**Sonic *Weapons***

**Infrasound Holds a Terrible Secret in its Silent Roar**

**The Sonic Weapon of Vladimir Gavreau**
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HE listened and closed his eyes as the rolling waves of sound poured over and through his being. Thrilling, intoxicating, the hysteria of heaven, the enthralled and frightening flight of angels. Electrifying. Messaien's organ music signaled messages of meaning, titanic foghorns ululating among dimly perceived near-worlds. Olivier Messaien, master composer of musical expressionism, used the ground thrumming tones of great Parisian cathedral organs to evoke sensations which may only be called otherworldly. Masterfully macabre. Black foundations, blue pillars, and rainbow ceilings.

Sound, rhythm, and space. Ultra-chromatic chord frames, rising like rock walls from the black depths. And immense stellar crystallizations, radiating tonal perfumes through deep and black radiant space. Lovely and lyrically swooping melodies, the flight of birds through delicate limbs. And melodic lines, reaching up toward unknown depths of space, each had their foundation in ultrabass tones of rooted depth. The basso profunda of Messaien are the critical foundations, the strong vertical pillars of an immense architecture which extends beyond performance walls. He scoured the deep and unreachable roots of worlds to hold his musical cathedrals together. Such majesty and grandeur of sound! Rich in the intelligence which flooded and made the world, the musical currents and the atmosphere of tones. Fluidic music and meaning.

The most fundamental signals which permeate this world are inaudible. They not only surpass our hearing, but they undergird our being. Natural infrasounds rumble through experience daily. There manifestations are fortunately infrequent and incoherent. Infrasound is inaudible to human hearing, being of pitch below 15 cycles per second. The bottom human limit. The plynth. The foundation. Infrasound is not heard, it is felt. Infrasound holds a terrible secret in its silent roar.

Infrasound produces varied physiological sensations which begin as vague "irritations". At certain pitch, infrasound produces physical pressure. At specific low intensity, fear and disorientation. Nazi propaganda engineers methodically used infrasound to stir up the hostilities of crowds who were gathered to hear their madman. The results are historical nightmares.

At a very specific pitch, infrasound explodes matter. At others, infrasound incapacitates and kills. Organisms rupture in its blast. Sea creatures use this power to stun and kill prey.

The swelling bass tones of the cathedral seem as though they can burst the very pillars which uphold the ancient vaults. Stained glass windows have been known to erupt in a shower of colored fragments from the organ's basso profunda. Impulsed ultrabass tones...thunder. Somewhere in the almost inaudible roll of these basement sounds there was a devastating and fearful power.

THE ABYSS

The Cold War was on. The United States alone held the dread secret. The most terrible weapon yet developed was the private property of one government. The mere existence of the atomic bomb was threat to nations whose motives were not entirely altruistic. Motivated, aggressive, and imperialistic, obtaining atomic bomb data was a priority for several nations. The only manner in which some nations obtained the secret was by stealing it. When Stalin's science officers finally developed an atomic duplicate of the American bomb, pressure suddenly was placed upon every other European nation to achieve an equivalent or better device.

When one seeks to defend one's borders, the consequences of releasing weapons of devastation to the world do not seem important. Weaponry is death-oriented by nature. But there are moral differences between weapons of defense and weapons of offense. Previous to this atomic proliferation, competing nations concentrated their weapons research on truly bizarre and equally deadly means for defending their national boundaries. A great variety of such deadly weapons were perfected in rapid succession. This included deadly variations and combinations of gas weaponry, pathogenic agents, and radiant weaponry. Stalin's research teams investigated psychic powers as a possible means for destroying an enemy. Psychotronic warfare was developed among numerous groups, both private and national, with measurable success. Information on some simpler psychotronic weapons have recently been obtained through an increasing process of Soviet disclosure.

In truth, the larger the weaponry the less safe the national boundaries truly were. While the superpowers concentrated their weapons development programs on mass-destructive nuclear weaponry, others focused on more practical conventions. The limited tactical warfare of small battlefields seemed a more immediate need. While developing their own atomic device, France sought defensive tactical weaponry on every possible technological front. Short range weapons would best defend against a conventional national assault. But other systems were also sought; systems which, though non-nuclear, were equally invincible. As the great Frankish Knight, Charles "the Hammer" Martel repelled ruthless invaders from the medieval east, so a new hammer would be sought to defend France against possible new enemies from the east. Even as Charles Martel arose from obscurity, so this strange new "hammer" would arise in equal obscurity.

GAVREAU

The central research theme of Dr. Vladimir Gavreau was the development of remote controlled automatons and robotic devices. To this end he assembled a group of scientists in 1957. The group, including Marcel Miane, Henri Saul, and Raymond Comdat, successfully developed a great variety of robotic devices for industrial and military purposes. In the course of developing mobile robots for use in battlefields and industrial fields, Dr. Gavreau and his staff made a strange and astounding observation which, not only interrupted their work, but became their major research theme.

Housed in a large concrete building, the entire group periodically experienced a disconcerting nausea which flooded the research facility. Day after day, for weeks at a time, the symptoms plagued the researchers. Called to inspect the situation, industrial examiners also fell victim to the malady. It was thought that the condition was caused by pathogens, a "building sickness". No such agencies were ever biologically detected. Yet the condition prevailed. Research schedules now seriously interrupted, a complete examination of the building was called.

The researchers noticed that the mysterious nauseations ceased when certain laboratory windows were blocked. It was then assumed that "chemical gas emissions" of some kind were responsible for the malady, and so a thorough search of the building was undertaken. While no noxious fumes could be detected by any technical means, the source was finally traced by building engineers to an improperly installed motor-driven ventilator. The engineers at first thought that this motor might be emitting noxious fumes, possibly evaporated oils and lubricants. But no evaporated products were ever detected. It was found that the loosely poised low speed motor, poised in its cavernous duct of several stories, was developing "nauseating vibrations".

The mystery magnified for Dr. Gavreau and his team, when they tried to measure the sound intensity and pitch. Failing to register any acoustic readings at all, the team doubted the assessment of the building engineers. Nevertheless, closing the windows blocked the sense of nausea. In a step of brilliant scientific reasoning, Gavreau and his colleagues realized that the sound with which they were dealing was so low in pitch that it could not register on any available microphonic detector. The data was costly to the crew.

They could not pursue the "search" for long time periods. During the very course of tracking the sound down, an accidental direct exposure rendered them all extremely ill for hours. When finally measured, it was found that a low intensity pitch of a fundamental 7 cycles per second was being produced. Furthermore, this infrasonic pitch was not one of great intensity either. It became obvious that the slow vibrating motor was activating an infrasonic resonant mode in the large concrete duct. Operating as the vibrating "tongue" of an immense "organ pipe", the rattling motor produced nauseating infrasound. Coupled with the rest of the concrete building, a cavernous industrial enclosure, the vibrating air column formed a bizarre infrasonic "amplifier".

Knowledge of this infrasonic configuration also explained why shutting the windows was mildly effective in "blocking the malady". The windows altered the total resonant profile of the building, shifting the infrasonic pitch and intensity. Since this time, others have noted the personally damaging effects of such infrasonic generation in office buildings and industrial facilities. The nauseating effects of exposure to a low intensity natural or manmade infrasonic source is now well appreciated.

It has become a routine architectural procedure to seek out and alter any possible such resonant cavities. The sources often appear in older buildings, the result of construction rendered faulty by previous lack of this knowledge. All such "improper" architectural formats are modified by the additions of sound-blocking materials.

WHISTLES

Dr. Gavreau and his research team now carefully investigated the effects of their "infrasonic organ" at various intensity levels and pitch. Changing the spring tension on shock mounts which held the fan motor, it was possible to change the pitch. Various infrasonic resonances were established throughout the large research building. Shutting the windows blocked most of the symptoms. When the window was again opened, however weak as the source was made, the team felt the nauseating effects once again.

In the business of military research, Dr. Gavreau believed he had discovered a new and previously "unknown weapon" in these infrasounds. Aware of the natural explosives by which infrasonics are generated, Dr. Gavreau began to speculate on the application of infrasonics as a defense initiative. The haphazard explosive effects of natural infrasound in thunderclaps were quite effective in demonstrating what an artificial "thunder-maker" could do. But, how could a thunderclap be artificially generated in a compact system? These thoughts stimulated theoretical discussions on the possibility of producing coherent infrasound: an infrasonic "laser".

The first devices Dr. Gavreau implemented were designed to imitate the "accident" which first made his research group aware of infrasonics. They designed real organ pipes of exceedingly great width and length. The first of these was six feet in diameter and seventy five feet long. These designs were tested outdoors, securely propped against protective sound-absorbent walls. The investigators stood at a great distance. Two forms of these infrasonic organ pipes were built. The first utilized a drive piston which pulsed the pipe output. The second utilized compressed air in a more conventional manner.

The main resonant frequency of these pipes occurred in the "range of death", found to lie between three and seven cycles per second. These sounds could not be humanly heard, a distinct advantage for a defense system. The effects were felt however. The symptoms come on rapidly and unexpectedly, though the pipes were operating for a few seconds. Their pressure waves impacted against the entire body in a terrible and inescapable grip. The grip was a pressure which came in on one from all sides simultaneously, an envelope of death.

Next came the pain, dull infrasonic pressure against the eyes and ears. Then came a frightening manifestation on the material supports of the device itself. With sustained operation of the pipe, a sudden rumble rocked the area, nearly destroying the test building. Every pillar and joint of the massive structure bolted and moved. One of the technicians managed to ignore the pain enough to shut down the power supply.

These experiments with infrasonics were as dangerous as those early investigations of nuclear energy. Dr. Gavreau and his associates were dangerously ill for nearly a day after these preliminary tests. These maladies were sustained for hours after the device was turned off. Infrasonic assaults on the body are the more lethal because they come with dreadful silence. The eyesight of Dr. Gavreau and his fellow workers were affected for days. More dangerously were their internal organs affected: the heart, lungs, stomach, intestinal cavity were filled with continual painful spasms for an equal time period.

Musculature convulses, torques, and tears were the symptoms of infrasonic exposure. All the resonant body cavities absorbed the self-destructive acoustic energy, and would have been torn apart had the power not been extinguished at that precise moment. The effectiveness of infrasound as a defense weapon of frightening power having been demonstrated "to satisfaction", more questions were asked. After this dreadful accident, approaching the equipment once again was almost a fearful exercise. How powerful could the output of an infrasonic device be raised before even the operating engineers were affected?

With greatest caution and respect for the power with which they worked, Dr. Gavreau began recalculating all of his design parameters. He had grossly misjudged the power released by the pipes. He had, in fact, greatly lowered those calculated outputs for diagnostic purposes. Never had he imagined that these figures were actually far too great in the world of infrasound!

Empirical data being the only way to determine how infrasonic energy correlated with both biological and material effect, the tests were again attempted with a miniature power supply. First, the dimensions of these devices had to be greatly reduced. Their extreme length was objectionable. In order to provide absolutely safe control of the deadly blasts, several emergency cutoff switches were provided. These responded to the radiated infrasonic pressure wave. the intensity could be absolutely limited by use of automated barometric switches.

In an attempt to achieve more compact and controllable infrasound generators, Dr. Gavreau designed and tested special horns and "whistles" of various volumes. These were each remarkably simple flat circular resonant cavities, having a side output duct. They were simply the large analogues of foghorns and police whistles. These flat forms were volumetrically reduced in successive design stages because it was found that their output was far too great. The infrasonic foghorns could produce a frightening two kilowatts of infrasonic energy, at a pitch of one hundred fifty cycles per second.

The flat "police whistles" were more easily designed to required specifications. Their overall characteristics were quite simple to determine, a mathematical formula being devised for the purpose. The whistle's resonant pitch was found by dividing its diameter into a numerical constant of 51. Increasing the depth of the whistle effectively increased its amplitude. A whistle 1.3 meters in diameter produced an infrasonic pitch of 37 cycles per second. This form violently shook the walls of the entire laboratory complex, though its intensity was less than 2 watts infrasonic power.

DANGER

Not much amplitude is required for infrasound to produce physiological malady. Several researchers accidentally did themselves great harm when, by deliberate intent or accident, they succeeded in generating infrasonic vibrations. Tesla used vibrating platforms as an aid to vitality. He delighted in "toning the body" with vibrational platforms of his own design. Mounted on heavy rubber pads, these platforms were vibrated by simple motorized "eccentric" wheels.

Their mild use, for a minute, could be pleasantly stimulating. The effects invigorating the whole body for hours thereafter. Excessive use would produce grave illness however, excessive aggravations of the heart being the most dangerous aspect of the stimulation. The entire body "rang" for hours with an elevated heart rate and greatly stimulated blood pressure. The effects could be deadly.

In one historic instance, Samuel Clemens, Tesla's close friend, refused to descend from the vibrating platform. Tesla was sorry he had allowed him to mount it. After repeated warnings, Tesla's concern was drowned out by both the vibrating machine and Clemens' jubilant exaltations and praises. Several more seconds and Clemens nearly soiled his white suit, the effects of infrasound being "duly recorded".

Tesla often went to great lengths in describing the effects of infrasounds to newspaper reporters who, behind his back, scoffed at the notion that a "little sound" could effect such devastations. Yet, it was precisely with such a "little sound" that Tesla nearly brought down his laboratory on Houston Street. His compact infrasonic impulsers were terribly efficient. Tesla later designed and tested infrasonic impulse weapons capable of wrecking buildings and whole cities on command.

Walt Disney and his artists were once made seriously ill when a sound effect, intended for a short cartoon scene, was slowed down several times on a tape machine and amplified through a theater sound system. The original sound source was a soldering iron, whose buzzing 60 cycle tone was lowered five times to 12 cycles. This tone produced a lingering nausea in the crew which lasted for days.

Physiology seems to remain paralyzed by infrasound. Infrasound stimulates middle ear disruptions, ruining organismic equilibrium. The effect is like severe and prolonged seasickness. Infrasound immobilizes its victims. Restoration to normal vitality requires several hours, or even days. Exposure to mild infrasound intensities produces illness, but increased intensities result in death. Alarming responses to infrasound have been accurately recorded by military medical experts.

Tolerances from 40 to 100 cycles per second have been recorded by military examiners. The results are sobering ones. As infrasonic pitches decrease, the deadly symptoms increase. Altered cardiac rhythms, with pulse rates rising to 40 percent of their rest values, are the precursors to other pre-lethal states. Mild nausea, giddiness, skin flushing, and body tingling occur at 100 cycles per second. Vertigo, anxiety, extreme fatigue, throat pressure, and respiratory dysfunction follow. Coughing, severe sternal pressure, choking, excessive salivation, extreme swallowing pains, inability to breathe, headache, and abdominal pain occur between 60 and 73 cycles per second. Post exposure fatigue is marked. Certain subjects continued to cough for half an hour, while many continued the skin-flush manifestation for up to four hours.

Significant visual acuity decrements are noted when humans are exposed to infrasounds between 43 and 73 cycles per second. Intelligibility scores for persons exposed, fall to a low of 77 percent their normal scores. Spatial orientation becomes completely distorted. Muscular coordination and equilibrium falter considerably. Depressed manual dexterity and slurred speech have been noted before individuals blackout. Just before this point, a significant loss in intelligibility is noted.

The findings of Dr. Gavreau in the infrasonic range between 1 and 10 cycles per second are truly shocking. Lethal infrasonic pitch lies in the 7 cycle range. Small amplitude increases affect human behavior in this pitch range. Intellectual activity is first inhibited, blocked, and then destroyed. As the amplitude is increased, several disconcerting responses had been noted. These responses begin as complete neurological interference. The action of the medulla is physiologically blocked, its autonomic functions cease.

WATCHMEN

Infrasound clings to the ground, a phenomenon well known in the animal world. Female vocalizations and those of their young, take their traceable routes through the air. High pitched sounds are aerial in nature. This makes females and young natural targets for predators. Low pitched tones cling to the ground, being "guided" along the soil layers. Male vocalizations cannot be localized by predators. Male sounds "hug the ground", diffusing out from their source. Some males rumble the ground with voice and hooves. These are communications signals which they alone comprehend.

The fact that the ground draws and guides low frequency tones is a remarkable gift to the animal kingdom, enhancing the survival of male leaders. When herds are attacked by predators, the males can continue to give guidance to their companions, while remaining completely "invisible" and elusive. Predators cannot locate the voices and rumblings of male leaders because their low pitched signals are impossible to pinpoint. They are therefore also impossible to attack. Predators are often overtaken by the males who maintain their diffusive communications across and through the ground.

The same analogies would apply to an infrasonic defense system. First, infrasound does not lose its intensity when travelling very long distances across the ground. They remain at the same intensity as when released from their deadly sources. Also, because of the ground clinging effect, infrasonic sources cannot be located without special appliances. This would work well for those who used the weaponry of infrasound. But suppose some hostile force were themselves using infrasonics? Infrasonics are inaudible. The battle would be over before anyone knew it had begun. How would one know of an infrasonic attack? The first line of defense would therefore be the detection of the "unperceived enemy". The development of an adequate infrasonic weapons systems would first require an infrasound detector.

Dr. Gavreau first concentrated on developing infallible infrasonic detectors for the personal safety of his operators as well as for eventual tactical deployment. He experimented with several designs which followed the arcane analogues of old wireless detectors. One such design used enclosed flames to detect infrasonic pitches. They were reminiscent of those flame detectors developed by Lee De Forest just before his invention of the triode. The flame detectors of Gavreau employed variable resonant cavities. Flame amplitudes shifted with specific infrasonic pitches. He could calibrate the infrasonic intensity as well as the pitch with these detectors. But, flames are dangerous and fickle, not being very reliable in battle.

Dr. Gavreau next experimented with enhanced mechanical barometers. These coupled large resonant cavities with very fine barometer tubes. They displayed great sensitivity. Steady increases in barometric pressure were registered when large cavity bellows were compressed by infrasounds. The sensitivity of these barometers increased as the bellows capacity was increased. They were adequate, but frail.

Another embodiment resembled the early mechanical television designs of John Logie Baird. It utilized large tympani skins, mirrors, lights, and photocells. A mirror was fastened to the tympanum. A light beam flickered when infrasound struck the mirror. The photocell recorded these flickers as an electrical signal. This detector system was very reliable.

By far, the most advanced detectors which Gavreau designed and tested utilized an electrolytic process. In this analogue of systems developed by Fessenden to measure faint wireless signals, chemical solutions and fine wire point electrical contacts were used. Chemical solutions, separated by an osmotic barrier, were forced to migrate through the barriers whenever infrasound traversed the system. This chemical mixture was then measured as an increased electrical conductivity in a sensitive galvanometer. This system was reliable and accurate. All of these systems suffered from one possibility. The offensive use of an incredible infrasonic amplitude would burst them into vapor.

ARMOR

Claims were issued by French authorities, stating that Dr. Gavreau was not developing weapons at all. Several patents, however, betray this conspicuous smoke-screen. While it is impossible to retrieve the actual patents for the infrasonic generators, Dr. Gavreau is credited with extensive development of "infrasonic armor". Why would he "waste" such time and expense if not for an anti-weapons program?

Thus use of infrasonic weaponry necessitates the development and implementation of infrasonic shields. Dr. Gavreau spent more time developing infrasonic shields than on developing efficient infrasonic horns. Infrasound could not adequately be blocked, as Dr. Gavreau discovered early in his research. Infrasonic devices require extremely large baffles.

Furthermore, no one would dare initiate an infrasonic barrage on any invasive force without adequate protection. Infrasonic horns can project their sounds in a given direction, but natural environments "leak" portions of the sound in all directions. Infrasounds saturate their generators, flooding and permeating their sources in a few seconds. They "work their way back" toward those who dispatch their deadly signals. Infrasounds "hug the ground" and spread around their sources. Unfortunately, those who would release infrasonic energy would themselves be slaughtered in the very act.

The first method of Gavreau involves the conversion of infrasound into successively higher pitches, until the infrasonic pitch is "lost". This was achieved in his passive "structural" method, an enormous layered series of baffles and resonant cavities. This form is "passive" since it merely stands and waits for infrasonic barrages, absorbing and converting them into harmless audible tones.

The second method of Gavreau is more active and "aggressive". It actively engages and nullifies any offensive infrasonic power. The nullifier uses a well known physical principle for its operation. As an "active" shield, it transmits tones whose opposing wavefronts destructively interfere with incoming infrasound. Infrasonic attacks are nullified, or at least brought to much weaker levels.

This method requires high speed detection and response systems. The process involves determination of an attack pitch, generation of the same, and projection of the pitch "out of phase". The active nullifier method is not completely accurate or protective by any means. A highly modulated, mobile infrasonic source would be nearly impossible to successfully neutralize without extremely sophisticated electronics.

But an elegantly simple approach was imagined, one which would not require the defender to be exposed to his own infrasonic projections. While fixated on the old notion of gun installations and stations, Gavreau and the team had momentarily forgotten their first research endeavor. Robotics!

THE HAMMER

Let us recall that Dr. Gavreau and his team of pioneers were in the business of robotics. They developed industrial and military automaton systems. How difficult would it have been to couple his newfound weaponry with robotic applications? Dr. Gavreau combined the organ pipe and whistle format. The device was housed in a block of concrete. It was less than a cubic meter in volume. The primary whistle was poised within its interior. At its flared opening were placed several resonant pipes. The device was operated by highly compressed air. Its output was frightful. It was capable, in a conventional engagement, of utterly destroying an aggressor.

This infrasound whistle design was once sealed in an 880 pound concrete pier for tests, a concrete baffle placed over its projective end. Even with these precautions, the device succeeded in absolutely shaking a fan-shaped portion of Marseille. It broke through its supportive concrete pier and destroyed the baffle covering in an instant. Macabre. No sound was ever heard.

This design demonstrated great pitch selectivity, power, and directivity. In this last feature, Gavreau and his team achieved a safety factor of greatest value. Infrasonic defensive armaments could now be safely directed away from the operators against any foe. This weapon was a remarkably compact and efficient device. Its efficiency was gauged by the destructive output and the weapon volume.

A later embodiment of this terror disclosed another compact cube. The infrasonic whistle was presumably housed therein. Proceeding from the front plate were some sixty pipes, flared horns aimed in deadly forward array. It was said that this device alone, remotely guided into an arranged artificial battlefield, burst heavy battlements and tank interiors open with a hideous effortlessness. In addition, several other more frightening and unmentionable disruptions were observed with equal effectiveness. In each, not a sound was ever heard.

The device was mounted and mobilized. A robotic vehicle. Powered by diesel engines or compressed gas, the almost insignificant unit would be a bizarre foe for an army to engage. Preliminary experiments had proven the extreme danger of loosing infrasonic power among Gavreau and his workers. Without automatic remote control mechanisms each technician would succumb to the deadly sound and die, while the machine kept broadcasting its deadly sound. As defensive weaponry, such a device would be terrible and effective. The system would be a true deterrent for those who would be foolish enough to attempt ground assault on any nation so armed. Armies would fall flat. Once the infrasonic horns were unleashed against the foe, the battle would not even begin.

Such a war engine would be impossible to locate. None who saw its size would believe it to contain such a lethal power. Most would overlook the device completely. A flood of such devices, each emanating a peculiar highly modulated blend of infrasound, would be an unstoppable wall. Robotic tanks equipped with infrasonic generators could sweep an area with deadly infrasound, destroying all opponents to within a five mile radius. These terrible infrasonic weapons could easily be secured in drone jets, where aerial assaults could quickly and methodically waste any offensive approaching army.

Deterring would-be aerial attackers could be equally devastating for the offenders. Infrasonic beacons could sweep and scan the skies with a deadly accuracy. Infrasound passes through all matter with equal effectiveness, seeking out offenders with deadly consequence. The intensities which the Gavreau devices effectively broadcast into the environment are frightening. In these devices we see the perfection of phenomena which never naturally occur in such dangerous intensities. This is why these weapons must be deployed by remote control, operating as automatons at great distances from their operators.

Weapons are made to defend, not to offend. In Gavreau's own words: "There does not exist complete protection against infrasound. It is not absorbed by ordinary matter, walls and chambers do not suffice to arrest it". And so, once again, we stand at the cross-roads. We are called, summoned to appear before two pathways. On the one, we hear Messaien and the musical messages of peace. On the other, Gavreau and the musical messages of war. And again we choose. And again we must choose. Whose music will it be?

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