

Soviet strategic radio-frequency and other assault weapons: a primer

by Warren J. Hamerman

The following “primer” has been prepared to complement the May 26, 1987 statement of Lyndon H. LaRouche, Jr. entitled “The next Soviet ‘Sputnik’: strategic radio-frequency assault weapons” (*EIR*, June 5, 1987, page 37). This is by no means conceived to be the last word on the subject, but is rather intended as a guide to those who may wish to explore the area further, as a result of LaRouche’s focusing attention on its strategic implications. Anyone interested in countering a potential Russian assault on the West or in finding the most advanced biophysics research track to stop AIDS must foster this area of science.

What are the radio frequencies?

The Radio-Frequency Electromagnetic—or RFEM—end of the spectrum is characterized by the longer wavelengths and smaller frequencies. It includes long radio waves measured in meters, short waves measured in centimeters, and microwaves measured in millimeters and below. The *in vacuo* wavelengths in this region range from 0.003 all the way up to 1,000 meters. Thus, the significance of this end of the spectrum, especially the millimeter microwaves, is that the wavelengths approximate the physical dimensions of the human body. Biological tissues and organelles and whole bodies are of the same dimension as the wavelengths involved. Formally speaking, RFEM include waves that range in frequency from greater than 0 up to 10^{12} Hz. Therefore, the frequencies associated with the human voice—through all its “registers”—fall within this region. The biological effects of RFEM have been extensively studied on both sides of the Iron Curtain in the frequency range from 3×10^5 to 10^{11} Hz. Unlike ionizing radiation, RFEM must be specified in terms of carrier frequency, modulation, electric-field and magnetic-field strengths (or power density when applicable), and zone of radiation.

What are radio-frequency weapons?

Radio-frequency or RF weapons are any weapons which shoot or send out pulses (p) or continuous waves (cw) in the RFEM end of the electromagnetic spectrum. The 1987 edition of *Soviet Military Power*, published by the Pentagon warned of a massive Soviet research and development effort

in RF weaponry. The March 1987 issue of *Atlantic Monthly* magazine contained an article, quoting various experts in popular language on RF weapons under the title of “The Zap Gap.” One year earlier, the Feb. 15, 1986 *EIR Special Report* entitled “An emergency war plan to fight AIDS and other pandemics,” reported on this capability in a special section on the Pushchino Frank Soviet Institute of Physiology and Biophysics.

What has the Pentagon said about Soviet RF weapons?

Soviet Military Power (1987) warns: “The U.S.S.R. has conducted research in the use of strong radio-frequency signals that have the potential to interfere with or destroy critical electronic components of ballistic missile warheads or satellites. The Soviets could test a ground-based radio-frequency weapon capable of damaging satellites in the 1990s. . . . Recent Soviet developments in radio-frequency generation devices could enable them to build weapons to degrade or destroy electronics or cause disorientation of personnel. They have generated single pulses with peak power exceeding one gigawatt and repetitive pulses over 100 megawatts.”

How is the Soviet war machine organized to force such scientific breakthroughs in areas involving “new physical principles”?

The Soviets are on a full-scale scientific-military war footing, which means that they pour resources into advancing their technological-scientific capabilities in general, so that various weapons applications can literally be pulled “off the laboratory shelf” as military exigencies require. This is the way we used to do things here. This is the essence of the Ogarkov War Plan, which differs from a Western-style war mobilization only in that the Russians do not worry about transferring their capabilities in depth into their civilian economy. Their military-scientific command structure is tightly centralized so that breakthroughs in one of their programs can be quickly and efficiently propagated through other areas. Thus, unlike in the West during peacetime, they closely coordinate developments and goals across the following programs—particle accelerator physics, SDI/ASAT, space ex-

ploration and rocketry physics, plasma physics/fusion, and bio-electromagnetic field effects.

What types of technological capability do they have on the front burner?

The Soviets have a massive capability in particle-physics accelerators. For approximately 15 years they have had a so-called "Super Collider," or a multi-teravolt accelerator, on a par with that at CERN (Centre Européen de Recherches Nucléaires, Geneva). For a little over a decade they have led the field in the development of "oversized" gyrotrons, or what we call in the West a "cross-field klystron," which are instruments originally developed for fusion research to generate pulsed microwaves and other waves in the radio-frequency range. Their fusion energy and plasma physics programs are top-notch. In the electromagnetic pulse (EMP) field the Soviets have gyrotrons which have achieved three to six orders of magnitude higher output than the West. Soviet particle beam capability, from proton and neutron particle beams, to more exotic particle beams, is as good as anywhere in the world.

What would be the short list of immediate scientific-technological commitments of the Soviet military build-up?

1) Radio-frequency weapons. 2) Particle beam weapons of all sorts. 3) Anti-satellite and SDI weapons of all sorts. 4) Weapons and technologies to interfere or "blow out" computers and communications and neutralize Western "smart weapons" over large areas; for instance, EMP effects can be achieved by blowing holes in the ionosphere or so-called "chip guns" which can hone in and destroy the silicon-chip circuitry in all modernized smart weapons and vehicles on land, sea, air, and space. 5) Anti-personnel weapons which can be "broadcast" against specific individuals or a large number of individuals in a given area; these weapons can be "tuned" either to kill, maim, or affect various emotional and thought-pattern states.

These technologies all rest on a firm scientific base which includes the following notable capabilities: a) accelerators, b) antennae, c) electromagnetic field theory, and d) materials development, such as "high-temperature" superconducting ceramics. There is strong evidence that the Soviets, for example, have utilized high-temperature superconductors in the construction of gyrotrons (cross-field klystrons) for over five years. A gyrotron is a "short-wave microwave generator" and the Soviet power output in these is anywhere from three to six orders of magnitude higher than that achieved in the West.

Is the idea of a radio-frequency instrument to essentially "electrocute" a target?

Not at all. There is a vast potential of utilizing such instruments for diagnosing diseases through what is called nonlinear biological spectroscopy, or optical biophysics. We are going to have to gear up this area of science massively if we are going to conquer AIDS and cancer, for example. That

is why we believe that we must launch a crash multibillion-dollar program for a Biological Strategic Defense Initiative, or BSDI. Nuclear Magnetic Resonance (NMR) instruments, for example, rest on these principles. They can "see" inside a human body and distinguish between healthy cells and cells that are part of tumors or are infected by viruses, without a surgeon having to cut into the individual! Since the AIDS viruses, for example, find sanctuary in the brain, NMR may prove essential as a non-invasive spectroscopy.

Even more fundamentally, it is known that the AIDS virus "infects" the DNA of a host cell's chromosome. Suppose that we wanted the nucleus' own "genome" or "genetic message" to eject the virus message during the process of mitosis. To accomplish such a task, we would want to first detect or "tune into" the combined signals. Then we would wish to "detune" the unwanted sources of part of the signal in the overall process. While such a goal is barely a dream today, there are sufficient experimental results for us to be encouraged if we pursued such an experimental path intensively.

By analogy, much of what must be done in such work on the cellular level, has already been done on a much larger scale with phased-array super-sophisticated radars. There are also many encouraging experiments which show that such instruments may be able to cure otherwise incurable diseases. Some of the latest technological frontiers in optical biophysics research on both sides of the Iron Curtain are outlined in a special chapter in the *EIR Quarterly Economic Report*, First Quarter 1987. Most people are miseducated into believing that only the electrical component (E) of a wave carries power. Actually the magnetic component (H) of a wave carries power as well. Like most advanced scientific capabilities, the technological applications of the research can be for either civilian or military purposes, depending upon government direction.

Is the idea of an advanced radio-frequency instrument to "cook" people as if they were in some sort of microwave oven?

No. Of course, there is no dispute that there will be "thermal effects" at high power densities over, say, 100 mW/cm². However, the really advanced work occurs at low power densities, for example, at less than 10 mW/cm². The more advanced researchers all operate from the principle that "thermal" or heating effects are not what's important about this capability.

What is the scientific basis of these technologies?

The mathematical geometries employed are associated with the work of Gauss and Riemann on elliptical functions and differential geometry and *not* the linear algebras and statistics of Newton and Boltzmann. In other words, while the velocity, phase, and rotational components of several waves are calculated separately, they can be integrated as a single elliptical wave geometry inside the biological object. This is "frequency fine tuning" and *not* scalar "calorie count-

ing.” The general scientific principle is as follows. Electromagnetic pulsed waves can generate “acoustical shock-waves” inside biological organisms. What is critical is that the power is delivered in “pulsed” rather than continuous wave (cw) form. The right “mixture” of frequencies can couple into natural physiologic frequencies and resonances. The Soviets have conducted extensive experiments to determine which “species-specific” and “tissue-specific” resonances are most efficient.

Is there a single specific “magic frequency,” so to speak?

No. There is a mixture of frequencies. You can separate someone who is truly knowledgeable about electromagnetic phenomena in biological systems from a novice with one simple test. If the person thinks of electromagnetic wave propagation in terms of one single frequency bathing an object, or a linear wave radiation in a single plane, then he is a novice. If the person thinks in terms of generating an “elliptical wave” *inside* the target(s) he is onto the right area. The concept is to do wave-mixing *inside* the biological object by generating a series of in-phase/out-of-phase relationships at a mixture of frequencies. The entire power deposited on the surface area of the object or objects is then absorbed and can be focused or concentrated at one or two focal points inside the target. The net effect of mixing frequencies inside the object and moving the focal point to certain areas allows for precision fine-tuning on specific organs or organelles of the body. The Soviets are the masters of wave mixing and multiple-frequency effects.

When did the Soviets commit themselves to developing this capability of controlling living processes through “mixing” electromagnetic radiations?

Six decades ago! In 1926 the great Russian scientist Vladimir I. Vernadskii returned from exile at Marie Curie’s Radium Institute in Paris to take over the post of Director of the State Radium Institute in Leningrad, which was essentially created around him. Vernadskii lists as the scientists who most influenced his own outlook B. Riemann, Louis Pasteur, and the Curies. The Curies had intensively studied the work of Louis Pasteur on “molecular dissymmetry” and credit him for being instrumental in their discovery and elaboration of radiation phenomena. In the mid-1920s, the brilliant success of the experimental work of Russian biophysicist Gurwitsch in discovering the phenomena of “mitogenic radiation” no doubt had a major effect on Soviet commitment to this area.

How did Vernadskii view the relationship between electromagnetic radiation and living phenomena?

This is the subject of his life’s work. However, there is a short answer to the question. In his 1926 inaugural address to the Leningrad State Radium Institute later published under the title *The Biosphere*, Vernadskii stated: “We are surrounded and penetrated, at all times and in all places, by eternally changing, combining, and opposing radiations of different

wavelengths—from ten-millionths of a millimeter to several kilometers.” He committed his institute to unraveling the secrets of radiation phenomena in the biosphere: “Only a few of the invisible radiations are known to us at present. We have hardly begun to realize their diversity and the scrappy nature and inadequacy of our knowledge of the radiations which surround us and pass through us in the biosphere, and to understand their basic role in the processes going on around us, a role which is difficult to comprehend by minds accustomed to other conceptions of the universe.”

Vernadskii directed the State Radium Institute from its founding in 1926 to 1938; in 1934 he created and became president of the Soviet Commission for the Study of Heavy Water and oversaw the construction of a cyclotron at the Radium Institute. In 1940 he became director and coordinator of the Soviet wartime crash effort to develop a Russian nuclear bomb. (V.I. Vernadskii, 1926, *The Biosphere*, First and Second Essays, Nauchno-Teckhn. Izd., Leningrad.)

But isn’t Soviet biology backward?

The West has maintained the illusion that Soviet biology is “crude” and “unsophisticated” primarily because of the Lysenko Affair. The Russians have helped to propagate this fairy tale, in part as a way to camouflage their actual capability. In areas such as the 1950s, 1960s, and 1970s technologies of molecular biology instrumentation, the Soviets have lagged behind the West. However, in the biotechnologies of the 1990s and 21st century, this is not true. In the “hard science” areas of biophysics, bioelectromagnetics, and optical biophysics, Russian scientists have field-leading capabilities, even if they lack certain well-known instrumentation-production capabilities.

What are the biological effects of RFEM?

There are three basic types of effects: 1) thermal effects from high-energy microwaves, which are relatively the least efficient; 2) So-called ELF or Extremely Low-Frequency effects which result from lower-powered radio waves at low frequencies; 3) Nonlinear effects which result from geometric wave-mixing inside the biological object. A comprehensive review exists in the public domain by the National Council on Radiation Protection and Measurements (NCRP), issued on April 2, 1986. They report extensively on biological effects researched in the following domains: macromolecular and cellular effects including cell transformations, tumor cells, and cellular genetics; chromosomal and mutagenic effects; carcinogenesis; effects on reproduction, growth, and development; effects on immune and hematopoietic systems; effects on endocrine system; effects on cardiovascular functions; interactions with the blood-brain barrier; interactions with the nervous system; clinical investigations; laboratory exposure investigations; cataractogenesis; and thermoregulatory responses.

Do the Russians have the technological capability to use radio-frequency assault weapons against Western Europe right now?

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Absolutely and emphatically yes.

What is a radio-frequency "chip gun"?

RF transmitters can be tuned to burn out the silicon chip integrated circuits that provide the basis of the electronic "brains" of all so-called modern "smart weapons." At the right frequency, the chips themselves act as miniaturized receiving antennae. Furthermore, at certain frequencies the atmosphere is quite transparent to RF. As with other aspects of the SDI, there is essentially what physicists call a "zero time of flight characteristic." Moreover, there is less resistance from the air with RF than with lasers and particle beams.

What would a "chip gun" be used for?

In regular warfare, they can be used for strategic or tactical purposes, either offensively or defensively. For instance, they could be used to blind reconnaissance satellites or neutralize the super-sophisticated electronic battle management systems such as the E-3 Sentry AWACS and other more advanced systems. Long-range versions of "chip guns" would be used as anti-aircraft weapons to knock out the computer systems of super-sophisticated F-16 aircraft and other systems. Or, as part of the SDI, they could be used to create an entire defense zone behind a kind of "electromagnetic wall." The objective would be to sweep whole regions and disable the "electromagnetic brains" of any military hardware which flew, drove, sailed, or marched into the zone.

Can such weapons be used at long range?

Generally speaking, the smaller the device, the shorter the range. A lot of power is required to transmit over five miles. Nonetheless, one should not forget that the standard test for long-range radars is to send a signal out several light years into space and bounce it back to receive a "clean" signal in return. Astrophysicists do routine radio-frequency probes into deep space.

In addition to deployments of RF in regular warfare, how would RF deployment fit into the Soviet "spetsnaz" or irregular warfare commitment?

One or several medium-sized trucks, with characteristic antennae built into the design of the truck, so that they are not visible, could "broadcast" to directed targets or over an entire area. A swept beam of pulses could also be transmitted from several helicopters or aircraft. Gyrotrons are rather big, but can fit in trucks or aircraft. There also exist smaller varieties of electromagnetic weapons which can be hand-carried as individual anti-personnel weapons to stun, maim, or kill.

Have RF weapons ever been used in warfare situations?

It is well established that the Soviets bombarded the U.S. embassy in Moscow with microwaves over several years. It is believed that such devices may have been used against the Chinese in the late 1960s. Otherwise, their use in other military conflicts, as well as sabotage of U.S. missile launches, has been hypothesized.

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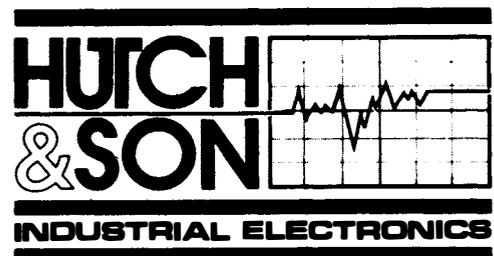
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