

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РФ  
ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ  
БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ  
УЧРЕЖДЕНИЕ  
ВЫСШЕГО ПРОФЕССИОНАЛЬНОГО ОБРАЗОВАНИЯ  
«ВОРОНЕЖСКИЙ ГОСУДАРСТВЕННЫЙ  
УНИВЕРСИТЕТ»

## **ENGLISH FOR STUDENTS OF PHYSICS**

Часть II

Учебное пособие для вузов

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## Unit I. Infra Sound. Part I

*I. Put the paragraphs of the article in the right order to make a text.*

**A.** Others have used this technique as well. Vic Tandy, a lecturer at Coventry University, suggested that the frequency 19 hertz was responsible for many ghost sightings. He was working late one night alone in a supposedly haunted laboratory at Warwick, when he felt very anxious, and saw a grey blob out of the corner of his eye. When he turned to face it, there was nothing there. The following day, he was working on his fencing foil, with the handle held in a vice. Although there was nothing touching it, it started to vibrate wildly. Further investigation led him to discover that the fume hood fan was emitting a frequency of 18.98 Hz, very close to the resonant frequency of the eye also given as 18 Hz in NASA Technical Report 19770013810 by the way. This was why he believed he saw a ghostly figure, believing it was an optical illusion caused by his eyeballs resonating. In addition, the room was exactly half a wavelength in length, and the desk was in the center, thus causing a standing wave which was detected by the foil. Vic investigated this phenomenon further, and wrote a paper entitled *The Ghost in the Machine*. He carried out a number of investigations at various sites believed to be haunted, including the basement of the Tourist Information Bureau next to Coventry Cathedral and Edinburgh Castle. There is just one problem with Vic's consensus. If his eyes were at resonant frequency, he would have still seen the ghost when he looked at it straight on. So the question remains, how do we measure infrasound?

**B.** The precision measurement of Infrasound is an expensive proposition. The trick here is it requires a special microphone and a special preamp. Most consumer electronics and even pro application electronics in the audio field have a frequency response falling somewhere between 20 Hz and 20 KHz, well beyond the realm of infrasound. One site talks about Vic Tandy's *infamous* discovery concerning Infrasound and "haunts" then casually explains how a

*II. Fill in the gaps with the vocabulary units from the article:*

- \_\_\_\_\_ the process by which a substance, a feeling or energy gradually disappears by becoming less strong.
- \_\_\_\_\_ It is believed/ considered that...
- \_\_\_\_\_ as a consequence of...
- \_\_\_\_\_ the end of a gun barrel where the bullets come out.
- \_\_\_\_\_ a weapon consisting of a metal container filled with a substance that explodes, fired from a large gun.
- \_\_\_\_\_ the tools, machines, or other things that you need in a laboratory (informal).
- \_\_\_\_\_ to plan in detail how something will happen.
- \_\_\_\_\_ a powerful spinning current of air or water that pulls everything down inside it.
- \_\_\_\_\_ caught by a tool used for holding an object firmly while you are working with it.
- \_\_\_\_\_ not carefully enough, in a relaxed/ light-minded fashion.

*III. Discussion*

1. What special properties of infrasound do you remember?
2. What natural phenomena can produce infrasound?
3. What are the spheres of its use? Can you think of any more ways of using it?
4. What is known about the pioneers in infrasonic research?
5. What does the controversy of Mr. Tandy's research consist in?
6. Why is it so hard to measure infrasound?
7. What is the overall tone of the article? What can you say about the style?  
Where could it possibly be published?

*IV. Debate.* Can you *justify the use of infrasound* to produce unease in the audience in film soundtracks?

## Unit II. Infra Sound. Part II

**Alpha waves** range between 7 – 12 HZ. This is a place of deep relaxation, but not quite meditation. In Alpha, we begin to access the wealth of creativity that lies just below our conscious awareness - it is the gateway, the entry-point that leads into deeper states of consciousness. Alpha is also **the home-of the window frequency** known as the Schuman Resonance, which is the-resonant frequency of the earth's electromagnetic field.

The Schuman resonances are standing extremely low frequency (ELF) electromagnetic waves. Their frequencies are in the same range as brain waves. They **vary in intensity** locally and temporally, depending on the distance between the surface of the earth and the ionosphere, which form two conducting layers separated by an insulating layer. These ELF waves seem to amplify brain waves, and through the quantum Zeeman-Stark Effect cause other changes. They also drive brain waves of the same frequency and of harmonic frequencies. A \_\_\_\_\_ They have been measured all over the earth. Frequency peaks in cycles per second are reported at 8, 14, 22, 26, 32, and 38. Lightning is believed to also operate in the 8 Cycle Schuman resonance.

What is a Schumann Resonance? The Earth behaves like an enormous electric circuit. The atmosphere is actually a weak conductor and if there were no sources of charge, its existing electric charge would diffuse away over a long period of time (due to the atmosphere's insulative nature). There is a '**cavity**' defined by the surface of the Earth and the inner edge of the ionosphere 55 kilometers up. At any moment, the total charge residing in this cavity is roughly 500,000 Coulombs. There is a vertical current flow between the ground and the ionosphere of  $1 - 3 \times 10^{-12}$  Amperes per square meter. The resistance of the atmosphere is approximately 200 Ohms, so the voltage potential is at around 200,000 Volts.

The electrons that are sent by the sun meet up with the negatively charged ionosphere and are repelled or slowed down and accumulated. The Earth's

atmosphere is an insulator to electrons and they do not have enough inertial energy to penetrate it. B \_\_\_\_\_ The charge keeps increasing until the atmosphere breaks down and the electrons find their way to the Earth in the form of lightning.

This ionospheric (sphere of ions) charge creates an electrical shield around the Earth. This shield then becomes the outer conductor of an electrical sphere (the Earth) within a sphere (the ionosphere). The atmosphere is a **dielectric insulator**, which separates the two. Thus a spherical **capacitor** as well as a spherical resonator is created and maintained. Electrical signals of **sufficient** wavelength (low frequency) are wave-guided around and around between this "sphere within a sphere" and is known as the base Schumann Resonance of 7.8Hz mainly traveling from West to East. During a **solar flare**, the **aurora borealis** is seen as the electrical current through the upper atmosphere increases enough at that altitude to cause secondary emission in the form of light. The key here is amplitude. ANY frequency that is **propagated** at sufficient level will have some effect on the body. C \_\_\_\_\_ So we don't go crazy, and leap off a ship in the middle of the ocean.

Another website shows a tripod mount device with a parabolic reflector and an extremely large tube on the back side of it. From the photos it is hard to tell what sort of element is being used inside the tube, but I will guess it is some model of a standard microphone enclosed in the tube. I am sure they are measuring sound, but they are certainly missing the boat on Infrasound. Consumer available Microphones go down to 15Hz at best. Some people are capable of hearing 15 Hz, so it is not considered infrasound at all, but the low end of audio. Many **subwoofers** mounted in automobiles go down to 15 Hz as evident when one drive's by your house operating at near full volume and your dishes react by vibrating on the shelves. Impressive, but not Infrasound. Parabolic reflectors are used in many cases to provide directivity and gain to audio in the voice spectrum. They are specially designed reflectors for the audio frequency spectrum. The