



The Fire-Bolt™ is a High Powered Anti-Shark Repellent System for Surfboards

Using the advanced principles of Pulsed Powered Physics, a new generation of Shark Repelling Devices exceeds the range and intensity capabilities of existing electronic shark deterrents, including both the low voltage and the passive magnetic types.

A few Words about Intensity when dealing with large Sharks:

The idea of a “shark deterrent” suggests words like self-control, moderation, curb, curtail, check, hindrance, interference, obstruction, and intervention.

The Fire-Bolt System™ was developed with defining words like quell, overcome, suppress, subdue, crush, overwhelm, smother, overpower, stifle, and render unconscious.

The Fire-Bolt System™ is designed to launch high-powered, electro-magnetic field pulses by switching high-voltage storage banks built into the surfboard. The resulting pulses last for several milliseconds while reversing the high voltage field in the surrounding water. The pulse amplitude can be varied, but at full power, this signal is likely to be seen by the Navy and Coast Guard for dozens of miles around, making for an effective distress signal when pulsed as an S.O.S. pattern.

This Fire-Bolt System™ works on several levels at the same time. First, there is the “Noisy Power Supply Sound” which emits a constant electro-magnetic buzz that changes in tone with varying conditions.

Secondly, large-area electrodes inside the surfboard maintain a high voltage electric field around the surfboard. The strength of this DC electric field can easily exceed the range of permanent magnets, making it more effective as a long range repellent, rather than a local deterrent.

The third and most abrupt aspect of the Fire-Bolt System™ is its magnetic pulse capability. This is like having a million-watt flashbulb go off; the shark is “blinded” into basal confusion, its own subconscious motor responses temporarily paralyzed. This gives the surfer more time to paddle away. With enough distance, the shark will recover its senses and swim as fast as possible away from that “loud painful thing”.

Keeping the system on the lowest setting and frequency throughout the day sends a warning out on a regular basis for sharks to stay out of the area, and purposely extends the battery life. However, at a moment’s notice, both the Intensity and the Frequency can be increased to levels that will stun a nearby shark’s senses and brain functions into total shut down, near comatose.

Given this shocking experience just once, any ‘newly conditioned’ sharks will recognize the Noisy Power Supply Sound in the future and stay as far away as possible. Like being stung by an unknown animal in the wild, -once is all it takes. From there on, one Fire-Bolt™ Surfboard in the water can protect all the surfers and swimmers in that same local area.



The Fire-Bolt™ is the first High Powered, Anti-Shark Repellent System.

The Fire-Bolt System™ utilizes high voltage, pulsed power technology to produce much stronger electromagnetic fields over a considerably larger region than current technologies. This pulsed power system has the added advantages of farther field propagation, greater impact on the shark’s sensory organs, and longer battery life during standby.

Upon command, the Fire-Bolt™ discharges the high voltage bank into the Main Radar Pulse Coil. This generates large, sharp magnetic pulses into the surrounding water. At the same time, the static electrodes undergo a rapid transition from a Dipole Field to a Monopole Field, causing a high-powered ripple effect in the local electric field. This is very un-natural, confusing, and painful to the shark, and its 10M-year-old sensory array.

The unique physics of a strong magnetic pulse and an extremely sharp rise-time in the electric field produces a harsh warning sign. More importantly, the Fire-Bolt’s™ electro-magnetic pulses are about 25 Billion times stronger than anything sharks currently sense in Nature. These electro-magnetic bursts will instinctively cause sharks to fear for their life; seen as “heart-beats” these extreme pulses will appear absolutely Goliath to them.

The following analogy can help put the Fire-Bolt System™ into perspective with other electronic and magnetic shark deterrent devices. The electro-magnetic sensitivity of most sharks is under 10 nanoVolts/cm. (ten billionths of a volt across a 1/3 of an inch). This is roughly equivalent to sensing the lightest feather on their snout. Most of the shark deterrent devices available today are more of a nuisance than an actual hard persuasion. These devices are more like poking a sharp twig or tree bough in their face. This is not always convincing to larger sharks.

In contrast, the Fire-Bolt™ is designed more like an electro-magnetic sledgehammer on the low setting, and more like a wrecking-ball on the high setting. A shark’s only chance of avoiding serious sensory pain is to stay as far away as possible; 100’s if not 1,000’s of yards out of their so-called “hearing” range. The distinct characteristics of this E-M pulse are shown in Figure 1.

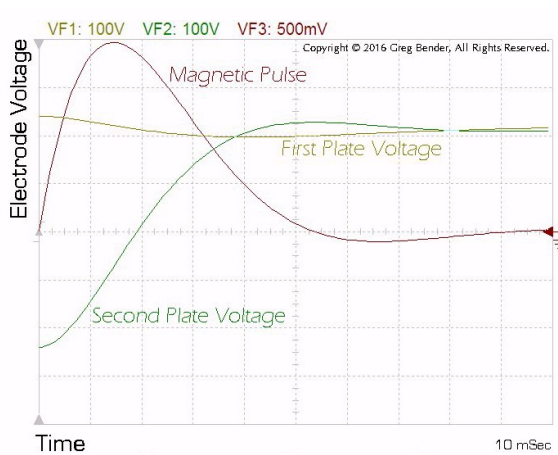


Figure 1a. This graph shows the characteristics of the Magnetic Pulse fired from the Main Radar Pulse Coil during a transition pulse.

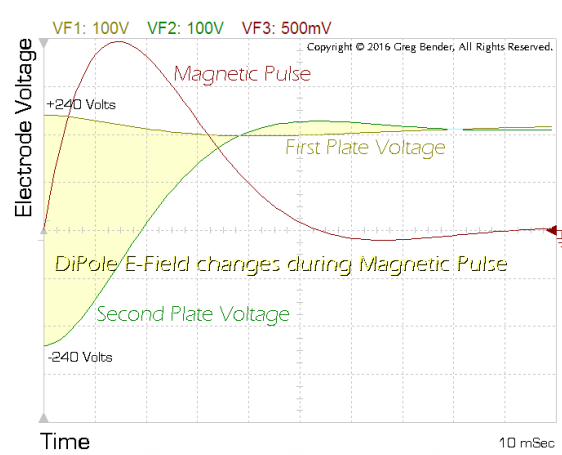
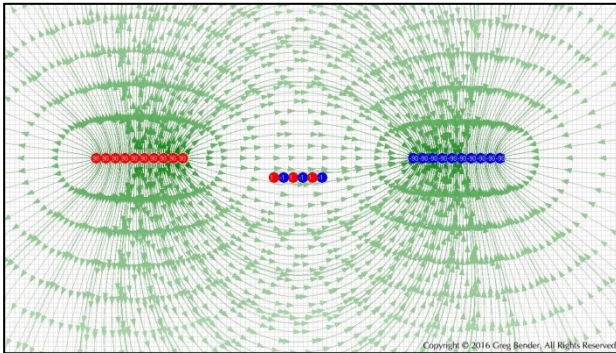


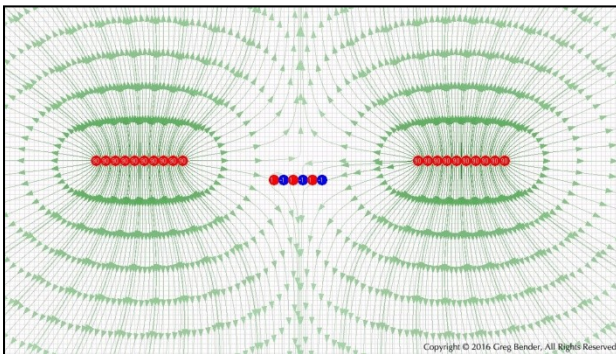
Figure 1b. The Dual Electrodes form a Dipole Circuit. This creates a rapidly changing Electric Field during the Magnetic Pulse.

Dual Electrodes Can Reshape E-Fields During Abrupt Transitions

By sequencing the pulses on two HV Dipole Electrodes, the electric field lines will transition between four dramatically different stages and polarities. These extreme and rapid changes between E-field shapes are likely to cause the most disorientation and un-natural shock to the shark's senses.

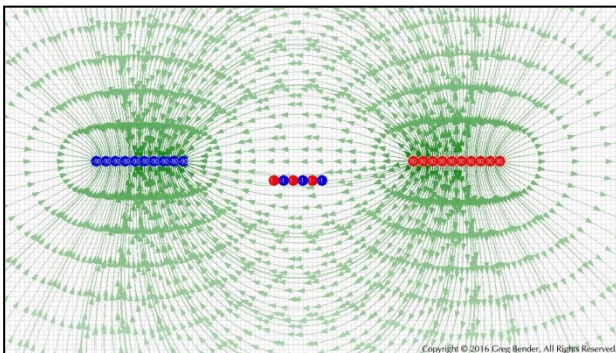


Stage 1. Dipole Electrodes start a Pulsed Transition toward positive.



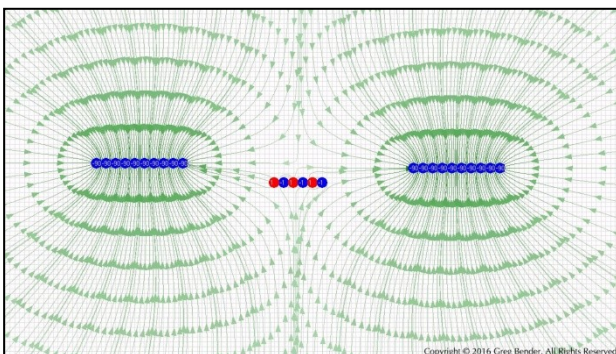
Stage 2. Both Electrodes are forced positive into a Monopole.

Once the transition is complete, both electrodes are brought to the same high voltage level and stay charged as a Monopole. This keeps a strong, constant DC E-field in the surrounding water as a stable deterrent. By using two electrodes spaced apart inside the surfboard, a stronger DC E-field can spread out farther in water and cover more area than a small group of magnets.



Stage 3. Dipole Electrodes start a Pulsed Transition toward negative.

Either by timer, the panic button, or large drops in the DC E-field, the control unit automatically fires in a microsecond and resets the E-field to the opposite polarity. This is something that cannot be done with solid magnets. Because these transitions are extremely fast, the electromagnetic pulses from the Main Radar Pulse Coil will propagate 1000's of times farther than the steady-state M-field of a permanent magnet.



Stage 4. Both Electrodes are forced negative into a Monopole.

It is important that sharks' senses never adapt to this high voltage E-field stimulus. By regularly changing polarities on the DC deterrent E-field, the shark's sensory array cannot "drift" towards an offset level and over time become numb or acclimated to a single DC bias voltage. Moreover, the harsh transition pulses are sure to scramble any level of calm & comfort.



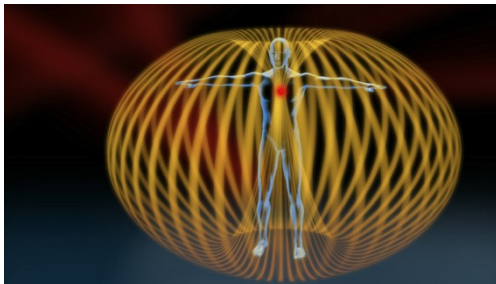
The Fire-Bolt™ System Controls

Timer Setting: This sets the frequency between automatic pulses, from 1 pulse per second to approximately 1 pulse every hour. Should the charge on the electrode plates drop below 50%, the system will fire again and reset the electrode voltage to the opposite polarity, using the same Intensity Setting.

Intensity Setting: Figure 2. shows the level of voltage that will be applied to the Main Radar Pulse Coil when the system is discharged. The Intensity Control can be varied between 50V_{DC} and 240V_{DC}. All High Voltage Cautions and Safety Interlocks must be in place before the Fire-Bolt System™ will charge up and fire.

Variable Pulses: An additional signal may be added to the Timer to produce a seemingly random pattern of pulsed discharges. This adds to a level of “unpredictability” that further prevents the sharks’ senses from becoming acclimated to these purposely-invasive electro-magnetic field pulses.

Panic Button: Under normal conditions, the power banks are fully charged and ready to pulse the Main Radar Pulse Coil. Hitting the Panic Button will discharge the banks into the Main Coil immediately. After that, at least a full second is required for the power banks to re-charge enough to fire pulses continuously. This generates a constant barrage of painful, over-stimulated pulses every second that can incapacitate the shark’s basal brain functions, forcing temporary sensory “blindness”, disorientation, incapacitation, and catatonic response. This allows plenty of time for the surfer(s) to paddle farther away and signal for help.



The surfer is actually standing in the safest place, in the center of the toroidal field produced by the Main Radar Pulse Coil. Most of the energy is focused into the water due to its much higher conductivity. More importantly, Humans do not have the extreme sensitivity to electromagnetic waves that sharks do. These pulses are designed to overload the sharks’ sensory organs only, and not actually physically harm them in any way.

Dual Battery System: This is a paramount aspect for extended safety. Only one battery is used at a time. As with any system, as the battery wears down, so does the signal. This droop in signal intensity can be sensed by the sharks, which are now both confused and curious. Any sign of diminishing signal strength will bring their curiosity closer. When the primary battery reaches

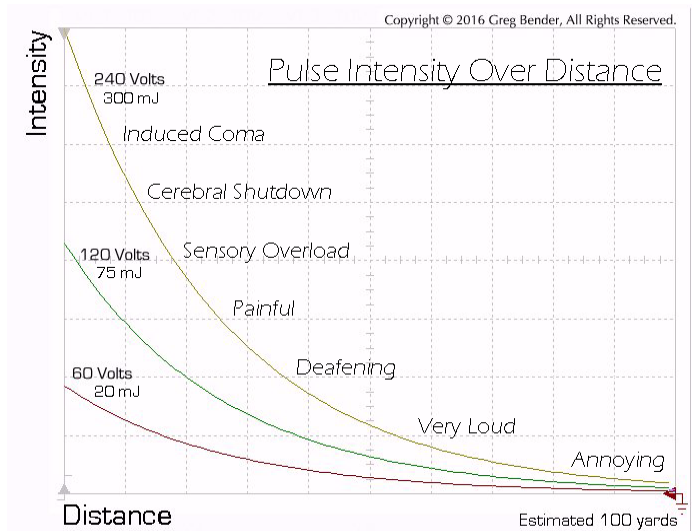


Figure 2. This graph shows the relative intensity of the HV magnetic pulses as the shark gets closer to the Main Radar Pulse Coil. While the Intensity Setting should be kept on low to extend battery life, it can be increased at any time.

roughly half power, the second battery will be switched on automatically, bringing full power back to the pulses, again surprising the sharks' senses into "fearing-for-its-own-life" and causing another immediate retreat. This second battery, this 'second-wind' of intensity is paramount in convincing the sharks they are still the prey. It is also a good sign for the surfer(s) to return to shore.

Battery Life: This is mostly dependent on the amp-hour rating of the batteries used. Secondly, the Frequency and Intensity Settings are important. When on standby, the high efficiency of this pulsed-powered system should extend one battery charge to 24 hours or more. However, firing maximum pulses every second under emergency conditions, the battery charge should last for about 2 hours before the second battery is required. This is more than enough time to stun any local sharks into a coma and still get back to shore safely.

Also, the Future-Spark R&D Center has proprietary plans for more permanent, solar-powered versions that will be installed on piers and buoys in and around popular public beaches.

The **Fire-Bolt™ Product Line** is now ready for fast-track development into production, to be marketed worldwide with various models and product trade names. The circuitry has been thoroughly verified with software simulations, the PCB layout has been planned, and key components have been chosen. Future-Spark R&D is currently seeking equity investors.

For anyone who is interested in getting involved with building, testing, owning, or distributing the Fire-Bolt System™, please send an email to greg@future-spark.com with "fire-bolt" in the subject line and a brief message with your questions and/or interests. Thank you in advance.

All proprietary technology covering this full line of shark repelling products, initially known as the Fire-Bolt™ and the Fire-Bolt System™, are held by Greg Bender and the Future-Spark R&D Center. This includes any of the similarly associated names listed below, any and all schematics, drawings, logos, prototypes, models, product variations, and accessories; all of which are currently covered under standard copyright, trademark, proprietary, and trade secret laws. Of course, serious equity investment offers are welcomed.

Lightning Shock
Shark Shock
Shark Fright
Shark Stun
Shark-Shock
Shark Scare

Sharks' Panic
Shark Daze
Shark-Bolt
Shark Strike
Shark Stryker
Shark-Volt



Firebolt
Fire-Bolt™
FireVolt
Thunderbolt
Thunder-Bolt
ThunderVolt

Copyright © 2016, [Greg Bender](#) & [Future-Spark R&D Center](#), All Rights Reserved. All Trademarks Reserved. This document contains Proprietary and Trade Secret Information, No Rights Implied.