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THE MECHANISM OF THE TRANSFORMATION OF ELECTRIC AND MAGNETIC FI--ETC(U)
APR 77 M KHVEDELIDZE, S DUMBADZE
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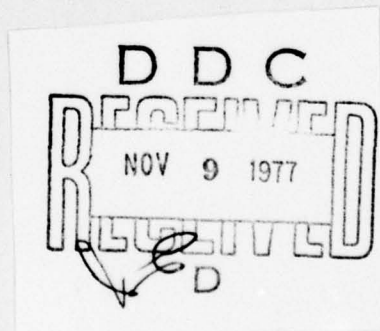
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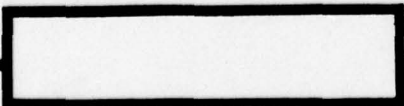
THE MECHANISM OF THE TRANSFORMATION OF ELECTRIC AND MAGNETIC FIELDS IN A. NERVOUS SYSTEM

by

M. Khvedelidze, S. Dumbadze, et al



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THE MECHANISM OF THE TRANSFORMATION OF ELECTRIC AND MAGNETIC FIELD IN A NERVOUS SYSTEM

By: M. Khvedelidze, S. Dumbadze, et al.

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RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English
sin	sin
cos	cos
tg	tan
ctg	cot
sec	sec
cosec	csc
sh	sinh
ch	cosh
th	tanh
cth	coth
sch	sech
csch	csch
arc sin	\sin^{-1}
arc cos	\cos^{-1}
arc tg	\tan^{-1}
arc ctg	\cot^{-1}
arc sec	\sec^{-1}
arc cosec	\csc^{-1}
arc sh	\sinh^{-1}
arc ch	\cosh^{-1}
arc th	\tanh^{-1}
arc cth	\coth^{-1}
arc sch	sech^{-1}
arc csch	csch^{-1}
—	
rot	curl
lg	log

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	А а	A, a	Р р	Р р	R, r
Б б	Б б	B, b	С с	С с	S, s
В в	В в	V, v	Т т	Т т	T, t
Г г	Г г	G, g	У у	У у	U, u
Д д	Д д	D, d	Ф ф	Ф ф	F, f
Е е	Е е	Ye, ye; E, e*	Х х	Х х	Kh, kh
Ж ж	Ж ж	Zh, zh	Ц ц	Ц ц	Ts, ts
З з	З з	Z, z	Ч ч	Ч ч	Ch, ch
И и	И и	I, i	Ш ш	Ш ш	Sh, sh
Й й	Й й	Y, y	Щ щ	Щ щ	Shch, shch
К к	К к	K, k	Ъ ъ	Ъ ъ	"
Л л	Л л	L, l	Ы ы	Ы ы	Y, y
М м	М м	M, m	Ь ь	Ь ь	'
Н н	Н н	N, n	Э э	Э э	E, e
О о	О о	O, o	Ю ю	Ю ю	Yu, yu
П п	П п	P, p	Я я	Я я	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
 When written as ë in Russian, transliterate as yë or ë.
 The use of diacritical marks is preferred, but such marks
 may be omitted when expediency dictates.

GREEK ALPHABET

Alpha	A	α	α	Nu	N	ν
Beta	B	β		Xi	Ξ	ξ
Gamma	Γ	γ		Omicron	Ο	ο
Delta	Δ	δ		Pi	Π	π
Epsilon	E	ε	ε	Rho	Ρ	ρ ϑ
Zeta	Z	ζ		Sigma	Σ	σ ς
Eta	H	η		Tau	Τ	τ
Theta	Θ	θ	θ	Upsilon	Υ	υ
Iota	I	ι		Phi	Φ	φ φ
Kappa	K	κ	κ κ	Chi	Χ	χ
Lambda	Λ	λ		Psi	Ψ	ψ
Mu	M	μ		Omega	Ω	ω

MT/ST-77-0330

THE MECHANISM OF THE TRANSFORMATION OF ELECTRIC AND MAGNETIC FIELDS
IN A NERVOUS SYSTEM.

M. Khvedelidze, S. Dumbadze, V. Apridonidze, M. ^Ssokolova, B.
Zhorzholiani, Kh. Gagud

Pages 137-140.

In the work are examined two experimental problems: a) the investigation of the effect of direct perception by the brain of the pulse electric field of the high tension of the frequency order of the rhythm of brain; b) research on the effect of perception by the auditory center of the brain (animal) of the electromagnetic field of high frequency by the intensity below 10 mV/cm with modulation by sonic frequency.

For the solution of these problems were developed and made the

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modulator of high tension, electrode-antenna for producing the pulse field of high voltage and low frequency in the screened from external hollow chambers, high-quality generator with the keying unit of low frequency and the cascade/stage of preamplifier to electron-beam oscillograph.

The modulator of high tension is comprised from the units of the high-voltage regulated rectifier of the type VS-22^[BC-22] the multiple power source of the type UPI-1^[YMT-1] square-pulse generator of the type GIS-2, the oscillator tube GU-50[^] with cathode loading. Schematic diagram is shown in the figure. Output/yield from this diagram is connected with the electrode- antenna, structurally made in the form of loop antenna 1.5 x 1.5 m in size/dimension. Was assembled the oscillator circuit of high frequency in the range 2.5 m (12 MHz) on two lamps G-807, the ensuring power measurement in continuous duty 5 W.

From power generator of high frequency was fed to the condenser/capacitor electrodes, between which was establish/installed the head of experimental animal. As the indicator of the reaction of brain to the action of pulse electric and high-frequency field was used the reciprocal bioelectric activity of brain.

Page 138.

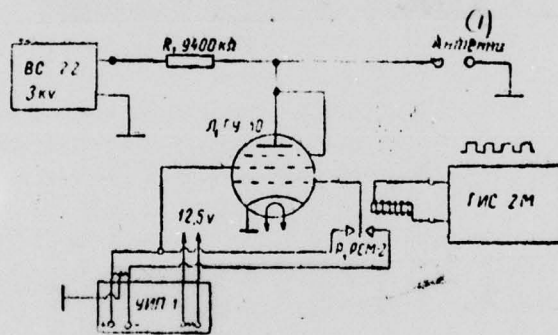
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The bioelectric activity of brain was studied visually with the aid of the amplifier of biopotentials of the type UBP-1-02. For registration of bioelectric activity on film was used double-beam electron oscillograph with the movie camera of the firm Kossor model 1049 with the preliminary dc amplifier model 1440, ensuring amplification of 50 thousand times, with rectilinear frequency characteristic from 0 to 50 kHz. In separate experiments under the direct and local effect of high-frequency current on the individual sections of the brain of animals in acute/sharp or in chronic experiments was used the generator of the type GSS-12.

Experiments on the action of the pulse electric field of high tension on frequency on the order of alpha of the rhythm of brain were carried out on the coworkers of laboratory (these experiments in principle could not cause any pathological consequences).

In view of the fact that the experiments were conducted on people and by the indicator of reception them pulse field they were their perception, fell the need of recording the reciprocal bioelectric activity of brain under such difficult technical conditions under the effect of high-voltage field.

The introspections of the coworkers showed that during combination in the beginning of the experiment of photic momentum/impulse/pulses from photophonostimulator of the type FPS-02 on the momentum/impulse/pulses of high-voltage electric field on frequency alpha of rhythm sharply is reveal/detected the discomfort of pulse electric field, also, after stopping the feed of photic momentum/impulse/pulses.



Schematic diagram of setting.

Key: (1). Antenna.

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According to literature data [1] the perception of electric pulse field most is clearly expressed in the nerve patients.

The following set of experiments was carried out with the application/use the study technique of the bioelectric activity of brain. Plate electrodes applied to the auditory and postcranial region of head. The notation of bioelectric activity for photic and sonic stimulation produced to photographic film.

Experiment on action on audible range of the brain of the high-frequency field of low intensity/strength on the order of 1 did not make it possible to reveal/detect auditory perception with modulation of this field with low frequency.

At average impedance between the electrodes of order $10 \cdot 10^3$ ohm, the circuital current could reach by 10^{-6} A, and the power, isolated in this circuit, I could be not more than 0.1 mW/cm, at frequencies from 150 to 1000 MHz. Fearing pathological consequences, we could not conduct the further research on people, since for obtaining the effect of auditory sensation on the action/effect of pulse high-frequency field it was necessary to increase electrode voltage on several orders.

The direct auditory sensation of electric field easily is realized, if we the auditory nerve of man arrange in the electric field of low frequency by intensity/strength is not less than 50 V. In this case occurs the explicit action of the ac field of audio frequency nonmediocrely on auditory nerve.

The third set of experiments was carried out on animals (rabbits and cats). We have developed the procedure of production and input/introduction of deep electrodes into the skull of experimental animals.

For conducting chronic experiments to experimental cats drove in into skull under anesthesia steel small tubes from the needles of syringe 0.4 mm in diameter by length 8 mm.

Under conditions of weak background activity of neurons was given the high-frequency field 160 MHz, modulated low frequency 200 Hz during about 1 s. The voltage of high frequency was 0.25 V. From oscillogram it is evident that after the break-down of field occurs the latent period, equal to 0.4 s, after which appears reciprocal periodic activity with the increased amplitude during about 2 s with the subsequent fading.

Page 140.

During the resistance of circuit to high-frequency current on the order of 10 ohms the current had value 2.5×10^{-6} A, and the power, secreted in cerebriic tissue, could not exceed 0.625×10^{-6} W. Consequently, in this case could not occur the heating effect of current.

Laboratory investigations confirmed the literature data on the action of electric and electromagnetic fields on the auditory range of brain [2, 3].

In the nervous system as in receiving antenna, electromagnetic energy it is converted already into the energy of the ion current, which has active and reactive component.

^Rreaktivno- the capacitive component of the impedance of membrane cells, including neurons, apparently, possesses semiconductor nonlinear properties, thanks to which the energy of the field of high frequency can be converted into the energy of the ion current, modulated by low frequency.

During the study of these properties of neuron synapses it is necessary to assume that can be used the model of nonlinear physical semiconductor condenser/capacitors [4].

Furthermore, can be used electrokinetic [5], magnetohydrodynamic and galvanomagnetic effects [6] for the modelling of the mechanism of the action of pulse electromagnetic field on ion migration in neuron grid/networks.

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