of Faradays Law. An RF wave is a transmitted oscillating magnetic and electrical field. Faradays law states that the induced voltage in an inductor is proportional to the rate of change of the magnetic field. The faster the magnetic field turns on and off (rise and fall times) the greater will be the induced voltage.

Pulse rate of 3000 Hz. Rise/Fall times 1 microsecond. Leading edge spike of less than 4 microseconds duration, and trailing edge spike measured at less than 3 microseconds duration.

Other methods via which the device produces effects can be found in various published scientific papers relating to the effects of sonic resonances on cells, and the non thermal effects of RF fields on bacteria cultures. Some areas of present interest are magneto- strictive and Widemann effects upon cells. There are numerous research papers and patents involving the use of pulsed electrical, magnetic, and RF fields on micro organisms and tumors which help to explain the devices effects. An interesting patented, clinically tested, and FDA approved product that utilizes specific radio frequencies to up regulate specific genes is the Regensis Device . The Regenesis device will decrease wound healing time by 70% through manipulation of gene expression. **(http://www.regenesisbiomedical.com/)**

To review some of these patents and research papers on pulsed fields, go to the Electro-Plasma Digest website. This web site also contains a large number of original letters, pictures, and published articles about Dr. Rife and his machine. **(Electro-Plasma Digest -- http://www.rife.org/)**

The author has created a new term for the use of resonant energies to create physiologic effects. This is an acronym of Dr. Rife's name.

Resonance Initiated Field Effects

Electrical Frequency Devices are not new, and are in fact in widespread current usage in Traditional Medical Practice. It is just that few tend to think of these as frequency instruments. The following are just a few of the electrical frequency instruments in present therapeutic medical use.

Muscle stimulators which relieve pain, reduce spasms and edema, tonify weak muscles, and assist the healing process, run at from 1 to 130 Hz. TENS units are used to block pain run at about 80 to 100 Hz. Interferential Therapy units are a type of muscle stimulator run at 3000 to 4000 Hz. Bio Feedback instruments used to modify behavior and retrain the nervous and muscular systems, run from below 1Hz to about 40 Hz. Bone Growth Stimulators, used to heal broken bones run at frequencies from about 40 to 80 Hz. Deep Brain Stimulators - use implanted electrodes to impart electrical pulses from between 120 and 160 Hz directly to the brain to control involuntary muscular tremors in Parkinson's disease. Heart Pacemakers use an electrical impulse to regulate the hearts rhythm. These are just a few of the current electrical frequency devices in use.

The use of the device on disease in humans is worthy of further investigation in a more appropriate clinical manner. Anecdotal reports from constructor - users of the device has shown rather dramatic effects on Herpes Virus outbreaks, Lyme disease, and an assortment of different bacterial infections. Please be aware these reports are anecdotal, and are not claims claims for the devices efficacy. The intent is to encourage the need for further clinical investigation.

It is time to discuss the effects of frequency devices on cancer. Dr. Rife is associated with a so called "clinical trial" in 1934 wherein his device was used on 16 people with cancer and all recovered. This story is full of holes and questions, for no real documentation exists as to the outcome. Supporting documents exist to the fact Rife's machine was used, but the protocols and actual treatments are unknown. It is known that at least one person that participated in the use of the device relapsed and was sent by one of key Dr.'s in the machine trial for surgery. As to "why not use the machine again?", there remain many questions. One must not forget that in 1934, the diagnosis of cancer was what would be considered as crude by today's standards. No scans (MRI, PET, CAT,) were available. Highly sensitive lab tests did not exist and treatment options were few. Physical diagnosis, a few simple lab tests, and an X-ray were used to confirm the presence or absence of cancer. Treatment was surgery, some supporting medications, and radiation. Being pronounced "cured" in 1934 could be a very different pronouncement in 2009. It seems obvious Rife's machine was used on the patients, but did the patients also undergo conventional treatment , the machine being merely an adjunct to the patients overall treatment ? Such seems reasonable to the author. Why would a physician give up known conventional treatment to utilize a method they have no familiarity with, and failure of the new treatment would result in a worsening of the patients condition ? Would a conscientious physician not wish to do the best they could for their patient?

All that being said, the devices' effects, on Cancer needs further investigation. The Rife/Bare device is presently not an actual cure for cancer. Nor is the author aware of any frequency device , regardless of it's principles of operation that are. If someone with cancer responds to any frequency device, that is ,their tumors may shrink and their lab tests normalize, they must continue exposures. Without continuing exposures, the cancer will return. Even with exposures, sometimes the cancer adapts, and can become non responsive.

Even though the device is not a cure for cancer, there are people who have significantly exceeded predicted survival times. These people had a terminal prognosis, with so certain an outcome that their Dr. was able to estimate their remaining lifetime. Many who have used the device, are still here, some are now working as productive members of society, in spite of their predicted demise. It is the authors fondest desire for true clinical investigation be undertaken to evaluate level of effectiveness of the device. From the reports of users, which are no more than anecdotal and certainly not claims of true effectiveness, the device presently has provided a viable treatment that has both significantly prolonged survival times and increased the quality of life in some, but most certainly, not all, people.

Please be aware that if a person has a prognosis of only a few weeks to live, and tries a frequency device, the results have been universally poor. The degree of response to frequency devices seems to be directly related to the overall ability of a persons body to respond and rebuild. If there is massive cancerous invasion of various organ systems with associated failure of the organs, the results of exposure are very meager. There have been anecdotal reports of people responding with multiple metastatic sites where the damage done by the cancer was not severe enough to be immediately life threatening.

Our bodies often heal sites of prior tumors with scar tissue. Meaning that an organ damaged by cancer may still shows signs of impaired function after the tumor is destroyed.

For the technically versed, the transmitter should be thought of as an amplitude modulated, diminished carrier , dual side band type.

The transmitter is not a square wave modulated Continuous Wave (CW) transmitter! Such transmitters only provide about 25% of their available energy to what are known as sidebands. It is the sidebands that undergo demodulation, and produce the local electrical field. Thus, in a square wave modulated CW transmitter, for every 100 watts of transmitter power, only 25 watts will be available for demodulation. By using over modulation - one moves the majority of the transmitters power to the side bands, leaving very little carrier power.

Besides the conversion of the input RF wave into complex EM emissions with many individual harmonics, the plasma tube acts like a fast switch. That is, the tube turns on and off at the applied audio frequency. Thus pulse modulating the all the tubes emissions .

Another way to consider the effects of the R/B device is by a variation in Faraday's Law. Basically the current induced in an inductor (our bodies have inductance)can be expressed by this equation.
Current Induced= Frequency X Length of the Body X Field Strength.

This equation is important for it means the the power absorbed and generated by the wave within the body is proportional to the size i.e. length of the body. To state this more clearly, the device automatically compensates for a small animal, child, or an adult! One can put a small animal in the field produced by a 200 watt device and not have to worry about over exposure due to the strength of the field!

Different gasses within the plasma tube produce different spectra, and thus will produce different resonant/physiologic effects. Neon for example is vitalizing, sedating, warming (due to its Infra Red output), muscle relaxing, and pain

relieving. Argon has a very wide spectral emission, and thus is the preferred gas that is used with the device. It is vitalizing, cooling, sedating or stimulating depending on the applied audio frequency. Argon can also be pain relieving, and most importantly ,it has intense devitalizing and in some cases destructive effects on micro organisms.

THEORETICAL LOW FREQUENCY ACOUSTIC RESONANCES OF VARIOUS RIFE-BARE PLASMA DRIVE DEVICE ANTENNAS,
UPON DESTRUCTION OF BLEPHARISMA AND PARAMECIUM MICRO-ORGANISMS

5th International Workshop on Biological Effects of Electromagnetic Fields September 28th - October 2nd 2008, Città del Mare, Terrasini, Palermo

[PDF]

MORPHOLOGICAL TRANSFORMATION OF THE PROTOZOA BLEPHARISMA
BY FREQUENCY SPECIFIC AMPLITUDE MODULATED RF PULSED PLASMAS

30th Bioelectromagnetics Society Annual Meeting June 8-12, 2008 San Diego, California.Abstracts; P-79, pg 359-60

FIGURE 1: Disintegration in progress of the protozoa blepharisma caused by a frequency specific amplitude modulated RF pulsed plasma. Photo taken through an Olympus BX60 research microscope

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http://dnafrequencies.com

DNA Pathogen Frequencies

The following paper is an abridged version of the longer one published in 1999 by Charlene Boehm, the inventor of the DNA frequency method. Some text from that original paper has been removed from this version because it is outdated, redundant, or not specifically related to the DNA frequency method.

A Look At the Frequencies of Rife-related Plasma Emission Devices

by

Charlene Boehm

August 6, 1999

This is a story of an exploration with numbers.

The origin of the MORs (Mortal Oscillatory Rates of bacteria and viruses), originally discovered by Royal Rife during the first half of the twentieth century, has perplexed many people since that time. While it is generally acknowledged that some type of resonance phenomenon destroyed or debilitated the organisms, it has been difficult at best to pinpoint any association of specific frequency with what is physically affecting these life forms during the time of their debilitation or demise.

What exactly might be the destructive mechanism that is affecting each organism? Is it a resonance related to its full size, or perhaps that of the nucleus, mitochondria, or capsid? Is it a correlation with some type of biochemical resonance? Why does each organism seem to need a specific frequency? Could the phenomenon be related to its DNA, and if so, what is the resonance relationship? These questions and more have kept folks that use or explore Rife-related technologies awake into the wee hours of the morning on many occasions, and have been the focus of endless animated discussions.

This paper will explore some possibilities that might assist in shedding light on the resonance relationships.

These mechanisms of action require that some type of physical parameter be available that can be converted into frequency. Two major physics relationships, that of converting a length into frequency (or wavelength, to be more accurate); and that of converting mass into frequency, will be looked at in some detail.

While it is acknowledged that some of the concepts presented in this paper will be open to dispute, it was felt that the sheer number of correlations found with the audio frequencies currently being used begged a closer look. For that reason these ideas are being offered to the community of serious researchers as a springboard for further discussion. The concepts and frequencies discussed in this paper, and any materials eventually offered in conjunction with this paper, are in no manner intended to suggest treatment or cure for any disease or condition. Furthermore, this writer cannot assume any responsibility for enhancement of or degradation to physical health arising from use of the information presented in this paper.

The complete genome.

The developments in the past thirty to forty years in the field of genetics and molecular biology has resulted in an explosion of information available to anyone that cares to take a look. Information is widely available in medical and scientific journals, and extensive databases can also be accessed on the internet.

The length of any object can be thought of as having a resonant frequency by virtue of correlation with a wave-length. For instance, a person's height has its own resonant wavelength and resultant frequency. Is it possible that an organism's entire DNA genome could also possess a resonant wavelength and frequency related to its total length? Is there a way to calculate the entire length of an organism's DNA genome? Thanks to explicit analysis of DNA structure, it is now accurately known how far apart the base pair molecules are spaced in that helix. If one knows exactly how many base pairs are contained in the complete genome, finding the entire length is a simple matter of multiplying the number of base pairs times the spacing. [For an explanation regarding structure and base pairs of DNA, see L. Stryer, Biochemistry, 4th ed., (W.H. Freeman, 1995), p. 75 ff., ISBN 0-7167-2009-4]

As a point of discussion, it must be pointed out that advanced x-ray analysis of crystallized DNA has shown that base pair spacing is not always consistent. There are some very localized areas that contain "squeezing" or "spreading" of the base pairs. However, for the purpose of this analysis, the classic Watson-Crick model of base pair spacing will be used, which is actually an average spacing over the entire length of the DNA genome. To use any other model for this discussion would make it hopelessly complex for these purposes. For further discussion on this subject, see Stryer, p. 788.

The dimensions of the B-helix, which is by far the most common DNA form for bacterial and eukaryotic life forms, tells us that:
a.One complete turn of the helix spans a distance of 35.4 angstroms on its axis.
b.There are 10.4 base pairs in each helical turn. [These measurements are given in Stryer, p. 791].

Therefore, the spacing of the individual base pairs on the axis would be 35.4 angstroms divided by 10.4, which equals 3.403846 angstroms. In scientific notation, this can be written as 3.403846 e-10 meters. The use of meters will now make it possible to convert this total length (or wavelength) to frequency.

Looking at an example from a real organism, the Rubella measles virus contains 9755 base pairs in its entire DNA genome. (For access to base pair information on viruses, go to http://www.ncbi.nlm.nih.gov/genomes/static/vis.html).

9755 base pairs x the base pair spacing of 3.403846 e-10 meters = 3.32045 e-06 meters total length. This is a figure that can be used as a possible wavelength for the Rubella viral DNA.

To convert this wavelength to frequency, we turn to the physics formula:
velocity / wavelength = frequency
[See J. Cutnell & K. Johnson, Physics, 2nd ed., (John Wiley & Sons, 1992), pg. 698, ISBN 0-471-52919-2, or any good physics text].

In this instance we will use the speed of light: 299,792,458 meters per second as a velocity. (Further comments regarding the use of this velocity follow shortly).

Substituting the numbers into the forumla, we get 299,792,458 meters/second divided by 3.32045 e-06 meters = 9.02866 e+13 hertz.
This would be a possible theoretical resonant frequency for the Rubella DNA genome. It is interesting to note that this frequency falls at the high end of the infrared section of the electromagnetic spectrum (near visible light), and in the general area of the spectrum that Royal Rife had under consideration in his microscopic work.

To access this frequency in the audio range, an accurate and resonant way to accomplish this it is to repeatedly divide the frequency by 2. In music, this would be called going to a lower octave. Because there is no comparable term to "octave" in electromagnetic frequency terminology, the word "octave" will be used from this point onward to designate this /2 relationship (or x2 for an upper octave). It is a calculation that will be used often. Furthermore, dividing a frequency by 2 (i.e., translating it into the immediate lower octave) can also be visualized as doubling its wavelength in an exact and exceedingly precise manner.

Therefore, dividing the original Rubella resonant frequency of 9.02866 e+13 hz down by many octaves (i.e., doubling the wavelength many times) eventually brings us to a frequency at a representative octave low in the audio range: 164.23045 hz. This could be a possible resonant frequency of the Rubella genome in this low audio range.

To "debilitate" this frequency, the following mathematical relationship was considered: multiplying this resonant frequency by the square root of 2 (1.4142136).

A note is perhaps in order to the general reader: while these ideas are being presented in a manner to reach as wide an audience as possible, a brief explanation follows (involving the square root of 2 relationship) which will get slightly technical. One can proceed to the section following the starred line (if desired), with no interruption in content.

The general physics formula for the velocity of electromagnetic (EM) radiation through any medium equals the inverse of the square root of the product of the electrical permittivity and the magnetic permeability. The formula reads (in the case of EM velocity through a vacuum, and also a good approximation for air):

velocity = $1/v\ (e0\mu0)$

where e0 is the electrical permittivity, and μ0 is the magnetic permeability.
The permittivity and permeability are commonly known physics constants:
permittivity e0 = 8.85418782 e-12 farads/meter
permeability μ0 = 1.2566370614 e-6 henrys/meter
[D. Lide, ed., Handbook of Chemistry and Physics, 76th ed., (CRC Press, 1995), p. 1-1].

Applying these constants in the above formula indeed results in the velocity of light through a vacuum: 299,792,458 meters per second. Having this velocity figure makes it possible to compute electromagnetic frequencies (if the wavelength is also a known factor).

However, the next question arises: do electromagnetic waves travel through biological tissue at this velocity? Perhaps a new velocity can be computed from the formula above, using values for permittivity and permeability through biological media.

A representative figure for permittivity (e) through body tissue is: 71 e-12 farads/meter. [See E. Hecht, Physics, Vol. 2, (Brooks/Cole Publishing Co., 1996), p. 664].

And the permeability (μ) through body tissue is for all practical purposes, the same as that of a vacuum: 1.25663706144 e-06 henrys/meter. [See R. T. Hitchcock & R. Patterson, Radio-Frequency and ELF Electromagnetic Energies, A Handbook for Professionals, (Van Nostrand Reinhold, 1995), chart on page 27].

Applying these numbers to the above physics formula, the result is: velocity = 1 / v [(71 e-12 F/m) x (1.2566370614 e-06 H/m)] = 105,868,288.9 meters per second as a representative velocity of electromagnetic energy through body tissue.

How does this figure compare with that of the speed of light through a vacuum?
Putting these two figures into a ratio gives:
299,792,458 meters per sec. / 105,868,288.9 meters per sec. = 2.831749347

If that ratio is divided in half, the result is 1.4158747, extremely close to 1.4142136, the value for the square root of 2. The next logical step would then be to explore the use of this ratio in computing possible frequencies for use in conjunction with body tissue (i.e., multiplying a frequency obtained with speed-of-light velocity by the square root of two).

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The possible low-octave DNA resonant frequency for the Rubella virus (using the speed of light velocity) was 164.23045 hz, and multiplying that number by v2 = 232.256 hz. (The frequencies that are arrived at using the v2 multiplier will henceforth be referred to as a "debilitating frequency").

Now if one uses the representative EM velocity through body tissue (105,868,288.9 meters per second), and recalculates the frequency associated with the Rubella viral genome wavelength (using the formula: velocity / wavelength = frequency), and then divides down by octaves as usual, one will come up with nearly the exact same frequency as would be arrived at by using the speed of light velocity, dividing the high frequency down by octaves, and multiplying the low octave by the square root of 2. (105,868,288.9 meters per sec / 3.32045 E-06 meters = 3.188371724 E+13 hz, which divided down by many octaves comes to 231.9845 hz, and is extremely close to the 232.256 hz debilitating frequency using the speed of light and v2 method).

Now, if we multiply the frequency 232.256 up by just one octave (x2), we get 464.5 hz. Interestingly, one of the frequencies used for Rubella with the plasma beam devices is 459 hz, only 4.5 hz away!

Because the plasma beam devices present the frequencies using a square wave (which contains a very strong showing of

odd-numbered harmonics), it was thought that perhaps some of the early odd harmonics (such as 3, 5, 7, 9, 11, etc.) of a currently used frequency might also show a mathematical correlation with the DNA debilitating frequency suggested above. Such correlations could easily be determined using a computer spreadsheet. Here is one such example.

One of the frequencies used for "general" measles is 745 hz. Its 5th harmonic falls at 3725 hz (745 x 5 = 3725), which when divided down by 4 octaves (divide by 16) gives 232.8 hz. This is extremely close to the above debilitating frequency of 232.256 hz.

One could also look at it in this manner: multiplying the original DNA debilitating frequency up by four octaves, 232.256 hz x 16 = 3716.1 hz. This is close to the fifth harmonic of 745 hz (3725 hz). So at this juncture we might ask, is the fifth harmonic of 745 hz hitting an octave of the DNA "debilitating frequency" as described above, or at least very close to it?

The Rubella viral organism was used to present the basic concepts and procedures being used in this methodology. Another organism that gives even more information is Borrelia burgdorferi, which is associated with Lyme's disease.

For convenience however, the formula for finding the genome-related debilitating frequency is recapitulated:

[299,792,458 m. per sec / (# of base pairs) x (3.403846154 E-10 m.)] = frequency
which, when divided down by many octaves to the low audio range, and then multiplied by v2, yields a baseline "debilitating frequency".

The entire genome of Borrelia burgdorferi sains 910,724 base pairs. Using the spacing length of 3.403846 e-10 meters, this gives us a total genome length of 3.09996 e-04 meters, which converts to a frequency (using speed of light as velocity) of 9.670835558 e+11 hz. Dividing this down by octaves into the low audio range gives us 112.58 hz, and then multiplying by v2 yields a debilitating frequency of 159.217 hz.

Multiplying this number up by 2 octaves (x4) gives 636.87 hz. One of the frequencies currently being used for Lyme's is 640 hz (under "hatchlings/eggs" in the frequency list website given above).

Another frequency currently used for this condition is 254 hz, and its 5th harmonic is 1270 hz, which divided down by 3 octaves (divide by 8) = 158.75 hz, almost exactly falling at the Borrelia representative debilitating frequency (abbr. "df") of 159.217 hz. Remember, it is possible that a debilitating frequency may occur for an organism at any octave location up and down the entire spectrum!

Yet another frequency being used for Lyme's is 432 hz and its upper octave 864 hz. The third harmonic of 432 hz = 1296 hz, which divided down by 3 octaves (divide by 8) gives 162 hz, also fairly close to the df of 159.217 hz.

Once again these are two more examples of the odd harmonics of currently used frequencies correlating with an upper octave of the debilitating frequency. It could also help to initially explain why more than one audio frequency is effective at targeting an organism.

At this point it also must be stated, there will always be variation in nature, now and forever. Organisms constantly adapt to their surroundings, and this is reflected in (or initiated by) changes in their DNA structure. Therefore, one can never assume that frequencies computed on the basis of genome wavelength will always and forever give accurate, hard and fast results. The numbers should be used only to guide us into the ballpark, so to speak.

Another aspect of Borrelia burgdorferi that turns out to hold considerable interest is that of the plasmids that the organism harbors. Plasmids are small, freely-circulating independent pieces of usually circular DNA that often (but not always) program information relating to the pathogenicity or virulence of the organism, and are present in nearly all (if not all) types of bacteria. After looking at the base pair information of 11 Borrelia plasmids thus far, the following frequency correlations have shown up (to save time and space, the entire mathematical procedure will be shortened):

1. Plasmid cp26 containing 26,498 base pairs. Debilitating frequency (df) is at 171 hz, one octave up is at 342 hz, near currently used Lyme frequencies of 338 and 344 hz.

2. Plasmid cp9 containing 9386 base pairs, df is at 241.4 hz, one octave up is 482.8 hz, near currently used frequencies of 484 and 485 hz.

3. Plasmid lp28-1 containing 26,921 base pairs, df is at 168.3 hz, one octave up is 336.6 hz, very near currently used frequency at 338 hz.

4. Plasmid lp28-2 containing 29,766 base pairs, df is at 152.2 hz, next 2 octaves up are at 304.5 and 608.9 hz, near the currently used frequencies of 306 & 610 hz.

5. Plasmid lp28-3 containing 28,601 base pairs, df is at 158.4 hz, two octaves up falls at 633.6 hz, near the currently used frequency of 630 hz.

6. Plasmid lp28-4 containing 27,323 base pairs, df is at 165.8 hz, two octaves up falls at 663.4 hz, near the currently used

frequency of 667 hz.

7. Plasmid lp36 containing 36,849 base pairs, df is at 245.9 hz, one octave up falls at 491.9 hz, near the currently used frequency of 495 hz.

8. Plasmid lp54 containing 53,561 base pairs, df is at 169.2 hz, one octave up falls at 338.4 hz, almost exactly the same as the currently used frequency of 338 hz.

US2007128590
Methods for determining therapeutic resonant frequencies

Inventor(s): BOEHM CHARLENE A

Also published as: US7280874 // WO02063980 // EP1372415 // CA2437856

Methods are provided for readily and efficiently determining resonant frequencies that can be used therapeutically or beneficially, for debilitation of specific types of genomic materials, including DNA and/or RNA, genes, and gene sections. The methods can be used in a variety of circumstances related to various human and animal diseases and conditions. Methods allow determination of therapeutic resonant frequencies for use in various media having different refractivities. Therapeutic or beneficial resonance frequencies thus determined are adapted for use with currently available frequency-emitting devices by shifting resonant frequencies to electromagnetic ranges capable of generation by such devices.

Resonant frequency device
US8652184

James Bare

A resonant frequency device provided with a transmitter, an amplifier and an impedance matching circuit connected to an antenna, such as a plasma antenna. A voltage or current balun could be provided between the impedance matching circuit and the antenna.

[0001] The present application claims the priority of U.S. provisional patent application Ser. No. 61/136,259, filed Aug. 22, 2008, as well as U.S. patent application Ser. No. 12/457,502, filed Jun. 12, 2009, and are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention is directed to the field of resonant of frequency devices having utility as a therapy device producing bio-physiological effects.

BACKGROUND OF THE INVENTION

[0003] The device of the present invention improves all of these operational attributes by a range of many factors via various methods and implements. This improved device utilizes significantly improved components that greatly increase the modulation capability, commercial applications, and creation of biophysiologic effects by factors of several times over the existing device. This new device consists of a frequency generator (preferably square wave), a transmitter, an amplifier, an impedance matcher (antenna tuner), a balun or lack of balun, and an antenna (plasma tube or metallic depending upon application). Design and operation of the Resonant Frequency Therapy device disclosed in U.S. Pat. No. 5,908,441, issued Jun. 1, 1999, and in U.S. Pat. No. 6,221,094, issued Apr. 24, 2001, both entitled "Resonant Frequency Therapy Device" issued to the present inventor show that there are significant limitations and capabilities of the components utilized in their construction. The patented devices are based upon utilization of a transmitter derived from that of a CB radio. All components attached to such transmitter have inherent limitations that ultimately limit the ability of the device to produce bio physiologic effects including the treatment of infections, disease states and cancer, and it's applicability to data transmission, and radar. The major limitations involve the rise and fall time of the pulse envelope, the frequency modulation capability of the amplifier, and the ability to manipulate the modulation frequency. The transmitter utilized in the prior art patents is limited to about one micro second rise and fall time.

[0004] Due to the use of a modulation transformer there is limitation to the modulation frequency handling capability of the transmitter. Another limitation on modulation frequency with existing transmitters is the use of an audio amplifier to step up the input audio signal voltage and current to the modulation transformer. Existing audio amplifiers for this purpose are limited to about 400,000 Hz. Existing transmitters, due to limitation of the modulation transformer and the audio amplifier, are limited to about 300,000 Hz maximum modulation frequency, and this is achieved only with a significant degradation of the pulse envelope.

[0005] The presence of a modulation transformer also severely disrupts the pulse envelope with modulation frequencies below 100 Hz. Simply connecting a transmitter with faster rise and fall times to components is found in U.S. Pat. Nos. 5,908,441 and 6,221,094, does not mean that the output pulse delivered from the antenna of the device will show improvement. Each component downstream from the transmitter must be equally as capable of the transmitter in handling, and thus not distorting or diminishing the quality of the oscillating electrical pulse.

[0006] The transmitter utilized in the existing patents is limited to about 1 micro second rise and fall times. This new device utilizes a new transmitter revealed in U.S. patent application Ser. No. 12/457,502, filed Jun. 12, 2009, which is incorporated by reference. This new transmitter and its attached components that make up the improved Frequency Therapy Device-(amplifier, tuner, plasma tube (or other antenna type) is capable of producing rise and fall times of approximately 40 nanoseconds. The improvement of rise and fall times alone is that of about 25 times over the existing device. The existing device, as mentioned in these patents, utilizes a large ferrite balun in the antenna tuner. It has been found that a large ferrite balun causes a limitation of both modulation frequency response, and limitation of the rise and fall times of the pulse envelope. For example, the large balun used with existing devices, will severely distort the pulse envelope limiting rise and fall times of the pulse envelope to approximately 1 microsecond and the modulation pass band to approximately 500 KHz.

[0007] The existing devices described in U.S. Pat. Nos. 5,090,441 and 6,221,094 utilize long lengths of coaxial cable between the components. It has been found that at high modulation frequencies, these lengths of coaxial cable can severely degrade the pulse envelope and diminish the modulation frequency pass band.

[0008] Additionally, the prior art patents to the present inventor are limited to pulses longer than 1 microsecond and are incapable of many bio-physiological effects. Pulses of less than 1 microsecond durations will selectively charge the internal organelles and internal membranes of a cell, and not change the outer plasma membrane. Thus the prior art patents will charge the external cells membrane (plasma membrane) simultaneously with internal organelles and internal organelle membrane. There is no selectivity with these devices.

SUMMARY OF THE INVENTION

[0009] The deficiencies of the prior art are addressed by the present invention which utilizes a new transmitter and its attached components that make up the improved frequency therapy device. These components include an amplifier, a tuner, a plasma tube or other antenna type which is capable of rise and fall times of approximately 40 nanoseconds. This is approximately 25 times greater than the rise and fall times of the aforementioned existing devices. The new transmitter of the present invention and its attached accessory components (amplifier, tuner and antenna) are capable of outputting frequencies as high as 4 MHz with minimal degradation of the pulse envelope. This frequency range is improvement of approximately 13 times over the existing devices.

[0010] The present invention describes a device to be used in radar, data transmission, and the production of bio-physiologic effects. These effects have been found capable of affecting multicellular organisms, and micro organisms including all members of the 5 Kingdoms i.e., Fungi, Monera, Animalia, Plantae, and Protista. Effects extend to all viruses, prions, other infective "agents" and all cell types including cancer. The emissions can influence the nervous system of those organisms that should possess such and create pain relief, sedation and other influences on nerves of both the peripheral and central nervous systems. The device can be utilized for the treatment of infections and various disease states including cancer, the enhancement of ionizing radiation effects on the body, the enhancement of bioactive compounds on the body such as chemotherapeutic medications and antibiotics, and manipulation of genetic expression.

[0011] Since the presence of a prior art modulation transformer can severely disrupt the pulse envelope with modulation frequencies below 100 Hz, the transmitter of the present invention would produce a highly consistent and properly shaped pulse form that range from less than 1 Hz to beyond 3 MHz. FIG. 1 shows the prior art device with an output at 40 Hz with a 50% duty cycle. This should be compared to the output illustrated in FIG. 2 having a square wave output at 40 Hz with a 50% duty cycle. FIG. 3 illustrates a prior art device with an output at 500 KHz with a 50% duty cycle and is compared to the output of the present invention as shown in FIG. 4 at 500 KHz at a 50% duty cycle.

[0012] The modulation transformer and the audio amplifier also create limitations of the ability to fully adjust the duty cycle of the modulation signal. Extremely high square wave duty cycles (greater than 70%) tend to overheat both the modulation transformer and the audio amplifier and cause failure of the modulation transformer and the audio amplifier. The present invention shows significant improvement with modulation frequency duty cycles from 1% to over 99%. In order to obtain the maximum utilization of the improved devices capabilities, it is necessary to modulate the new transmitter with a square wave generator that can generate square waves with rise and fall times shorter than that of the prior art devices capabilities, i.e. less than 40 nanoseconds. These square wave generated outputs are illustrated in FIGS. 2 and 4.

[0013] The present invention utilizes various configurations. Three of these configurations utilize a balun which is of a lesser size than included in the devices described in U.S. Pat. Nos. 5,908,441 and 6,221,094. Another configuration operates without the benefit of a balun. The elimination of the ferrite balun would produce the best output frequency range and pulse shape but would make plasma initiating difficult with an antenna so designed. In yet another configuration, a small voltage type balun is utilized to step up the output voltage of the transmitter and ease plasma initiation. Due to the severe overheating effects, this small voltage round balun is only useable with lower power amplifiers generally under 150

watts. The large ferrite voltage balun as described in U.S. Pat. Nos. 5,908,441 and 6,221,094, when combined with other component improvements of the present invention can produce rise and fall times of the pulse envelope of 330 nanoseconds, a three fold improvement over the capabilities of these existing devices. A current balun can also be used in one of the configurations which offer a superior pulse shape through and modulation frequency pass band to that of the voltage balun. The current balun and the large voltage balun can handle very high amplifier power levels, far in excess of 150 watts.

[0014] The improved device utilizes an impedance matcher (antenna tuner). Different shapes and types of plasma tubes, different tube gasses, different gas volumes, different gas pressures, different metallic antennas and other output devices such as a laser or a pair of electrodes for use in creating electro kinetic effects all have different impedances. These impedances must be matched between the amplifier and the antenna. Failure to match impedances will result in diminished effectiveness of the device, or destruction of the amplifier. For a plasma tube, there are two primary impedances, the impedance of the tube without a plasma, and the impedance of the tube once a plasma is created. It is almost impossible to start a plasma tube without having some sort of adjustable impedance matching circuit between the amplifier and the plasma antenna. Due to the presence of many harmonics and the creation of sidebands produced at MHz modulation frequencies, the construction of the tuning capacitors within the antenna tuner (impedance matching circuit) are critical to pass band and output pulse shape of the matching circuit. Ideally the matching circuit would be designed to be almost self resonant using an inductor coil and minimal adjustable capacitance. What has been found is that relatively large size tuning plates in the air capacitors are superior in tuning ability, pass band, and maintenance of pulse shape, to those of small tuning plates. As an example, a small tuning plate might be [3/4] inch in diameter and have a surface area of around 1 square inch. A large tuning plate might be 2 inches or more in diameter and have a surface area of over 6 square inches. A large number of tuning plates-will cause limitation of the modulation (pulse) frequency pass band. The ideal capacitor for use in not causing distortion of the pulse envelope and allowing for a maximum modulation frequency pass band will have a relatively large surface area to the plates, and only 3-5 plates to compose the capacitor.

[0015] The present invention would utilize coaxial cables that are as short as possible or are a direct connection between the components such as integrated "all on one circuit board" configuration comprising the entire electrical system which are also the best management of the oscillating pulse signal with minimum distortion. The length of this short coaxial cable should be less than one foot.

[0016] The antenna used for the output of this improved device needs to be attached closely to the impedance matching circuit. Use of long cables or wires to connect to the antenna will not only degrade the signal, but will limit the modulation frequency pass band. The antenna construction must be designed to account for the modulation frequency bandwidth and the integrity of the pulse envelope. Due to the formation of side bands, and harmonics generated by the pulse transmitter and the amplifier, a metal antenna might be required to pass a bandwidth of frequencies that extend across a bandwidth exceeding 8 MHz or more from the transmitter's carrier frequency. This is due to sideband formation and the existence of harmonics. If utilizing a plasma type antenna there are two basic design choices. One design choice would be an antenna with internal electrodes. A second design choice would not include internal electrodes in the antenna. Internal electrode tubes with close approximation (1 to 2 inches for example) such as described in the existing device as mentioned in U.S. Pat. Nos. 5,908,441 and 6,221,094, are ideal for wide band width modulation frequency response, and minimal rise and fall times of the pulse envelope.

[0017] Long tubes with no internal electrodes such as one might utilize in a plasma tube or laser, are capacitively coupled to the output of the impedance matching circuit. To minimize rise and fall times and increase modulation frequency response it is necessary to utilize an insulating material of high dielectric value, high temperature resistance and high breakdown voltage resistance between the tube and the output wires of the impedance matcher. Capacitive coupling between the impedance matcher and tube is in usage with the existing devices as described in U.S. Pat. Nos. 5,908,441 and 6,221,094 but what has been found is that the use of a high dielectric constant and high breakdown voltage resistance material is mandatory when using capacitive coupling methods at high modulation frequencies. The dielectric material will increase modulation frequency response and pulse envelope shape as emitted from the plasma tube. An advantage of using capacitive coupling with a high dielectric insulator to excite the tube is that one may use much higher power levels without danger of overheating of electrodes or possible melting of the glass around the electrodes and sacrificing tube integrity. When using insulating materials a problem with RC times ensues. There is an inherent resistivity within the plasma tube that is higher when the plasma is not present, than when the plasma is present and conducting current. The addition of a dielectric material to the tube, as an insulation between the wires connecting the tube to the impedance matcher as a wrapping, will add capacitance to the system and thus influence RC discharge times. Care must be taken that the amount of dielectric material is small and the coupling area of the tube to the impedance matcher is small. A material with an excessive high dielectric property, or a tube coupling that is composed of a large surface area of dielectric material and a large coupling surface area to the tube such as a copper collar, can create enough capacitance to diminish the frequency output capability of the plasma tube. Excessively large coupling areas will also affect the quality of the created pulse envelope and slow rise and fall times. One ideal insulator material is Teflon. Teflon has a dielectric constant of roughly 2, but also possesses a very high voltage breakdown resistance and high heat tolerance.

[0018] The presence of a modulation transformer also severely disrupts the pulse envelope with modulation frequencies below 100 Hz. See pictures below-The new equipment and transmitter produce a highly consistent and properly shaped pulse from <1 Hz to beyond 3 MHz. The modulation transformer and audio amplifier also create limitations of the ability to fully adjust the duty cycle of the modulation signal. Extremely high square wave duty cycles (>70%) tend to overheat both the modulation transformer and audio amplifier and cause failure of said modulation transformer and audio amplifier.

This new equipment shows significant improvement with modulation frequency duty cycles from 1% to over 99%.

[0019] In order to obtain the maximum utilization of the improved devices capabilities it is necessary to modulate the new transmitter with a square wave generator that can generate square waves with rise and falls times shorter than that of devices capabilities i.e. less than 40 ns.

[0020] The gas type and pressure utilized in plasma tube antennas with this improved device is critical to obtain optimal modulation frequency capability and pulse shape integrity. The input to the tube being a pulse causes the tube plasma to pulse off an on. It has been found that a highly conductive gas such as neon will at a certain point continue to stay lit between pulses and cause a degradation of the pulse envelope and the output modulation frequency response. A highly resistive gas such as helium, especially when used at pressures 20 mm and above will tend to "self quench" between pulses and offers a very wide modulation frequency response and minor pulse envelope degradation.

[0021] Optimal pulse shape and modulation frequency response (pass band) must be accounted for in the design of the transmitter, any amplifier, impedance matching circuit, or any antenna that comprises it.

[0022] A square wave frequency generator with rise and fall times shorter than those the transmitter is capable of generating (40 ns or better) is used to drive a transmitter capable of MHz range of pulse repetition rate (PRR) output. The output from the transmitter is fed to an amplifier that is capable of amplifying the MHz PRR pulses from the transmitter and the amplifier has electrical components capable of handling the instantaneous high voltages created by short pulses of fast rise and fall times of MHz PRR. Output from the amplifier is fed to an impedance matcher circuit with tuning capacitors of large surface area tuning plates, but small number of plates. Output from the impedance matcher is then fed to either a metallic antenna tuned to manage the MHz PRR or to a plasma antenna. The Plasma antenna has gasses such as helium and gas pressures capable of outputting MHz PRR.

[0023] Due to the diminished rise and fall times of the pulse envelope, the improved duty cycle manipulation, and frequency range of this improved frequency device, biophysiologic effects are significantly improved over the existing device.

[0024] Biophysiological effects are improved when the output of the transmitter is fed to an antenna. Regardless of whether the antenna is a conventional design, or a plasma tube, the emitted EM waves will have a directional vector which will intersect with any object nearby. Should that object be conductive, it can be considered to have the electrical property of inductance. The output of the transmitter being a pulse, means that all EM energy is contained within the pulse, and thus a conductive object is subject to Faraday's Law of Induction in a unique manner.

[0025] Faraday's law states-"The magnitude of an electromagnetic force induced in a conductor is proportional to the rate of change of the magnetic flux that cuts across the conductor."

[0026] Mathematically, Faraday's law is written as:

[0000]
$$E=-(DF/Dt)$$

[0000] where E is the induced electromotive force in volts, DF is the change in magnetic force in webers (a Weber is equal to 1 volt-second), and Dt is the amount of time in seconds in which the change in magnetic force takes place.

[0027] From the above formula we see that the amount of induced voltage induced in the conductor is determined by the amount of magnetic flux and the rate at which the magnetic field lines cut across the conductor.

[0028] The greater the number of magnetic field lines cutting across a conductor, the greater the induced voltage. Additionally, the faster the magnetic field lines cut across a conductor, or the conductor cuts across the magnetic field lines, the greater the induced voltage.

[0029] Should the magnetic flux generated by transmitted pulse cut across any electrically conductive object, the induced voltage in that object will conform to Faraday's law. An RF wave contains both an electrical and magnetic component. In the circuit utilized for this or the existing transmitter as described in U.S. Pat. Nos. 5,908,441 and 6,221,094, changes in the magnetic flux component would be minimal. One could increase the magnetic flux component by simply increasing power output of the device by utilizing further amplification stages or the addition of an external amplifier. One could also utilize an antenna designed to enhance magnetic flux output. Regardless, changes in the magnetic flux component strength, while important, are limited. It would be very difficult for example, to increase the transmitted magnetic flux field by a factor of 100 times.

[0030] Significant changes in the EMF generated within a conductor can be accomplished by simply changing the modulation frequency. The output of the transmitter creates a pulse rate equal to the modulation frequency, and thus, with each transmitted pulse, a magnetic field is generated of a specific time duration. Although the magnetic flux may hold static for a particular antenna, a change in the pulse modulation rate of the transmitter will cause changes in the induced voltage present in any conductor cut by the antennas emitted field. It is simple to change the pulse rate by a factor of 1000 or more times. Thus, in this improved device and the predicate device, the generated electromotive force in any conductor

cut by the emitted pulsed magnetic field is predominantly time domain dependent. The induced voltage in a conductor by the output pulse can be extremely large. For example, the improved device by changing from a pulse rate of 300 Hz with a fixed magnetic field strength, to 3 MHz with the same magnetic field strength, a conductor will see an instantaneous induced EMF change of ten thousand times. The existing device, due to limitations of the components could produce a shift from 300 Hz to 300 KHz a change in EMF of only 1000 times. The significantly higher instantaneous EMF has considerable application to the creation of biophysiological effects. It is well known in the literature that large voltages, when applied as short pulses can create many biophysiologic effects such as electroporation and apoptosis.

[0031] The present invention offers an improved method of increasing the induced EMF in a conductor of biological or non biological origin by varying its modulation frequency. A similar effect of significant instantaneous induced EMF change can be created by gating the output of the transmitter. One could take a 2 MHz signal and gate it at 4 Hz. Bursts of 2 MHz PRR signal would thus occur 4 times a second. By creating what might be considered as a relaxation time between each signal burst, the conductor would have time to lose any accumulated charge and thus be subject to a maximum induced voltage from the pulse burst. Ideally the charge on the conductor would be allowed to drop to 0 and then be subject to a maximum generated EMF via Faraday's Law.

[0032] The device according to the present invention offers an improved method of increasing the induced EMF in a conductor of biological or non biological origin by utilizing a variable gate frequency of the modulation frequency. Such an effect can be seen on an oscilloscope when the improved device is driving a closed tube in which a gas plasma is formed by the RF pulse. As each gated train of pulses is generated, and each gated train of pulses is cut off, a large instantaneous voltage spike can be seen at the leading and trailing end of each pulse within the train of pulses created by the gate frequency. The generated instantaneous voltage spike on each pulse can be of very short time duration. For example at a 10 KHz PRR, the trailing edge voltage spike has been measured at less than 100 ns time duration, with a fall time of under 20 nanoseconds.

[0033] "Faraday's Law" has significant interaction with the components of the circuit. This includes components utilized by any amplifier, or antenna connected to the transmitter. A non obvious effect of the generated pulse within the circuit of this transmitter is an increase in the circuit voltages of the transmitter with increases in modulation frequency. Component parts of the device must account for this voltage variation with frequency.

[0034] The device according to the present invention will create significant voltages at high modulation frequencies that must be accounted for in component selection of the transmitter, any amplifier, or any antenna connected to it. The transmitter may be utilized with an amplifier which may range up to many thousands of watts of power. The transmitter may be utilized with amplifiers of unlimited power levels to increase the electromagnetic field (EMF) for the production of bio-effects. If using a dipole like antenna, spacing the antenna elements closely together can achieve field strengths sufficient to create many commonly known physiologic effects. By placing a living organism of some sort close to the focal point of the field between the closely aligned antenna elements, one can optimize the physiologic effects. There are many well known bio-physiologic effects mentioned in the literature from the application of high intensity pulsed fields to cells and micro organisms. This can include but are not limited to; sterilization, electroporation, apoptosis, necrosis, transfection, and gene manipulation.

[0035] The device of the present invention can be utilized to create sterilization, electroporation, apoptosis, necrosis, transfection, and gene manipulation. Typically such physiologic effects have been accomplished with pulse durations of millisecond to microsecond duration. Recent research has shown that many cellular physiologic effects can be achieved by the use of high power pulses of nanosecond duration. The existing device, as described in U.S. Pat. Nos. 5,908,441 and 6,221,094 being limited to pulses longer than 1 microsecond is incapable of many bio-physiologic effects. Pulses of less than one micro second duration will selectively charge the internal organelles and internal membranes of a cell, and not charge the outer plasma membrane and thus the existing device will charge the external cell membrane (plasma membrane) simultaneously with the internal organelles and internal organelle membranes. There is no selectivity with the existing device. The improved device which is capable of generating sub microsecond pulses is capable of charging just the internal organelles and membranes of a cell, leaving the outer plasma membrane uncharged. Another advantage of the device is that instead of only a few nanosecond pulses per second being generated as in most instruments utilized for this purpose, the device can generate millions of sub-microsecond duration pulses per second.

[0036] The device of the present invention can be utilized to create sub-microsecond duration pulses to selectively charge and influence the internal organelles and membranes of a cell without charging the outer plasma membrane. Cellular membranes possess the ability to demodulate amplitude modulated radio transmissions. This means that the demodulated electrical signal forms local to the point of demodulation within the cell membranes. Further, many cell membranes possess the ability to amplify pulsed electrical signals. The demodulated signal thus has the ability to influence the bioelectrochemistry of a cell's outer membranes, and indirectly influence the metabolism of the cell which is dependent upon the outer membranes bioelectrochemistry. Thus, simply by changing the modulation frequency and/or pulse duty cycle of this improved device in order to create sub microsecond pulses, one can selectively create charges on a cell as whole, or on just the interior organelles and membranes of a cell.

[0037] The improved transmitter/device being of the AM type and more specifically an overmodulated AM type, allows for demodulation of the side band signals occur in a cell's various membranes. The demodulated signal, a pulsed electrical signal, will affect the bio electrochemistry of the membrane and thus affect the cells physiology.

[0038] The well known electrokinetic effect of Electrokinetic Sonic Amplitude (ESA) can be utilized to create a compressional type wave within a cell or living organism's body. ESA occurs when an alternating electrical current is applied to a suspension of charged particles. The particles move back and forth in the liquid in response to the electrical field creating tiny pressure disturbances around the particles in the liquid. If there is a density difference between the particles and the liquid, a macroscopic acoustic wave develops at the boundaries of the suspension.

[0039] If a pulse emitted from the device is demodulated within a cell or body, it may produce a compressional type of wave. This wave will travel through the body at an average of 1440 Meters per second, but will vary depending upon the tissue density and other well known attributes of body tissue response to compressional waves.

[0040] With this improved device, one must account for the duty cycle of the generated EM pulse in order to determine the width of the generated compressional pulse (wave). Changes in the duty cycle changes the time duration of each EM pulse emitted from the device, creating different pulse widths for a fixed frequency. By knowing the time duration of a single EM pulse, one can calculate the amount of space or distance that each compressional pulse (wave) will occupy. An EM pulse of 500 KHz with a 50% duty cycle will have a time duration of one microsecond. Thus a single compressional pulse of 1 microsecond will occupy 1.440e+6 mm/sec/1e-6 sec=1.440 mm (0.0566 inch). By adjusting either the modulation frequency or the duty cycle, a compressional pulse (wave) generated by a 100 nanosecond duration pulse being generated at a 500 KHz rate (5% duty cycle), would have a dimension of 0.1440 mm. (0.00566 inch).

[0041] The device is capable of forming compressional pulses (waves) within a cell or large organism's body. The PRR of the compressional wave is equal to the modulation frequency of the device. The device due its wide modulation bandwidth is capable of generating compressional waves that extend well into the ultrasonic region. The wavelength of the generated compressional pulse (wave) is related both the PRR and the duty cycle of the EM pulse that creates the compressional wave.

[0042] A well known electrokinetic effect is that an electrical signal arises when an acoustic wave is applied to a suspension of colloidal particles in an electrolyte solution. The electrical signal is known as the Colloid Vibration Potential (CVP). This has applicability to many different cells and tissues of the body which are filled with many different colloidal like particles and electrolytes. Thus, the CVP will create an increased electrical charge that can create biophysiological effects. For example one of these bio-physiological effects can be Voltage Dependent Ion Gating (VDIG) in which ion channels in many different types of cells can be opened by the presence of an external electrical field. The improved device being capable of MHz modulation levels, improves the ability to manipulate cells using CVP and VDIG.

[0043] As a transverse or longitudinal compression wave passes through a cell or tissue, it will have an amplitude. The amplitude of the wave represents the maximum displacement of the individual particles from their previous equilibrium positions. The energy carried by the wave is proportional to the square of its amplitude. Mathematically this is expressed in the equation:

[0000]
E[mu][infinity]A<2 >

[0000] where E[mu] is the energy of the wave, and A is the amplitude of the wave. As the transverse or longitudinal wave passes through a cell or tissues, its power (energy) may be absorbed. The amount of power available to be absorbed from the wave is proportional to the square of its amplitude multiplied by its velocity. Since the velocity of conduction remains essentially static inside a cell or tissue, the initial amplitude of the wave (which is based upon the rise and fall time of the pulse envelope and the power of the device) is the primary determinant of the wave's ability to create physiologic effects. The power delivered by the wave if it is absorbed, is proportional to the square of its amplitude times its speed. This is defined mathematically by the equation P[mu][infinity]A<2>V. The speed of the wave is defined as its conduction velocity, which in the body for a compressional wave an average of 1440 M/Sec. The speed being fixed, modest increases in the wave's amplitude can result in significant increases in the power delivered by the wave. The improved device with it's much improved pulse rise and fall times will produce a wave with significantly higher amplitude than the predicate device all other attributes (power, frequency, etc.) being equal.

[0044] If a pulse emitted from the device should be demodulated within a conductive media, and then travel through that media as a compressional wave, the opportunity for constructive interference of the pulse exists. If the end point of the conductive media is loosely coupled, the wave when it reaches the end of the media will bounce and return towards its source, creating constructive interference and thus significant high voltage standing waves can be generated within the conductive media. When an object is vibrating at its fundamental frequency, then all the particles that make up the object oscillate in phase with that fundamental frequency. At its natural frequency of oscillation, a standing wave is created within an object. The application of an in phase driving force with the same frequency as the fundamental to the object can very efficiently pump energy into the object via the process of resonance. At resonance, the amplitude of the standing wave within the object increases essentially without limit, until the structure is damaged. The improved device due to increased wave amplitude ability is more effective at creating resonance than the predicate device.

[0045] The ability of the improved device to produce high voltage potentials through constructive wave interference, electrokinetic effects, demodulation, amplification, and Faraday's law of induction means that the output pulse can be used for biological manipulation of various physiologic mechanisms within living organisms that is superior to the predicate device. It is known in the literature that changes in the modulation frequency and pulse duration are important to the

creation of bio-physiologic effects.

[0046] Two separate modulating frequencies when input to the device can be used to create beats. The beat frequency generated is equal to the difference between the two modulating frequencies. If the output of the device is used to create a gas plasma, laser, or other light emitting device, the beat frequency (if below 30 Hz) can be visualized in the plasma. The improved device being capable of MHz modulation levels can create beat frequency effects using two separate frequencies far in excess of the capabilities of the predicate device. For example by using 600,000 Hz and 600,004 Hz one could create a beat frequency of 4 Hz. The predicate device is incapable of creating this effect within these frequency ranges.

[0047] The device of the present invention can be used to create beat frequencies within an object that absorbs and demodulates the wave, and within a gas plasma, laser, or other light emitting device excited by the device. The importance of short duration pulses created by two or more modulating frequencies is important to the creation of standing waves. If one inputs two or more different frequencies of identical phases and identical amplitude, to the device and then applies the output signals of the device to a cell, or organism, one will produce standing waves in the cells or organism. Ideally there should be one low frequency (a fundamental) and all other modulating frequencies are a higher harmonic (multiple) of the fundamental. Standing waves will be formed whose amplitude is based upon the vector sum of the frequencies. The summation will create a wave like pattern with an ascending slope and a descending slope. The angle (sharpness) of the slope is dependent upon the frequencies of the waves. Vector summation of the waves is based upon the effects of the demodulated signals at the cellular level which is a consequence of side band formation. When signals within the sidebands generated by different modulating frequencies have identical phases and are also related harmonically, a vector summation will occur thus dramatically increasing the ability of the transmitted wave to create bio-physiologic effects.

[0048] The device of the present invention can be used to produce standing waves with cells and organisms. Additionally, this device when modulated by different frequencies that are harmonically related, will produce sidebands that can vectoraly sum via identical phases and will create or increase bio-physiological effects.

[0049] Improved dielectrophoretic effects can be produced by the device. All particles exhibit dielectrophoretic activity in the presence of electric fields. Dielectrophoretic (DEP) effects can be used for separation of cells, and other particles. Dielectrophoretic effects are frequency specific for different organisms and substances based upon their dielectric properties. Frequency specificity can be used for separation and identification of different species of bacteria, viruses, fungi, molds, and other living organism's. The use of multiple frequencies to induce dielectrophoretic effects is superior to single frequency DEP in the manipulation of cells, micro organisms and particles. Frequencies utilized in DEP can be from less than 1 Hz to over 1 MHz. The predicate device, being limited to 300 KHz limits the ability to evaluate DEP. The improved device having PRR's beyond 1 MHz allows for full evaluation capability of DEP.

[0050] The device can be used to create single and multi frequency dielectrophoretic effects (MFDEP). The device can be used to create DEP or Multi Frequency DEP via the combined mechanism of the frequency of the carrier wave, the modulation frequency, the gate frequency, and the addition of one of more frequencies.

[0051] The improved device can create physiologically active bio photons of specific wavelengths within single cells, and multicellular organisms of shorter wavelength than those of the predicate device. Published papers on the existing device show the wavelength of the biophotons created are directly related to the modulation frequency. Increases in modulation frequency can produce shorter wavelength biophotons. The existing device being limited to about 300 KHz is capable of producing biophotons with wavelengths in the near ultraviolet regions of approximately 380 nmk. This improved device being capable of multi MHz levels of modulation can create Biophotons with high energy levels, around 250 nm or less. The higher energy (shorter wavelength) Biophotons being in the Ultra Violet range produced by this improved device can have very pronounced biophysiologic effects upon cells.

[0052] It is known in the literature that DNA transfection can be accomplished using low amplitude low frequency AC fields with oscillation rates of from 0.1 to greater than 1 MHz. This improved device having a PRR beyond the 300 KHz limit of the predicate device can be used to create superior DNA transfection effects. The device can be used for DNA transfection of bacteria utilizing frequencies from less than 1 Hz to more than 1 MHz.

[0053] The device can produce electro-osmosis and electroendocytosis effects. Via electro osmosis and electro endocytosis methods one may influence the flow of ions into and out of a cell or micro organism. Published literatures show that when a pulsed EM field is combined with cancer chemotherapy medication or antibiotics it is possible to enhance the effectiveness of the medications. For antibiotics this is known as the "Bioelectric Antibiotic Effect". The devices effects are not just limited to these types of medications, but other existing medications and new medications can be designed to work specifically with the pulsed EM field created by the device. Due to the variability of the pulse duration effects of the device on cells, one could selectively affect either the entire cell or just the interior of the cell and thus control to some degree how that cell interacts with the applied medication.

[0054] It is known in the literature that a molecule that is immobilized or is tumbling more slowly than the frequency of an oscillating electric field, may interact with the field to produce chemical effects. This interaction can increase the rate of chemical reactions and include the exchange of energy between the field and the conformation of the molecule. The molecule can absorb and couple energy of the field to drive endergonic and exergonic reactions. That is, the energy within extremely high ECC fields can be used to transduce electrical energy into chemical energy, and chemical energy into electrical energy. Key to understanding ECC is that the efficiency of the coupling between the molecule and the oscillating

electrical field depends upon the field strength and the frequency of the field. The improved device having the ability to increase field strengths and PRR's beyond that of the predicate device can create superior ECC effects to that of the predicate device. Via production of ECC by the device, it is possible to change the conformation of various proteins. Many proteins are toxic (poisonous), for example Prions, bacterial exotoxins and mold exotoxins. Changing the conformation of a protein will disable the ability of the protein to be physiologically active and thus inactivate any toxic effects of said protein

[0055] Polar molecules emit electromagnetic energy due to internal vibrational states. Such polar oscillators can absorb electromagnetic energy and their reactions to the external field can vary based upon the frequency of the field. For example microtubules are electrically polar and will react to an oscillating external field to transport molecules and charges. Micro tubules have been shown to be sensitive to frequencies within the GHz ranges. Recent testing of the improved device demonstrates that due to mixing effects within a plasma tube antenna, near field emissions extending up to 14 GHz have been noted.

[0056] Published literature shows that cellular plasma membranes can demodulate pulsed electromagnetic fields. An electrical signal will form local to the point of demodulation. This electrical signal will increase the electropotential of the plasma membrane. VDIG, electro-osmosis, electro-endocytosis, and other bio physiologic effects can be possible via demodulation of the device's pulsed EMF. The significance of raising the electrical potential of plasma membranes is considerable. Non dividing cells have large transmembrane potentials (TMP). It is known that cancer cells have very low transmembrane potentials-published papers demonstrate that increasing the transmembrane potentials of cancer cells will slow their rate of replication and affect many other aspects of cancer cell metabolism. High cellular plasma transmembrane potential can be utilized to thwart infection by viruses, and to prevent upregulation of virulence genes in disease causing bacteria. Published literature has demonstrated that a cell or cells with lowered transmembrane potentials will signal disease causing bacteria to up regulate virulence genes and turn a benign bacteria into a virulent one. Viruses enter and exit cells by lowering the transmembrane potential. It has been shown that activation of some types of retro viruses which attach themselves to a hosts DNA will activate when the TMP is lowered. An example is that of the herpes simplex type I virus, which can cause fever blisters and shingles decades after someone has been initially infected (chicken pox). If the cell transmembrane potential is sufficiently high, the virus cannot lower the TMP enough to cause ingress or if the cell is infected with the virus, to allow replicated viri out of the cell. The device can be used to inhibit viral infection, prevent activation of latent viruses, and inhibit bacteria from up regulating virulence genes.

[0057] Oscillating fields cause forced vibrations of all free ions on the surface of a cells plasma membrane via coherence effects. The output of both the predicate and improved device is a oscillating pulse. The improved device having higher PRR than the predicate device is capable of creating the effect across a wider class of ions and creates stronger coherence effects due to increased wave amplitude formation. In this situation the coherence is created as a form of forced resonance.

[0058] When the output of the device is connected to an antenna or a device designed specifically to use RF energy such as an antenna, electrodes, a transducer or other RF emitter/antenna; the transmitter can be used to produce biophysiologic effects. These effects extend to all types of single and multicellular organisms, micro organisms, and cell types such as cancer. These effects can be detrimental or beneficial depending upon several parameters such as: modulation frequency, exposure time, field strength, and antenna emissions.

[0059] Gene Switching (up and down regulation) Published literature shows that specific genes may be up and down regulated based upon the applied frequency of an EM field. The improved device, providing a superior PRR to the predicate device offers the capability to influence a wider variety of genes than the predicate device.

[0060] Bioelectric X-Ray Effect-Published literature shows enhancement of the effects of therapeutic ionizing radiation especially in cancer from pulsed EM fields. EM field exposure following ionizing radiation exposure increases the effectiveness of the radiation on cancer cells. The improved device provides a superior PRR to that of the predicate device and can be utilized to provide a superior Bio Electric X-Ray effect.

BRIEF DESCRIPTION OF THE DRAWINGS

[0061] Additional objects and features of the present invention will be described in more detail with respect to the following Figures in which:

[0062] FIG. 1 is a diagram of the output of a prior art device at 40 Hz with 50% duty cycle;

[0063] FIG. 2 is an output of the present invention at 40 Hz with 50% duty cycle;

[0064] FIG. 3 is the output of the prior art device at 500 KHz with 50% duty cycle;

[0065] FIG. 4 is a diagram of the output of the present invention at 500 KHz at 50% duty cycle;

[0066] FIG. 5 is a block diagram of the present invention utilizing a balun;

[0067] FIG. 6 is a block diagram of the present invention without the utilization of a balun;

[0068] FIG. 7 is a block diagram of the present invention creating electro kinetic effects;

[0069] FIG. 8 is a diagram of the present invention using a tube capacitive coupling method;

[0070] FIG. 9 is a diagram of an internal electro glass plasma tube/antenna;

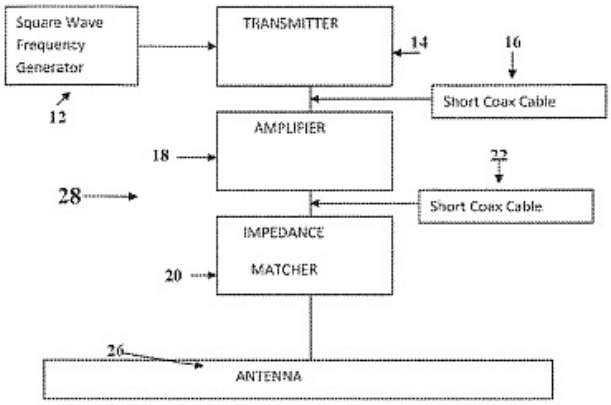
[0071] FIG. 10 illustrates a current balun;

[0072] FIG. 11 illustrates a voltage balun; and

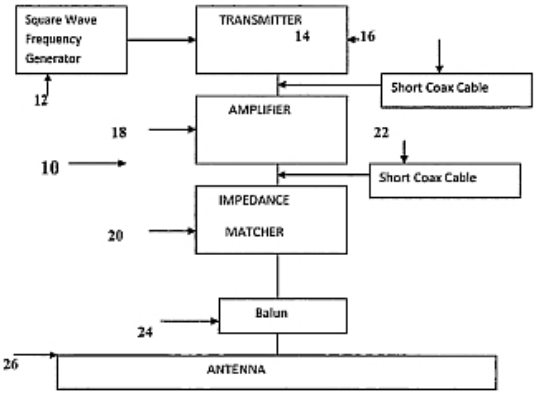
[0073] FIGS. 12 and 13 illustrate the embodiments of the transmitter used in the present invention.

Device Components Without Balun

Figure 6

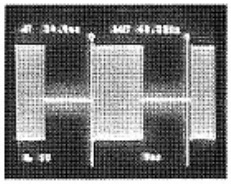


Device Components With Balun



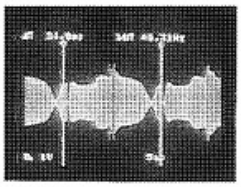
Improvement in Pulse Output Shape With Frequency

Figure 2



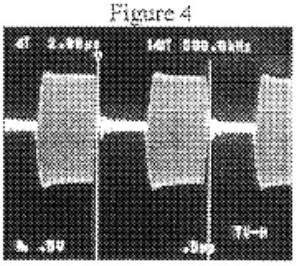
New Device output at 40 Hz with 50 % Duty Cycle

Figure 1



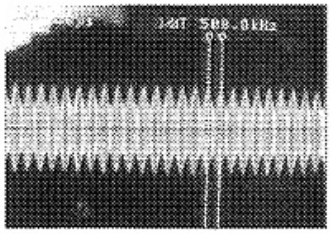
Old Device Output at 40 Hz with 50% Duty Cycle

Figure 4



New Device Output at 500 KHz 50% Duty Cycle

Figure 3



Old Device Output at 500 KHz With 50% Duty Cycle

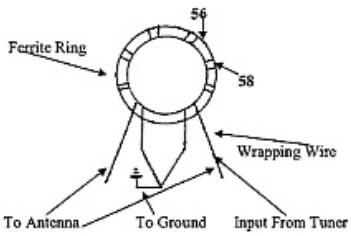
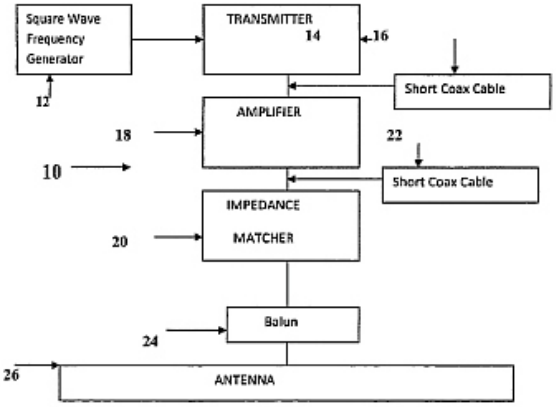


Figure 11

Voltage Balun – Bifilar Wound, Small and Large are identical except for size (diameter) and number of winds of wire

Device Components With Balun

Figure 5



Application to Create Electrokinetic Effects

Figure 7

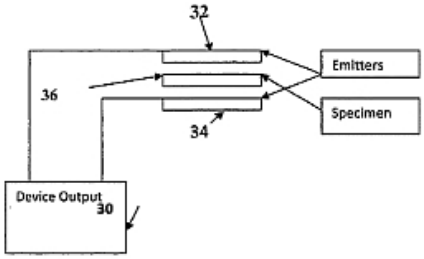
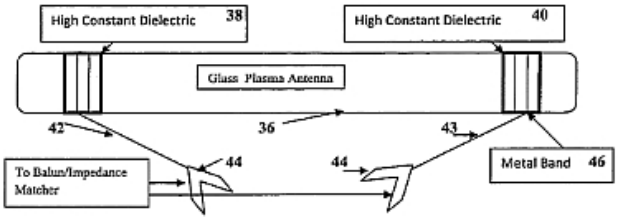


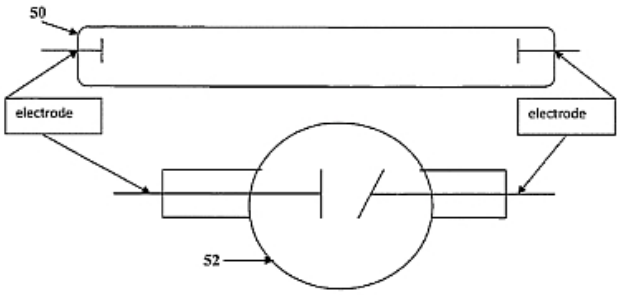
Figure 8



Tube Capacitive Coupling Method

Internal Electrode Glass Plasma Tubes/Antennas . To Include Lasers and other Gas Filled Light Emission Tubes

Figure 9



Balun Types 54

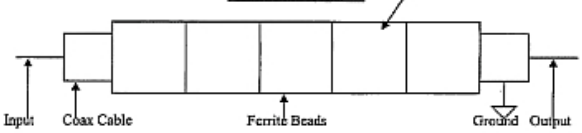
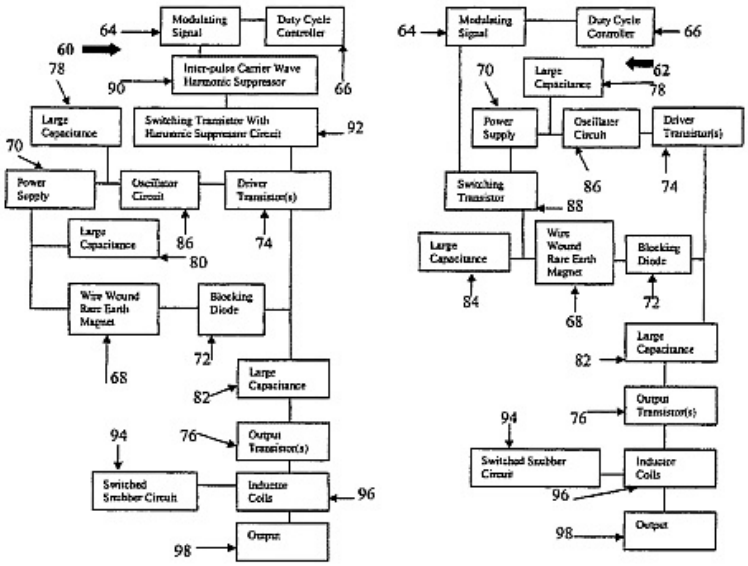


Figure 10

Current Balun

Figure 12 **Figure 13**



DETAILED DESCRIPTION OF THE PRESENT INVENTION

[0074] FIGS. 5 and 6 illustrate the present invention utilizing a balun (FIG. 5) as well as without use of a balun (FIG. 6). Both of these figures will be described with the utilization of like reference numerals being assigned to the same device. A square wave generator 12, as shown in the circuit 10 of FIG. 5 and the circuit 28 of FIG. 6 will be connected to a transmitter 14 which is described in U.S. patent application Ser. No. 12/457,502, filed on Jun. 12, 2009, is incorporated by reference, and described with respect to FIGS. 12 and 13. The transmitter 14 will be connected to an amplifier 18 by a direct connection or by a short coaxial cable 16. The amplifier 18 will be connected to an impedance matching circuit 20 either directly or by a relatively short coaxial cable 22. The length of these coaxial cables should be less than one foot. The impedance matching circuit 20 is either directly connected to an antenna 26 or either by a voltage or current balun 24 provided between the impedance matching circuit 20 and the antenna 26. The impedance matching circuit is designed to be almost self-resonant utilizing an inductor coil and minimal adjustable capacitance. Relatively large sized surface tuning plates would work very well. A relatively small number of turning plates, preferably between 3 and 5, will be used. Even with the utilization of a balun 24, it has been found that the impendence matching circuit 20 should be provided as close to the antenna 26 as possible.

[0075] The present invention as illustrated with respect to FIGS. 5 and 6 can be applied to create electro kinetic effects as shown in FIG. 7. The device 30 represents the square wave frequency generator, transmitter, amplifier, impedance matcher and balun of FIG. 5 or the lack of the balun in FIG. 6. The device 30 is coupled to a pair of emitters 34 having a specimen 36 provided therebetween. The emitters 32 and 34 would be placed as close to the specimen 36 as possible to maximize the field strength and to produce the desired effects. These desired effects can be physically observed using direct physical observation or with the addition of a microscope, video camera or similar device.

[0076] FIG. 8 illustrates the use of a plasma tube as the antenna for the present invention. The antenna is capacatively connected to either the balun 24 shown in FIG. 5 or directly to the impedance matching circuit 20 shown in FIG. 6. Reference numerals 44 represent the balun or impedance matching circuit shown in FIGS. 5 and 6 connected to the metal band 46 by a direct conductor 43 or to the insulator 38 by conductor 42. It is noted that any type of conductive gas plasma can be provided within the glass plasma tube 36, with the tube glass also acting as an insulator. The insulator could be Teflon. This is accomplished by wrapping the plasma tube under the area of the conductor. It is noted that other dielectric material could be used as the insulator.

[0077] FIG. 9 illustrates two types of internal electrode tubes which may be utilized. It is noted that these tubes are a general representation of the tubes which can be employed. Typical tubes are shown by reference numerals 50 and 52. The internal electrode shape, size, arrangement and design may vary based upon the type of tube which is used. Tubes with internal electrodes are directly connected to the output of the balun or the impedance matcher and no dielectric insulation is used.

[0078] FIG. 10 illustrates a current balun 54 which is inserted between the output of the impedance matching circuit 20 and the antenna 26 shown in FIG. 5. The current balun 54 is connected at both ends to the ground and one end is connected to the impedance matching circuit 20 and the second end to the antenna 26 of FIG. 5. This current balun could be constructed from a plurality of ferrite beads. The hot lead from the tuner goes to the input side of the current balun and the output side of the current balun.

[0079] FIG. 11 shows a voltage balun 56 containing a plurality of wrapping wires 58. The hot lead from the tuner goes to the input side of the voltage balun which is also one of the output sides of the voltage balun.

[0080] FIGS. 12 and 13 illustrate two embodiments of the amplitude modulated pulse transmitter, the similarities and the

differences will be described herein below used with the present invention. As shown in these figures, a modulated signal 64 is introduced into the either of the transmitting circuits 60, 62. The duty cycle of this signal would be controlled by a standard duty cycle controller 66.

[0081] Both of the transmitters 60, 62 would utilize a wire wound rare earth magnet 68 instead of a transformer used in a standard AM modulated pulse transmitter. Typical of the rare earth magnets utilized in the present invention is a bar magnet having a wire wrapped therearound in a sequential manner. A ring magnet, similar to the bar magnet, including a wire wrap could be used. Each of the rare earth magnets would have a high gauss rating and is wound a number of times with their respective wires. It is preferable that these wires be made of solid copper to create a type of circular magnetic inductor. As shown in FIG. 6, the rare earth magnet 68 is directly connected between a standard power supply 70 and a blocking diode 72. This is the high power side of the transmitter circuit which would supply voltage and current to the collector's source (FET) of the driver transistor or transistors 74 as well as the output transistor or transistors 76.

[0082] It has been determined that the number of turns of the wire in either the bar magnet or the ring magnet would affect the operation of the transmitters 60, 62. For example, utilizing a ring magnet having a 0.75 inch diameter, a suitable range of turns would be between 15 and 25. Based upon the sizes and shapes (square, rectangular and so forth) the number of magnets, as well as the different sizes of wire, different circuits and different strengths of magnets will cause a variation in the number of necessary turns. Employing the high gauss rare earth magnets, many of the circuit's reactances are eliminated and the output power tends to stay very flat with increases in modulation frequencies. Output impedance stays very constant with only slight variations across a multi MHz wide modulation frequency range.

[0083] The pulse shaped, frequency response and irregularity of each carrier oscillation in the pulse is corrected by stabilizing the pulse shape at high frequencies. This is accomplished utilizing the large capacitors 78, 80 and 82 of FIG. 6 as well as the large capacitors 78, 80 and 84 of the circuit illustrated with respect to FIG. 13. It has been found that electrolytic capacitors having a range of 3300 uf to approximately 10,000 uf are added to improve the pulse shape and frequency response. The capacitor 78 in both circuits is provided in parallel to the low voltage input 70 of the power supply that powers an oscillator circuit 86. A second large electrolytic capacitor 30 having the same parameters of the capacitor 78 is provided in parallel to the high voltage input side of the circuit between the power supply 70 and the rare earth magnet 68. The large capacitor 84 of FIG. 13 is provided between the power supply 70 and the rare earth magnet 68 through a switching transistor 88. In this second embodiment, the modulated signal is directly connected to the switching transistor 88. A third large electrolytic capacitor 82 having the same parameters as the first and second large capacitors is added in series to the circuit that feeds the collector (FET source) of the driver transistor or transistors 74 and the base (FET-Gate) of the output transistor or transistors 76 in both FIGS. 6 and 7.

[0084] It is important to note that the large capacitor 82 is installed backwards with the negative side of the capacitor receiving positive power from the high voltage side of the circuit that feeds the collectors of the output transistor or transistors 76. The positive side of this capacitor is attached to the collector or collectors of the drive transistor or transistors 74 and to the base of the output transistor or transistors. Installing this capacitor 82 backwards decreases the rise and fall time of the pulse envelope. Additionally, the voltage rating of the capacitor must be significantly higher than that of the voltage entering it. It is important to note that use of a non-polar electrolytic capacitor in this position results in a slight degradation of rise and fall time pulse envelope shaping and modulation frequency capability can be employed. Use of these high value capacitors will improve the pulse shape; assist in stabilizing output power level of the transmitter and increase pulse frequency bandwidth. The capacitor 82 must have a significantly higher voltage rating than would normally be used in this type of transmitter. For example, a 30 volt capacitor might be used if installed normally. In this case, a 100 volt rating or more must be used. If a non polar electrolytic capacitor is used, the voltage of the capacitor can be set for the circuit (30 volts).

[0085] Prior art high level AM modulated pulse transmitters would use a modulation transformer. In this case, a blocking diode was used to prevent ingress of RF energy into the modulation transformers. Both of the circuits shown in FIGS. 12 and 13 would use a similar blocking diode 72 to limit RF entry back to the power supply after passing through the rare earth magnets 32. This blocking diode plays an important role in the modulation pass band and impedance stabilization ability of the transmitter. The diode 72 is connected to the source of the driver transistors 74 and the output transistors 76 and the electrical parameters of the diode are important to the operation of the transmitter. An incorrect diode would cause a limit of the pass band, a degradation of the pulse shape, a limit to the duty cycle response at high KHz and MHz frequencies, as well as slow rise and fall time. The blocking diode 72 would have a low forward resistance which can effect the RC time which can affect the pass band and pulse shape, the circuit reactance which affect the pass band as well as the circuit reactance which effect the transmitter output impedance variation with modulation frequency. The RC as well as LC time constants are calculated utilizing the following:

[0086] The RC time constant is identified by the Greek letter [tau]. The time constant is given in seconds. [tau]=R*C Where R is the circuit resistance in ohms and C is the circuit capacitance in farads. The cutoff frequency or fc is the maximum frequency a circuit will pass and is related to [tau]. Cutoff frequency is calculated in this manner.

[0000] [mathematical formula][mathematical formula][mathematical formula]

[0000] The LC time constant is derived by the formula
Time=L/R Where L is inductance in Henry's and R is the resistance in Ohms and Time is in seconds.

[0088] The cutoff frequency is the maximum frequency the circuit will pass, and what is wanted is a high cut off frequency. At MHz pulse rates times get very short-billionths of a second. As can be seen, it is the combined values of R, C, or L, which can increase, or if one is not careful, decrease the cut off frequency. In this transmitter-one must be careful of how the values are combined. What is wanted are very high MHz cut off frequencies. The transmitter is capable of generating pulses of 100 nanosecond or 100 billionths of a second duration. This all applies to the blocking diode. Diodes have voltage losses across them due to internal resistances, as well as on/off switching time, which both play a part in the transmitters pulse rate capability.

[0089] Increasing voltage of the low voltage side of the circuit which includes the oscillator, to a value approximately 50 to 60% of the high voltage side of the circuit decreases the rise and fall time of the pulse, increases output power across the transmitters pulse bandwidth, improves pulse envelope shape, and decreases ringing of the pulse. For example the high voltage side of the circuit that feeds the collectors (FET-Source) of the output transistors may be operating at 31 volts, while the low voltage side of the circuit would be operated at 16 volts.

[0090] Increasing the current to the low voltage side of the circuit, which includes the oscillator, while holding the voltage at a low level (13 Volts typical) will produce an effect similar to that of increasing the voltage. That is, an increase in current will increase output power across the transmitter bandwidth, improve pulse envelope shape, and decrease ringing of the pulse. The advantage of increasing current over increasing voltage of the low voltage-oscillator side of the circuit, is that when using an amplifier with a high conduction angle, the carrier wave will not fully cut off between pulses, and the carrier will tend to be of significant enough power between pulses to damage an amplifiers transistors. As such, a low voltage with high current improves the ability of the transmitter to be used with an amplifier.

[0091] Circuit ringing between pulses can become evident at modulation frequencies of 1 MHz and above. This is important since the range of the transmitter of the present invention can be as great as 4 MHz and above. If severe enough, the circuit ringing can cause limitation of the pulse bandwidth capability. One manner in which this situation can be alleviated would be to utilize a harmonic suppressor 90 with a switching transistor 92 in the first embodiment illustrated with respect to FIG. 12. The switching transistor 92 is utilized with a resistor and a diode. The resistor is approximately 12 ohms and one end is connected to the base of the switching transistor 62. The other end of the resistor is attached to the anode of the diode. The cathode of the diode is connected to the collector of the switching transistor.

[0092] Another manner of controlling the circuit ringing is to use a switched snubber circuit 94 as illustrated in FIG. 12. The snubber circuit can be used with both the transmitters shown in FIGS. 6 and 7. This circuit includes a resistor and capacitor provided in series with one end of the capacitor attached to ground. The resistor and capacitor are connected in series to a tuning inductor coil 96. The coil 96 or coils are provided between the output transistor 76 and an output jack 98. Additionally, switch 74 is provided between the coils 42 and the snubber circuit 40.

[0093] The circuit illustrated in FIG. 12 also includes an inter-pulse carrier wave harmonic suppressor 90. This circuit would eliminate the inter-pulse carrier wave harmonic form by utilizing a small resistor and an electrolytic capacitor between the modulation signal input jack and the switching transistor. The small resistor could be of approximately 50 ohms and the electrolytic capacitor would be about 20 uf placed in parallel to each other and in series with the input modulation signal before the signal is sent to the base of the switching transistor. The positive end of the electrolytic capacitor is attached to the input side of the wave signal. The use of this arrangement would eliminate damage to power transistors that would be used in an attached amplifier.

[0094] The foregoing description of the preferred embodiment of the invention has been presented for purposes of illustration and description. It is not intended to be exhausted or to limit the invention to the precise form disclosed, and obviously many modifications and variations are possible in light of the above teaching. The proceeding embodiments which show and describe in order to best explain the principles invention and its practical application to thereby enable others skilled in the art to best utilize the invention in the described embodiments and with various modifications as are suited to the particular use contemplated.

Resonant frequency therapy device
US5908441

Also published as: **WO9831418 // US6221094 // GB2336318 // CA2278776**

A generator of a complex energy wave, having audio, radio and light components, including an audio frequency oscillator, a radio frequency transmitter, a radio frequency amplifier, an antenna tuner, an antenna, tuned coaxial cables and an optional reverberation unit.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to surgical devices. More specifically, the present invention relates to radiative type surgical devices.

2. Description of the Prior Art

Organisms are able to absorb or store energy which later may be converted into useful work, heat or re-radiated. In the event energy is absorbed faster than the subject may utilize it, or re-radiate it, excess energy builds up. When an organism is under the influence of an energy wave having frequency equal to the resonant frequency of the organism, the organism, or at least some resonant part of it, continues absorbing energy. At the point where too much energy is absorbed, the energy begins to cause failure in the structure absorbing the energy. At resonance, this process of structural failure occurs very quickly. This may easily be seen by exposing Paramecium Caudatum to the present device when operating at 1150 Hertz (Hz). The normally very motile organism literally stops motion while changes occur in the protoplasm until a point in the cell wall fails.

The energy associated with this process is described by the formula, E=hv, which is applicable to ultraviolet light, X-rays, and radiation on various molecules. "E" symbolizes energy content, "h." represents Planck's constant and "v" stands for the frequency in cycles per second.

Electromagnetic waves include visible light, heat, X-rays, radio waves and the like. These are all merely different frequencies of the electromagnetic spectrum, and as such have different properties. Each may be amplified, diminished, changed in frequency, radiated or even heterodyned. Heterodyning is the combining of two dissimilar waves to produce two new waves. One of the new waves is the sum of the two frequencies, the other new wave being the difference of the frequencies.

The use of audio, radio and light waves to treat diseased tissue is well known in the arts. Audio wave-type devices typically employ a piezoelectric ultrasonic generator driven by a radio frequency amplifier coupled to an ultrasonic lens of known focal length. The locus of cells to be destroyed is ascertained through known pulse-echo imaging techniques. Once the locus of target cells is fixed, the lens is focused on the target area and the intensity of the ultrasound is increased to a level sufficient to affect tissue destruction by thermal heating. An example of this technique is shown in U.S. Pat. No. 4,315,514, issued Feb. 16, 1992, to William Drews et al.

Radio wave-type cell destroying devices typically employ amplitude-modulating transmitters in series with an amplifier, tuner and antenna for training high power radio waves on a target area. As with the above device, the intensity of the radio waves increases to a level sufficient to affect tissue destruction by thermal heating.

Light wave-type cell destructive devices typically employ lasers, constructed by known means, which also are trained only a target locus of cells. The high intensity light waves deliver light energy of an intensity sufficient to affect destruction of the cells by a thermal heating.

Each of the above devices have been somewhat effective in destroying living cells, but, individually, are not fully compatible with the complex nature of living cell tissue. As a testament to this, some analytical tools have been developed which simultaneously apply different kinds of wave energy. For example, in U.S. Pat. No. 5,402,782, issued Apr. 4, 1995, and U.S. Pat. No. 5,553,610, issued Sep. 10, 1996, both to Robert A. Lodder, similar devices are disclosed which simultaneously apply to a subject, a magnetic field, near-infrared radiation and an acoustic wave. Collection of the electrical, acoustical and near-infrared spectra provides much more comprehensive data that is more useful in the treatment of the subject.

Although multi-component wave generating devices have been used for analytical purposes, none are used for affecting cell destruction. Owing to the complex nature of biological cells, a need exists for a resonant frequency therapy device providing for the transmission of multiple wave energies.

None of the above references, taken alone or in combination, are seen as teaching or suggesting the presently claimed resonant frequency therapy device.

SUMMARY OF THE INVENTION

The present invention overcomes the limitations of the above inventions by providing a resonant frequency therapy device which delivers a complex transmission of energy waves comprising audio, radio and light waves, possibly generating a fourth type of wave. The invention includes known components, namely an audio frequency oscillator, a radio frequency transmitter, a radio frequency amplifier, an antenna tuner, an antenna, tuned coaxial cables and an optional reverberation unit.

In consideration of the above, a first object of the invention is to provide a resonant frequency therapy device for destroying cell malignancies.

A second object of the invention is to provide a resonant frequency therapy device which may be constructed from inexpensive readily available materials.

A third object of the invention is to provide a resonant frequency therapy device which combines diverse wave energies and generates a composite energy wave which may be used to treat malignant cells.

A fourth object of the invention is to provide a resonant frequency therapy device which may break down microorganisms.

A fifth object of the invention is to provide a means of stimulating the circulating white blood cells into a state of hypermobility.

A sixth object of the invention is to provide a device that repels or drives insects from an area.

A seventh object of the invention is to provide improved elements and arrangements thereof in an apparatus, for the purposes described, which is inexpensive, dependable, and effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic view of the invention.

FIG. 2 is a diagrammatic view of an embodiment of an antenna used with the invention.

FIG. 3 is a diagrammatic view of an embodiment of an antenna used with the invention.

FIG. 4 is a diagrammatic view of an alternative embodiment of an antenna used with the invention.

FIG. 5 is a diagrammatic view of an alternative embodiment of an antenna used with the invention.

Similar reference characters denote corresponding features of the invention consistently throughout the attached drawings.

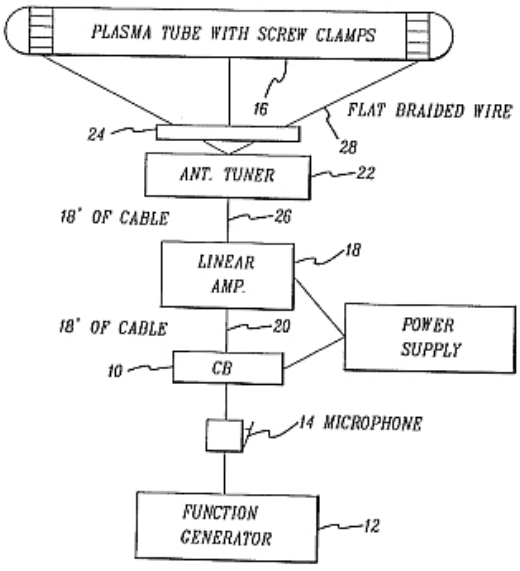


FIG. 1

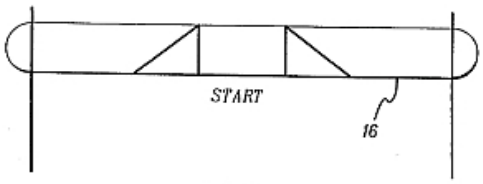


FIG. 2

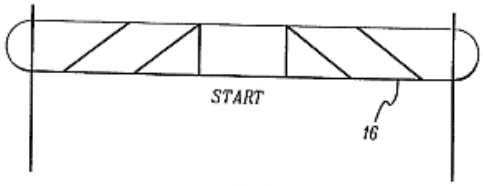


FIG. 3

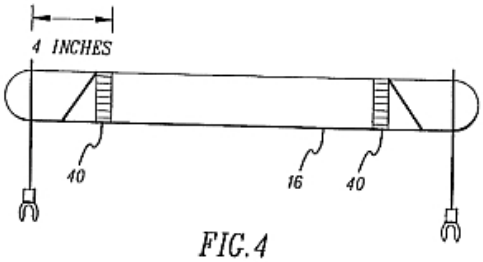


FIG. 4

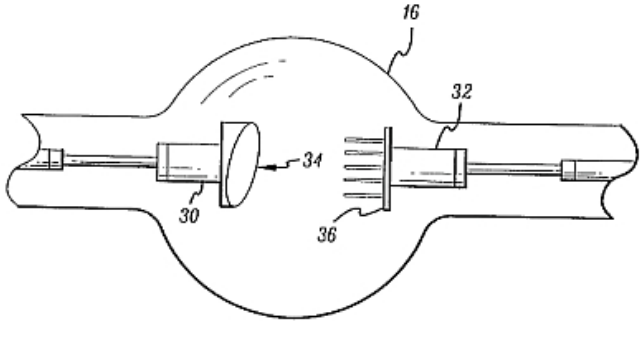


FIG. 5

FIG. 5

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present device incorporates a phenomenon known as harmonics in its operation to trigger the resonant characteristics of target cells or organisms. A harmonic is a multiple of the original (fundamental) frequencies of wave functions. For example, a second harmonic of 100 cycles is 200 cycles or Hz while a third harmonic would be 300 cycles.

The invention employs square shaped wave functions which are made up of an infinite number of the odd numbered harmonics fundamental frequency. That is, a square wave is constructed from sine waves using the third, fifth, seventh and so on, harmonics of the fundamental frequencies. For example, a 1000 cycle fundamental output square wave contains sine waves of 3000 Hz, 5000 Hz, 7000 Hz, and all other odd numbered harmonics.

The invention employs an amplitude modulated (AM) radio wave which comprises three waves, the primary wave and two side bands which are the sum and difference of the radio wave and the modulated audio wave. For example, a 1000 cycle audio wave on a 1,000,000 cycle radio wave produces two side bands; one, the lower side band at 999,000 cycles, and two, the upper side band at 1,001,000 cycles. The separation between the upper and lower side bands is what is known as the bandwidth. In this example, the bandwidth is 2000 cycles. The harmonics that make up the audio frequency square wave will produce the bandwidth of the transmitted electromagnetic wave, which will play an important part in the construction and operation of the present invention.

The side bands are important in that they contain all of the square waves generated. The side bands contain only one third of the power of the total electromagnetic energy generated and transmitted, while the carrier wave retains the other two thirds of the power transmitted. All of the harmonics that make up the square wave also will produce side bands of their own. Further, a linear amplifier will produce harmonics of the primary input radio wave generated by the transmitter used in the present invention. These harmonics of the radio wave also will act as a carrier of all the harmonics of the square wave and produce another set of side bands, thus resulting in literally hundreds of radio and audio frequencies produced by and introduced into a plasma tube antenna, discussed below. The effects of the device are dependent upon the properly applied audio frequency. It is the audio frequency that determines the formation of side bands, and the ability to produce resonant interaction between the device and the selected tissues or microorganisms. Therefore with the proper audio frequency resonant effects occur, and with the incorrect audio frequency, there are no effects.

Referring to FIG. 1, the device includes a low power radio frequency transmitter 10 generating radio waves having a radio frequency and a radio function. The radio frequency utilized generally is in the 2 to 33 MHz range. It has been found that certain radio frequencies may produce deeper tissue penetration with the device than other radio frequencies. The FCC has set aside certain frequencies for use with industrial, scientific and medical (ISM) devices. The most commonly used of these is located at 27.12 MHz. The allocated bandwidth by the FCC at 27.12 MHz is + or -163,000 cycles or a total of 326,000 cycles. It is to the devices advantage to utilize all this available allocated bandwidth in its operation.

The primary low power radio frequency transmitter must be Amplitude Modulated preferably on a frequency of 27.12 MHz. The simplest method to generate the necessary 27.12 AM radio wave is to utilize a standard Citizen Band (CB) radio set to operate on channel 14. CB radios generally include audio filters that limit the audio frequency response to a range of 300 to 2500 cycles. This frequency limitation effectively inhibits and clips off the harmonics in the square wave. To overcome this frequency limitation, modifications are made to the CB radio that widens its bandwidth. Further, the modulation limiter of the CB radio is bypassed allowing the CB radio to over-modulate. Over-modulation produces a pulsed radio wave. When the radio wave is modulated with an audio signal, the audio wave will therefore be pulsed too. The effects of pulsed radio frequency energy on tissues is well known. The unique effect generated by the modified CB radio is that the pulse width and duration varies directly with the modulated audio frequency square wave. The higher the audio frequency modulated, the shorter and more frequent the output pulse of radio energy.

The invention also employs an audio frequency oscillator 12 generating audio waves having an audio frequency and an audio function. The audio frequency oscillator 12 must provide for square wave output and should be adjustable in multiple range steps for frequency. Preferably, the quality of the square wave is quite high, being less than 0.1% distorted. The square wave should have a rise time of less than 20 nanoseconds, the faster the rise time the better. The audio frequency oscillator may be connected to the AM transmitter directly or to the microphone 14 of the transmitter.

One way to deliver optimum voltage output to the microphone is to listen to the output of the CB unit on another CB and set the output voltage to produce a clear signal. A second way is to set the output of the square wave generator to below 0.2 volt, then set the plasma tube antenna 16 to near maximum brightness by increasing or decreasing the voltage out of the frequency generator. Once set for one frequency, the voltage output should be correct for all audio frequencies. A third way is to employ a wide band oscilloscope to set the voltage output to the microphone at its optimum level.

Ideally, the radio frequency transmitter delivers a pulsed wide band width radio wave with a pulse rate and width varying with the applied audio frequency. Also, the radio frequency amplifier should deliver power in an amount that increases as the audio frequency increases.

Stability in audio frequency output may not be necessary toward optimum usage of the invention. Recent investigation has shown that frequency instability may be more effective. Toward this end, the invention may include means for presetting

the degree of drift or sweep across a certain set amount of audio frequencies.

Where a high powered AM radio transmitter is used, the invention includes the use of a wide band width linear radio frequency amplifier. A wide bandwidth linear amplifier is necessary in order to properly amplify the side bands generated by the primary radio frequency generator. Preferably the linear radio frequency amplifier has no harmonic suppression and will generate its own radio frequency band harmonic signals. The linear amplifier receives and amplifies the output radio wave from the primary transmitter. From the amount of amplification produced by the linear amplifier, a power multiplication factor can be determined. This power multiplication factor in a 200 watt output linear amplifier being driven by a 4 watt output CB radio is equal to 50. The power multiplication factor is important in giving power to the side bands generated by the input audio square wave. For example, a harmonically generated side band of the fundamental square wave audio frequency may have only one-half watt of power as it leaves the CB radio. After passing through the linear amplifier this same side band now has 25 watts of power.

Between the radio frequency transmitter and the radio frequency amplifier, the invention employs a discrete length of coaxial wire 20. The length chosen is crucial in that the invention is most effective where transmission occurs with a minimum of standing wave ratio. Standing wave ratio is a measure of the power absorbed by the antenna relative to the power reflected back to the radio frequency amplifier. The ideal ratio is 1:1, however anything below 2:1 is good. A standing wave ratio that is too high will destroy the amplifier as well as the transmitter. Ideally, the cable length should be 18 feet or 1/2 wavelength long. The use of an 18 foot or 1/2 wavelength cable between the primary radio transmitter and the linear amplifier has been found to facilitate the creation of a gas plasma within the plasma tube.

The invention also includes an antenna tuner 22. The antenna tuner matches the output of the radio frequency amplifier to the plasma tube 16 to insure that the maximum power is transmitted to the tube. The tuner receives the output from the radio frequency amplifier and supplies it via the wire terminals of the antenna tuner to the antenna leads of the plasma tube.

In order for the antenna tuner to function, it must be set on the lowest inductance regardless of the type of tube or gas used. Once the plasma lights in the plasma antenna, the standing wave ratio will approach infinity briefly until the plasma begins absorbing the power. At that point, the tuner knobs may be used to bring the standing wave ratio to a minimum. If the plasma does not light, input to the transmitter should be ceased temporarily to prevent damage to the primary radio frequency transmitter and linear amplifier.

Optionally, the invention may employ an external balun 24, an impedance matching transformer used in some antenna tuners. The balun plays an important role in the full generation of the plasma waves of interest. A balun is rated by its ability to match dissimilar circuits. For example, a 4:1 balun will match a 75 ohm to a 300 ohm circuit. The size and type of balun has a direct effect on the strength and field density of the wave produced by the device. It has been found that certain baluns containing a large toroid can produce local fields that are physically difficult to tolerate for more than a few minutes at a time. The invention may also use a reverberator in communication with the audio frequency oscillator.

The invention employs a second length of coaxial cable 26 interposed between the radio frequency amplifier and antenna tuner. Ideally, the cable should be 18 feet or 1/2 wavelength long. The use of said 18 foot or 1/2 wavelength long cable tends to orient the output wave from the plasma tube fore and aft rather than laterally relative to the plasma tube.

The antenna tuner delivers energy to the antenna via approximately four feet of antenna wire 28. The standing wave ratio should be maintained under 2:1 to prevent damage to the electronics.

The invention employs a plasma tube 16 as an antenna. The antenna 16 generates an output signal. A plasma tube antenna allows exposure of the entire subject, or a room full of subjects at one time.

Any of three types of glass may be used: First, common leaded glass found in any neon tube shop; second, quartz; and third, borosilicate (pyrex). Leaded glass is the easiest to work, is of the lowest cost and fastest to fabricate. Leaded glass is not ideally suited for the present invention because it is not very strong and tends to obstruct ultraviolet light.

Quartz glass is very strong, passes the entire light spectrum and has high heat resistance. Unfortunately, quartz is very expensive and generally does not accept internal electrodes. Bombardment, or purification of a finished quartz tube by heating it with flame or electrical current while evacuating it, is quite difficult without internal electrodes. Pyrex, on the other hand, does accept metal inserts of kovar or tungsten.

The tube may be filled with any noble gas (Argon, Helium, Neon, Xenon or Krypton). Argon, Helium and Neon give off ultraviolet radiations when excited by high voltage electricity. In order to fully utilize the spectrum of these gases, unleaded glass must be used. Diluting the primary gas with another gas reduces the amount of voltage necessary to create lighting of the plasma, commonly known as Penning affect. Experimentation with a mixture of about 98% Helium and 2% Argon has shown to be a very easily lightable mixture.

Table 1, below, contains a number of spectral lines and their position in the infrared, visible and ultraviolet regions for the noble gases.

TABLE I

Number of Spectral Lines

GAS	TOTAL	VISIBLE	>7050 (IR) <3950 (UV)
Argon	3	164	110 109
Helium	129	26	47 57
Krypton	260	77	130 53
Neon	439	82	153 204
Xenon	309	130	132 47
Mercury@1	195	41	32 122

@1 Mercury is not a noble gas.

Visible light generally exists between 3950 and 7050 angstroms. Accordingly, Neon provides comparatively little visible strength yet it is the brightest of the noble gases in the visible region when excited by radio frequencies.

Below, Table 2 shows the range of spectral lines for each of the gases.

TABLE II

Range of Spectral Lines

GAS	RANGE
Argon	487 to 23,966
Helium	231 to 40,478
Krypton	729 to 40,685
Neon	352 to 33,834
Xenon	740 to 39,955
Mercury@1	893 to 36,303

@1 Mercury, when added to the above gases, may decrease the power necessary to initiate the lighting of the plasma.

Table II shows the range within the spectrum occupied by each gas. It is well known that a shorter wavelength, in Angstroms, will provide for a more powerful spectral wave. Between 100 and 1000 angstroms, the wave has enough power to produce photoionization of O2, O, N2, and N. Between 1000 and 3000 angstroms, the spectral wave has enough power to photodissociate O2 and O3. Generally, germicidal ultraviolet radiation occurs between 2200 and 2950 angstroms. The most effective transmission commonly used being 2537 angstroms.

Table III, below, lists the typical amount of germicidal energy necessary to destroy common microorganisms. Significantly, all of the gases of interest produce spectral lines far below the 2537 angstrom level. These spectral lines can be of use only if utilizing either quartz or more silicate glass for the plasma tube.

TABLE III

Germicidal Energy

BACTERIAL ORGANISM	UV ENERGY (uw-sec/cm@2)
B. Anthracis (Anthrax)	4520
Salmonella Enteritidis (Food Poisoning)	4000
C. Diphtheriae (Diphtheria)	3370
E. Coli (Food Poisoning)	3000

N. Catarrhalis (Sinus Infection)
4400
P. Aeruginosa (Various Infections)
5500
Dysentery Bacilli 2200
Staph. Aureus (Various Infections)
2600
Strep. Viridans (Various Infections)
2000

Utilizing the linear amplifier of the present invention, the plasma tube may produce approximately 125,000,000 microwatts of power entering the plasma tube, the actual power being modulated by the light waves being unknown. The result in transmitted power, measured especially in the UV region, at this time, is not directly ascertainable. The light energy given off may be measured with various well known instruments, but the measurement does not truly indicate the power of the UV wave.

Table IV below, shows the total sum strength of the spectral electromagnetic light waves emitted by each type of gas in the UV, visible and infrared bands. The table also shows the number of spectral lines having a strength of 1000 or more. Spectral line strength is relative and compared to the standardized weakest observable line, which is 1.

TABLE IV

Electromagnetic Light Wave Strength

GAS + # LINES > 1000
EM BAND STRENGTH
TOTAL FOR GAS

Helium UV 4843 11,901
Lines = 5 Visible 1416
IR 5742
Krypton UV 12,370 151,290
Lines = 45 Visible 38,910
IR 100,010
Mercury UV 38,761 55,371
Lines = 9 Visible 9950
IR 6660
Xenon UV 12,370 168,326
Lines = 46 Visible 55,040
IR 93,329
Neon UV 30,526 266,823
Lines = 86 Visible 6712
IR 212,795
Argon UV 17,015 418,460
Lines = 32 Visible 33,549
IR 382,837

Other gases, that have not been examined due to toxicity and/or chemical reactivity, include Fluorine, Bromine and Chlorine. Each gas has certain aspects which are very appealing for use. For example, Bromine has nearly 10 times the UV output of Mercury, 9 times the visible output over Xenon and about 2.5 times the IR output of Argon. Due to the chemical reactivity of these gases, they should never be used in a tube with an internal electrode, probably only in a quartz tube with ultraviolet shielding.

The internal electrodes of the plasma tube may vary quite a bit. If using standard or common Neon sign tubing, cold cathode type electrodes with flexible woven connecting leads for power input should be used. Electrodes with solid copper connecting leads will quickly break the wire lead. The two internal electrodes are known as a cathode and an anode. The anode in this unit should be a piece of round barstock with a sloping face on it, attached to the tube. The cathode may be a piece of the same round barstock except that it generally has a flat face perpendicular to the anode support. The anode has an angle on its face between 17 DEG and 22 DEG . The greater the anode angle, the more energy required for a particle to leave the face of the anode parallel to the cathode face. The narrower the anode face angle, the less energy that is needed for a particle to leave the anode face parallel to the cathode face. As a result, the main beam comes out of the tube at a glancing angle, instead of at 90 DEG , therefore the subject being treated will have to be positioned accordingly.

The cathode may be formed with a point in the center of it to better disperse the radio frequency energy. The cathode may be nothing more than a pointed tip at the end of the support rod. The cathode also may be round and flat faced with multiple sharp needles projecting outward toward to anode. As a rule, the anode and cathode should not be placed nearer

than 1 cm. apart, preferably around 2.5 cm. apart. This is exemplified in FIG. 5. The tube 16 is shown containing anode 30 and cathode 32. The anode 30 has a flat angled face 34. The cathode 32 has a flat face 36 with a plurality of sharp needles 38 projecting therefrom.

The anode and cathode should be constructed from non-porous, heat-tolerant material, such as steel, stainless steel, tungsten, kovar, tantalum or nickel/chrome-plated brass. Porous metals, such as silver, gold, brass, tin, aluminum and copper, trap small amounts of gases and impurities that may leak into the tube over time and contaminate it. Further, the electrodes do become quite hot under the influence of radio frequency, thus some metals may melt, destroying the tube.

If a tube without electrodes is used to practice the invention, the tube must be wrapped with a flat braided wire. This is best seen in FIGS. 2, 3 and 4. Referring to FIG. 4, the tube should be wrapped with approximately one turn of wire before two automotive hose clamps 40 are mounted on the tube, securing the wire thereto. Preferably, on a 16-inch long tube, the clamps should be located approximately 12 inches apart. Another method would be to attached the wire to the electrodes at the end of the tube. This method is not recommended because of the difficulty in lighting the gas.

Referring to FIG. 2, wrapping the tube with a spiral of wire is possible, but care must be taken in doing so. This method may produce a condition in which the plasma tends to twist and distort and in some cases, not light. If not done properly, too much current density prevents plasma. Argon-filled tubes seem to work well with this method.

A focused metallic reflector behind the tube tends to help direct the light waves and intensify some of the devices effects.

The precise nature of a plasma wave, the energy produced in a plasma tube, is not clear. One theory has it that the radio wave, with its attached or modulated audio wave, is attached to the light generated in the plasma tube. Possibly, the light waves are modulated onto the radio-audio waves. Yet another theory is that an entirely new form of energy is created which has properties common to sound, light and radio waves, but also properties which are not common.

Within the plasma tube, the audio frequency is spread about longitudinally, the light travels in longitudinal waves and the radio waves are disbursed vertically or horizontally from a standard antenna. The vector interface of these three forms of vibration in cellular structures may be a contributing factor in the device's ability to cause the devitalization of small organisms. The heterodyning occurring within the plasma tube also may account for literally thousands of different frequencies.

Although the above has been directed primarily toward eradication of malignant cells, the device also may be employed for other beneficial purposes. During development of the present device, it was observed that insects were irritated by the transmitted waves. Although sustained large doses transmitted waves may be lethal to human beings, experimentation with frequency and power levels should result in a device that is harmless to humans, yet annoying to insects such that they are driven from an area, such as a house or farmer's field. The output signal of the present device may be directed toward an insect population to drive them from a location.