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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY

### WITH INDEXES

### (Supplement 123)

### JANUARY 1974

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# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

(Supplement 123)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1973 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*



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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 226 reports, articles and other documents announced during December 1973 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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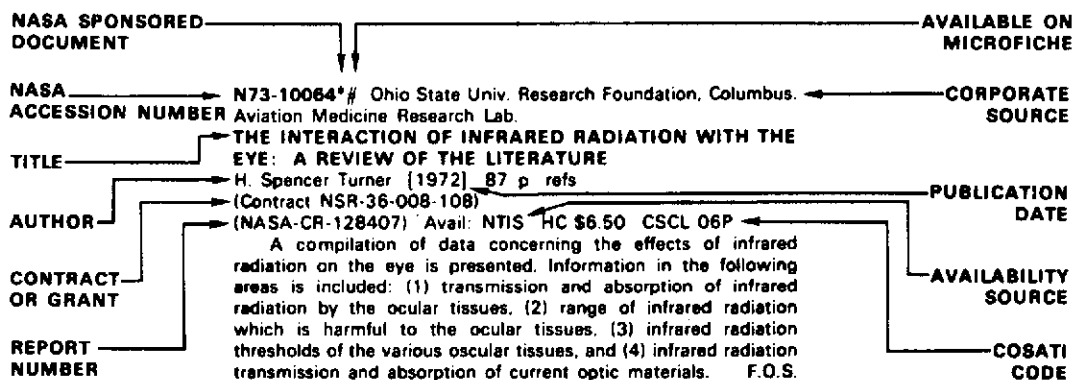
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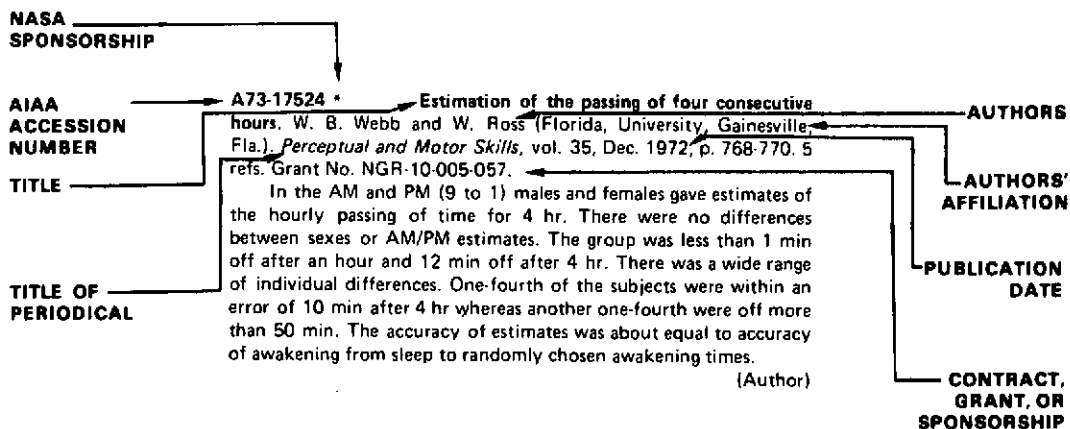
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## TYPICAL CITATION AND ABSTRACT FROM IAA





# AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 123) JANUARY 1974

## IAA ENTRIES

**A73-43211 Adaptive measurement of vigilance decrement.** E. L. Wiener (Miami, University, Coral Gables, Fla.). *Ergonomics*, vol. 16, July 1973, p. 353-363. 12 refs. Grant No. PHS-R01-OH-00346.

This paper describes a computer-based monitoring task which is adaptive, or self-adjusting, with the size of the signal stimulus (compared to a fixed non-signal stimulus) being mediated by the detection score of the subject, so as to maintain a constant detection rate. Data are presented which indicate that in order to maintain a fixed detection criterion over a 48-min vigil, the adaptive variable (separation distance of a pair of dots presented simultaneously) behaved in a manner consistent with the usual measures of vigilance decrement. Several adaptive strategies are discussed. (Author)

**A73-43212 Studies of visual inspection.** J. W. Schoonard, J. D. Gould, and L. A. Miller (IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.). *Ergonomics*, vol. 16, July 1973, p. 365-379. 21 refs. Research supported by the IBM Corp.

At one stage during the manufacture of integrated circuit chips inspectors using a microscope cull out chips which have visually detectable anomalies. The eye movements of eight women inspectors were recorded while they inspected colored slides of one family of chips. Another experiment investigated the detailed performance of trained inspectors on actual chips in a throughput situation. Effects of the average rate of inspection and of optical conditions on inspection accuracy were also studied. G.R.

**A73-43213 Use of a digital computer for studying velocity judgements of radar targets.** B. Bergstrom, P. Arnberg, M. Gillberg, and H. Jansson (Institute of Military Psychology, Stockholm, Sweden). *Ergonomics*, vol. 16, July 1973, p. 417-421.

Ten subjects estimated the velocity of simulated radar targets according to the method of constant stimuli. The experimental procedure was rendered automatic through a PDP 12 digital computer, and the data were processed on line. Less than 50 man-hours were required to complete the experiment, a fact which demonstrates the suitability of a small computer when solving specific problems for system designers. (Author)

**A73-43214 Use of a response surface to optimize digital telecommunication systems.** S. M. Soliday and J. A. Gardner (North Carolina State University, Raleigh, N.C.). *Ergonomics*, vol. 16, July 1973, p. 423-433. 9 refs. Contract No. F44620-69-C-0033.

A response surface-based technique for measuring and relating human perception to various degrees of complexity and cost of digital telecommunication systems is described. To illustrate the technique, the smallest letters that subjects could read were first determined for several variations of a simulated digital television

system. The variations were created by changing the S/N ratio and bandwidth of pictures in which the letters appeared, a procedure equivalent to varying code length and sampling frequency, the two physical parameters of a digital system most relevant to the human observer. A response surface based on the subjects' performances was then generated, and the surface, in turn, was related to curves that showed how system complexity and cost varied with the physical parameters. (Author)

**A73-43215 Keeping track of sequential events - Implications for the design of displays.** R. A. Monty (U.S. Army, Human Engineering Laboratory, Aberdeen Proving Ground, Md.). *Ergonomics*, vol. 16, July 1973, p. 443-454. 14 refs.

Several years of research on man's ability to keep track mentally of a series of events occurring in rapid sequence have been reviewed for the purpose of identifying parameters of potential importance to the designer of displays. Parameters such as presentation rate, the role of on-off ratio, irrelevant information, irregular presentation rate and audio versus visual displays are among those reviewed. (Author)

**A73-43216 Human reactions to whole-body transverse angular vibrations compared to linear vertical vibrations.** L. Sjøflot (Norwegian Institute of Agricultural Engineering, Norway) and C. W. Suggs (North Carolina State University, Raleigh, N.C.). *Ergonomics*, vol. 16, July 1973, p. 455-468. 17 refs. Research supported by the W. K. Kellogg Foundation.

An electro hydraulic vibration device was used to study the effects of some forms of angular motion in the transverse mode and a combination of angular transverse and vertical motion, common in ground vehicles. Heart rate, tracking error, hip and shoulder acceleration, and subjective judgements of three subjects were recorded under different test conditions using three different seats. The excitation acceleration had a 0.25 and 0.50 g peak to peak linear component on the seat at frequencies of 1, 1.7, 2.5, and 4.0 Hz. Man is more affected and shows more degraded performance under the influence of transverse angular vibration than under vertical vibrations alone. Worst is a combination of transverse angular and vertical motion. Tractor seats good for vertical vibrations are not necessarily good for transverse vibrations. (Author)

**A73-43217 Optimal work-rest schedules under prolonged vibration.** R. A. Dudek, M. M. Ayoub, and M. A. El-Nawawi (Texas Tech University, Lubbock, Tex.). *Ergonomics*, vol. 16, July 1973, p. 469-479. 36 refs. Grant No. DAAD05-69-C-0102. Project THEMIS.

This research was conducted for the purpose of studying the performance and recovery characteristics of men when subjected to low-level, whole-body vertical sinusoidal vibration for durations of one to two hours. Several male subjects performed a vertical compensatory tracking task using a CRT display according to three work-rest schedules under both normal and vibratory environments. The vibratory environment was that of vertical sinusoidal vibration with a frequency of 5 cps and an amplitude of 0.08 inches resulting in an acceleration intensity of approximately 0.20 g. The working period was divided into equal intervals during which performance was continuously monitored. Decrement of performance was measured using absolute error score. Results and conclusions are presented regarding performance decrement and recovery under

varying work-rest schedules. Optimum work-rest schedules and implications of control tasks under a vibratory environment are discussed. (Author)

**A73-43218 #** An exploratory study of arm-reach dynamics under several levels of gravity. N. M. Aume (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Ergonomics*, vol. 16, July 1973, p. 481-494. 10 refs.

Four adult male subjects made vertical reaching movements, upward and downward, over 10, 20, and 30 in. distances; these movements were performed under weightlessness (0.0g), Martian gravity (0.38g), earth gravity (1.0g), and 1.3G. The movements were recorded with a movie camera running at 64 frames per second. The subject's arm was considered as consisting of two rigid parts: the upper arm and the lower arm. Three instantaneous velocities over the entire movement were derived from the film records to describe the motion of these parts: the linear velocities of the centers of mass in both the horizontal and vertical directions, and the angular velocity of each part. Reach times, both maximum angular velocities and maximum lower arm velocity were selected as criterion measures. They were found to be affected by reach distance, reach direction, and gravity level (in descending order of importance). The need to study accelerations, force or torque reactions, and energy expenditures during movements is indicated. (Author)

**A73-43276 \*** New formaldehyde base disinfectants. R. Trujillo and K. F. Lindell (Sandia Laboratories, Albuquerque, N. Mex.). *Applied Microbiology*, vol. 26, July 1973, p. 106-110. NASA-supported research. NASA Order W-12853.

Preparations of formaldehyde in various organic liquids ethylene glycol, glycerol, and propylene glycol - serve as effective disinfectants towards microbial vegetative cells and spores. This disinfection is a temperature-dependent process and is manifest when these formaldehyde base disinfectants are dissolved in water. The irritating vapors associated with formaldehyde disinfection are not present in either of these new formaldehyde base disinfectants or in aqueous solutions of them. (Author)

**A73-43292** A model of heat transfer in a biological tissue perfused by blood of arbitrary temperature. A. Shitzer (Technion - Israel Institute of Technology, Haifa, Israel). (*Israel Conference on Mechanical Engineering, 7th, Haifa, Israel, June 27, 28, 1973.*) *Israel Journal of Technology*, vol. 11, no. 4, 1973, p. 169-177. 15 refs.

A steady-state analysis is presented for the problem of heat transfer in a biological tissue. This tissue is assumed to be perfused by blood of arbitrary temperature. Analytical solutions are obtained for both cylindrical and rectangular configurations in which the tissue is in contact with a network of cooling tubes - e.g., a liquid-cooled garment. Results allow for the inclusion of any variable blood supply temperature and demonstrate the important role that the cardiac system plays in the transport of heat within a biological tissue. (Author)

**A73-43317 #** Signal processing in medical technology (Signalverarbeitung in der medizinischen Technik). E. Hilz and O. Schott (Siemens AG, Erlangen, West Germany). In: Signal processing; Specialists' Conference, Erlangen, West Germany, April 4-6, 1973, Reports. Erlangen, Nachrichtentechnische Gesellschaft, 1973, p. 132-151. 16 refs. In German.

Electronic methods of medical technology are considered, giving attention to devices for cardiac surveillance, blood pressure measurements, automatic EKG determinations, EEG evaluation, and the pictorial representation of the interior of the body with the aid of ultrasonic methods. Questions of signal processing in X-ray technology are also discussed, taking into account aspects of vascular representation by means of subtraction methods, the clarification of details with the aid of local frequency filtering, an analysis of motion, questions of video-densitometry, and volumetric measurements in the heart. G.R.

**A73-43338** Gamma-aminobutyric acid antagonism in visual cortex - Different effects on simple, complex, and hyper-complex neurons. J. D. Pettigrew and J. D. Daniels (California, University, Berkeley, Calif.). *Science*, vol. 182, Oct. 5, 1973, p. 81-83. 20 refs. Grant No. PHS-EY-00276-09.

**A73-43342** Bezold-Brücke effect and visual nonlinearity. R. E. Savoie (Stanford Research Institute, Menlo Park, Calif.). *Optical Society of America, Journal*, vol. 63, Oct. 1973, p. 1253-1261. 17 refs. Grant No. NIH-NS-08322-03.

Investigation of the Bezold-Brücke effect as a means of studying nonlinearity in vision. Two subjects performed hue-matching experiments using simultaneously presented monochromatic stimuli of unequal corneal irradiances. For seven wavelengths between 560 and 620 nm, the shift of hue was measured over a 1000:1 range of irradiances, in steps of about 3:1. Contrary to previous reports of the Bezold-Brücke hue shift, the hue of a given wavelength is not a monotonic function of irradiance, nor is there an invariant wavelength in this spectral region. Some previous models of the Bezold-Brücke effect in the literature are incompatible with the present data. A physiologically plausible, analytic form for nonlinearities of the red and green color systems is proposed, as well as a simple model for the physiological correlate of hue, which together are capable of predicting some major characteristics of the present data and of previously reported data. (Author)

**A73-43343** Increment thresholds for multiple identical flashes in the peripheral retina. R. M. Herrick (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Optical Society of America, Journal*, vol. 63, Oct. 1973, p. 1261-1265. 15 refs.

Experimental study of mean threshold luminance as a function of flash duration and number. The results of the study provide additional data on the interaction of identical flashes for two and more flashes of 5, 10, and 20 milliseconds duration. In addition, the study includes detection data obtained with single flashes of different durations for comparison with multiple-flash data. M.V.E.

**A73-43344** Image detection by a bee ommatidium. C. Pask and A. W. Snyder (Australian National University, Canberra, Australia). *Optical Society of America, Journal*, vol. 63, Oct. 1973, p. 1266-1268. 6 refs.

A previous electromagnetic analysis of light absorption in the bee rhabdom (i.e., the photoreceptor of each ommatidium or single-eye element making up the compound eye of an arthropod) reported by Snyder and Pask is used for verifying the validity of a simple physical model designed to help investigate the self-contained image-detecting capability of a single ommatidium. The results obtained suggest that the bee rhabdom is unlikely to make possible such an image-detecting capability. M.V.E.

**A73-43389 \*** Proton dosimeter design for distributed body organs. G. S. Khandelwal (Old Dominion University, Norfolk, Va.) and J. W. Wilson (NASA, Langley Research Center, Hampton, Va.). *Nuclear Technology*, vol. 20, Oct. 1973, p. 64-67. 8 refs.

The design of a real-time rem-rad dosimeter with sufficient generality for inclusion of dose distribution factors for space applications is discussed. This generalized dosimetric system is only slightly more complex than dosimeters in current use. (Author)

**A73-43492** Transient S-T elevation detected by 24-hour ECG monitoring during normal daily activity. B. Golding, E. Wolf, D. Tzivoni, and S. Stern (Hadassah University Hospital; Hebrew University, Jerusalem, Israel). *American Heart Journal*, vol. 86, Oct. 1973, p. 501-507. 14 refs. Research supported by the Joint Fund of the Hebrew University and the Hadassah Medical Organization.

Seven out of 174 patients subjected to continuous 24-hour ECG monitoring because of a typical chest pain and/or palpitations were found to have transient S-T elevation. Two were diagnosed as

suffering from neurocirculatory asthenia, three had myocardial infarction, and two Prinzmetal's variant angina pectoris. The finding of transient S-T elevation is believed to be of special significance because of its discussed pathological and therapeutic implications.

M.V.E.

**A73-43500 #** Conventional and high frequency hearing of naval aircrewmembers as a function of noise exposure. J. L. Fletcher (Memphis State University, Memphis, Tenn.). *Acoustical Society of America, Meeting, 84th, Miami Beach, Fla., Nov. 28-Dec. 1, 1972, Paper*. 49 p. 5 refs. Contract No. N00014-71-C-0354. NR Project 197-002.

Description of the methods and procedures used and the results obtained in a study of conventional and high-frequency hearing of naval aircrewmembers from the beginning of their aircrew training through their flying career, with the aim of determining the onset and progress of hearing loss as a function both of hours of flight time and of type of aircraft flown. The results reviewed include the finding that the rate of hearing loss appears to increase, for prop and jet pilots, some time after about 500 hrs flight time. For helicopter pilots, this seems to appear earlier, around 200+ hrs. On the whole, prop type flying seems most hazardous, followed by helicopter, then jet.

M.V.E.

**A73-43524 \*** Effects of rehydration on +Gz tolerance after 14-days' bed rest. J. E. Greenleaf, W. van Beaumont, E. M. Bernauer, R. F. Haines, H. Sandler, R. W. Staley, H. L. Young, and J. W. Yusken (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Aerospace Medicine*, vol. 44, July 1973, p. 715-722. 25 refs.

Investigation of the magnitude of reduction in human tolerance to centrifugation following 2 weeks of bed rest with moderate daily exercise. The degree of hypovolemia associated with these exposures is assessed, and the possibility to improve or to return to control levels the tolerance to acceleration forces acting in the head-to-foot direction through rehydration prior to acceleration is explored.

M.V.E.

**A73-43578 #** Multidimensional scaling methods and data visualization /Review/ (Metody mnogomernogo shkalirovaniia i vizualizatsii dannykh /Obzor/). A. Iu. Terekhina. *Avtomatika i Telemekhanika*, July 1973, p. 80-94. 70 refs. In Russian.

Various multidimensional scaling methods are reviewed that are based on a reduction in the number of dimensions of the data-descriptive space geometry. The review surveys linear and nonlinear methods, and the latter include metric and nonmetric ones. A method using differences in expert opinions for determining covert opinion-forming factors is also described. Illustrative examples are presented.

M.V.E.

**A73-43707 #** Theoretical study of primary photosynthesis processes in higher plants and algae (Teoreticheskoe issledovanie pervichnykh protsessov fotosinteza vysshikh rastenii i vodoroslei). A. K. Kukushkin, A. N. Tikhonov, L. A. Blumenfel'd, and E. K. Ruuge (Moskovskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 211, July 21, 1973, p. 718-721. 9 refs. In Russian.

**A73-43788 #** Fluorescent angiographic technique for fundus oculi (Metodika fluorestsentnoi angiografii glaznogo dna). A. A. Triaskov. *Voenna-Meditsinskii Zhurnal*, July 1973, p. 42-46. In Russian.

Description of experiments in which fluorescent angiography of fundus oculi was performed on 122 patients with various tunica and vasa sanguinea retinae conditions. Five ml of 10% sodium fluorescein was given intravenous to the patients, and angiograms were taken in blue light. Representative angiograms showing all fluorescein microcirculation phases in healthy fungus oculi are interpreted.

V.Z.

**A73-43789 #** Functional state of the auditory analyzer under conditions of prolonged cinostatic hypokinesia (Funktsional'noe sostoiianie slukhovogo analizatora v usloviakh dlitel'noi khinostaticheskoi gipokinezii). E. I. Matsnev. *Voenna-Meditsinskii Zhurnal*, July 1973, p. 62-65. In Russian.

Pharmacotherapeutic correction of water, salt and protein metabolism disorders was attempted in 10 young healthy subjects confined to bed in a lying position for 120 days. Audiometers of various types were used for auditory threshold recording in acoustic perception tests when acoustic signals were delivered through bones, tissues or from the air, and nerobol, pituitrin and desoxycorticosterone acetate therapies were applied. Possible mechanisms of the auditory disorders observed in some of the subjects are discussed.

V.Z.

**A73-43790 #** Evaluation of the physical conditions of individual airmen (Ob individual'noi otsenke fizicheskogo razvitiia letchikov). L. A. Fel'dman, L. S. Anikin, and S. I. Nagornyi. *Voenna-Meditsinskii Zhurnal*, July 1973, p. 66-71. In Russian.

Anthropometric charts containing height, weight, thorax circumference, lung capacity, and wrist strength are proposed as a basis for the evaluation of the physical conditions of individual members of flying personnel. The charts are an extension of a table used for medical examination of athletes and conscripts. The charts are also suggested for the evaluation of the dynamics of physical development of individual air force members in various age groups. Several representative examples of application of the charts are discussed.

V.Z.

**A73-43791 #** Apparatus for measurement of vision acuity restoration time after brief macula lutea exposures to light (Pribor dlia opredeleniia vremeni vosstanovleniia ostroty zreniia posle kratkovremennykh zasvetov zheltogo piatna). L. A. Balashevich and V. I. Shostak. *Voenna-Meditsinskii Zhurnal*, July 1973, p. 82, 83. In Russian.

**A73-43792 #** Apparatus for measuring the colloid osmotic pressure in blood serum (Apparat dlia izmereniia kolloidno-osmoticheskogo davleniia syvorotki krovi). G. E. Sokolovich and V. N. Kholiavka. *Voenna-Meditsinskii Zhurnal*, July 1973, p. 83, 84. In Russian.

**A73-43847 #** Does the perception threshold change the dominance between vision and touch (Verändert die Wahrnehmungsschwelle die Dominanz zwischen Sehen und Tasten). C. Becker-Carus (Max-Planck-Institut für Psychiatrie, Munich, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 20, 3rd Quarter, 1973, p. 347-365. 16 refs. In German.

Results obtained by Rock and Harris (1967) regarding a dominance of visual impressions over tactual perception are considered. An experimental investigation shows that in case information is supplied by two sense organs the information provided by the sense organ with the lower difference threshold is dominant. In the case of a human adult, the visual difference threshold is normally lower than the tactual difference threshold. The information provided by vision is, therefore, taken to be correct even if conflicting information is supplied by tactual perception. However, the subject considers the information provided by the tactual perception to be correct if under the prevailing experimental conditions the tactual difference threshold is lowered below the visual difference threshold.

G.R.

**A73-43848 #** The effect of anxiety control on the level of information processing (Der Einfluss von Angstvermeidung auf das Niveau der Informationsverarbeitung). H. W. Krohne (Marburg, Universität, Marburg an der Lahn, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 20, 3rd Quarter, 1973, p. 408-443. 49 refs. In German.

Questions regarding the generality of an individual information processing level are considered in connection with the model of complex information processing developed by Schröder et al. (1967). A contradiction is found between the theoretical expectation of a high degree of generality in the case of an individual level and the observation that corresponding empirical indicators show a low degree of statistical association. A model regarding the interaction between anxiety control and information processing is developed in order to eliminate the contradiction. It is postulated that subjects with abnormal anxiety control characteristics attain less generality than persons with normal anxiety control. G.R.

**A73-43926 # Structurally functional properties of the dendrites of central neurons (Strukturno-funktsional'nye svoistva dendritov tsentral'nykh neuronov).** G. D. Smirnov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and Iu. B. Manteifel' (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 4, July-Sept. 1973, p. 3-23. 186 refs. In Russian.

A critical survey and comparison of published and original observations of the microstructure and electrophysiological properties of central nervous system dendrites serve as the basis of a discussion of their functional aspects and of the significance of various synaptic and other contacts between neurons. The behavior of excitation in dendrites is examined, considering such topics as the local potentials and their electrotonic action, propagating dendritic potentials, dendritic activity reflected in intracellularly recorded potential oscillations, role of inhibitory synapses, and the participation of dendrites in the electrotonic interaction of neurons. Particular attention is given to dendritic spinules and to synapses based on them as agents which are apparently directly related with prolonged retention of trace processes and with long-term memory. T.M.

**A73-43927 # Nerve mechanisms in the control of capacitance vessels (Nervnye mekhanizmy kontrolya emkostnykh sosudov).** B. I. Tkachenko and G. V. Cherniavskaiia (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 4, July-Sept. 1973, p. 24-45. 108 refs. In Russian.

Published studies on neurogenic and local regulation of resistance and capacitance vessels are surveyed. The influence of the sympathetic nervous system on resistance and capacitance vessels of musculocutaneous and splanchnic regions is discussed, and original data are given for neurogenic reactions of the resistance and capacitance vessels as obtained by separate and simultaneous observations of the musculocutaneous and splanchnic regions. The problem of the participation of capacitance-type greater-circulation vessels in venous return of blood to the heart is examined, and contradictions apparent in the literature on this subject are pointed out. T.M.

**A73-43928 # A physiological study of the complex behavior of anthropoids (chimpanzee) (Fiziologicheskoe issledovanie slozhnogo povedeniia antropoidov (shimpanze)).** A. I. Schastnyi (Leningradskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 4, July-Sept. 1973, p. 46-68. 83 refs. In Russian.

Special experimental equipment and procedures were developed to study the dynamics and evolution of various voluntary behavioral acts differing in form and complexity in chimpanzees. When the chimpanzees were presented with a new mechanism or object, their initial motor reactions were chaotic in nature and served the purpose of familiarization with the novel situation. This phase was followed by prolonged manipulation of the device or object, and the animals carried out a series of evidently consecutive motor actions. The final phase of behavior showed a developed sense of approach wherein the animal performed the required actions with the object (operated a food delivery mechanism or realized the purpose of a toy). Group behavior studies were also conducted, and nerve mechanisms of voluntary acts are discussed on the basis of the observations. T.M.

**A73-43929 # Problem of hemoglobin oxygenation (Problema oksigenatsii gemoglobina).** P. A. Korzhuev (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 4, July-Sept. 1973, p. 69-112. 386 refs. In Russian.

Survey of published literature on the hemoglobin oxygenation reaction. It is shown that in spite of the tremendous amount of research on this problem there are several unclear points regarding the mechanism of oxygen binding by the hemoglobin molecule. An attempt is made to examine not only the relationships between the oxygen and hemoglobin molecules in the usual approach, but also to elucidate the role of numerous factors influencing the ability of hemoglobin to transport oxygen. Attention is given to the characteristic features of erythrocytes as hemoglobin carriers and to the role of ecological factors and physicochemical conditions affecting hemoglobin. T.M.

**A73-43993 Transfer of oxygen into haemoglobin solution.** J. A. E. Spaan (Eindhoven, Technische Hogeschool, Eindhoven, Netherlands). *Pflügers Archiv*, vol. 342, no. 4, 1973, p. 289-306. 17 refs.

It is shown that, when oxygen and hemoglobin are diffusing through hemoglobin solutions, the concentration of total hemoglobin will be constant, independent of the reaction scheme of hemoglobin with oxygen. Solutions of transport equations for the cases of oxygen uptake in a stationary and in a moving flat film of hemoglobin solution are given. The influence of the diffusion of hemoglobin is shown. Advancing front equations, corrected for physically dissolved oxygen, are derived by formal integration of the transport equations. It is shown that these derived formulas are good approximations of the solutions of the transport equations when the diffusion of hemoglobin is neglected. (Author)

**A73-43994 Thermoregulatory behaviour in *Rana esculenta* Effects of spinal cord heating (Comportement thermoregulateur chez *Rana esculenta* - Influence du réchauffement spinal).** R. Duclaux, M. Fantino, and M. Cabanac (Lyon I, Université, Oullins, Rhône, France). *Pflügers Archiv*, vol. 342, no. 4, 1973, p. 347-358. 30 refs. In French. Research supported by the Centre National de la Recherche Scientifique and Institut National de la Santé et de la Recherche Médicale.

Behavioral temperature regulation of frogs has been studied in an aqueous thermal gradient during selective heating of the spinal cord. These experiments confirmed that the mean thermopreferendum in this species is about 26°C without spinal cord heating. After spinal heating frogs chose a colder ambient temperature. This decrease of the thermopreferendum was proportional to the heating power dissipated in the thermode. A similar behavior has been obtained after complete denervation of the dorsal skin. Therefore the change in thermopreferendum was triggered by deep thermal receptors. The measurement of colonic, cephalic, brain and spinal temperatures showed that only the spinal region was heated by the thermode. It is therefore reasonable to assume that the behavior was triggered by spinal thermoreceptors. (Author)

**A73-44094 # Reactions of living organisms to the action of electromagnetic waves in the millimeter range (Reaktsii zhiyykh organizmov na vozdeistvie elektromagnitnykh voln millimetrovogo diapazona).** N. P. Zaliubovskaiia. (Akademiia Nauk SSSR, Nauchnaia Sessia Otdeleniia Obshchei Fiziki i Astronomii, Moscow, USSR, Jan. 17, 18, 1973.) *Uspekhi Fiziologicheskikh Nauk*, vol. 110, July 1973, p. 462-464. In Russian.

Investigation of the biological action of electromagnetic waves of the millimeter range on *Drosophila* flies, chicken embryos, and albino rats and mice. Retardation of body functions and of feather growth were observed in the chicken grown from irradiated embryos. The nucleic acid and protein contents were lower in the liver and spleen of rats and mice after exposures. V.Z.

**A73-44095 #** Effects of electromagnetic waves of the millimeter range on a cell and on some structural elements of a cell (Vozdeistviia elektromagnitnykh voln millimetrovogo diapazona na kletku i nekotorye strukturnye elementy kletki). R. I. Kiselev and N. P. Zaliubovskaia. (*Akademiia Nauk SSSR, Nauchnaia Sessia Otdeleniia Obshchei Fiziki i Astronomii, Moscow, USSR, Jan. 17, 18, 1973.*) *Uspekhi Fizicheskikh Nauk* vol. 110, July 1973, p. 464-466. In Russian.

Damaged cellular membranes, protoplasm degeneration, cell enlargement, increased nucleic acid and protein contents, decreased vitality, and changes in the hemolytic stability of erythrocytes were observed in biological cells after exposure to electromagnetic waves in the millimeter range. The study covered isolated cells of man, animals, microbes and viruses. V.Z.

**A73-44096 #** Prospects for studying mechanisms responsible for the nonthermal effects of millimeter- and submillimeter-band electromagnetic radiation on biologically active compounds (Perspektivy izucheniia mekhanizmov neteplovogo vozdeistviia elektromagnitnogo izlucheniia millimetrovogo i submillimetrovogo diapazonov na biologicheski aktivnye soedineniia). V. I. Gaiduk, Iu. I. Khurgin, and V. A. Kudriashova. (*Akademiia Nauk SSSR, Nauchnaia Sessia Otdeleniia Obshchei Fiziki i Astronomii, Moscow, USSR, Jan. 17, 18, 1973.*) *Uspekhi Fizicheskikh Nauk*, vol. 110, July 1973, p. 466-468. 12 refs. In Russian.

**A73-44179 #** The effect of low X-ray doses on the central nervous system (Die Wirkung kleiner Dosen von Röntgenstrahlen auf das Zentralnervensystem). T. Vasulescu (Cluj, Universitatea, Cluj, Rumania), M. Rusu (Rumänische Akademie, Zentrum für biologische Untersuchungen, Rumania), G. Pasculescu, V. Papilian, and I. Serban. *Radiobiologia - Radiotherapia*, vol. 14, no. 4, 1973, p. 407-416. 19 refs. In German.

An investigation was conducted concerning the relations between the histopathological (morphological) changes, the histochemical changes (nucleic acids), and the changes in acid phosphatase. Male white rats were used in the tests. Animals of one group were subjected once to a dose of 50 r while animals of a second group were subjected to ten radiation exposures within 37 days with a dose of 5 r on each occasion. The histopathological and histochemical changes produced were studied at times ranging from 1 hour to 30 weeks after the radiation exposure. G.R.

**A73-44180** Sentography - Dynamic forms of communication of emotion and qualities. M. Clynes (Biocybernetic Institute, Palisades, N.Y.). *Computers in Biology and Medicine*, vol. 3, Sept. 1973, p. 119-130. 18 refs.

Description of sentography, a method developed during the last four years for measuring the dynamic forms of expression of emotion and qualities in a standardized manner. Sentography permits objective measures of the precise dynamic forms of emotional communication, called essentic forms. These forms are active in both auto- and cross-communications. They form elements of artistic and personal communication of affects and qualities. The experience and use of these forms in personal relationships and in the interrelation of man to his environment are integral to man's nature and his needs. M.V.E.

**A73-44212** A megarad plastic film dosimeter. P. H. C. V. Richard, J. A. Douglas, M. Marshall, and J. A. B. Gibson (Atomic Energy Research Establishment, Harwell, Berks., England). *Physics in Medicine and Biology*, vol. 18, Sept. 1973, p. 665-672. 10 refs.

A simple dosimeter has been designed for the measurement of dose from 0.1 to 100 Mrad. The dosimeter is a thin film of polycarbonate (thickness 200 microns), and the response to radiation is recorded by an increase in absorption at wavelengths of 290, 300, or 325 nm. The effect of Co-60 gamma-radiation on the film has been measured. After an initial storage period of 10 hr, the reading

fades at the rate of 0.4% per week and is unaffected by extremes of temperature and humidity during storage. The precision is plus or minus 2% from 1 to 50 Mrad, but doses of 0.1 Mrad and up to at least 100 Mrad can be measured. Above 37 C, the dosimeter is sensitive to temperature during radiation, and at dose rates below 50 krad/hr there is a reduction in response by about 20%. (Author)

**A73-44213** Spectral emissivity of skin and pericardium. J. Steketee (Erasmus University, Rotterdam, Netherlands). *Physics in Medicine and Biology*, vol. 18, Sept. 1973, p. 686-694. 17 refs.

A monochromator was modified to measure the emissivity of living tissue in the infrared region between 1 and 14 microns. The infrared radiation from the tissue was compared with blackbody radiation and in this way the emissivity has been determined for white skin, black skin, burnt skin, and pericardium. A compensating skin thermometer was constructed to measure the temperature of the surface of the tissue. The temperature difference before and after contact between a gold ring and the surface was made as small as possible (0.05 K). A reference radiator with the same spectral radiance (experimentally determined) was used in compensating for the environment. It appeared that the emissivity for skin is independent of the wavelength and equal to 0.98 plus or minus 0.01. These results contradict those of Elam, et al. (1963), but are in good agreement with those of Hardy (1934) and Watmough and Oliver (1968). In addition, there was no difference between the emissivities for normal skin and burnt skin. Epicardium values were found to lie between 0.83 (fresh heart) and 0.90 (after two hours and after nine days). (Author)

**A73-44214** Electroradiography - Some remarks on its technique and future. K. H. Reiss and G. Lange (Siemens AG, Erlangen, West Germany). *Physics in Medicine and Biology*, vol. 18, Sept. 1973, p. 695-703. 9 refs.

The present report records experimental results which are of importance for electroradiography using gas amplification in the Townsend region. In particular, the pulse height distribution for various cathode arrangements and the conditions necessary for taking good pictures are studied. The experimental conditions for the use of secondary electron layers and preliminary gas layers with a view to increasing the quantum efficiency are presented. (Author)

**A73-44215** Comparison of plethysmographic and electromagnetic flow measurements. E. R. Raman, V. J. Vanhuyse (Rijksuniversitair Centrum, Antwerp, Belgium), and A. H. Jageneau (Janssen Research Laboratory, Beerse, Belgium). *Physics in Medicine and Biology*, vol. 18, Sept. 1973, p. 704-711. 15 refs.

The influence of plethysmographic congesting pressures on blood flow has been studied in anesthetized mongrel dogs and primates. The flow was measured simultaneously with a plethysmograph and with an electromagnetic flowmeter, and the results are compared with electromagnetic measurements just before occlusion. In the case of complete venous obstruction, the plethysmographic flow values are equal to the electromagnetic flow values during occlusion but are smaller than the electromagnetically measured values before occlusion. The maximum flow measured with the plethysmograph was about 80% of the undisturbed flow for the dogs and about 92% of that for the primates. (Author)

**A73-44216** Electrical field distribution in the human body. S. K. Guha, M. R. Khan, and S. N. Tandon (Indian Institute of Technology; All India Institute of Medical Sciences, New Delhi, India). *Physics in Medicine and Biology*, vol. 18, Sept. 1973, p. 712-720. 6 refs.

Laplace equations and equations of electromagnetic field are applied in calculations of the distribution of the electromagnetic field in the human body. A numerical method and a computer program are used to solve these equations with the boundary

conditions applicable to the thorax. The variation of the current density across the thorax is determined. An electrolytic tank model is used for experiments supporting the theoretical results. V.Z.

**A73-44217** The effect of transmission on temperature measurements of human skin. J. Steketeer (Erasmus University, Rotterdam, Netherlands). *Physics in Medicine and Biology*, vol. 18, Sept. 1973, p. 726-729. 5 refs.

Derivation of a new relation between the effective temperature, the thermal gradient, and the absorption coefficient of human skin. The desired relation is obtained by applying the basic principles of McMahon's (1950) theory of partially transparent bodies to a slab of partially transparent skin. In this case, however, McMahon's theory is modified in that the presence of a thermal gradient across the epidermis is assumed. A.B.K.

**A73-44299** # Hemotherapy of coagulation system disturbances of hepatolienal origin (K voprosu gemoterapii narushenii svertvyaiushchei sistemy krovi gepatolienalnogo proiskhozhdeniia). B. I. Kekeliia (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Gematologii i Perelivaniia Krovi, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 71, July 1973, p. 229-232. 7 refs. In Russian.

Investigation of the spleen and liver contributions to the hemotherapeutic effect of blood transfusion on hemostasis disorders of hepatolienal origin. Results obtained in experiments on dogs include the finding that blood transfusion, following both liver resection and splenectomy, cures coagulation system disorders faster than in the cases of liver resection only or splenectomy alone. M.V.E.

**A73-44429** # Influence of histotoxic hypoxia on the activity of lactic dehydrogenase isoenzymes in neurons and neuroglia of various sections of the central nervous system (Vliianie gistotoksicheskoi gipoksii na aktivnost' izofermentov laktatdehidrogenazy v neironakh i neiroglii razlichnykh otdelov tsentral'noi nervnoi sistemy). V. A. Brumberg (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 211, July 11, 1973, p. 470-473. 18 refs. In Russian.

**A73-44430** # Activity of acid nucleases in eye tissues under the action of corticosteroidal hormones (Aktivnost' kislykh nukleaz tkanei glaza pri deistvii kortikosteroidnykh gormonov). B. S. Kasavina and N. B. Chesnokova (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 211, July 11, 1973, p. 477-480. 14 refs. In Russian.

**A73-44469** Measurement of left anterior descending coronary arterial blood flow - Technique, methods of blood flow analysis and correlation with angiography. L. Schwartz, G. Froggatt, H. D. Covey, K. Taylor, and J. E. Morch (Toronto General Hospital, Toronto, Canada). *American Journal of Cardiology*, vol. 32, Oct. 1973, p. 679-685. 17 refs. Research supported by the Ontario Heart Foundation.

**A73-44549** # Effect of adaptation to altitude hypoxia on the behavior of animals in a conflict situation (Vliianie adaptatsii k vysotnoi gipoksii na povedenie zhivotnykh v konfliktnoi situatsii). F. Z. Meerson, E. S. Solomatina, Iu. I. Vikhlaev, and T. A. Klygul' (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 23, July-Aug. 1973, p. 751-756. 20 refs. In Russian.

After adaptation to altitude hypoxia, rats make three times as many attempts to drink water from an electric-shock administering water dispenser, as compared to nonadapted control animals. Replacement of the drinking reflex by the defensive one was observed to occur in the adapted animals at a pain stimulation twice as strong as in control animals. The possible underlying causes are discussed. M.V.E.

**A73-44550** # Neuronal activity of the sensorimotor and visual cortex in rabbits during development of a summation focus in the reticular formation (Neironnaia aktivnost' sensorimotorno i zritel'noi kory krolika pri sozdanii summatsionnogo ochaga v retikulirnoi formatsii). M. A. Riabinina and E. N. Panakhova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 23, July-Aug. 1973, p. 823-831. 34 refs. In Russian.

**A73-44553** Directed Panspermia. F. H. C. Crick (Medical Research Council, Laboratory of Molecular Biology, Cambridge, England) and L. E. Orgel (Salk Institute for Biological Studies, San Diego, Calif.). *Icarus*, vol. 19, July 1973, p. 341-346. 10 refs.

It now seems unlikely that extraterrestrial living organisms could have reached the earth either as spores driven by the radiation pressure from another star or as living organisms imbedded in a meteorite. As an alternative to these nineteenth-century mechanisms, Directed Panspermia, the theory that organisms were deliberately transmitted to the earth by intelligent beings on another planet, is considered. It is concluded that it is possible that life reached the earth in this way, but that the scientific evidence is inadequate at the present time to say anything about the probability. Attention is drawn to the kinds of evidence that might throw additional light on the topic. (Author)

**A73-44554** The zoo hypothesis. J. A. Ball. *Icarus*, vol. 19, July 1973, p. 347-349. 12 refs.

A hypothesis is proposed about extraterrestrial intelligent life and on the possible causes of the failure to detect it so far. Such life, it is felt, may be almost ubiquitous, and its apparent failure to interact with us may be understood in terms of the assumption that they have set us aside as part of a wilderness area or zoo. M.V.E.

**A73-44663** # A method for the approximation of processes in homogeneous biological structures (Ob odnom metode approksimatsii protsessov v odnorodnykh biologicheskikh strukturakh). V. M. Alekseev, A. V. Kochergin, and V. M. El'iasberg. *Avtomatika i Telemekhanika*, Aug. 1973, p. 52-61. 7 refs. In Russian.

A mathematical model of a tonic muscle of a crustacean is considered. The dependence of the strain of each muscle fiber on the impulse inflow from motoneurons is described by a nonlinear differential operator containing parameters that vary from fiber to fiber. A formulation and solution are presented for the problem of approximating the operator that can describe the total muscle strain by means of an 'averaged-fiber' operator. M.V.E.

**A73-44667** # Experimental investigation of the characteristics of the visual recognition of images (Eksperimental'noe issledovanie kharakteristik vizual'nogo raspoznavaniia izobrazhenii). V. A. Avtonomova and Iu. M. Kholodilov. *Avtomatika i Telemekhanika*, Aug. 1973, p. 161-165. 6 refs. In Russian.

An experiment is described on human recognition of noise-blurred images. The obtained results indicate that the empirical probabilities of recognition differ from the potential probabilities arrived at by statistical analysis. M.V.E.

**A73-44668** # Effect of prolonged hypokinesia on the higher nervous activity of humans (Vpliv trivaloi gripokinezii na stan vishchoi nervovoi dial'nosti liudini). N. V. Kol'chenko and S. I. Moldavs'ka (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 435-440. 9 refs. In Ukrainian.

Observations of healthy subjects during and after 10-day bed rest with unrestricted body functions showed no adverse effects on their mental capacity and performance. In contrast, a bed rest of 5 to 10 days with lower extremities in plaster bandages, and a bed rest of 10 to 30 days without body function restrictions resulted in an impairment of mental performance, a slowing-down of video-motor responses, and a lower performance in proof-reading assignments. A period of up to eight days was required for the restoration of these functions after experiments. V.Z.



**A73-44669 #** Age-dependent characteristics of myoglobin content and distribution in the heart and skeletal muscles (Vikovi osoblivosti vmistu ta rozpodilu mioglobinu v sertsii i skeletnii muskulaturii). I. M. Man'kova's'ka (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 477-484. 46 refs. In Ukrainian.

Myoglobin content and distribution were studied by chemical and histological analyses in the myocardium and skeletal muscles of albino rats 1 to 32 months old. The myoglobin concentration in the myocardium and red muscles tended to decrease with the age of the rats. A classification, based on myoglobin content levels, is proposed for fibers of skeletal muscles. V.Z.

**A73-44670 #** The energetic metabolism and some reactions of the cardiovascular system during multichannel electrical stimulation and voluntary stressing of muscles (Energetichnii obmin ta deiki reaktsii sertsevo-sudinnoi sistemi pri bagatokanal'nii elektrostimulatsii i dovil'nikh napruzheniakh m'iaziv). V. Iu. Davidenko, V. I. Danileiko, I. P. Semeniutin, and M. N. Shabatura (Kiiv's'kii Institut Fizichnoi Kul'turi; Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 497-502. 23 refs. In Ukrainian.

**A73-44671 #** Changes in indices of the carbohydrate and fat metabolism, the state of the sympathoadrenal system, and oxidative processes under varying-intensity cold effects (Zmini pokaznikiv vuglevodnogo ta zhirovogo obminu, stanu simpato-adrenalovoi sistemi ta oksinikh protsesiv pri kholodovikh vplivakh riznoi intensivnosti). L. O. Liakh (Donets'kii Derzhavnii Universitet, Donetsk, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 503-510. 41 refs. In Ukrainian.

**A73-44672 #** Influence of physical stress on the state of human higher nervous activity under conditions of underwater labor (Vpliv fizichnogo navantazhennia na stan vishchoi nervovoi dial'nosti liudini v umovakh roboti pid vodoiu). V. I. Shakhova and I. A. Mitronova (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 541, 542. In Ukrainian.

**A73-44673 #** Use of the conditioned reflex method to study the motor analyzer during hygienic evaluation of working conditions in the presence of vibrations (Vikoristannia umovnoreflektornogo metodu doslidzhennia rukhovogo analizatora dlia gigienichnoi otsinki rezhimu pratsi pid vplivom vibratsii). M. A. Skidan (Kiiv's'kii Institut Gigieni Pratsi i Profzakhvoriuvan', Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 543, 544. 7 refs. In Ukrainian.

**A73-44674 #** Desoxyribonucleases in sweat gland secretion of man (Dezoksiribonukleazi sekretu potovikh zaloz liudini). M. Iu. Khursin (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 552-554. 13 refs. In Ukrainian.

Sweat gland secretion samples were taken from the foreheads of subjects. Viscosity of the samples was measured and was compared with that of reference samples. The results suggest the presence of appreciable amounts of desoxyribonucleases in the sweat gland secretion of man. V.Z.

**A73-44675 #** Anatomic and functional organization of the ventral anterior and reticular nuclei of the thalamus (Anatomichna i funktsional'na organizatsiia ventral'nogo peredn'ogo i retikuliamnogo iader zorovogo bugra). M. Ia. Voloshin (Akademiia Nauk Ukrain's'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 19, July-Aug. 1973, p. 557-565. 139 refs. In Ukrainian.

**A73-44689** Oxygen affinity and electrolyte distribution of human blood - Changes induced by propranolol. A. Agostoni, C. Berfasconi, and G. C. Gerli (Milano, Università, Milan, Italy). *Science*, vol. 182, Oct. 19, 1973, p. 300, 301. 12 refs. Consiglio Nazionale Delle Ricerche Contract No. 70,01170,04,115,2635.

Propranolol causes a massive leakage of potassium ions from red cells, which results in an alteration of the Gibbs-Donnan equilibrium across the red cell membrane. According to such a mechanism, the presence of propranolol significantly increases the hydrogen ion activity of the interior of the red cell, causing a decreased oxygen affinity of hemoglobin according to the classical Bohr effect. No release of 2,3-diphosphoglycerate which may be bound to the membrane is thus necessary to explain the effect of propranolol on the oxygen dissociation curve of blood. (Author)

**A73-44699 \*** Sterols of the fungi - Distribution and biosynthesis. J. D. Weete (Lunar Science Institute, Houston, Tex.). *Phytochemistry*, vol. 12, 1973, p. 1843-1864. 187 refs. Contracts No. NSR-09-051-001; No. NAS9-12622.

The importance of sterols in the growth and reproduction in fungi is becoming increasingly apparent. This article concerns the composition and biosynthesis of ergosterol in these organisms. Comparison to plant and animal sterol formation are made. (Author)

**A73-44717 #** Some physiological mechanisms of alpha-rhythm frequency fluctuations in man under conditions of relative rest (Nekotorye fiziologicheskie mekhanizmy fluktuatsii chastoty alpha-ritma cheloveka v usloviakh otositel'nogo pokoia). F. Ia. Zolotarev (MSO, Institut Ekspertizy Trudospobnosti i Organizatsii Truda Invalidov, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1145-1150. 14 refs. In Russian.

Periodometric analysis of alpha-rhythm frequency fluctuations in healthy subjects and in patients with central nervous system organic disorders who were confined in a reclining position with closed eyes in a sound-proof dark chamber. A close relation is established between the amplitude-frequency characteristics of alpha-rhythm and the variations in cephalogram front lengths of the subjects. The alpha-rhythm periodic frequency fluctuations were higher when the information input in the brain was increased. V.Z.

**A73-44718 #** The nature and significance of the dynamics of electrical activity in the neocortex and hippocampus during the paradoxal phase of sleep (O kharaktere i znachenii dinamiki elektricheskoi aktivnosti novoi kory i gippokampa pri paradoksal'noi faze sna). T. N. Oniani, M. G. Koridze, and M. G. Kavkasidze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1168-1175. 31 refs. In Russian.

**A73-44719 #** Stroke volume measurement from an integral rheogram of human body (Izmerenia udarnogo ob'ema krovi po integral'noi reogramme tela cheloveka). M. I. Tishchenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1216-1224. 24 refs. In Russian.

Short-circuited electrode pairs were applied to the distal areas of the forearms and shins of subjects, and rheograms were taken by connecting the measuring arm of a bridge rheograph between the electrode pairs. A formula was derived to calculate the stroke volume of the left ventricle from the anacrotic section of rheograms obtained by this technique. The results for electrical resistance pulsations in blood vessels were comparable to those obtained by other methods when this rheographic technique and the formula were used in measurements and calculations. The technique was found effective in stroke volume measurements during single contractions of the heart. V.Z.

**A73-44720 #** Measurements of arterial pressure and of pressoreceptor reactions during prolonged pressure shifts in carotid arteries (Izmeneniia arterial'nogo davleniia i reaktsii s pressoretseptor-

rov pri dlitel'nykh sdvigakh davleniia v sonnykh arteriakh). B. A. Smirnov and E. V. Tkachenko (Meditsinskii Institut, Dnepropetrovsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1242-1250, 12 refs. In Russian.

**A73-44721 #** Chemical thermoregulation after an 'accelerated' adaptation to the cold (Khimicheskaia termoregulatsiia posle 'uskorennoi' adaptatsii k kholodu). A. D. Slonim and E. I. Shvetsova (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1262-1267. 31 refs. In Russian.

Metabolic processes were studied in albino rats during and after single or repeated exposures to subzero temperatures of various degrees and durations. Chemical thermoregulation was more intensive and the muscular electric activity was lower in rats exposed one and two times to cooling with rectal temperatures of 30 deg. Intermittent exposures to -20 deg over a combined period of 30 min with thaw intermissions of 5 min proved very effective for adaptation to cold in terms of body temperature stability and electric activity of skeletal muscles. V.Z.

**A73-44722 #** Application of factor analysis to the encephalographic characterization of sleep (Primenenie faktornogo analiza dlia entsefalograficheskoi kharakteristiki sna). A. S. Kaplunovskii and M. M. Bogoslovskii (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1291, 1292. 7 refs. In Russian.

Concurrent processes of nervous activity are studied by factor analysis in wakeful cats and during various phases of sleep. Particular attention is given to the relation between the encephalograms of different portions of the cortex. A diagram is plotted to show the factor matrices of this relation. V.Z.

**A73-44723 #** A transistor amplifier for microelectrode circuitry with an extended range of applicability (Tranzistornyi usilitel' mikroelektroodnykh otvedeni s rasshirennyimi vozmozhnostiami primeneniia). S. G. Dan'ko and G. G. Kurchavii (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 59, Aug. 1973, p. 1293-1295. 8 refs. In Russian.

Description of an alternative transistor amplifier circuit which is superior to other circuits in microelectrode applications in having a higher input resistance, a lower through-object current, and a negative-capacitance correction capability. A block diagram of the two-channel amplifier circuit is included. V.Z.

**A73-44724 #** Inhibition by selenium of the free-radical states of the retina of the eye (Ob ingibirovani selenom svobodno-radikal'nykh sostoianii setchatki glaza). G. B. Abdullaev, Sh. V. Mamedov, A. I. Dzhaferov, and V. V. Perelygin (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Fiziki and Institut Fiziologii, Baku, Azerbaidzhan SSR). *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, vol. 29, no. 3, 1973, p. 25-28. 13 refs. In Russian.

Investigation of the effect of selenium compounds on free radical concentrations in the eye retina of rabbits. The results obtained made it possible to observe for the first time the inhibitory effect of a selenium compound on the free radical states in the retina of the eye. M.V.E.

**A73-44725 #** Electronic simulation and analog computer studies of the influence of temperature on the process of nerve impulse shaping (Elektronnoe modelirovanie i issledovanie na AVM vliianiia temperatury na protsess formirovaniia nervnogo impul'sa). Ia. B. Kadymov and Kh. T. Bairamov (Azerbaidzhanskii Politekhnikheskii Institut, Baku, Azerbaidzhan SSR). *Akademiia Nauk Azerbaidzhanskoi SSR, Doklady*, vol. 29, no. 3, 1973, p. 29-32. 11 refs. In Russian.

**A73-44769 #** The presence in the heart of compounds which participate in the neurohumoral regulation of coronary circulation (O nalichii v serdtse soedinenii, primimaiushchikh uchastie v neurogumoral'noi reguliatsii koronarnogo krovoobrashcheniia). R. M. Sraponian and A. A. Galoian (Akademiia Nauk Armianskoi SSR, Institut Biokhimii, Yerevan, Armenian SSR). *Akademiia Nauk Armianskoi SSR, Doklady*, vol. 56, no. 3, 1973, p. 174-177. 6 refs. In Russian.

Results of an experimental study carried out for the purpose of detecting and identifying substances from the heart muscle which participate in the formation and release of coronary-dilating neurohormones. The study was carried out on various types of animals both under normal conditions and in the presence of stimuli promoting the release of these neurohormones from the brain into the blood. As a result of this study, a coronary-active subfraction is obtained which is UV-absorbing, ninhydrin-negative, and highly mobile electrophoretically. When this substance was introduced into the blood stream, a coronary-dilating effect was produced. Following blocking of the Hering nerve, the substance isolated did not produce a coronary-dilating effect when introduced into the blood stream. It is therefore concluded that the substance extracted from the heart muscle affects the coronary circulation by a neurohumoral mechanism which apparently promotes the release of coronary-dilating hypothalamic neurohormones from the brain into the blood. A.B.K.

**A73-44770** Noise laws don't protect the sensitive. M. Bryan (Salford University, Salford, England). *New Scientist*, vol. 59, Sept. 27, 1973, p. 738-740.

Studies show that there are very large differences between people concerning the relation between annoyance and noise. It is found that a noise-sensitive person notices noise at quite a low level while the noise insensitive person doesn't become aware of the noise until it is about 16-times louder. The mean annoyance line in a figure presented shows how the 'average' person's annoyance grows with noise level. Noise regulations are presumably based upon the response of this mythical person. Relations between the level of noise sensitivity and personality traits are explored. It is pointed out that existing noise regulations provide little or no protection for the 'noise sensitive' group which apparently represents about one-fifth of the population. G.R.

**A73-44773** Response surface methodology central-composite design modifications for human performance research. C. Clark and R. C. Williges (Illinois, University, Urbana, Ill.). *Human Factors*, vol. 15, Aug. 1973, p. 295-310. 16 refs. USAF-supported research.

Selected response surface methodology (RSM) designs that are viable alternatives in human performance research are discussed. Two major RSM designs that are variations of the basic, blocked, central-composite design have been selected for consideration: (1) central-composite designs with multiple observations at only the center point, and (2) central-composite designs with multiple observations at each experimental point. Designs of the latter type are further categorized as: (a) designs which collapse data across all observations at the same experimental point; (b) between-subjects designs in which no subject is observed more than once, and observations at each experimental point may be multiple and unequal or multiple and equal; and (c) within-subject designs in which each subject is observed only once at each experimental point. The ramifications of these designs are discussed in terms of various criteria such as rotatability, orthogonal blocking, and estimates of error. (Author)

**A73-44774** Transfer assessment using a between-subjects central-composite design. R. C. Williges and M. L. Baron (Illinois, University, Urbana, Ill.). *Human Factors*, vol. 15, Aug. 1973, p. 311-319. 19 refs. Research supported by the Link Foundation and U.S. Air Force.

Transfer of training from a pursuit rotor to an epicycloid pursuit rotor was assessed by means of a response surface methodology

(RSM) central-composite design. Number of training trials, time between training trials, and tracking speed of the training task were combined in a three-factor, RSM central-composite design. Multiple-regression prediction equations relating these three independent variables to trials to criterion on the epicycloid pursuit rotor were calculated for both an unreplicated and replicated RSM design. A representative first-order response surface was plotted for the replicated design. The results are discussed in terms of necessary RSM central-composite design modifications and the overall applicability of using RSM in transfer of training research. (Author)

**A73-44775 #** Performance prediction in a single-operator simulated surveillance system. R. G. Mills (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio) and R. C. Williges (Illinois, University, Urbana, Ill.). *Human Factors*, vol. 15, Aug. 1973, p. 337-348. 7 refs. USAF-sponsored research.

A semiautomatic radar surveillance system was simulated using a time-compressed, real-time cathode-ray tube display. Subjects were required to detect targets entering the surveillance area, initiate automatic tracking of these targets, and reinstate lost tracks when automatic tracking failed. A within-subject response surface methodology (RSM) central-composite design was employed which permitted simultaneous investigation of the effects of five system parameters on surveillance operator performance. Response surface fits (second-order polynomials) were obtained and analyses of variance were conducted to describe these effects on two dependent measures of performance. Results support the contention that operator performance may be dependent upon complex relationships among the five system parameters tested. Furthermore, an RSM central-composite design provided an efficient method for obtaining data and quantifying these relationships. (Author)

**A73-44776 #** Predictive validity of central-composite design regression equations. R. C. Williges (Illinois, University, Urbana, Ill.) and R. G. Mills (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Human Factors*, vol. 15, Aug. 1973, p. 349-354. 5 refs. USAF-sponsored research.

The predictive validity of the Mills and Williges (1973) empirically derived prediction equations of single operator performance in a simulated surveillance system was assessed by measuring 16 additional data points on the same four subjects participating in the original study. Correlations between predicted and observed performance on 16 points augmented to the design compared favorably with estimated shrunken multiple-correlation coefficients. In addition, the averages of each of the 16 additional treatment conditions were compared to the 95% confidence interval of the predicted values using the Mills and Williges (1973) regression equations. The 16 data points were also chosen such that a supplementary factorial analysis of variance could be conducted on the data. Comparisons were made between the analysis of variance and the multiple-regression analysis. It was concluded that the response surface methodology procedures for developing overall prediction equations of human performance demonstrate a high degree of predictive validity. (Author)

**A73-44777** Decrements in tracking and visual performance during vibration. A. M. Collins (Bolt Beranek and Newman, Inc., Cambridge, Mass.). *Human Factors*, vol. 15, Aug. 1973, p. 379-393. 34 refs. Contract No. N00014-69-C-0095.

The conclusions obtained in the review of the literature on vibration and human performance conducted by Grether (1971) are extended in several significant ways. The figures provided make it possible to compare percentage decrements across various studies in the tracking and visual performance literature. The problem of translating results from sinusoidal vibration studies into predictions of operational decrements is considered in detail. A testable hypothesis is presented which, if correct, would specify an explicit procedure for making the translation. The effects of varying different aspects of task situations are discussed with respect to their implications for operational environments. G.R.

**A73-44778** Information seeking with multiple sources of conflicting and unreliable information. J. M. Levine (American Institutes for Research, Washington, D.C.) and M. G. Samet (U.S. Army, Behavior and Systems Research Laboratory, Arlington, Va.). *Human Factors*, vol. 15, Aug. 1973, p. 407-419. 12 refs. NIH-supported research; Grant No. DAHC19-71-C-0030.

The reported study was designed to articulate more clearly the operational definitions of conflicts. Sixteen U.S. Army enlisted men served as subjects. The experimental task was an abstracted version of a tactical decision problem similar to that used by Levine (1973). The task required the subject to determine which one of eight friendly locations was the target of a hypothetical enemy advance. Information was supplied in the form of slides showing 'pathways' connecting discrete enemy positions as reported by each of three intelligence sources. The results obtained in the study are discussed, giving attention to dependent variables, first decisions, questions of accuracy, correct decisions, second decisions, third decisions, and information sampling latency. G.R.

**A73-44901 #** Structural complexity and technical realization of formal neurons by means of magnetic current switches (O strukturnoi slozhnosti i tekhnicheskoi realizatsii formal'nykh neuronov na magnitnykh tokovykh perekliuchateliakh). V. I. Potapov and P. V. Mirenkov. *Problemy Bioniki*, no. 10, 1973, p. 3-15. 11 refs. In Russian.

**A73-44902 #** Synthesis of minimized formal neurons by means of magnetic current switches (Sintez minimizirovannykh formal'nykh neuronov na magnitnykh tokovykh perekliuchateliakh). L. V. Voronkova. *Problemy Bioniki*, no. 10, 1973, p. 15-22. In Russian.

**A73-44903 #** Physical model selection for the balance preservation system in man (K voprosu o vybere fizicheskoi modeli sistemy podderzhanii ravnovesiia cheloveka). V. A. Vnukov and R. A. Gurevich. *Problemy Bioniki*, no. 10, 1973, p. 33-38. In Russian.

Discussion of the statics of some mechanical models for keeping a human body in its frontal sagittal plane. The maximum angle of body deflection from the normal at which the system still keeps the body in balance is taken as the static stability criterion in the evaluation of system quality. A reliable mechanical model for body equilibrium in terms of this criterion is selected and evaluated. V.Z.

**A73-44904 #** Neuron-like elements in the activity of restoration organs (Neuronopodobnye elementy v rezhime vosstanavli-vaiushchikh organov). V. I. Potapov and M. F. Dotsenko. *Problemy Bioniki*, no. 10, 1973, p. 38-49. In Russian.

Consideration of mathematical models for neuron-like elements active in restoration organs. Expressions are derived for calculating the probability of smooth work of redundant systems with adaptable and inadaptible neuron-like restoration organs. The efficiency of neuron-like elements in the performance of restoration functions is evaluated. A procedure for the selection of the most effective structures for restoration organs from available a priori probability estimates is proposed. An algorithm is also developed for adaptation of a neuron-like restoration organ. V.Z.

**A73-44905 #** Algebraic nature of thought formation structures (Algebraicheskaia priroda struktur formirovaniushchegosia myshleniia). V. N. Chudakov. *Problemy Bioniki*, no. 10, 1973, p. 49-57. 11 refs. In Russian.

The algebraic properties of thought structures are analyzed in the process of their formation. Attention is given to their reversibility, group characteristics and order structures. Theorems are formulated and proved to demonstrate the reversibility of thought formation processes. Sufficient conditions for a logical thinking process, and the group properties of thinking structures are determined. Some formal-level thought formation structures are described. V.Z.

**A73-44906 #** Introduction of a metric into the visual field (Vvedenie metriki v pole zreniia). Iu. P. Shabanov-Kushnarenko, I. V. Shul'gin, and B. K. Lopatchenko. *Problemy Bioniki*, no. 10, 1973, p. 58-66. 7 refs. In Russian.

A mathematical description is given for the transformation of a physical space into a subjective visual field in the case of monocular vision. A mathematical model is developed for a visual field metric. Diagrams are included on which the mathematical model is based.

V.Z.

**A73-44907 #** A mathematical model for controlled image contour sharpness enhancement (Matematicheskaia model' reguliruemogo podcherkivaniia konturov izobrazheniia). E. P. Putiatin and V. Ia. Serdiuchenko. *Problemy Bioniki*, no. 10, 1973, p. 74-82. 5 refs. In Russian.

A mathematical basis is discussed for controlled boundary contrast enhancement in optical images. The model is based on a modification of one of the four expressions previously proposed by the authors (1971) for a four-block model of boundary contrast enhancement. Analysis and experiments show that the parameter of contour contrast enhancement for an input optical signal of a broken-line type is independent of the brightness function gradient when this mathematical model is applied.

V.Z.

**A73-44908 #** Theoretical prerequisites of image normalization. I (Teoreticheskie predposylki normalizatsii izobrazhenii. I). E. P. Putiatin. *Problemy Bioniki*, no. 10, 1973, p. 82-89. 5 refs. In Russian.

A theorem is formulated and proved to demonstrate the existence of reference images when the image-carrying signal is subjected to additive and multiplicative transformations. The necessary conditions to be met by image normalization operators for an adequate image normalization process are determined.

V.Z.

**A73-44909 #** Dynamics of the balance preservation system of man (K dinamike sistemy podderzhaniia ravnovesiia cheloveka). V. A. Vnukov and Iu. P. Shabanov-Kushnarenko. *Problemy Bioniki*, no. 10, 1973, p. 99-104. In Russian.

The balanced state of a multicomponent rotational system is analyzed under the action of conservative loads in the absence of follow-up forces. It is assumed that some balance-restoring moments are acting on the hinged joints of the system and that the balanced state of the system is controlled by a feedback mechanism under a certain law. The system is represented by a multilink pendulum with a static point of support, consisting of a chain of interlinked members which can move only in the frontal plane. A model represented by this system is applied to a study of balance preservation in man.

V.Z.

**A73-44910 #** A method for experimental examination of hearing (Ob odnom sposobe eksperimental'nogo issledovaniia slukha). G. S. Eremin. *Problemy Bioniki*, no. 10, 1973, p. 104-109. 6 refs. In Russian.

Description of a circuit with a voltage-controlled attenuator which facilitates a gentle control of acoustic signal duration and repetition in auditory system examinations. The circuit is designed as an alternative to other methods requiring abrupt signal switch-on and off manipulations producing clicks in the earphones of subjects.

V.Z.

**A73-44911 #** Determination of performance precision and informativeness of electronic models of the sensory system of man (K voprosu ob opredelenii tochnosti i informativnosti funktsionirovaniia elektronnykh modelei sensornoi sistemy cheloveka). V. V. Tishchenko. *Problemy Bioniki*, no. 10, 1973, p. 109-113. 5 refs. In Russian.

**A73-44912 #** Optical electronic model of local detectors of the visual analyzer (Optiko-elektronnaia model' lokal'nykh detekto-

rov zritel'nogo analizatora). Iu. P. Bugai, V. A. Bakhtigozin, and V. G. Chervov. *Problemy Bioniki*, no. 10, 1973, p. 120-124. 5 refs. In Russian.

Description of an assembly comprising an optical system and an electronic circuit which is capable of reproducing the receptive fields of the visual analyzer. Applications of the assembly for simulation of the excitation zone and inhibition zone of the visual analyzer are discussed. Particular attention is given to the performance of the assembly in simulation of the directional motion of objects.

V.Z.

**A73-44946** Ischemic polarcardiographic changes induced by exercise - A new criterion. G. E. Dower, R. A. Bruce, J. Pool, M. L. Simoons, L. J. Meilink (Washington University, Seattle, Wash.; Rotterdam, University, Hospital, Rotterdam, Netherlands), and M. W. Niederberger. *Circulation*, vol. 48, Oct. 1973, p. 725-734. 10 refs. Research supported by the Max Kade Foundation; Grant No. NIH-HE-13517-02.

The polarcardiographic responses to exercise in normal men, young and middle-aged, have been compared with those of men who show ischemic responses on the electrocardiogram. Changes in the ST-vectors are the most significant. These changes have been reduced to a single numerical quantity based on the spatial magnitude of the vector at the end of the QRS complex and the spatial direction of a vector occurring at a clearly specified time during the period of the ST-segment. The assets of polarcardiography are that it enables study of direction and magnitude of ST-vectors in a time sequence. Thus it provides information of clinical importance which cannot be obtained by either electro- or vectorcardiography.

(Author)

**A73-44947** Doppler echocardiography - The localization of cardiac murmurs. S. L. Johnson, D. W. Baker, R. A. Lute, and H. T. Dodge (Washington, University, Seattle, Wash.). *Circulation*, vol. 48, Oct. 1973, p. 810-822. 23 refs. Grants No. PHS-HE-07293; No. PHS-HE-13517; No. PHS-RR-37.

A range-gated pulsed Doppler flowmeter has recently been developed that measures the average velocity of blood flow within a small tear-drop shaped (4 mm by 2 mm) sample volume. Unlike the continuous wave Doppler, the distance from the transducer face to the sampling site can be continuously varied by a range adjustment knob. Twenty patients with cardiac murmurs were evaluated in a noninvasive laboratory by brief cardiac physical examination, abbreviated phonocardiogram, complete echocardiogram, and localization of the murmurs by Doppler echocardiography. The localization depends on the detection of turbulent flow or jets at the sampling site. The murmurs included the diastolic rumble of mitral stenosis, mitral regurgitation, the murmur of left ventricular outflow tract obstruction, aortic stenosis, aortic insufficiency, diastolic rumble of tricuspid stenosis, augmented right ventricular filling sound in atrial septal defects, pulmonic stenosis, pulmonic insufficiency, and high velocity flow through the obstruction in coarctation of the aorta.

(Author)

**A73-45058** Cardiopulmonary responses of male and female swine to simulated high altitude. I. F. McMurtry, C. H. Frith, and D. H. Will (Colorado State University, Fort Collins, Colo.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 459-462. 22 refs. Grants No. NIH-HE-11821; No. NIH-SSO-1RR-05458-9.

The tests were conducted at the laboratory altitude of 1,524 m and after four weeks of exposure to a simulated altitude of 5,490 m. Changes in arterial and mixed venous blood gases were considered together with hemoglobin concentration, right heart and pulmonary arterial blood pressures, and ventricular weight ratios. The swine at 5,490 m were extremely hypoxemic. The death of three animals indicated that an arterial oxygen partial pressure of 30 mm Hg was near the intolerable limit. Swine at 5,490 m developed marked pulmonary hypertension and right ventricular hypertrophy.

G.R.

**A73-45059** Energy balance and change in body weight and body water in man during a 2-day cold exposure. L. A. Wennberg, N. A. Ekstrom, F. O. Adler, G. E. Malm, M. Mikiver, and G. E. Olsson (Forsvarets Forskningsanstalt, Sundbyberg, Sweden). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 477-479. 16 refs.

**A73-45060** Hemoglobin-oxygen equilibrium and coronary blood flow - An analog model. M. A. Duvelleroy, H. Mehmel, and M. B. Laver (Harvard University, Boston, Mass.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 480-484. 15 refs. Grant No. PHS-GM-15904-05.

An analog model is presented that describes the behavior of coronary blood flow whenever the affinity of hemoglobin for oxygen is altered. The model predicts that changes in oxygen transport are associated with changes in blood flow, thereby emphasizing the need for definition of the oxyhemoglobin dissociation curve whenever regulation of blood flow is studied. The validity of the model has been substantially demonstrated. M.V.E.

**A73-45061** Response of coronary blood flow to pH-induced changes in hemoglobin-O<sub>2</sub> affinity. H. C. Mehmel, M. A. Duvelleroy, and M. B. Laver (Harvard University; Shriner's Burns Institute, Boston, Mass.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 485-489. 23 refs. Research supported by the Shriner's Burns Institute; Grant No. PHS-GM-15904-05.

The results of a preliminary test of an analog model of coronary blood flow (CBF) regulation, previously described, are reviewed. The test was undertaken in a heart-lung preparation perfused with whole blood. Changes in the hemoglobin-O<sub>2</sub> affinity relationship were achieved by altering plasma pH from 7.2 to 7.8 by the addition of Tris buffer while myocardial oxygen consumption was kept constant. The experimentally obtained plot of CBF versus pH-induced changes in partial oxygen tension at 50% saturation followed very closely the predicted curves. M.V.E.

**A73-45062** Oxygen kinetics for constant work loads at various altitudes. R. Bason, C. E. Billings, E. L. Fox, and R. Gerke (Ohio State University, Columbus, Ohio). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 497-500. 21 refs. Research supported by the Ohio State University; Grant No. NIH-FR-5409.

Oxygen kinetics were observed for eight male subjects who performed at three intensities of work (30, 60, 80% maximum O<sub>2</sub> uptake) on a bicycle ergometer at 223, 2,286, and 3,810 m simulated altitude. The data suggest that the time to steady-state O<sub>2</sub> uptake is related to the intensity of the work, being more delayed the greater the intensity. A steady state rate of uptake was reached in 6 and 20 min for work at 30 and 60% of aerobic capacity, respectively, independent of altitude. No steady state rate of uptake was reached in any of the subjects for work at 80% of aerobic capacity. The O<sub>2</sub> uptake process from the onset of exercise approaches an asymptotic value in an exponential manner directly related to the intensity of the work. At 30% of maximum O<sub>2</sub> uptake the rate of O<sub>2</sub> uptake at time t can be adequately described by a single exponential function. At 60% of maximum O<sub>2</sub> uptake, however, the rate of O<sub>2</sub> uptake at time t requires at least two exponential components to accurately describe the curve. (Author)

**A73-45063** Cardiovascular adjustments to progressive dehydration. D. H. Horstman and S. M. Horvath (California, University, Santa Barbara, Calif.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 501-504. 15 refs. Grant No. AF-AFOSR-69-1653.

Nine nonheat-acclimatized male subjects were exposed at 48 C, vapor pressure 7.0 mm Hg, for seven hours without fluid replace-

ment. Body temperatures, metabolism, evaporative losses, cardiac output, and peripheral blood flow (calf and forearm) were measured. Changes in thermal balances during the heat exposure of these nine subjects were similar to those observed in a previous study of three men. Cardiac output increased twofold and remained at this level during the entire period of dehydration, while calf and forearm flows increased to their peak values after one hour, remaining at or below the peak level for 3 to 4 hr, and then they steadily declined toward control levels. The interrelationships between the different patterns of central and peripheral blood flows during progressive dehydration are discussed. (Author)

**A73-45064** Model experiments on apparent blood viscosity and hematocrit in pulmonary alveoli. R.-T. Yen and Y.-C. Fung (California, University, La Jolla, Calif.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 510-517. 25 refs. NSF Grants No. GK-27647; No. GK-31160X; Grant No. NIH-HL-12494.

A model which is about 2,000 times larger than the prototype is used to simulate the pulmonary alveolar capillaries. A fluid of high viscosity is chosen to simulate the plasma so that the Reynolds number of the flow in the model is about the same as that in the mammalian lung. Red cells are simulated by flexible pellets. The dependence of viscosity on hematocrit in the alveolar sheet is determined. This information is required in an analysis of the distribution of red blood cells in alveolar sheets. There is a natural tendency for red cells to be concentrated in faster channels. G.R.

**A73-45065 \*** Regression of altitude-produced cardiac hypertrophy. D. A. Sizemore, T. W. McIntyre, E. J. Van Lier, and M. F. Wilson (West Virginia University, Morgantown, W. Va.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 518-521. 12 refs. Grant No. NGR-49-001-048.

The rate of regression of cardiac hypertrophy with time has been determined in adult male albino rats. The hypertrophy was induced by intermittent exposure to simulated high altitude. The percentage hypertrophy was much greater (46%) in the right ventricle than in the left (16%). The regression could be adequately fitted to a single exponential function with a half-time of 6.73 plus or minus 0.71 days (90% CI). There was no significant difference in the rates of regression for the two ventricles. (Author)

**A73-45066** Respiratory cycle optimization in exercise. S. M. Yamashiro and F. S. Grodins (Southern California, University, Los Angeles, Calif.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 522-525. 18 refs. Grant No. NIH-GM-16437.

The effects of including FRC and airflow pattern along with respiratory frequency as controlled variables contributing to the minimization of respiratory work during exercise were studied. Cycle characteristics predicted by such a theoretical formulation were compared with experimental data taken from the literature. The results suggest that the behavior of the respiratory cycle observed during exercise in man is consistent with this work minimization criterion. (Author)

**A73-45067** Fundamental frequency analysis of pulmonary mechanical resistance and compliance. L. E. Ostrander, E. H. Chester, and J.-B. Franck (Case-Western-Reserve University; U.S. Veterans Administration Hospital, Cleveland, Ohio). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 526-537. 36 refs. Research supported by the Ohio Thoracic Society and Samuel Rubin Foundation; U.S. Veterans Administration Grant No. MRIS-1000-01; Grant No. NIH-GM-47364.

The describing function (DF) method is used to examine some aspects of lung function. Lung mechanical descriptions as produced by DF methods and by standard tests are compared. The DF method is employed to assess nonlinearity and statistical variability in lung

function for a specific set of breathing maneuvers. Aspects of measurement theory are discussed together with experimental methods, the statistical analysis of data, error sources, and airway resistance. Values of DF resistance and DF compliance are obtainable at different frequencies of breathing and for different rhythmic breathing maneuvers. G.R.

**A73-45068** Rebreathing equilibration of CO<sub>2</sub> during exercise. N. L. Jones and A. S. Rebeck (McMaster University, Hamilton, Ontario, Canada). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 538-541. 12 refs. Research supported by the Medical Research Council of Canada and Ontario Thoracic Society.

Changes in carbon dioxide tension during rebreathing of several concentrations of carbon dioxide in molecular oxygen in exercising normal subjects are reported. The concentrations chosen ranged from 7 to 19% CO<sub>2</sub>, and two levels of power output were used to study the effect of variations in CO<sub>2</sub> output. M.V.E.

**A73-45069** Differences between inspired and expired minute volumes of nitrogen in man. J. M. Herron, H. A. Saltzman, B. A. Hills, and J. A. Kylstra (Duke University, Durham, N.C.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 546-551. 17 refs. Contracts No. N00014-67-A-0251-0015; No. N00014-67-A-0251-0007; Grant No. NIH-HL-07896.

Under the conditions of the study conducted, men exhaled, on the average, slightly more nitrogen than they inhaled. Possible explanations for this finding are related to the methodologic error, the washout of dissolved molecular nitrogen from body tissues, and the metabolic production of nitrogen gas. Measurements with 10 subjects were conducted. Differences between expired and inspired volumes of nitrogen as a function of the time of exposure to a He-oxygen mixture are presented in a graph. It is pointed out that washout of dissolved nitrogen from body tissues can explain the excess of nitrogen in expired gas, observed in the experiment. G.R.

**A73-45070** An equation for the oxygen hemoglobin dissociation curve. A. Aberman, J. M. Cavanilles, J. Trotter, D. Erbeck, M. H. Weil, and H. Shubin (Southern California, University; Hollywood Presbyterian Hospital, Los Angeles, Calif.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 570, 571. 10 refs. Grants No. NIH-HL-05570; No. NIH-GM-16462; No. PHS-HS-00238.

An equation that represents the standard oxygen hemoglobin dissociation curve and is valid for oxygen tensions between 1.9 and 700 torr is described. Its derivation was mathematical and no physiological significance to the form of the equation is implied. The root mean square of the differences between the measured and equation-derived oxygen saturations for the 38 measured oxygen tensions of the standard oxygen hemoglobin dissociation curve is 0.17%. A computer subroutine has been written that converts oxygen tension to saturation and, with iteration, oxygen saturation to tension. (Author)

**A73-45071 \*** Oxygen consumption measurements during continual centrifugation of mice. W. Fethke, K. M. Cook, S. M. Porter, and C. C. Wunder (Iowa, University, Iowa City; Coe College, Cedar Rapids, Iowa). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 572-577. 14 refs. Grant No. NGR-16-001-031; Contract No. NAS2-6064.

A simple method is described for measurement of metabolism of conscious, unrestrained animals, during chronic centrifugation or other conditions of isolation (23.75 hr/day) from the investigators in an essentially normal atmospheric environment for as long as seven days. This involves telemetry of pressure changes in a metabolic chamber. At 7 G's, increased O<sub>2</sub> intake lasting two to seven days and

a decreased excursion of the day-night difference were measured for male white mice with less effect or even an opposite effect at lower fields. Base-line measurements of metabolic rate per mouse are less affected by animal size than expected from the surface area law.

(Author)

**A73-45072** Intracellular measurements in a closed hyperbaric chamber. J. S. Colton and A. R. Freeman (Indiana University, Indianapolis, Ind.). *Journal of Applied Physiology*, vol. 35, Oct. 1973, p. 578-580.

A method for intracellular current passage and voltage recording with two glass microelectrodes mounted on one micromanipulator inside a closed hyperbaric chamber is described. Impalement and maintenance of the electrodes within the cell is accomplished with an electronically pulsed microdrive. The technique permits current passage and voltage recordings to be made in high-pressure, pure-oxygen atmospheres without the danger of fire or explosion.

(Author)

**A73-45157** Plasmatic lactate origins and ends (Origine et destinée du lactate plasmatique). Y. Minaire (CNRS, Laboratoire de Thermorégulation, Lyons, France). *Journal de Physiologie*, vol. 66, Sept. 1973, p. 229-257. 196 refs. In French.

In light of pertinent research published in the international literature, the present state of knowledge about the production, metabolism, and utilization of plasmatic lactate throughout the organism is reviewed, with emphasis on quantitative approximation where possible. Following a discussion of the genesis and renewal of plasmatic lactate, its ultimate utilization and disposal modes are considered in terms of excretion and, especially, metabolic conversion. The conversion into glucose throughout the organism is evaluated, and the enzymatic prerequisites of lactate resynthesis are examined, along with the patterns of conversion into glucides in the liver, kidneys, and skeletal muscles. Special attention is given to conversion resulting from oxidation by skeletal muscles, the myocardium, and the kidneys. M.V.E.

**A73-45158** Diurnal variations of plasma cortisol and glucose and of urinary excretion of free cortisol in man at rest (Variations diurnes de la cortisolémie, de la glycémie et du cortisol libre urinaire chez l'homme au repos). G. Brandenberger and M. Follenius (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France). *Journal de Physiologie*, vol. 66, Sept. 1973, p. 271-282. 19 refs. In French.

Changes in plasma cortisol and glucose concentrations and in urinary excretions of cortisol, measured in an experiment with six healthy young subjects, are reviewed. Plasma cortisol determinations at 10-minute intervals showed three major fluctuations: an early morning rise, and peaks at 1 PM and 5 PM. Urinary cortisol, determined at 2-hour intervals, reflects the variations in plasma cortisol levels. Meal-related blood glucose levels seem to be associated with increases in plasma cortisol. When meals were taken two hours later than on control days, the slopes of the plasma cortisol peaks became milder and the peaks themselves were delayed. M.V.E.

**A73-45159** Cortical and intracortical study of the frontal visual evoked potential in photosensitive Papio papio (Étude corticale et intracorticale du potentiel évoqué visuel frontal chez Papio papio photosensible). G. Charmasson (CNRS, Institut de Neurophysiologie et de Psychophysiologie, Marseille, France) and J. Catier (CNRS, Institut de Neurophysiologie et de Psychophysiologie; Aix-Marseille, Université, Marseille, France). *Journal de Physiologie*, vol. 66, Sept. 1973, p. 317-331. 35 refs. In French.

Mean visual evoked potentials (VEPs) recorded from prefrontal, premotor, motor, and oculomotor cortices, with the aid of cortical and intracortical electrodes, in the form of monopolar and bipolar recordings obtained from the frontal lobes of ten photosensitive baboons immobilized with gallamine are reviewed. Considerable topographical and morphological response variations were observed in the cortical recordings. Intracortical recordings confirm the

localized origin of the prefrontal, premotor, and motor responses, as well as their large amplitude. A possible relation of frontal VEPs and the photosensitivity of baboons is considered. M.V.E.

**A73-45160** Permanent catheterism of the thoracic aorta - Direct measurement of arterial pressure, injection of substances, and the taking of blood in wake rats (Cathétérisme permanent de l'aorte thoracique - Mesure directe de la pression artérielle, injection de substances et prélèvements de sang chez le rat vigile). G. Waeldele and J.-C. Stoclet (Strasbourg I, Université, Strasbourg, France). *Journal de Physiologie*, vol. 66, Sept. 1973, p. 357-366. 7 refs. In French. Research supported by the Caisse Nationale de l'Assurance Maladie des Travailleurs Salariés.

**A73-45166** Prefrontal lobe functions and the neocortical commissures in monkeys. S.-I. Yamaguchi and R. E. Myers (NIH, Laboratory of Perinatal Physiology, Bethesda, Md.). *Experimental Brain Research*, vol. 18, Sept. 29, 1973, p. 119-130. 16 refs.

Monkeys with the neocortical commissures and the optic chiasm sectioned still exhibit a substantial contralateral generalization of delayed response and delayed alternation learning even though the sensory and motor activities during learning are restricted to a single hemisphere. The commissure and chiasma transections, on the other hand, interrupt the contralateral generalization of unilaterally acquired, visual stimulus (color) dependent Go, No-go performances. The differences in outcome between these two types of tasks appears to depend upon the presence or absence of a cueing of correct performance by specific exteroceptive sensory stimuli. (Author)

**A73-45167** Visual evoked potentials to changes in the motion of a patterned field. P. G. H. Clarke (Keele, University, Keele, Staffs., England). *Experimental Brain Research*, vol. 18, Sept. 29, 1973, p. 145-155. 25 refs. Research supported by the Science Research Council.

Human averaged visual evoked potentials (VEPs) have been recorded to the onset, reversal and offset of the motion of a visual noise pattern. The VEPs have been analyzed into components, distinguishable by their different scalp distributions, and by their distinct dependences on the retinal area stimulated and the pattern velocity. The effects of varying the form and the scale of the pattern have been investigated. The VEPs were almost invariant with respect to changes in the brightness, the direction of motion, and the sharpness of the boundary of the visual field. Under some circumstances the motion-reversal VEP was very similar to the sum of the motion-onset and the motion-offset VEPs. These VEPs will qualify as a useful tool for investigating the processing of movement information only if they can be shown to be genuine responses to changes in the motion as such. Discussion of this question has been deferred to the following paper. (Author)

**A73-45168** Comparison of visual evoked potentials to stationary and to moving patterns. P. G. H. Clarke (Keele, University, Keele, Staffs., England). *Experimental Brain Research*, vol. 18, Sept. 29, 1973, p. 156-164. 15 refs. Research supported by the Science Research Council.

Visual evoked potentials (VEPs) to changes in the motion of a patterned field, previously studied by Clarke (1973), are compared with VEPs to the appearance and disappearance of stationary and moving noise patterns. Possible explanations for some of the similarities between these VEPs are discussed. M.V.E.

**A73-45248 #** Inferior colliculus neuron responses to an amplitude-modulated signal with varying intensity levels (Reaktsii neuronov zadnego dvukholmiia pri izmenenii urovnia intensivnosti amplitudno-modulirovannogo signala). I. A. Vartanian (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) and G. A. Sharaev (Akademiia Nauk SSSR, Institut Fiziologii,

Leningrad, USSR). *Neirofiziologiia*, vol. 5, July-Aug. 1973, p. 355-366. 11 refs. In Russian.

**A73-45249 #** Spinal and spino-bulbo-spinal neuron mechanisms of somatic and visero-motor reflex transfer in the thoracic spinal cord (Spinal'nye i spino-bul'bo-spinal'nye neuronnye mekhanizmy peredachi somato- i visero-motornykh vliianii v grudnom otdele spinnogo mozga). P. Duda, A. P. Gokin, and Iu. Pavlasek (Slovak Academy of Sciences, Institute of Normal and Pathological Physiology, Bratislava, Czechoslovakia; Akademiia Nauk Ukrainkoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Neirofiziologiia*, vol. 5, July-Aug. 1973, p. 392-400. 28 refs. In Russian.

**A73-45250 #** Local resistance variations caused by membrane potential shifts in the interior of the horizontal retina cell (Lokal'nye izmeneniia soprotivleniia vnutri gorizonta'noi kletki setchatki, vyzvannye sdvigami membrannogo potentsiala). A. L. Byzov and Iu. A. Trifonov (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Neirofiziologiia*, vol. 5, July-Aug. 1973, p. 432-441. 8 refs. In Russian.

**A73-45337** Visual and verbal coding in the inter-hemispheric transfer of information. R. Davis and V. Schmit (Newcastle-upon-Tyne, University, Newcastle-upon-Tyne, England). *Acta Psychologica*, vol. 37, Aug. 1973, p. 229-240. 14 refs.

Described experiments, complementing Davis and Schmit's previous (1971) interhemispheric information transfer study, are shown to confirm the main finding of this study, namely, that when two signals are presented each to different hemispheres reaction times are shorter than when they are both presented to the same hemisphere. New evidence obtained on the role of each hemisphere is reported. A model to explain the results in terms of different functions of the two hemispheres is proposed. M.V.E.

**A73-45338** Asymmetry in perception - Attention versus other determinants. H. L. Dee and H. J. Hannay (Iowa, University, Iowa City, Iowa). *Acta Psychologica*, vol. 37, Aug. 1973, p. 241-247. 15 refs. Grants No. NIH-NS-00616; No. NIH-NS-03354.

This experiment explored the role of expectancy in producing asymmetry in perceptual performance. Trigrams and randomly generated forms of low association value were presented in random sequence to the right and left visual fields. The results suggested that expectancy, when contrasted with such variables as mode of processing (visual vs verbal) and mnemonic factors, plays little role in the production of asymmetry in perceptual performance. (Author)

**A73-45339** Two components and two stages in search performance - A case study in visual search. W. Prinz and D. Ataian (Ruhr-Universität, Bochum, West Germany). *Acta Psychologica*, vol. 37, Aug. 1973, p. 255-277. 5 refs.

A model of skilled performance in visual search tasks is presented. According to the model, search behavior is controlled by two memory components. Each of them plays a different role in two stages of search. The two components are the memory representations of the target category and context category, respectively. The two stages are scan and check-for-target. It is argued that the scan is dominantly context-controlled (resulting in target detection) and that the target check is target-controlled (leading to target identification). The model is tested in a transfer experiment. It is shown that the model must be revised to account for two different ways of processing, depending on properties of the stimulus lists: (1) one-stage-scan under target and context control and (2) scan-and-check processing where checking is target-and-context controlled and scanning is not under memory control at all. Implications of these findings are discussed. (Author)

**A73-45375 #** Ventilation at transition from rest to exercise. E. Asmussen (Kobenhavns Universitet, Copenhagen, Denmark). *Acta Physiologica Scandinavica*, vol. 89, Sept. 1973, p. 68-78. 22 refs.

Experiments are described which have confirmed earlier reports on a 'fast neurogenic component' in the ventilatory adaptation to exercise. This component is roughly related to the intensity of the exercise. It is probably not caused by an independent 'work stimulus' but rather by a sensitizing effect on the respiratory center toward existing chemical stimuli. The sensitizing effect is of peripheral reflex origin and presupposes movement. It can be split up in an abrupt effect, related to the movements per se and roughly graded after their frequency, and a more gradual effect related to work power and thus to the local metabolic rate. The 'fast neurogenic component' seen at the start of dynamic exercise is the resultant of these two factors interacting with or adding to the effect of the prevalent respiratory stimuli. F.R.L.

**A73-45400** Comparison of ultrasound and cineangiographic measurements of left ventricular performance in patients with and without wall motion abnormalities. P. Ludbrook, J. S. Karliner, K. Peterson, G. Leopold, and R. A. O'Rourke (California, University, La Jolla, Calif.). *British Heart Journal*, vol. 35, Oct. 1973, p. 1026-1032. 11 refs. Research supported by the National Heart Foundation of Australia and PHS.

**A73-45521 #** Determination of the size distribution function of erythrocytes by the spectral transparency method (Opredelenie funktsii raspredeleniia eritrotsitov po razmeram metodom spektral'noi prozrachnosti). A. Ia. Khairullina and S. F. Shumilina. *Zhurnal Prikladnoi Spektroskopii*, vol. 19, Aug. 1973, p. 340-347. 11 refs. In Russian.

Description of a method of determining the size distribution function and concentration of erythrocytes in whole blood. The proposed method (called the spectral transparency method) consists in the experimental determination of the transmission coefficient of radiation directly transmitted through a layer of scattering particles at various wavelengths in a certain spectral range. Then, using the Bouguer law, the attenuation factor of the layer of scattering particles is calculated under the assumption that only single scattering occurs in the medium. Applying the method, the spectra of suspensions of erythrocytes in an NaCl solution are measured in the wavelength range from 300 to 1200 nm in directly transmitted light relative to hemolyzed blood of the same concentration which ensures single scattering. The experimental data are treated according to an algorithm which serves as the basis of the spectral transparency method. A.B.K.

**A73-45557 \*** Erythrocyte volume in acidified venous blood from exercising limbs. W. van Beaumont and R. H. Rochelle (St. Louis University, St. Louis, Mo.). *Pflügers Archiv*, vol. 343, no. 1, 1973, p. 41-48. 22 refs. Grant No. NGR-26-006-039.

Five male volunteers performed arm exercises in the sitting position by cranking the pedals of a bicycle ergometer at 50 revolutions per min. The initial mechanical work load of 0 kgm/min was increased every minute by 75 kgm/min until exhaustion occurred. The data obtained show a significant acidification of the venous blood from the working arms and a substantial increase in venous pCO<sub>2</sub> during this type of muscular activity. However, the erythrocyte volume remained unaltered during the exercise. G.R.



## STAR ENTRIES

**N73-31997\*#** Kanner (Leo) Associates, Redwood City, Calif.  
**EVALUATION OF GAS EXCHANGE AND REACTION OF THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS TO PHYSICAL WORK**

Washington NASA Sep. 1973 7 p Transl. into ENGLISH of "Otsenka Gazoobmena i Reaktsiy Serdechno-Sosudistoy i Dykhatel'noy Sistem Na Fizicheskuyu Rabotu", Acad. of Sci. USSR, Moscow, report, 1973 6 p  
 (Contract NASw-2481)

(NASA-TT-F-15090) Avail: NTIS HC \$3.00 CSCL 06P

Data are produced on the energy expenditures of an astronaut with various physical loads on the bicycle ergometer, as well as the functioning of the cardiovascular and respiratory systems under conditions of physical stress. The data produced allows better estimates of the functional state of the organism of the astronaut and its changes under the influence of flight factors. The reactions of the cardiovascular and respiratory systems to physical loadings of low intensity, performed in the prone and sitting positions, can be used to evaluate the specific role of deterioration of orthostatic stability in the reduction of the physical working ability of an astronaut. Performance of maximum physical work during the annual examinations of astronauts can better be used to evaluate their state of training and the functional condition of their organism. Author

**N73-31998\*#** Kanner (Leo) Associates, Redwood City, Calif.  
**THE MEASUREMENT OF ARTERIAL PRESSURE UNDER THE INFLUENCE OF ODNT**

Washington NASA Sep. 1973 4 p Transl. into ENGLISH from Acad. of Sci. (USSR), 1973 2 p  
 (Contract NASw-2481)

(NASA-TT-F-15087) Avail: NTIS HC \$3.00 CSCL 06P

The method is reported of investigating arterial pressure consists of measurement of pressure in the left brachial artery before, during and after ODNT. The accuracy of the method is + or - 5 mm hg. Author

**N73-31999\*#** Grambling Coll., La.  
**THE EFFECT OF CONTINUOUS LOW DOSE-RATE GAMMA IRRADIATION ON CELL POPULATION KINETICS OF LYMPHOID TISSUE** Semiannual Status Report

Bessie Ruth Foster 13 Jul. 1973 23 p refs  
 (Grant NGR-19-011-008; NSF GB-29136)

(NASA-CR-135723; SASR-4) Avail: NTIS HC \$3.25 CSCL 06R

The problem studied involved cell proliferation in mice thymus undergoing irradiation at a dose rate of 10 roentgens/day for 105 days. Specifically, the aim was to determine whether or not a steady state of cell population can be established for the indicated period of time and what compensatory mechanisms of cell population are involved. Author

**N73-32000\*#** National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

**OPHTHALMIC LIQUEFACTION PUMP** Patent Application Edward F. Baehr, Jack B. Esgar, and William J. McGannon, inventors (to NASA) Filed 14 Sep. 1973 17 p

(NASA-Case-LEW-12051-1; US-Patent-Appl-SN-397478) Avail: NTIS HC \$3.00 CSCL 06E

A surgical tissue macerating and removal tool is disclosed wherein a rotating member having a cutting tip is utilized. When the instrument is to be used in an eye, a treatment fluid is supplied to the operative site and a first pump is provided to evacuate macerated material and treatment fluid from the eye. The rotating member may be disposed in a support tube having an aperture and communication with the first pump to provide for discharge of the macerated material and used treatment fluid. A second pump means is provided on the rotating member to provide a counter flow of treatment fluid into the space between the rotating member and the support tube. The second pump may provide additional support for the rotating member. A method is also provided for axially positioning rotating member to increase or decrease cutting action. NASA

**N73-32001\*#** Scientific Translation Service, Santa Barbara, Calif.

**EFFECTS OF CERTAIN EXTREME STRESSES ON THE STRUCTURE OF THE VASCULAR SYSTEM**

M. G. Prives Washington NASA Oct. 1973 23 p refs Transl. into ENGLISH from Arkh. Anat., Gistol. Embriol. (USSR), v. 58, no. 4, 1970 p 9-19

(Contract NASw-2483)

(NASA-TT-F-15081) Avail: NTIS HC \$3.25 CSCL 06S

The latest data on structural changes associated with adaptation of the body to certain stressful factors, i.e., gravitation, immobility, penetrating radiations, prevailing during flight in supersonic planes or spacecraft are reported. Disturbance of haemodynamics alone can hardly account for all the alterations affecting the blood stream, therefore neurohumoral regulation of all bodily functions, as well as haemodynamic factors, appear to be more plausible. In one and the same organ arteries and veins may be affected differently on exposure to the same stress. Changes affecting the lymphatic system are similar to those found in arteries, but not so severe. Preliminary training is shown to raise tolerance to the effects of subsequent stresses. The effects of immobility, strenuous exercise, and radiation on animals are studied with regard to the development of lymph collaterals. Author

**N73-32002\*#** Techtran Corp., Glen Burnie, Md.  
**INTERNAL CEREBRAL "SET POINT" TEMPERATURE MODEL IN WARM-BLOODED ANIMALS**

Juliusz Narebski Washington NASA Oct. 1973 16 p refs Transl. into ENGLISH from Acta Physiol. Pol. (Poland), v. 24, no. 3, suppl. 6, 1973 p 77-89

(Contract NASw-2485)

(NASA-TT-F-15138) Avail: NTIS \$3.00 CSCL 06C

The possibility of the hypothalamus serving as a heat regulator for the entire body is adduced from physiological evidence and experimental factors. However, it is very clear that this is a hypothesis and not necessarily fact. Author

**N73-32003\*#** Kanner (Leo) Associates, Redwood City, Calif.  
**THERMOREGULATION DURING PHYSICAL EXERCISES OF MEN WITH DIVERSE PHYSICAL PERFORMANCE CAPACITIES**

S. Kozlowski and J. Domaniecki Washington NASA Oct. 1973 17 p refs Transl. into ENGLISH from Acta Physiol. Polon. (Warsaw), v. 23, no. 5, 1972 p 761-772

(Contract NASw-2481)

(NASA-TT-F-15142) Avail: NTIS HC \$3.00 CSCL 06S

Ten males with low physical performance capacity and 10 males with high physical performance capacity were measured during one hour work on a cycleergometer for rectal temperature, mean skin temperature, and oxygen intake. During the most strenuous work, the rectal temperature stabilized after 30-45 min. among subjects with good physical performance capacity, whereas it increased among subjects with a low physical performance capacity. After one hour the difference exceeded 0.5 C (p smaller than 0.001). No differences were confirmed in the amount and composition of the electrolyte sweat and in the mean temperature of the skin. Author

**N73-32004\*#** Techtran Corp., Glen Burnie, Md.  
**DETERMINING OPTIMAL PERIODS OF BED REST BY CERTAIN PHYSIOLOGICAL INDICES**

A. A. Mikhaylenko Washington NASA Oct. 1973 8 p Transl. into ENGLISH from Voyenno-Med. Zh. (Moscow), v. 7, 1970 p 34-37

(Contract NASw-2485)  
 (NASA-TT-F-15144) Avail: NTIS HC \$3.00 CSCL 06P

A study of two groups of patients placed in a bed rest regime is reported, the first group being the control, the second group being the experiment. The control group, which was not permitted exercise, developed certain motor disorders and symptoms of vascular and emotional instability. The second group developed the same symptoms in spite of the exercise but at a later period. The development of symptoms in the experimental group is attributed to inadequately thorough regimes of exercise. Author

**N73-32005\*#** Physiometrics, Inc., Malibu, Calif.  
**POSTPONEMENT OF INCIPENT COLLAPSE DUE TO WORK-INDUCED HEAT STRESS BY LIMITED COOLING**  
 Final Report

W. Vincent Blockley Sep. 1973 33 p refs

(Contract NAS9-11889)  
 (NASA-CR-134059) Avail: NTIS HC \$3.75 CSCL 06S

Four subjects completed five treadmill training sessions under comfortable to cool conditions and were calibrated to find an optimum combination of speed and grade on the treadmill which would produce a metabolic rate of 2000 Btu-hr. Dressed in an Apollo liquid cooling garment, each man underwent a total of four experiments in which the rate of heat extraction from the liquid cooling garment was adjusted to an amount which would cause a storage within the body of 1000 Btu/hr. Physiological measurements included skin temperature at 9 locations, rectal and ear canal probes, and heart rate. The increases in tolerance time for the various subjects and the various methods of emergency cooling, ranged from a low of six minutes to a high of 48 minutes, or from 8 to 102% of the baseline tolerance times. The largest gains were achieved in a subject whose tolerance endpoint was atypical, and whose baseline heat tolerance was unusually low. Author

**N73-32006\*#** Scientific Translation Service, Santa Barbara, Calif.

**VIRUCIDAL ACTION OF HYDROGEN PEROXIDE AEROSOLS IN DECONTAMINATION OF AIR IN AN INFLUENZA NIDUS**

B. P. Fedayev, K. M. Florensova, V. V. Sidenko, and Z. I. Stepanova Washington NASA Oct. 1973 12 p refs Transl. into ENGLISH from Zh. Mikrobiol. Epidemiol. Immunobiol. (Moscow), no. 9, 1972 p 137-142

(Contract NASw-2483)  
 (NASA-TT-F-15127) Avail: NTIS HC \$3.00 CSCL 06E

Hydrogen peroxide aerosols were used for decontamination of the atmosphere in premises of an influenza epidemic nidus. The work was carried out in a children's institution during the influenza outbreak. Influenza virus, type A sub 2 was isolated from 12 out of 27 air samples tested before the disinfection. A distinct virucidal effect followed a single application of hydrogen peroxide aerosols. In the premises which were only ventilated the influenza virus of the same type was isolated in 6 air samples taken in the course of one day. The use of hydrogen peroxide aerosol is the most expedient for decontamination of the atmosphere in premises in which human beings stay for short periods of time. Author

**N73-32007\*#** National Aeronautics and Space Administration, Washington, D.C.

**BIOMEDICINE: A COMPILATION**  
 [1973] 32 p

(NASA-SP-5958(01)) Avail: NTIS HC \$1.00 CSCL 06D

Developments in NASA technology of possible interest to

outside users are reported. Complied are descriptions of a number of instruments that have proven useful in monitoring and treating patients. Described are several diagnostic, prosthetic, and therapeutic devices as well as patent information on new innovations in aerospace medicine technology. G.G.

**N73-32008\*#** Harding Coll., Searcy, Ark.  
**AN EVALUATION OF THE EFFECTS OF BED REST, SLEEP DEPRIVATION AND DISCONTINUANCE OF TRAINING ON THE PHYSICAL FITNESS OF HIGHLY TRAINED YOUNG MEN** Progress Report, 1 Sep. 1972 - 31 Aug. 1973

Harry D. Olree, Bob Corbin, Gene Dugger, and Carroll Smith 31 Aug. 1973 46 p refs

(Contract NAS9-9433)  
 (NASA-CR-134044) Avail: NTIS HC \$4.50 CSCL 06S

This experiment was conducted to determine what physiological effects result when highly trained subjects are confined to bed, deprived of sleep, or allowed to discontinue training. Results indicated: (1) There was a moderate increase in strength variables due to the training in this experiment but the stress which the subjects received caused a negligible change in strength variables. (2) The training program resulted in highly significant changes in specific bicycle ergometer variables indicating good increases in cardiopulmonary fitness. Five days of bed rest or fifty hours of sleep deprivation caused comparable drastic decreases in cardiopulmonary fitness. Post stress the subjects reverted to a normal daily schedule and after two weeks they had recovered about half of what they lost. (3) Cardiac output remains relatively constant at a constant work load, but stroke volume increases with conditioning and decreases with deconditioning due to stress. Author

**N73-32009\*#** Stanford Research Inst., Menlo Park, Calif.  
**MACROMOLECULAR FRACTIONATION AND DETERMINATION** Final Quarterly Report

Fu-Chuan Chao Jul. 1973 28 p refs

(Contract NAS2-5754; SRI Proj. LSU-8430)  
 (NASA-CR-114673; QR-13) Avail: NTIS HC \$3.50 CSCL 06M

Biological materials were recovered from other materials ultracentrifugation techniques. Data cover fatty acid synthetase, acetyl-CoA synthetase, ribosomes, DNA, RNA, and AMP.

E.H.W.

**N73-32010#** Naval Medical Research Inst., Bethesda, Md.  
**THE NMRI MARK 3 MOD 1 TREMOR DEVICE** Medical Research Progress Report no. 2

George J. Tresansky May 1973 23 p refs

Avail: NTIS CSCL 06/19

A muscle force transducer was developed as a research tool to detect and quantify tremors in divers working under hyperbaric conditions. The tremor device measures microtremor superimposed upon a neuromuscular response maintained within a specific force band. It incorporates a simple motor skill task, which requires the diver subject to maintain, for a predetermined number of seconds, a constant downward pressure with the tip of the middle finger upon a lever which is preset to a specific force. Variations in the subject's ability to maintain the zero reading are considered tremor. Measurement of tremor against an established baseline of an individual diver can provide an indication of neurological change, which may interfere with underwater work performance. Author (GRA)

**N73-32011\*** National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.

**AUTOMATIC INSTRUMENT FOR CHEMICAL PROCESSING TO DETECT MICROORGANISM IN BIOLOGICAL SAMPLES BY MEASURING LIGHT REACTIONS** Patent

Burton N. Kelbaugh, Grace L. Picciolo, Emmett W. Chappelle, and Maurice E. Colburn, inventors (to NASA) Issued 4 Sep. 1973 16 p Filed 30 Apr. 1971 Supersedes N71-34079

(09-21, p 3385) Continuation-in-part of abandoned US Patent Appl. SN-60882, filed 4 Aug. 1970

(NASA-Case-GSC-11169-2; US-Patent-3,756,920;  
US-Patent-Appl-SN-139094; US-Patent-Class-195-127;  
US-Patent-Appl-SN-60882) Avail: US Patent Office CSCL 06B

An automated apparatus is reported for sequentially assaying urine samples for the presence of bacterial adenosine triphosphate (ATP) that comprises a rotary table which carries a plurality of sample containing vials and automatically dispenses fluid reagents into the vials preparatory to injecting a light producing luciferase-luciferin mixture into the samples. The device automatically measures the light produced in each urine sample by a bioluminescence reaction of the free bacterial adenosine triphosphate with the luciferase-luciferin mixture. The light measured is proportional to the concentration of bacterial adenosine triphosphate which, in turn, is proportional to the number of bacteria present in the respective urine sample.

Official Gazette of the U.S. Patent Office

**N73-32012\*** International Latex Corp., Dover, Del.

**SPACE SUIT Patent**

Leonard F. Shepard, George P. Durney, Melvin C. Case, A. J. Kenneway, III, Robert C. Wise, Dixie Rinehart, Ronald J. Besette, and Richard C. Pulling, inventors (to NASA) Issued 14 Aug. 1973 21 p Filed 5 Aug. 1968 Sponsored by NASA

(NASA-Case-MSC-12609-1; US-Patent-3,751,727;  
US-Patent-Appl-SN-750031; US-Patent-Class-2-2.1A;  
US-Patent-Class-2-81; US-Patent-Class-128-1A) Avail: US Patent Office CSCL 06Q

A pressure suit for high altitude flights, particularly space missions is reported. The suit is designed for astronauts in the Apollo space program and may be worn both inside and outside a space vehicle, as well as on the lunar surface. It comprises an integrated assembly of inner comfort liner, intermediate pressure garment, and outer thermal protective garment with removable helmet, and gloves. The pressure garment comprises an inner convoluted sealing bladder and outer fabric restraint to which are attached a plurality of cable restraint assemblies. It provides versatility in combination with improved sealing and increased mobility for internal pressures suitable for life support in the near vacuum of outer space.

Official Gazette of the U.S. Patent Office

**N73-32013\*** North American Rockwell Corp., Los Angeles, Calif.

**TACTILE SENSING MEANS FOR PROSTHETIC LIMBS Patent**

Walter L. Scott, inventor (to NASA) Issued 14 Aug. 1973 5 p Filed 22 Feb. 1972

Sponsored by NASA

(NASA-Case-MFS-16570-1; US-Patent-3,751,733;  
US-Patent-Appl-SN-228150; US-Patent-Class-3-1.1;  
US-Patent-Class-3-2; US-Patent-Class-3-6;  
US-Patent-Class-3-12) Avail: US Patent Office CSCL 06B

An improved prosthetic device characterized by a frame and a socket for mounting on the stump of a truncated human appendage is described. Flexible digits extend from the distal end and transducers located within the digits act as sensing devices for detecting tactile stimuli. The transducers are connected through a power circuit with a slave unit supported by a strap and fixed to the stump. The tactile stimuli detected at the sensing devices are reproduced and applied to the skin of the appendage in order to stimulate the sensory organs located therein.

Official Gazette of the U.S. Patent Office

**N73-32014\*** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

**FOOT PEDAL OPERATED FLUID TYPE EXERCISING DEVICE Patent**

Gerald W. Crum and Richard J. Sauter, inventors (to NASA) Issued 11 Sep. 1973 6 p Filed 26 May 1971

(NASA-Case-MSC-11561-1; US-Patent-3,758,112;  
US-Patent-Appl-SN-146940; US-Patent-Class-272-79C;  
US-Patent-Class-272-DIG 5; US-Patent-Class-272-DIG.1;  
US-Patent-Class-272-DIG.4; US-Patent-Class-137-535;  
US-Patent-Class-91-186) Avail: US Patent Office CSCL 05E

A foot pedal operated exercising device is reported that contains a dynamometer formed of a pair of cylinders each containing a piston. The pistons are linked to each other. The upper portions of the two cylinders are joined together by a common opening to provide a common fluid reservoir and each piston is provided with a one way check valve to maintain an adequate supply of working fluid. Fluid from the driven cylinder is transmitted to the other cylinder through separate constant force spring biased valves each valve takes the predominant portion of the pressure drop thereby providing a constant force hydraulic dynamometer. A device is provided to determine the amount of movement of piston travel.

Official Gazette of the U.S. Patent Office

**N73-32015\*** Quantum Dynamics, Tarzana, Calif.

**RESPIRATORY ANALYSIS SYSTEM AND METHOD Patent**

Frederick F. Liu, inventor (to NASA) Issued 18 Sep. 1973 7 p Filed 19 Aug. 1971

Sponsored by NASA

(NASA-Case-MSC-13436-1; US-Patent-3,759,249;  
US-Patent-Appl-SN-173190; US-Patent-Class-128-2.08;  
US-Patent-Class-73-194E; US-Patent-Class-73-194M;  
US-Patent-Class-128-2.07) Avail: US Patent Office CSCL 06B

A system is described for monitoring the respiratory process in which the gas flow rate and the frequency of respiration and expiration cycles can be determined on a real time basis. A face mask is provided with one-way inlet and outlet valves where the gas flow is through independent flowmeters and through a mass spectrometer. The opening and closing of a valve operates an electrical switch, and the combination of the two switches produces a low frequency electrical signal of the respiratory inhalation and exhalation cycles. During the time a switch is operated, the corresponding flowmeter produces electric pulses representative of the flow rate; the electrical pulses being at a higher frequency than that of the breathing cycle and combined with the low frequency signal. The high frequency pulses are supplied to conventional analyzer computer which also receives temperature and pressure inputs and computes mass flow rate and totalized mass flow of gas. From the mass spectrometer, components of the gas are separately computed as to flow rate. The electrical switches cause operation of up-down inputs of a reversible counter. The respective up and down cycles can be individually monitored and combined for various respiratory measurements.

Official Gazette of the U.S. Patent Office

**N73-32016\*#** Kanner (Leo) Associates, Redwood City, Calif.  
**MEASUREMENT OF THE ARTERIAL PRESSURE BY THE TACHOOSCILLOSCOPE METHOD AFTER N. N. SAVITSKIY**

Washington NASA Sep. 1973 5 p Transl. into ENGLISH of Rept. "Izmereniye Arterialnogo Davleniya Takhoostsilograficheskim metodom po N. N. Savitskomu" Moscow, Acad. Sci. USSR, 1973 3 p (Contract NASw-2481)

(NASA-TT-F-15088) Avail: NTIS HC \$3.00 CSCL 06B

The tachoscillographic method is described as an oscillometric method that uses a differential manometer to determine the first derivative (rate curve) of the change of the volume of the vessel beneath the collar. It is not the height of the oscillation which is informative, but rather the nature of the deformation of the lower (diastolic) portion of the curve.

Author

**N73-32017\*#** Kanner (Leo) Associates, Redwood City, Calif.  
**CONTRIBUTION TO THE STUDY OF FACTORS CONTROLLING THE RATE OF SUMMATION OF LUMINOUS IMPRESSIONS FROM UNEQUAL SURFACES (RETINAL HETEROGENEITY)**

N. Kleitman and H. Pieron Washington NASA Oct. 1973  
 37 p refs Transl. into ENGLISH from Annee Psychologique (France), v. 29, 1928 p 57-91

(Contract NASw-2481)

(NASA-TT-F-15124) Avail: NTIS HC \$4.00 CSDL 05E

The influence is presented of the excitation surface with liminal brightness, for luminous perception and for chromatic perception, using white light or monochromatic lights in dark and in light adaptation, on the level of different regions of the retina. The retina's constitutive heterogeneity its duality of receptor elements, the unequal sensibility of these elements distributed over its entire surface, their unequal concentration on optic fibers and the unequal optic insulation of the elements and the unequal nervous insulation of the neurons are reported. The influence of the luminous excitation surface cannot be covered by a simple law, at least if we leave aside the small foveal region (with an aperture of about 1/2 deg) where there exist only cones that are individually connected to the central neurons. Author

**N73-32018\*#** Alabama Univ., Huntsville. School of Graduate Studies and Research.

**PAYLOAD CARRIER SIMULATOR MAN/SYSTEMS PROGRAM INTEGRATION, VOLUME 2, PHASE A Final Report**

Jon G. Rogers and Robert E. James Jul. 1973 173 p 2 Vol. (Contract NAS8-28512)

(NASA-CR-124430) Avail: NTIS HC \$10.75 CSDL 05H

A man/systems assessment plan is outlined that considers the various habitability parameters in order to verify design concepts for future shuttle-type manned space missions. A payload carrier simulation study is used to collect data on: crew productivity, crew state, and habitat design effectiveness. Statistical and experimental analyses are used to compare the various mission data with each other. G.G.

**N73-32019#** Joint Publications Research Service, Arlington, Va.

**IDEATION AND AUTOMATION**

D. A. Pospelov and V. N. Pushkin 24 Sep. 1973 185 p refs Transl. into ENGLISH of the book "Myshleniye i Avtomaty" Moscow, Izdatel'stvo Sovetskoye Radio, 17 Feb. 1972 224 p (JPRS-60103) Avail: NTIS HC \$11.25 CSDL 05E

An analysis is reported of the process of solving problems arising when controlling large systems. The results of experimental research on intuition, conducted using new objective methods, are submitted. A psychological concept is formulated that permits the planning of development of new methods of programming in cybernetics, and means of developing devices capable of controlling large systems of these methods is described. Author

**N73-32020\*#** National Aeronautics and Space Administration, John F. Kennedy Space Center, Cocoa Beach, Fla.

**ENVIRONMENT SANITATION HANDBOOK**

17 Aug. 1973 48 p refs

(NASA-TM-X-69522; KHB-1870.1/IS) Avail: NTIS HC \$4.50 CSDL 06I

The environmental Sanitation handbook provides guidance in the implementation of the basic provisions of occupational medicine and environmental health programs to environmental sanitation. It presents methods and procedures useful for the control of those sanitation factors which could create discomfort and illness in man or do harm to his environment. The provisions of this handbook are applicable to all organizational elements of the Kennedy Space Center (KSC), NASA, and to its associated contractors located at KSC in accordance with the terms of their respective contracts. Author

**N73-32021\*#** Hamilton Standard, Windsor Locks, Conn.  
**CENTRAL WASTE PROCESSING SYSTEM**

Frank L. Kester Jun. 1973 128 p refs

(Contract NAS9-12730)

(NASA-CR-134048; SVHSER-6224) Avail: NTIS HC \$8.50 CSDL 06I

A new concept for processing spacecraft type wastes has been evaluated. The feasibility of reacting various waste materials with steam at temperatures of 538 - 760 C in both a continuous and batch reactor with residence times from 3 to 60 seconds has been established. Essentially complete gasification is achieved. Product gases are primarily hydrogen, carbon dioxide, methane, and carbon monoxide. Water soluble synthetic wastes are readily processed in a continuous tubular reactor at concentrations up to 20 weight percent. The batch reactor is able to process wet and dry wastes at steam to waste weight ratios from 2 to 20. Feces, urine, and synthetic wastes have been successfully processed in the batch reactor. Author

**N73-32022\*#** McDonnell-Douglas Corp., St. Louis, Mo.  
**THE COMPUTERIZED ANATOMICAL MAN (CAM) MODEL**

**Summary Final Report**

M. P. Billings and W. R. Yucker Sep. 1973 160 p refs

(Contract NAS9-13228)

(NASA-CR-134043; MDC-G4655) Avail: NTIS HC \$10.00 CSDL 05E

A computerized anatomical man (CAM) model, representing the most detailed and anatomically correct geometrical model of the human body yet prepared, has been developed for use in analyzing radiation dose distribution in man. This model of a 50-percentile standing USAF man comprises some 1100 unique geometric surfaces and some 2450 solid regions. Internal body geometry such as organs, voids, bones, and bone marrow are explicitly modeled. A computer program called CAMERA has also been developed for performing analyses with the model. Such analyses include tracing rays through the CAM geometry, placing results on magnetic tape in various forms, collapsing areal density data from ray tracing information to areal density distributions, preparing cross section views, etc. Numerous computer drawn cross sections through the CAM model are presented. Author

**N73-32023\*#** Harding Coll., Searcy, Ark.

**AN EVALUATION OF THE EXER-GENIE EXERCISER AND THE COLLINS PEDAL MODE ERGOMETER FOR DEVELOPING PHYSICAL FITNESS Final Progress Report, 1 May 1969 - 31 Aug. 1973**

Harry D. Olree 31 Aug. 1973 7 p

(Contract NAS9-9433)

(NASA-CR-134046) Avail: NTIS HC \$3.00 CSDL 06D

Experiments that were conducted over a 52-month period showed that isometric and isotonic training on the Exer-Genie gave negligible increases in cardiorespiratory fitness whereas training on the ergometer at a programmed pulse rate increased fitness moderately. Author

**N73-32024#** Army Research Inst. for the Behavioral and Social Sciences, Arlington, Va.

**EFFECT OF PHOTO DEGRADATION ON INTERPRETER PERFORMANCE**

Thomas E. Jeffrey Jun. 1973 49 p

(DA Proj. 206-62704-A-721)

(AD-763908; ARI-TRN-245) Avail: NTIS CSDL 05/10

Scale, haze, and image motion are judged to be the key factors in determining the interpretability of photographs encountered operationally, and images varying in these factors were produced by manipulating operational imagery in the laboratory. Image interpreters were given tasks of detecting and identifying military targets on these images. Their scores were used to assess interpretability as a function of scale, haze, and image motion. When considered singly, scale, haze, and image motion had little effect on interpreter target detection

performance. When two or more of these sources of degradation were present simultaneously, target detection performance deteriorated markedly. In general, the decrease in target detection accuracy obtained with increased photo degradation appears to be due more to erroneous classification of non-targets as targets than to the misclassification of targets as non-targets. Target identification accuracy and completeness were significantly reduced by either unidimensional or multidimensional degrading conditions of the type used in this experiment. When photographic scale was small, the effect of other sources of degradation on interpreter performance was significantly greater than when photographic scale was large. (Modified author abstract) GRA

**N73-32025#** Illinois Univ., Savoy. Aviation Research Lab.  
**A PARAMETRIC STUDY OF PILOT PERFORMANCE WITH MODIFIED AIRCRAFT CONTROL DYNAMICS, VARYING NAVIGATIONAL TASK COMPLEXITY, AND INDUCED STRESS** Ph.D. Thesis

Emmett Francis Kraus May 1973 116 p refs  
(Contract F44620-70-C-0105; DOT-FA71WA-2574; AF Proj. 9778)  
(AD-764760; ARL-73-10/AFOSR-73-6/FAA-73-3) Avail: NTIS CSCL 01/3

Experiments were conducted in a Link GAT-2 to evaluate the effectiveness of a system providing direct control over aircraft maneuvering performance. Pilots performed complex navigational tasks involving the use of a computer-assisted area navigation system. Changing waypoint storage capacity of the simulated navigation system induced variable task loading on subjects. The experiment was replicated with and without a self-adaptive side task to determine levels of residual attention associated with the control modifications and the varying workload levels. The flight performance controller yielded greater precision of maneuvering control, fewer procedural blunders, and an increased level of residual pilot attention. The side task proved to be a reliable discriminator of changes in workload associated with small changes in system design and task complexity. Author (GRA)

**N73-32026#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.  
**PILOT PARAMETER IDENTIFICATION VIA THE EXTENDED KALMAN FILTER** M.S. Thesis

Stephen A. Walker Jun. 1973 128 p refs  
(AD-764694; GGC/MA/73-5) Avail: NTIS CSCL 05/9

The extended Kalman filter was used to estimate three pilot parameters, a pilot gain, lead time constant, and pure time delay. These parameters were estimated by defining them as states in an augmented state vector. The pilot model used consisted of a pilot gain, first order lead, and a Pade approximation of the pure time delay. The aircraft model consisted of the longitudinal short period equations plus a wind gust term. The accuracy of the estimated pilot parameters was determined by numerically comparing the true and estimated parameters and by model matching, that is, by comparing the transient responses of the pilot aircraft model containing the estimated pilot parameters with the pilot-aircraft model containing the true values of the parameters. (Modified author abstract) GRA

**N73-32027#** Human Resources Research Organization, Alexandria, Va.

**COMBAT JOB REQUIREMENTS FOR THE AIR CAVALRY AEROSCOPT PILOT AND AEROSCOPT OBSERVER**

William L. Warnick Dec. 1972 72 p refs  
(Contract DAHC19-73-C-0004; DA Proj. 2Q0-62107-A-745)  
(AD-755505; HUMRRO-TR-72-37) Avail: NTIS CSCL 05/9

The objectives of the research were to formulate and describe the skills and knowledges required for combat job performance for the aeroscort pilot and aeroscort observer in an Air Cavalry Unit, and to determine how much emphasis should be placed on each skill or knowledge area during training. Job inventory lists were administered to 14 combat-experienced aeroscort pilots and 15 aeroscort observers. The respondents judged each skill or knowledge item in terms of its importance for job performance in combats. This information provides a basis for organizing content

and subject emphasis of formal training programs, and provides school personnel and field commanders with a basis for evaluation and development of such. Author

**N73-32028#** Air Force Systems Command, Wright Patterson AFB, Ohio. Foreign Technology Div.  
**THE EFFECT OF VARIOUS TYPES OF FAILURES OF A HUMAN OPERATOR ON THE EFFECTIVENESS OF HIS WORK**

A. I. Gubinskii 27 Jul. 1973 15 p refs Transl. into ENGLISH from the book "Psikhologiya v Priborostr., Sb. Inzh." USSR, 1967 p 139-144  
(AD-764937; FTD-HT-23-695-73) Avail: NTIS CSCL 05/8

An examination is made of the effect of the various types of a human operator's errors on the reliability and efficiency of his work. GRA

**N73-32960\*** National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.  
**FACTORS INFLUENCING PUBLIC ACCEPTANCE OF STOL NOISE**

Philip M. Edge, Jr., Jimmy M. Cawthorn, and Clemans A. Powell, Jr. *In its* STOL Technol. 1972 p 353-365 refs

CSCL 05E

The responses of people to special noise characteristics associated with short takeoff aircraft are discussed. The findings of studies which have yielded data that may be pertinent to community acceptance of short takeoff aircraft noise are presented. A three step program to evaluate public acceptance of short takeoff aircraft noise was conducted. The three steps were: (1) definition of short takeoff aircraft noise characteristics, (2) laboratory tests to evaluate individual responses, and (3) the use of community survey data to extrapolate conventional takeoff aircraft experience. Author

**N73-33013** Texas Univ., Austin.  
**OXYGEN DEFICIT-OXYGEN REPAYMENT RELATIONSHIPS OF MEN IN TREADMILL RUNNING** Ph.D. Thesis

Donald Fraser McMiken 1972 128 p  
Avail: Univ. Microfilms Order No. 73-18468

Oxygen uptake and rectal temperature were measured in 30 male college students at baseline, during treadmill running for randomly assigned durations, and for a 30-minute recovery period at baseline work. Results indicated: (1) No difference in O<sub>2</sub>-repayment for steady-state or non-steady work; (2) O<sub>2</sub>-repayment was independent of work duration; (3) when workload and intensity were statistically controlled, O<sub>2</sub>-deficit was not a significant predictor of O<sub>2</sub>-repayment; (4) workload and intensity together accounted for about 80% of the variance in O<sub>2</sub>-repayment ( $r = .89, P < .001$ ); and (5) work intensity was the best single predictor of O<sub>2</sub>-repayment accounting for 69% of the variance. Dissert. Abstr.

**N73-33014#** Joint Publications Research Service, Arlington, Va.

**SPACE BIOLOGY AND MEDICINE, VOLUME 7, NO. 4, 1973**

O. G. Gazenko, ed. 10 Oct. 1973 149 p refs Transl. into ENGLISH from Kosm. Biol. Med. (Moscow), v. 7, No. 4, Jul. - Aug. 1973 92 p  
(JPRS-60248) Avail: NTIS HC \$9.50

Articles are presented concerning the selection of cosmonauts; evaluation and analysis of accumulated data to facilitate the on-going transition from orbital to interplanetary flights; reliability of the human component of the man-spaceship system; space psychology and physiology; and environmental problems.

**N73-33015** Joint Publications Research Service, Arlington, Va.  
**PRINCIPAL CHARACTERISTICS OF A METHOD FOR REGENERATING THE OXYGEN IN PRESSURIZED CHAM-**

**BERS BASED ON ELECTROLYSIS WITH USE OF SOLID ELECTROLYTES**

B. G. Grishayenkov, N. G. Zorina, and S. V. Devyatov *In its Space Biol. and Med.*, Vol. 7, No. 4, (JPRS-60248) 10 Oct. 1973 p 1-4 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 3-5

The main characteristics are given of an electrochemical system with a solid electrolyte designed to regenerate oxygen from human wastes (CO<sub>2</sub>, H<sub>2</sub>O). A possible mechanism of electrode reactions, a flow diagram used in supplying oxygen to an enclosed atmosphere, and an evaluation of system performance are described. Author

**N73-33016 Joint Publications Research Service, Arlington, Va. COURSE OF THE INFECTIOUS PROCESS AND FUNCTIONAL ACTIVITY OF PULMONARY MACROPHAGES IN MICE CONFINED TO AN ATMOSPHERE WITH A HIGH OXYGEN CONTENT**

A. S. Kaplanskiy, G. N. Durnova, and V. V. Portugalov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 5-9 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 6-9

The effect of a hyperoxic atmosphere (PO<sub>2</sub> - 304 mm Hg) on the course of the infectious process in the lungs of mice infected intranasally by *Klebsiella pneumoniae* was studied on the tenth experimental day. The infected animals developed interstitial pneumonia which was not fatal. The pathological process in the lungs of the infected mice developed similarly in the experimental and control mice from both the qualitative and quantitative points of view. No pathological changes were observed in the lungs of noninfected animals sacrificed on the 20th experimental day. The phagocytic activity of alveolar macrophages of experimental mice remained unchanged, whereas activity of succinate dehydrogenase and NAD-dependent and NAD-independent alpha-glycerophosphate dehydrogenase in the macrophage cytoplasm decreased significantly. It is suggested that an evaluation of succinate dehydrogenase activity in alveolar macrophages can be used as a test in measuring the toxic effect of oxygen. Author

**N73-33017 Joint Publications Research Service, Arlington, Va. CHANGE IN THE IMPULSE ACTIVITY OF NEURONS IN THE RESPIRATORY CENTER DURING ELECTRIC STIMULATION OF THE VESTIBULAR NERVE AND DORSAL ROOTS IN THE SPINAL CORD**

L. A. Radkevich and G. S. Ayzikov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 10-16 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 9-13

Experiments were carried out on adult cats anesthetized with chloralose nembutal. Impulse activity of 96 respiratory neurons in the medulla oblongata was investigated during electric stimulation of the utricular nerve and dorsal roots of the spinal cord by single square pulses (0.3 to 10 V, 0.5 msec, 1 to 0.3 cps). It was found that vestibular and muscular afferents converge on respiratory neurons in the medulla oblongata. It is noted that the response of single neurons to stimulation of the utricular nerve and dorsal roots was similar in 82.5% of the cases and opposite in 17.5% of the cases. The response of the respiratory neurons was more distinct during stimulation of muscular afferents than during stimulation of the utricular nerve. Those findings indicate that vestibular-respiratory responses may resemble proprio-respiratory reactions and that complex stimulation of these sensory systems may bring about a summation effect. Author

**N73-33018 Joint Publications Research Service, Arlington, Va. BLOOD SUPPLY TO THE SKELETAL MUSCLES OF RATS****DURING HYPOKINESIA**

G. N. Lenskaya *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 17-22 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 14-17

Quantitative changes in capillary blood flow were studied in vivo in *M. semimembraneus* and *M. soleus* of rats exposed to 5-, 15- and 30 day hypokinesia using intravascular injections of india-ink and gelatin mixtures. Blood flow was determined with respect to the number of capillaries per unit area and per one muscle fiber as well as with respect to the total surface of capillaries from the total surface of muscle fibers. *M. semimembraneus* exhibited a significant increase in the mean radius of the muscle fibers and capillaries. Due to considerable weight losses during the early hypokinetic stages the relative number of capillaries per unit area increased. *M. soleus* exhibited a significant decrease in the number of capillaries per unit area (by 14-16%) and per muscle fiber. Author

**N73-33019 Joint Publications Research Service, Arlington, Va. INFLUENCE EXERTED ON THE ANIMAL BODY BY CONTINUOUS AND DISCONTINUOUS EXPOSURE TO CARBON MONOXIDE**

B. I. Abidin, V. V. Kustov, V. I. Belkin, and L. T. Poddubnaya *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 23-29 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 17-21

Thirty-day experiments on male white rats demonstrated that continuous (on a 24-hour basis) and intermittent (for four hours daily) exposure to an atmosphere containing carbon monoxide has a similar effect, the daily dosage of the toxic gas being equal. It is suggested that a coefficient of not less than 3 should be used in computing the maximum admissible carbon monoxide concentration for its continuous effect on the basis of the industrial maximum admissible concentration. Author

**N73-33020 Joint Publications Research Service, Arlington, Va. FOOD CONSUMPTION AND MORPHOLOGICAL INDICES OF BLOOD IN WHITE MICE WITH THE REPLACEMENT OF AIR NITROGEN BY INERT GASES IN A PRESSURIZED CHAMBER**

A. B. Zimin and N. S. Malinovskaya *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 30-37 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 21-26

White male mice were exposed for five days to argon-oxygen, helium-oxygen and nitrogen-oxygen atmospheres. Food intakes were thoroughly measured. Significant variations in the amount of food intake were noted and correlated with the gas composition and temperature of the enclosed atmosphere. Changes in blood morphological composition were within the physiological limits normal for laboratory mice, although they indicated a certain relationship with thermal and physical properties of the atmosphere. As compared with the controls, the greatest deviations were noted in a helium-oxygen atmosphere at relatively low temperatures. Author

**N73-33021 Joint Publications Research Service, Arlington, Va. EFFECT OF ACCELERATIONS ON THE ACTIVE TRANSPORT OF GLUCOSE IN THE SMALL INTESTINE OF RATS**

K. V. Smirnov and T. A. Sokolova *In its Space Biol. and Med.*, Vol. 7, No. 4, (JPRS-60248) 10 Oct. 1973 p 38-43 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 26-29

The effect of a 20-minute exposure of rats to transverse accelerations on the active transport of glucose in the intestine was investigated. The experiments were carried out 3, 6, 24, 48, and 72 hours after the exposure. Glucose absorption increased three and especially six hours after the exposure. This

function underwent a gradual normalization during the 24 hours after exposure on the centrifuge. Author

**N73-33022** Joint Publications Research Service, Arlington, Va. **DYNAMICS OF WEIGHT CHANGE AND VARIATIONS IN WEIGHT INDICES OF INTERNAL ORGANS IN WHITE MICE AS A FUNCTION OF ATMOSPHERIC COMPOSITION AND DIET**

T. V. Makovkina *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 44-50 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 30-34

The effect of inert gases on the weight indices and water content and body weights of white mice was studied with respect to various diets. The visceral weight indices of white mice exhibited no significant changes under the influence of the gas composition. The weight and visceral weight indices were dependent primarily on the diet. In a helium-oxygen atmosphere the body weight decreased significantly on the fifth and tenth experimental days. The effect of exposure to an argon-oxygen or nitrogen-oxygen atmosphere was less pronounced. The visceral water content was not affected by either the atmosphere or the diet. Author

**N73-33023** Joint Publications Research Service, Arlington, Va. **ROLE OF EXTRACARDIAL INNERVATION IN COMPENSATION OF AN ORTHOSTATIC LOAD**

V. Ya. Katkov, A. Ye. Kuvayev, and V. B. Vlasov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 51-56 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 34-39

In experiments on anesthetized dogs sympathetic and parasympathetic influences on the heart were eliminated by inderal and atropine combined with a bilateral vagotomy. This decreased the heart rate to three beats per minute, reduced the cardiac output and increased the peripheral resistance. Following chemical denervation the heart rate did not increase during the orthostatic test, the absolute values of peripheral resistance increased, and the mean arterial pressure and cardiac output exhibited no tendency towards normalization, as was the case in experiments without chemical denervation. Cardiac denervation reduced the heart's capacity for compensation for orthostatic loading by about 10-12%. Author

**N73-33024** Joint Publications Research Service, Arlington, Va. **BIOLOGICAL EVALUATION OF THE INFLUENCE OF A HELIUM-OXYGEN ATMOSPHERE ON A CULTURE OF MAMMALIAN CELLS**

F. V. Sushkov, V. V. Portugalov, I. N. Smolenskaya, Z. K. Sorvacheva, R. L. Arndt, A. G. Dianov, and V. V. Isayenko *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1972 p 57-64 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 33-43

The cultivation of animal and human cells in vitro in an oxygen-helium atmosphere induced no noticeable changes in the morphological and physiological parameters of the tested cultures. No changes were observed in ten subsequent generations during the successive passages of the cultures under the studied conditions. Author

**N73-33025** Joint Publications Research Service, Arlington, Va. **INVESTIGATION OF THE POSSIBILITY OF RECORDING THE HUMAN ELECTROENCEPHALOGRAM UNDER THE INFLUENCE OF MUSCLE NOISE**

L. N. Nikolskiy and R. A. Vartbaronov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 65-70 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 43-47

Possible registry of the EEG was studied using two methods for the reduction of muscle noise. This reduction was attained by placing bipolar leads along the midline of the head of the frontoparietal region, the electrodes being located at a distance of 4-5 cm apart, or by an active selective filtration of EEG frequencies in any lead by means of a specially designed summator. Both methods ensured a considerable decrease in muscle noise during man's exposure to accelerations, as well as during arbitrary tension of the mastication muscles. Author

**N73-33026** Joint Publications Research Service, Arlington, Va. **ANALYSIS OF SOME INDICES OF ELECTRONYSTAGMOGRAMS FOR HEALTHY PERSONS IN LABYRINTHAL CALORIZATION TESTS**

D. Bodo, V. P. Baranova, E. I. Matsnev, and I. Ya. Yakovieva *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 71-76 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 47-51

Electronystagmographic indices were analyzed in 107 healthy persons exposed to caloric irrigation (calorization) by the Fitzgerald and Hallpike method. The results were statistically analyzed. With respect to the three or four parameters studied the reflex activity of the labyrinths exhibited physiological asymmetry due to the greater activity of the right labyrinth. In only four observations was a symmetry of reflex labyrinth activity noted. The mechanism of this phenomenon and the quantitative characteristics of the asymmetry require further study. Author

**N73-33027** Joint Publications Research Service, Arlington, Va. **STATE OF BLOOD FILLING AND BIOELECTRIC ACTIVITY OF THE BRAIN IN CIRCULATORY HYPOXIA IN HEALTHY PERSONS AND INDIVIDUALS WITH EARLY FORMS OF AUTONOMIC-VASCULAR DYSFUNCTION**

T. N. Krupina, M. P. Aleksandrova, and T. Ya. Pavlova *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 77-85 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 51-56

The results are presented of a study of 24 healthy persons and 25 individuals with autonomic-vascular dysfunction who were exposed to two-minute alternating occlusion of the carotid arteries for investigating pulse blood filling and cerebral bioelectric activity. The individuals with early forms of autonomic-vascular dysfunction exhibited an increase in eeg changes and lesser deficit of pulse blood filling. The genesis of these changes and the possibility of using simultaneous EEG and REG records in a test with temporary circulatory hypoxia as an additional objective test to be used in the screening of cosmonaut candidates are discussed. Author

**N73-33028** Joint Publications Research Service, Arlington, Va. **PECULIARITIES OF WATER-MINERAL METABOLISM DURING 120-DAY HYPOKINESIA**

Z. P. Pak, G. I. Kozyrevskaya, Yu. S. Koloskova, A. I. Grigoryev, Yu. Ye. Bezumova, and Ye. N. Biryukov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 86-91 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 56-59

The results of a study of the fluid-electrolyte balance in four test subjects during a 120-day bedrest experiment are presented. The investigations included measurements of the water consumed and the urine eliminated in 24 hours, changes in body weight, water content in the blood, plasma volume, electrolyte composition of the blood and urine, the rate of glomerular filtration and renal blood flow, osmotic concentration of the plasma and urine. The mentioned parameters changed in a wavelike pattern. Author

**N73-33029** Joint Publications Research Service, Arlington, Va.  
**ELIMINATION OF CREATININE IN THE URINE DURING  
 PROLONGED HYPOKINESIA**

I. M. Buznik and S. A. Kamforina *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 92-99 refs  
 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 60-64

Elimination of creatinine in the urine was examined in six test subjects exposed to a 94-day bed rest experiment. Three of them performed physical exercises with energy expenditures of 250 Cal/day. Beginning with the second week of hypokinesia the elimination of creatinine with the urine increased. Beginning with the 50th day of the experiment the test subjects who had performed no exercises exhibited a greater increase in elimination. These changes were traced using the CN index (urine creatinine nitrogen: total urine nitrogen x 100). This index is more precise than the creatinine coefficient and the absolute values, reflects changes in creatinine metabolism and can be recommended for their evaluation. An increase in the CN index gives evidence that catabolic processes predominate in the muscle tissue. Physical exercises do not eliminate but alleviate these changes, exerting a normalizing effect on the metabolism. There is a distinct correlation between creatinine excretion, total urine nitrogen and diuresis. Author

**N73-33030** Joint Publications Research Service, Arlington, Va.  
**INFLUENCE OF TRANSVERSE ACCELERATIONS ON  
 ELECTROLYTE COMPOSITION OF PLASMA AND ERYTHROCYTES**

M. M. Kvasova and I. D. Yertanova *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 100-106 refs  
 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 65-69

The electrolyte composition of plasma in humans subjected to accelerations exceeding 10 g was investigated by studying osmotic processes in the mitochondria on the basis of the accumulation of potassium and sodium ions. It was found that under the influence of accelerations of 12 and 10 g, there is a decrease in the concentration of potassium ions in the plasma and erythrocytes, whereas the content of sodium ions in the plasma is reduced and in the erythrocytes it is increased. It is concluded that the electrolyte metabolism indices can be used to evaluate tolerance to accelerations. F.O.S.

**N73-33031** Joint Publications Research Service, Arlington, Va.  
**PSYCHONEUROLOGICAL PROBLEMS IN MAN'S ADAPTA-  
 TION TO MODIFIED DIURNAL REGIMES**

O. N. Kuznetsov and A. N. Litsov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 107-115 refs  
 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 69-75

Theoretical and practical aspects of the psychoneurologic and personality problems involved in human adaptation to an altered diurnal regime (circadian cycle) are discussed. Stages and levels discriminated in clinical and experimental desynchronization are described. The role of anticipation, emotions, personality relationships and self-dependence in assimilating general experience for successful adaptation to an altered circadian cycle are demonstrated. An individual biorhythmological adaptive style is interpreted as a derivative of endogenous and exogenous processes in the course of personality development. The significance is shown of the exterior phase for the development of biorhythmological adaptive capabilities. The main characteristics of the personality which may favor or impede adaptation to an altered circadian cycle are also discussed. Author

**N73-33032** Joint Publications Research Service, Arlington, Va.  
**PROBLEMS OF SOCIAL PSYCHOLOGY IN SPACE**

B. S. Alyakrinskiy *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 116-120 refs  
 Transl. into

ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. Aug. 1973 p 75-78

The problems are discussed involved in achieving harmony in the life and work of small groups as applied to prolonged space flights. It was found desirable to separate crew members, bearing in mind their productive unification by ensuring a strict distribution of duties, control of verbal communication and separate rooms for each crew member. It is recommended that as soon as possible specialists detect negative tendencies in the emotions and relationships and that these be eliminated by means of a complete objectivization of their causes, particularly with the aid of daily entries in the diary, for the purpose of correcting possible conflicts and collisions. Author

**N73-33033** Joint Publications Research Service, Arlington, Va.  
**CHANGE IN CALCIUM CONTENT IN HUMAN BONE TISSUE  
 ACCOMPANYING THERMAL STRESS**

I. K. Zyuzin, S. M. Gorodinskiy, and Ye. I. Kuznets *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 121-127 refs  
 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 78-83

The effect of high ambient temperatures on the mineral content of human bone tissue was studied. Sealed chamber experiments on young healthy male test subjects demonstrated that both short-term and multiday exposures resulted in a decrease in bone optical density and bone demineralization. The exposure was followed by a decrease in trace elements in the plasma, a dropoff of calcium in the red blood cells and its increase in the plasma. The experimental findings make it possible to consider bone demineralization as an integrative index of thermal stress in the human body. Author

**N73-33034** Joint Publications Research Service, Arlington, Va.  
**PECULIARITIES OF HUMAN SKIN REACTIONS TO  
 LOTIONS OF DIFFERENT COMPOSITION DURING HYPO-  
 KINESIA**

V. V. Zhidkov, V. V. Borschchenko, G. N. Komzalova, and G. A. Vavilkina *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 128-132 refs  
 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, No. 4, Jul. - Aug. 1973 p 83-86

The irritating effect of different lotions and distilled water on the human skin was demonstrated in a 30-day bed rest experiment, the irritation increasing with the length of exposure to hypokinesia. The L-211 lotion was better tolerated than the other lotions tested. When recommending the use of various means of personal hygiene for manned space flights it is necessary to take into account the hypokinetic effect, which may increase skin hyperergic reactions. Author

**N73-33035** Joint Publications Research Service, Arlington, Va.  
**METHOD FOR AUTOMATIC PROCESSING OF THE INDICES  
 OF AN OPERATOR'S GAS EXCHANGE DURING WORK IN A  
 TRAINER USING A "DNEPRI" ELECTRONIC COM-  
 PUTE**

V. M. Baranov, M. M. Skvortsov, V. I. Grachev, and A. B. Shneyerov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 133-135  
 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 86-88

A system is described for automatically processing results of investigating gas exchange and energy expenditures of operators during experiments. In comparisons of results of tests using this method with data obtained by manual methods, there was a maximum difference of 6.5%. F.O.S.

**N73-33036** Joint Publications Research Service, Arlington, Va.  
**NEGATIVE PRESSURE ON THE LOWER HALF OF THE  
 HUMAN BODY AND THE VOLUME OF CIRCULATING**



**PLASMA**

N. M. Nukharlyamov, V. I. Kopolkov, A. A. Savilov, and B. S. Katkovskiy *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 136-137 refs Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 89-90

Results are presented of an investigation of the possibility for using lower body negative pressure (LBNP) for preventing a decrease in the volume of circulating plasma during a 30-day hypokinesia. During the period of hypokinesia there was a decrease in the volume of plasma from 43.3 to 31.8 ml/kg by the 22nd day. The use of LBNP beginning with the 26th day led to an increase in the volume, by the 29th day, to 39.4 ml/kg. F.O.S.

**N73-33037** Joint Publications Research Service, Arlington, Va.  
**WORK OF THE AEROSPACE SECTION OF THE LENINGRAD SOCIETY OF PHYSIOLOGISTS, BIOCHEMISTS AND PHARMACOLOGISTS IMENI I. M. SECHNOV**

G. I. Gurvich, E. V. Bondarev, and V. A. Yegorov *In its Space Biol. and Med.*, Vol. 7, No. 4 (JPRS-60248) 10 Oct. 1973 p 138-140 Transl. into ENGLISH from *Kosm. Biol. Med. (Moscow)*, v. 7, no. 4, Jul. - Aug. 1973 p 90-91

The conferences of the aerospace medicine section concerning aviation and space physiology and psychology are briefly reviewed. F.O.S.

**N73-33038\*** Colorado State Univ., Fort Collins.

**[MECHANISMS OF INERT GAS NARCOSIS] Semiannual Status Report**

30 Apr. 1973 78 p refs  
 (Grant NGR-06-002-075)

(NASA-CR 62096) Avail: NTIS HC \$6.00 CSCL 06B

Experiments describing the mechanism of inert gas narcosis are reported. A strain of mice, genetically altered to increase susceptibility to botulin poisoning (synaptic response) appears to increase metabolic rates while breathing argon; this infers a genetically altered synaptic response to both botulin toxin and narcotic gases. Studies of metabolic depression in human subjects breathing either air or a 30% mixture of nitrous oxide indicate that nitrous oxide narcosis does not produce pronounced metabolic depression. Tests on mice for relative susceptibilities to narcosis and oxygen poisoning as a function of fatty membrane composition show that alteration of the fatty acid composition of phospholipids increases resistance to metabolically depressant effects of argon but has no effect on nitrous oxide narcosis. Another study suggests that acclimatization to low tension prior to high pressure oxygen treatment enhances susceptibility of mice to convulsions and death; developing biochemical lesions cause CNS metabolite reductions and pulmonary damage. G.G.

**N73-33039\*** Maryland Univ., College Park. Dept. of Botany.  
**A STUDY OF PHYCOPHYSIOLOGY IN CONTROLLED ENVIRONMENTS Semiannual Status Report and Final Report**

Robert W. Krauss 15 Feb. 1973 100 p refs  
 (Grant NGR-21-002-003)

(NASA-CR-135796; TR-1024; SASR-24) Avail: NTIS HC \$7.00 CSCL 06M

In an attempt to understand the responses of *CHLORELLA* to various quantities and qualities of light in space flight life support system, studies were designed to give the maximum rates of growth as well as maximum yields at different densities of algae under different light intensities, and under light of different wave lengths. The results of studies on the effects of light on algal growth revealed that the effect was not only positive, as had been assumed in the case of photosynthesis, but that light had a negative action also. Light at the blue end of the spectrum was clearly inhibitory to cell division and vegetative reproduction. Carbon dioxide also limited growth by inhibition of cell divisions in *CHLORELLA* as well as in the colorless yeast *SACCHAROMYCES*. Author

**N73-33040\*** Exotech Systems, Inc., Falls Church, Va.  
**SCIENTIFIC AND TECHNICAL SERVICES DIRECTED TOWARD THE DEVELOPMENT OF PLANETARY QUARANTINE MEASURES FOR AUTOMATED SPACECRAFT Second Quarterly Report**

10 Oct. 1973 25 p

(Contract NASw-2503)

(NASA-CR-135795; QR-2) Avail: NTIS HC \$3.25 CSCL 06M

Planetary quarantine requirements and parameters are evaluated for their effects upon automated spacecraft flights data describing the heat resistance of naturally occurring microorganisms and sterilization requirements are analyzed and a possible method for assessment of these data is developed. Pertinent data from planetary mission microbial contamination logs are compiled and maintained in the quarantine document system. G.G.

**N73-33041\*** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

**PLANETARY QUARANTINE. SPACE RESEARCH AND TECHNOLOGY Semiannual Review, 1 Jan. - 30 Jun. 1973**

Oct. 1973 69 p refs

(Contract NAS7-100)

(NASA-CR-135791; JPL-900-636) Avail: NTIS HC \$5.50 CSCL 06M

The impact of satisfying satellite quarantine constraints on outer planet missions and spacecraft design are studied by considering the effects of planetary radiation belts, solar wind radiation, and space vacuum on microorganism survival. Post launch recontamination studies evaluate the effects of mission environments on particle distributions on spacecraft surfaces and effective cleaning and decontamination techniques. G.G.

**N73-33042\*** Uppsala Univ. (Sweden). Dept. of Otolaryngology.

**MORPHOLOGICAL STUDIES OF THE VESTIBULAR NERVE**

Bjoern Bergstroem 1973 41 p refs

(Grants NGR-52-028-003; NGR-52-028-004)

(NASA-CR-135746) Avail: NTIS HC \$4.25 CSCL 06P

The anatomy of the intratemporal part of the vestibular nerve in man, and the possible age related degenerative changes in the nerve were studied. The form and structure of the vestibular ganglion was studied with the light microscope. A numerical analysis of the vestibular nerve, and caliber spectra of the myelinated fibers in the vestibular nerve branches were studied in individuals of varying ages. It was found that the peripheral endings of the vestibular nerve form a complicated pattern inside the vestibular sensory epithelia. A detailed description of the sensory cells and their surface organelles is included. K.M.M.

**N73-33043\*** National Aeronautics and Space Administration, Washington, D.C.

**EXCHANGE OF HAND HEAT. THE ROLE OF CIRCULATORY REACTIONS AND VARIATIONS OF THE LOCAL TEMPERATURE OF ARTERIAL BLOODS**

D. Bargeton, J. Durand, J. Mensch-Dechene, and J. Decaud Washington NASA Oct. 1973 47 p refs Transl. into ENGLISH from *J. Physiol. (Paris)*, v. 51, 1959 p 111-150

(Contract NASw-2484)

(NASA-TT-F-15143) Avail: NTIS HC \$4.50 CSCL 06P

Heat exchange in the hand was studied as a function of the local thermal conditions, and the conditions of heat transport to the interior of the hand were analyzed. It is found that the temperature of the hand is a function of the surrounding temperature, except below 13 C in water and 5 C in air; increased blood circulation tends to raise the temperature and maintain it at 12 C. However, in the physiological zone, heat loss in the bath at 15 C is almost the same as that observed in a bath at 35 C. Author

**N73-33044#** Battelle-Northwest, Richland, Wash.  
**ANNUAL REPORT FOR 1971 TO THE USAEC DIVISION OF BIOLOGY AND MEDICINE. VOLUME 2: PHYSICAL SCIENCES. PART 1: ATMOSPHERIC SCIENCES**  
 C. L. Simpson Dec. 1972 198 p refs  
 (BNWL-1651-Vol-2-Pt-1) Avail: NTIS

Evaluations are given for siting nuclear facilities assess radiation exposures and hazards from routine low level releases during normal operations and from accidental release of significant quantities of radioactive materials into the atmosphere. Dispersion and associated turbulence and deposition models are reported that account for turbulent diffusion, transfer, and deposition of radioactive pollutants on the earth surface. Short term variation peak-to-mean-ratios are described applied to problems of instantaneous aspects, such as washout of gases in diffusing plumes where nonlinear reactions preclude the use of an average plume description. G.G.

**N73-33045#** World Meteorological Organization, Geneva (Switzerland).

**A STUDY OF THE AGROCLIMATOLOGY OF THE HIGHLANDS OF EASTERN AFRICA**

L. H. Brown and J. Cochems 1973 218 p refs Prepared in cooperation with Food and Agr. Organ. of the UN, Rome and UNESCO, Paris  
 (WMO-339: TN-125) Avail: NTIS HC \$13.00

The basic climatic potentials of agriculture in areas where more intensive agriculture and the arable land show potentialities for an increase in agricultural production are investigated. The study area is in eastern Africa, and comprises parts of Ethiopia, Kenya, Uganda, and Tanzania. The area is portrayed and the meteorology and climate described under sub areas. It is shown how the seasonal movement of the intertropical convergence zone could bring rain twice a year around the time of the equinoxes at the equator and once a year around the summer solstice near the tropics. Rainfall is the predominant agroclimatology factor, timing being more significant than the availability and the amount. Author (ESRO)

**N73-33046#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

**EFFECT OF FIBRINOGEN CONCENTRATION ON THE RHEODYNAMICAL BEHAVIOR OF HUMAN BLOOD**

Klaus Held 8 Mar. 1973 35 p refs In GERMAN; ENGLISH summary  
 (DLR-FB-73-54) Avail: NTIS HC \$3.75; DFVLR, Porz, West Ger. 12,30 DM

In order to analyze the rheodynamical influence of fibrinogen concentration on the viscosity of human blood, whole blood samples, plasmas, and sera of 25 healthy male subjects were studied in a Couette-type rotational viscometer under shear rates of 45 to 2,620/s. The results point to the extraordinary importance of fibrinogen in the rheological behavior of blood. In the field of shear rates studied, this effect becomes obvious, i.e. there exists an exponential dependence of the viscosity coefficient on fibrinogen concentration. Author (ESRO)

**N73-33047#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

**HEMATOLOGIC STUDIES AFTER RAPID DECOMPRESSION**  
**Thesis - Bonn Univ.**

Peter Bangen 4 Apr. 1973 58 p refs In GERMAN; ENGLISH summary  
 (DLR-FB-73-63) Avail: NTIS HC \$5.00; DFVLR, Porz, West Ger. 18,30 DM

The mode of behavior of several hematologic values after rapid decompression was investigated. After specification of the standard physiological values, eighty miniature swine were exposed to rapid decompression ten times at weekly intervals. The following tests on the blood of fifteen animals, showed each time prevailing significant changes in the fields of cell

morphology, albumin-chemistry and physiology of coagulation. An attempt is made to explain the factors which may have affected the experimental process. Author (ESRO)

**N73-33048#** School of Aerospace Medicine, Brooks AFB, Tex.  
**MIDDLE-EAR MUSCLE REFLEX TO AIRCRAFT NOISE**  
**Progress Report, Apr. 1972 - Mar. 1973**

Harrell C. Sutherland, Jr., Roy Danford, Jr., and Donald C. Gasaway  
 Jul. 1973 17 p refs  
 (AF Proj. 7755)  
 (AD-764739; SAM-TR-73-20) Avail: NTIS CSCL 06/19

Middle-ear muscle reflex threshold with three types of aircraft noise and with a 1000-Hz pure tone was sought with 21 rated flying personnel. Three subjects failed to respond to the noise at maximum intensity (108-dB SPL). Average reflex threshold in dB SPL for the other 18 subjects was 94.8 dB for the 1000-Hz tone, 95.2 dB for T-37b noise, 98.8 dB for UH-1P noise, and 94.4 dB for F-4E noise. Threshold for the UH-1P noise was significantly higher than thresholds for the other sounds. No other differences were significant. Threshold SPLs are well within the range of intensities commonly present in aircraft, which suggests that this reflex be considered in any study dealing with the effects of aircraft noise on occupants. Author (GRA)

**N73-33049** Houston Univ., Tex.  
**A CARDIOVASCULAR CONTROL SYSTEM SIMULATION FOR EXERCISE** Ph.D. Thesis

Ronald Colville Croston 1972 140 p  
 Avail: Univ. Microfilms Order No. 73-15727

A mathematical model and digital computer simulation of the human cardiovascular system and its controls are developed to simulate transient responses to bicycle ergometer exercise. The purpose of the model is to provide a method to analyze cardiovascular control hypotheses which cannot be easily tested in an animal or human. Complex cardiovascular control hypotheses are derived for the control of heart period, peripheral flow resistances, venous tone, and other controlled variables. Metabolic control models are also derived using simple mathematical models of oxygen up-take, oxygen deficit, and accumulating metabolites to indicate the transient metabolic state and simulate other chemical factors. Results of simulation tests are described for resting conditions, zero load pedaling, and four levels of exercise. Transient response characteristics and steady model values are presented and compared with experimental data. Dissert. Abstr.

**N73-33050** Illinois Univ., Urbana.  
**A STUDY OF VISUAL SHAPE PERCEPTION** Ph.D. Thesis  
 Kiyoshi Maruyama 1972 215 p  
 Avail: Univ. Microfilms Order No. 73-17314

Algorithms involved in visual shape perception are studied. The main interest is to solve the naming problem, i.e., the strategies by which map-like information is transferred to objects of the scene under analysis. The naming problem is specified by two input pictures: a sample picture and a text picture. The problem is to identify and name objects in the given sample picture using name information in the text picture. Once possible individual shape identification has been established, the next step is to consider the structural matching between the given sample and text pictures. Introducing the concept of angularly simple curves and the decomposing of a complex region into simpler classes of regions, basic shape representations for polygonal, pattern sequence, and skeleton representations are given. From these representations both global and local features are extracted to channel to a structural analysis of complex pictures. Dissert. Abstr.

**N73-33051** New York Univ., N.Y.  
**THE EFFECTS OF PHYSICAL FATIGUE ON SEQUENCING IN EYE-HAND COORDINATION PERFORMANCE** Ph.D. Thesis

Howard Gage 1973 172 p  
 Avail: Univ. Microfilms Order No. 73-19425

The biomechanical profile and its instrumentation are used for objective evaluation of specific aspects of sequencing and integration of major biomechanical elements in eye-hand coordination. Investigated are: (1) The effects on sensory motor performance of physical fatigue induced by a full day of light work; (2) the validity of certain rules of motion performance difficulty established by the Basic Motion Timestudy (BMT) system of predetermined motion times; and (3) the influence of subjects' age on various aspects of sensory motor coordination. Quantitative analyses of the biomechanical profiles show that fatigue adversely affected total performance times for all of the selected test movements.

Dissert. Abstr.

**N73-33052\*#** McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.

**LIFE SUPPORT SYSTEM COST STUDY: ADDENDUM TO COST ANALYSIS OF CARBON DIOXIDE CONCENTRATORS**

M. M. Yakut 30 Sep. 1973 6 p  
(Contract NAS8-28377)

(NASA-CR-124462; MDC-G4631) Avail: NTIS HC \$3.00 CSCI 06K

New cost data are presented for the Hydrogen-Depolarized Carbon Dioxide Concentrator (HDC), based on modifying the concentrator to delete the quick disconnect valves and filters included in the system model defined in MDC-G4631. System description, cost data and a comparison between CO<sub>2</sub> concentrator costs are presented.

Author

**N73-33053#** Joint Publications Research Service, Arlington, Va.

**THE MECHANISMS AND PRINCIPLES OF GOAL-DIRECTED BEHAVIOR**

P. K. Anokhin, ed. 21 Sep. 1973 315 p refs transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 296 p (JPRS-60091) Avail: NTIS HC \$17.75

Research is reported which includes: (1) the mathematical description and modeling of goal directed behavior; (2) the experimental investigation of behavioral goal-directed reactions; and (3) the precise neurophysiological study of the mechanisms that effect goal-directed behavior, including motivations and emotions.

33071.

**N73-33054** Joint Publications Research Service, Arlington, Va.  
**A DYNAMIC THEORY OF BEHAVIOR**

G. A. Golitsyn *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 2-31 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 5-33

A theory of systems is constructed that is considered to be sufficiently general, yet capable of providing effective behavior predictions. The theory involves an initial determination of the variables and the relations of a system. The task of prediction is then dependent upon mathematical expressions of the relations superimposed on the variables. An application of the theory is presented which deals with the dynamic principles of the behavior of animals.

D.L.G.

**N73-33055** Joint Publications Research Service, Arlington, Va.  
**AN APPROACH TO THE CONSTRUCTION OF A FORMAL MODEL OF BEHAVIOR**

A. L. Shamis and B. Yu. Levit *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 32-47 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 34-49

The problem of constructing a formal model of behavior is dealt with, and the underlying complexities and limitations are

analyzed. A simple mathematical model of optimal behavior in a fixed environment is formulated. However, this model is not adequate to the problem of behavior in a complex multiextremal environment. In order to bring the problem closer to the real situation of decision making by animals in free behavior, the task is considered of extending the model to a complicated environment. Insofar as the complicated environment is probabilistic in character, the mathematical expectation of the time at which the system leaves the domain of permissible values is necessarily maximized. It is pointed out that the local principle of decision making may be realized if the problem is reduced to a single-extremum problem by generalization and anticipation. The utilization of a control algorithm is then considered. It is concluded, however, that the real environment in which living organisms function is so complex that the formal application of the algorithm is practically impossible.

D.L.G.

**N73-33056** Joint Publications Research Service, Arlington, Va.  
**ONE CLASS OF ADAPTIVE SYSTEMS AND RESULTS OF COMPUTER MODELING OF THEIR SELF-INSTRUCTION**  
V. A. Yakubovich *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 48-77 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 50-79

An approach is described to the construction of a theory of one special class of adaptive systems. The approach is based on the use of the apparatus of finitely convergent algorithms for solving denumerable systems of inequalities. The approach is applied to the 'grasshopper' adaptive system in which it is assumed that a grasshopper and a target exist on a circular meadow. All of the grasshopper's activity is aimed at catching the next target to jump across the meadow. Since the grasshopper and the target jump simultaneously, in order to catch the target the grasshopper must anticipate where the target will jump at the next instant and then jump to the appropriate point. The anticipation problems solved by the grasshopper's brain are discussed and equations describing the functions are formulated.

D.L.G.

**N73-33057** Joint Publications Research Service, Arlington, Va.  
**THE EXPEDIENT FUNCTIONING OF AUTOMATA WITH NORMAL AND DISTURBED BEHAVIOR IN EXPERIMENTS ON REINFORCEMENT SELECTION**

N. I. Glazunov, G. Sh. Rozenshteyn, and A. I. Yablonskiy *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60092) 21 Sep. 1973 p 78-90 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 80-92

Some characteristics are determined for the optimal behavior of models constructed in problems of reinforcement selection. These characteristics are compared with data obtained in similar psychological experiments on healthy and sick human beings. A model is described and analyzed in which the simplest statistical problem of image recognition is considered to be a formal analogue of the psychological experiment on reinforcement selection. A payment function is assigned in the set of solutions to the recognition problem. It is shown that the payment received during the learning of an automaton with disturbed behavior is less than the payment that an automation with normal behavior receives while learning. Utilizing the described approach, it is possible to introduce quantitative measures of the deviation from the norm in order to construct tests in problems of clinical diagnosis or engineering psychology.

D.L.G.

**N73-33058** Joint Publications Research Service, Arlington, Va.  
**SIMPLE INDUCTIVE INTERACTION BETWEEN MAN AND OBJECTS AND EVENTS**

L. A. Kozharskiy *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 91-98 ref Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 93-100

Conventional mathematical methods are used to construct an algorithm of simple inductive interaction between man and his environment. Equations are derived which describe: (1) the collection of information for selection of a decision by the subject, (2) the accumulation of collected information by the subject, and (3) the selection by a subject of a decision on the basis of accumulated information. The algorithm may be utilized in programming problems of medical and technical diagnosis, quantitative and qualitative analysis, isolating information from interference, and other problems for which the selection of a decision is connected with the accumulation of data. D.L.G.

**N73-33059** Joint Publications Research Service, Arlington, Va.  
**MODELING COMPLEX BEHAVIOR WITH THE AID OF M-AUTOMATA**

A. M. Kasatkin *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 99-119 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 101-119

The principles of construction are described of one class of models of intelligent behavior. A modeling language convenient for the constructive representation of the hypothesis was also developed. Hebb-type neuron ensembles, which are the functional units of the natural nerve net, are considered as the neurophysiological analogues of these models. Artificial systems constructed on the basis of the developed concepts are realized in the form of specific nets. The assemblies of the net are the formal elements that correspond to cortical information models. These assemblies are referred to as i-models, and with the aid of a net of i-models it is possible to represent interconnected systems of images and concepts that are presumably utilized by man in the course of thinking. D.L.G.

**N73-33060** Joint Publications Research Service, Arlington, Va.  
**EXPERIMENTAL STUDY OF A MODEL OF MOTOR BEHAVIOR**

L. M. Kasatkina *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 118-140 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 120-142

A model of purposeful behavior is described which represents a complete nonlearning M automaton. It is designed to reproduce some processes of information processing by the cerebral cortex in the organization of motor behavior. The automaton functions in a certain conditional environment, and the decisions that it makes depend on the results of emotional evaluation and logical processing of information arriving at the automaton's inputs from the environment. A general block diagram of the automaton is presented and the operation of the model is described in detail. D.L.G.

**N73-33061** Joint Publications Research Service, Arlington, Va.  
**MODEL OF THE ORGANIZATION OF GOAL-DIRECTED BEHAVIOR**

S. A. Talayev *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 141-145 Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 143-147

The construction and experimental study of functioning models of some complex forms of mental activity are described. Heuristic modeling was chosen as the means of investigation, and an M-network (a network of information models) was selected as the means of realizing the functional model. The initial concept employed considers the brain as a system capable of modeling the subject's external and internal environment. The problem solving process in the planning of motor behavior is considered as the experimental situation. Emphasis is placed on the modeling of perception organization, since perceived information largely determines goals, and the perception of each specific situation depends on the motivation and goals of the proposed behavior. D.L.G.

**N73-33062** Joint Publications Research Service, Arlington, Va.  
**THEORETICAL ASPECTS OF MOTIVATIONAL STIMULATION**

K. V. Sudakov and I. M. Sechenov *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 147-168 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 148-167

A theoretical analysis of motivational stimulation is presented and the following conclusions are made: (1) Each of an organism's needs activates a specific functional system whose activity provides for the satisfaction of the need, which is important to the organism's existence. (2) The significance of motivational stimulation in the activity of various functional systems consists above all in mobilizing the organism to active behavior in the external environment. (3) This mobilization takes place through specific ascending activating influences of need-stimulated motivational centers of the hypothalamus on other sections of the brain. (4) Under different motivations these influences are always emphatically specific and always connect complexes of cortical elements selectively, on the basis of their specific chemical sensitivity. (5) Special goal-directed behavior is formed for each motivation on the basis of precisely such selective connection. D.L.G.

**N73-33063** Joint Publications Research Service, Arlington, Va.  
**STRUCTURAL, BEHAVIORAL, AND EEG CORRELATES OF ALIMENTARY MOTIVATION**

K. V. Shuleykina *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 169-199 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 168-195

A study is described in which alimentary motivation was subjected to a special neurophysiological analysis. The study was aimed at determining the basic objective criteria of motivational stimulation, including structural, behavioral, and electrographic. The work was carried out on 1-month old kittens with permanently implanted electrodes localized in the cortex and subcortical structures. The search for food and the process of eating served as the model forms of behavior. The culmination of the food-search reaction is the moment at which the food is seized. It was found in the study that this moment is the stage of the highest intensiveness of motivational efforts and reflects the decision making process. In recording the electrical activity corresponding to this state, spikes of particularly regular sinusoidal oscillations were observed which often exceeded in amplitude the mean value of the initial search rhythm. It is concluded that these spikes are one case of phase changes in motivational stimulation and correspond to the state of intention to act or decision making. D.L.G.

**N73-33064** Joint Publications Research Service, Arlington, Va.  
**USE OF MOTIVATIONAL RELATIONS TO FIND THE ACCEPTOR OF ACTION**

N. V. Asmayan *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 200-204 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 196-200

A series of experiments was conducted to demonstrate the significance of motivational relations for determining the acceptor of action when an error is present. The experiments were conducted on a dog in which instrumental conditioned reflexes to various reinforcements of two different conditioned stimuli from the same foodbox were developed. In response to a light signal the dog received a water ration upon pressing a lever, and in response to a bell signal the dog received a biscuit ration. It was found that when hunger and thirst were of identical strength, the dog would accept a substitution of water for biscuits without any negative reaction. However, when thirst was reduced and hunger heightened, the same substitution led to a rejection of the water. Immediately following this the dog was given a light signal and drank the water that it had just rejected. It was

concluded that the acceptor of action can be detected in the presence of an error in the form of negative motor reactions only if the stimulus that satisfies the stronger motivation is replaced by a stimulus that satisfies a weak or nearly absent motivation.

D.L.G.

**N73-33065** Joint Publications Research Service, Arlington, Va. **RELATION OF CONDITIONED REACTIONS TO EVALUATION OF RESULTS OF FORTHCOMING REINFORCEMENT**  
N. V. Asmayan *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 205-21 refs  
Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlennoogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p201-206

A study was aimed at creating experimental conditions under which negative motor reactions to a conditioned stimulus could be observed. The experiment was conducted on an excitable dog in which instrumental conditioned reflexes were developed in a chamber with two-way reinforcement. Based on the results obtained, the following conclusions were made: (1) Satisfaction of need changes in animal's attitude toward reinforcement from positive to negative. (2) At the same time the animal's attitude changes, the signal significance of the conditioned stimulus changes. This is confirmed by the animal's different reactions to the stimulus when motivation is present and after it has been satisfied. (3) The theory is confirmed that the animal's reaction to the conditioned stimulus is not a purely automatic reflex action, but the result of a complex process of afferent synthesis in which the internal state and the anticipated results of the action are taken into account.

D.L.G.

**N73-33066** Joint Publications Research Service, Arlington, Va. **FEATURES OF THE BEHAVIOR OF DOGS WHEN GIVEN A CHOICE OF VARIOUS REINFORCEMENTS**

N. V. Asmayan and U. V. Urvayev *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 211-214 refs  
Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlennoogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 207-211

The reaction of voluntary selection was investigated in four dogs. By pressing the righthand lever, in response to a general auditory signal, the animal received a bowl containing biscuits from the righthand foodbox or by pressing the lefthand lever, he received water from the lefthand foodbox. The experiments were conducted after the conditioned reflexes were stabilized. As the motivations declined during the experiment, the latent period of the conditioned instrumental reaction (CIR) increased. At the end of the experiment (after complete satisfaction of hunger and thirst) the dog performed a CIR in response to the conditioning signal but did not accept reinforcement. A CIR did not arise in response to a new stimulus (similar to the conditioning stimulus). When the possibility of performing a CIR was eliminated, the conditioning signal elicited a goal-directed search reaction. Erroneous CIR were corrected with consideration for the attainment of the next stage.

Author

**N73-33067** Joint Publications Research Service, Arlington, Va. **STRUCTURE AND FUNCTIONS OF CENTRAL MECHANISMS OF REINFORCEMENT**

Yu. A. Makarenko *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 215-231 refs  
Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlennoogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p212-227

The data obtained by various researchers on the central mechanisms of reinforcement are summarized. The topics covered include: (1) the topography of reinforcement zones, (2) correlation of central mechanisms of reinforcement upon stimulation of the brain with natural reinforcements, (3) the question of drive reduction or induction, and (4) the existence of separate motivational and reinforcing mechanisms.

D.L.G.

**N73-33068** Joint Publications Research Service, Arlington, Va. **ON VARIOUS TYPES OF CORTICOPETAL INFLUENCES FROM DEEP-SEATED EMOTIOGENIC FORMATIONS OF THE BRAIN**

Ye. M. Bogomolova *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 232-264 refs  
Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlennoogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 228-258

An analysis was conducted, under fixed experimental conditions, of the feature of behavioral emotionally-enhanced reactions that arise in cats upon electrical stimulation of emotiogenic regions of various sections of the mesencephalon, diencephalon, and telencephalon. The results obtained include the following: (1) The emotional reactions that arise on stimulation of the hypothalamus and structures of the mesencephalon are characterized by a low threshold, a short latent period, long duration, and a multiplicity of components. On stimulation of the telencephalic formations of equal force, emotional reactions prove less marked, have a greater latent period, and are distinguished at the height of their development by being transformed into convulsive seizures. (2) On solitary electrical stimulation of these deep-seated emotiogenic brain structures, evoked potentials that reveal the cortical projections of these formations arise at the cerebral cortex. On the basis of these projections it is possible to judge which regions of the cerebral cortex are included in the overall emotiogenic process on stimulation of subcortical emotiotropic structures.

D.L.G.

**N73-33069** Joint Publications Research Service, Arlington, Va. **CORRELATION BETWEEN PRIMARY RESPONSE AND LATE SLOW OSCILLATION OF EVOKED POTENTIAL IN RESPONSE TO LIGHT IN AWAKE AND ANAESTHETIZED RABBITS**

A. I. Shumilina and A. P. Karpov *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 265-278 refs  
Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlennoogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 259-271

The study was conducted on rabbits with electrodes permanently implanted at 48 points on the surface of the skull. Light bursts were produced by discharges from a flashlamp at the rate of one flash per second and in series of six to eight flashes. The following results were obtained: (1) In an awake rabbit adapted to the experimental conditions, the primary evoked potential (EP) in response to light is recorded most consistently in the visual region of the cortex, while the late slow negative-positive oscillation is generalized throughout the entire cerebral cortex. (2) Simultaneous application of light and a painful stimulus causes the primary response to be generalized beyond the projective region and the late slow oscillation to be suppressed in the cortex and subcortical formations. (3) The administration of a tranquilizer changes the configuration of the positive components of the primary response and the late slow oscillation of the EP in response to light. (4) The administration of stem-localized narcotics causes redistribution of the pathways of the ascending subcortical activations.

D.L.G.

**N73-33070** Joint Publications Research Service, Arlington, Va. **THE ORIENTATIVE-INVESTIGATIVE REACTION AS A FACTOR CHANGING THE CONFIGURATION OF EVOKED POTENTIALS ON REPEATED FLASHES**

M. V. Serbinenko *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 279-291 refs  
Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlennoogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 272-281

Experiments were conducted on awake rabbits with electrodes implanted epidurally into the sensorimotor, temporal, and occipital regions of the cortex, the corpus geniculatum laterale, the hippocampus, and other brain formations. During the experiments, it was observed that a defense state, manifested in stepped-up respiration with an increase in inspiratory dyspnea during the

period of the light flashing, appears at first. Then generalized desynchronization is recorded on the EEG in the anterior regions of the cortex. Evoked potentials appear irregularly and are represented primarily by the primary response in the occipital and temporal cortex. After several dozen flashes, vegetative reactions fade, the EEG becomes less active, and this usually coincides with the appearance of the elicited responses that include a two-phase component. It was concluded from the experiments that changes in the evoked potentials, under the influence of monotonous stimulation, are most often manifested in a reduction of amplitude and the depression of late components of the visual response, while the primary response is altered less noticeably. D.L.G.

**N73-33071** Joint Publications Research Service, Arlington, Va. **CROSS-CORRELATION ANALYSIS OF STRESS RHYTHM DURING ACTION OF STIMULI OF DIFFERENT BIOLOGICAL SIGNIFICANCE**

A. M. Mamedov *In its* The Mech. and Principles of Goal-Directed Behavior (JPRS-60091) 21 Sep. 1973 p 292-302 refs Transl. into ENGLISH of the book "Mekhanizmy i Printsipy Tselenapravlenogo Povedeniya" Moscow, Izd-vo Nauka, 1972 p 282-290

Experiments were conducted with unanesthetized rabbits with electrodes permanently implanted in various regions of the cerebral cortex and subcortical structures. The results of cross-correlation analysis of the stress rhythm during stimuli of varying biological quality showed the presence of phase shifts of different magnitude, reaching one half-period. In combination with the high functional relation between relatively remote anatomical structures of the brain, these phase shifts which turned up in the frequency of the periodic component, provide grounds to consider stress rhythm as an expression of cortico-subcortico reverberation of stimulation. D.L.G.

**N73-33072\*#** Linguistic Systems, Inc., Cambridge, Mass. **THE ROLE OF WATER TEMPERATURE IN BRADYCARDIA DURING FACIAL IMMERSION**

J. Corriol and J. J. Rohner Washington NASA Oct. 1973 15 p refs Transl. into ENGLISH from Arch. Sci. Physiol. (France), v. 22, 1968 p 265-274 {Contract NASw-2482} (NASA-TT-F-15025) Avail: NTIS HC \$3.00 CSCL 06S

The role is investigated of variations in water temperature upon bradycardia, or stimulus-induced cardiac deceleration. This phenomenon occurs as a reflex when the human face is immersed in water. Using twelve test subjects, the authors carry out facial immersions at various water temperatures, accompanied by accurate electrocardiographic measurement. Through statistical analysis, the effect of water temperature variations upon the bradycardia reflex is demonstrated. The nature of the cutaneous receptors involved in the reflex is also discussed. Author

**N73-33073\*#** Techtran Corp., Glen Burnie, Md. **FUNCTIONAL DISTURBANCES DURING HYPOKINESIA IN MAN**

L. I. Kakurin, B. S. Kamkovskiy, V. S. Georgiyevskiy, Yu. N. Purakhan, M. A. Cherenikhin, B. M. Mikhaylov, B. N. Pemukhov, and Ye. N. Buryikov Washington NASA Oct. 1973 11 p refs Transl. into ENGLISH from Vop. Kurortol., Fizioter, Lech. Fiz. Kul't. (USSR), v. 35, 1970 p 19-24 {Contract NASw-2485} (NASA-TT-F-15148) Avail: NTIS CSCL 06S

Two groups of three male volunteers each were confined to strict bed rest for 20 days. Group 2 performed exercises while in bed while group 1 did not; the members of the latter group showed a greater incidence of a neuroasthenic syndrome as well as more profound changes in circulatory parameters. Hence, physiological systems deteriorate with diffuse and this phenomenon must be taken into account when prescribing prolonged periods of bed rest. Author

**N73-33074\*#** Linguistic Systems, Inc., Cambridge, Mass. **RETINAL ADAPTION**

H. Lagrange Washington NASA Oct. 1973 28 p refs Transl. into ENGLISH from Ann. Ocul. (Paris), v. 167, 1930 p 404-426

(Contract NASw-2482) (NASA-TT-F-15036) Avail: NTIS HC \$3.50 CSCL 06S

A review is presented concerning retinal adaptation to varying light intensity. It enters into the anatomical and physiological substrate of adaptation, with a detailed discussion of how adaptation varies with the different light wavelengths. The retina is divided into different zones of sensitiveness and their mechanism and a physiological model is explained. Visual acuity is gone into in depth, and clinical case material is used to support some of the physiological models. Author

**N73-33075#** Illinois Univ., Savoy. **ENHANCEMENT OF HUMAN EFFECTIVENESS SYSTEM DESIGN, TRAINING, AND OPERATION Annual Progress Report, 1 Jul. 1972 - 30 Jun. 1973**

Charles O. Hopkins Jul. 1973 36 p refs {Contract F44620-70-C-0105; AF Proj. 9778} {AD-764761; ARL-73-14/AFOSR-73-9; AFOSR-73-1253TR} Avail: NTIS CSCL 05/10

The research reported consists of eight tasks, four concerned with manned systems research and four with human resources research. Although each task is basic in the sense that it seeks results of a broadly generalizable nature, each is specifically relevant to one or more well-known and long-standing Air Force problems. (Modified author abstract) GRA

**N73-33630** Tetra Tech, Inc., Pasadena, Calif. **FACTORS AFFECTING LONG RANGE VISION**

Willard H. Wells *In* AGARD Optics of the Sea (Interface and In-Water Transmission and Imaging) Aug. 1973 10 p refs

The various phenomena which affect long range underwater vision are discussed. The most important factors are: (1) decay of light in narrow and broad beams, (2) light backscattered from particulate matter, (3) return light whose image information is scrambled by small angle scatter enroute to the detector, (4) the statistics of detected photons, and (5) signal to noise ratio criteria for imaging. Mathematical models are presented to show the effects of the various factors. Author

**N73-33631** Tetra Tech, Inc., Pasadena, Calif. **CRITERIA FOR VISION: RESOLUTION, SIGNAL-TO-NOISE RATIO CONTRAST**

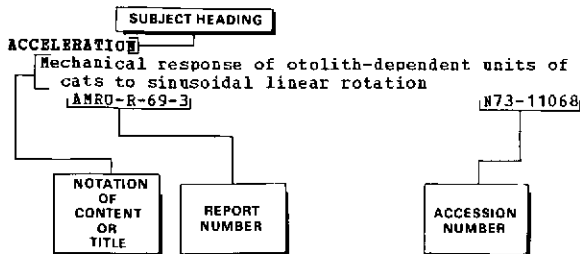
Henri Hodara *In* AGARD Optics of the Sea (Interface and In-Water Transmission and Imaging) Aug. 1973 13 p refs

The vision criteria of resolution, signal to noise ratio, and contrast are discussed. The concepts are applied to calculate the ultimate resolution of underwater imaging systems. It is stated that a signal to noise ratio of five is sufficient to ensure image quality. Mathematical models of the factors affecting underwater vision are developed. Author

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AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl. 123) JANUARY 1974

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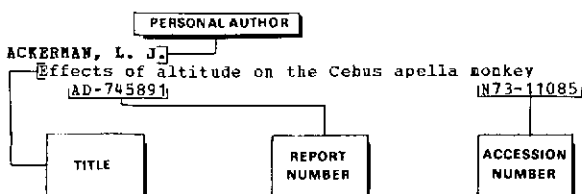
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