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BIONICS AND PROBLEMS OF INSTRUMENT MANUFACTURE

by

V. Ye. Manoylov

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

\*ye initially, after vowels, and after ъ, ь; e elsewhere.  
When written as ѣ in Russian, transliterate as yě or ě.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh <sup>-1</sup>
cos	cos	ch	cosh	arc ch	cosh <sup>-1</sup>
tg	tan	th	tanh	arc th	tanh <sup>-1</sup>
ctg	cot	cth	coth	arc cth	coth <sup>-1</sup>
sec	sec	sch	sech	arc sch	sech <sup>-1</sup>
cosec	csc	csch	csch	arc csch	csch <sup>-1</sup>

Russian English

rot curl  
lg log

GRAPHICS DISCLAIMER

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BIONICS AND PROBLEMS OF INSTRUMENT MANUFACTURE.

V. Ye. Manoylov.

From instrumentmakers everything is more and more required for measurements of extreme values in most varied regions. By fulfilling these requirements frequently is encountered the impossibility of the realization of measurements on the base of the existing instrument principles. The searches for new instrument principles in the most varied fields of science are characteristic for the present time. This is why taking place on 20-24 December 1965 II All-Union conference on the bionics was for many instrumentmakers of interest. This was reflected in sharply increased, in comparison with the I conference, with the number of participants in the technical-engineering profile with the sufficiently stabilized number of participants the biomedical of professions. Organizers of the conferences: The Academy of Sciences of the USSR, the scientific council for complex problem "Cybernetics", the ministry of higher and secondary special education of the USSR, the ministry of radio industry of the USSR, the academy of medical Science and the All-Union scientific and technical society im. A. S. Popov.

At conference took place two plenary meetings and fifteen sectional within sections: 1. Receptors, analyzers and pattern recognition. 2. Neuron organization and bionical systems of

reliability. 3. Bionical aspects of control of control and problem of men - automaton. 4. Orientation and navigation of animals. 5. Biomechanics and bioenergetics.

At two plenary meetings were made following reports: "State and trend of development of bionics" - academician A. I. Berg and corresponding member of AN B. S. Sotskov; "Means of irradiation in animals and their simulation" - N. P. Naumov, G. N. Siyemkin, V. D. Il'ichev, V. D. Protasov; "Problem of simulation of universal sensory sensor" Ya. A. Vinnikov; "Contemporary concepts about memory of man and bionical paths built in memory units of cybernetic machines" - L. P. Krayzmer; "Contemporary problems of biological aerohydrodynamics" - S. Ye. Kleynenberg, N. V. Kokshayskiy; "Some general laws governing chemoreudeption based on example of mechanism of perception of odors" - K. B. Karandeyev, B. I. Puchkin, M. Ya. Subbotin, Ya. D. Finkinshteyn. Nearly a hundred reports were heard and considered in the sections.

Application of mathematical methods of studying biological subjects led to appearance of new interesting hypo-those and theories. The essential interpenetration of combined ideas in the physicobiological investigations was outlined.

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Let us pause at some sectional reports, which generated special and justified interest of participants in conference.

In his report "Forecasting reliability of work of system "man - machine" and helio-geomagnetic factors" A. K. Podshibyakin, relying on large experimental material, showed that between biopotentials of man, animal and magnetic fields of atmosphere there is dependence. Proves to be a numerical value the biopotential of that reduced in the man between the temple and the hand, in a certain group of people sharply grows 3-4 days before the onset of so-called magnetic storms; in another group 1-2; in the third - directly and only in the relatively small group of people no changes in the biopotentials and physiological functions with a change in the activity of magnetic fields occurs in the period of an increase in the intensity of magnetic field. The confirmation of these observations with large factual material opens exceptionally important prospects in their use.

Is very curious according to structure of construction and original in content report, presented by Ye. V. Gubler, A. A. Pervozvanskiy and I. B. Chelnokov "Processes of "emergency" control in living organism as factor of his reliability under destructive influences". The authors convincingly showed that the processes of emergency control in the living organism during the diseases have a number of features of resemblance to the control during the emergency situations in the power systems.

Is interesting that upon liquidation of "emergency situations" in living organism occurs structural retuning and autoreduction, which

composes basis of process of recovery.

Generally results of investigation of biological automatic control were reflected more than in 20 reports. Thus, in the report Ye. V. Meystrakh, V. K. Zakharov, G. N. Il'yutkina and Yu. I. Lamyr' "Restoration and the maintenance of homeostasis in the terminal states in the conditions for the interaction of automaton and organism" - is described automatic equipment for the maintenance in the organism of animal of the homeostatic processes, disrupted under the effect of the extreme stimulations/irritations. Are given data of physiological experiments and are discussed some processes of the interaction of automaton and living organism at the level of the regulation of vegetative functions. In the report of G. A. Sergeyev and A. F. Romanenkos are examined the statistical properties of information component/link - the system "man - automaton" under the influence of transient input signals.

In report of L. Ya. Fukshanskiy and G. I. Yuzefovich "Mathematical models of mechanism of count in biological subjects" is given summary of extremely interesting experimental facts, which characterize "biological clock" of plants and insects. Is proposed the mathematical model of the mechanism of count, constructed on the principle - open systems plus external controlling action. The possibilities of temporary/time organization are shown.

Are interesting for specialists in region of navigational

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instruments reports to section - orientations and navigation in animals. B. P. Manteyfel' and V. Ya. Jacobi made a thorough survey of Soviet and foreign experiments on the orientation of the navigation of animals and birds. V. R. Protasov and Yu. D. Podlipalin gave the results of the effect of the gravitational fields of low frequency for the orientation of some fishes.

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A. R. Sakayan reported original data in connection with the materials of the foreign researchers on navigation of carrier pigeons. M. Ye. Shumakov's report is dedicated to experiments on the magnetic orientation of birds. It showed that in spite of the perception of the magnetic field of bird they cannot determine general direction during the motion in the special cell with its aid.

Whole series of interesting reports was dedicated to problem of simulation of neurons. This extremely promising trend in the bionics will render essential assistance to those, who work in the region of control.

Undoubtedly practical given and thoughts can be extracted from report of E. V. Baibakov "Simulation of mechanism of transformation of signals in receptors of living organisms". The author describes the method of amplifying the micro-signals in the membrane of the receptors of sense organs and proposes the method of solution of bionical task - the creation of the sensors, which possess sensitivity

and selectivity is similar to receptors. It also describes electron analogue, which illustrates bioamplifier converter.

Large scientific direction found reflection in problematic report of L. A. Chistovich, V. I. Galunova and V. V. Lyublenskoy about motor theory of perception of sound signals.

Most urgent problems (reliability of measuring meter) obtained peculiar and very original illumination in section "Neuron organization and bionical aspects of reliability". Perhaps, are most interesting were interesting reports directly or indirectly connected with the description and the data about the bionical principles of the reliability of brain.

Delegates of conference looked over series of scientific films, magnificently illustrating separate of position of reports. First of all to them one should relate film about the vital activity of bees.

Academician A. I. Berg totaled work of conference and outlined ways of further development of bionics. One of the important - is direct the practical use of results of bionical investigations in the measurement technique and the automation.

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