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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 101)

APRIL 1972

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 101)

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 March 1972 in

- *Scientific and technical Aerospace Reports (STAR)*
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 348 reports, articles, and other documents announced during March 1972 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, irregular 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 on 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.

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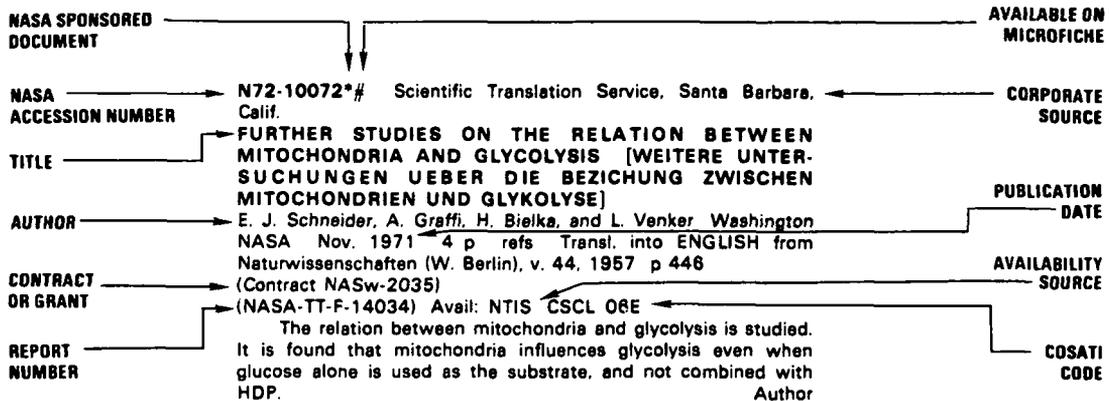
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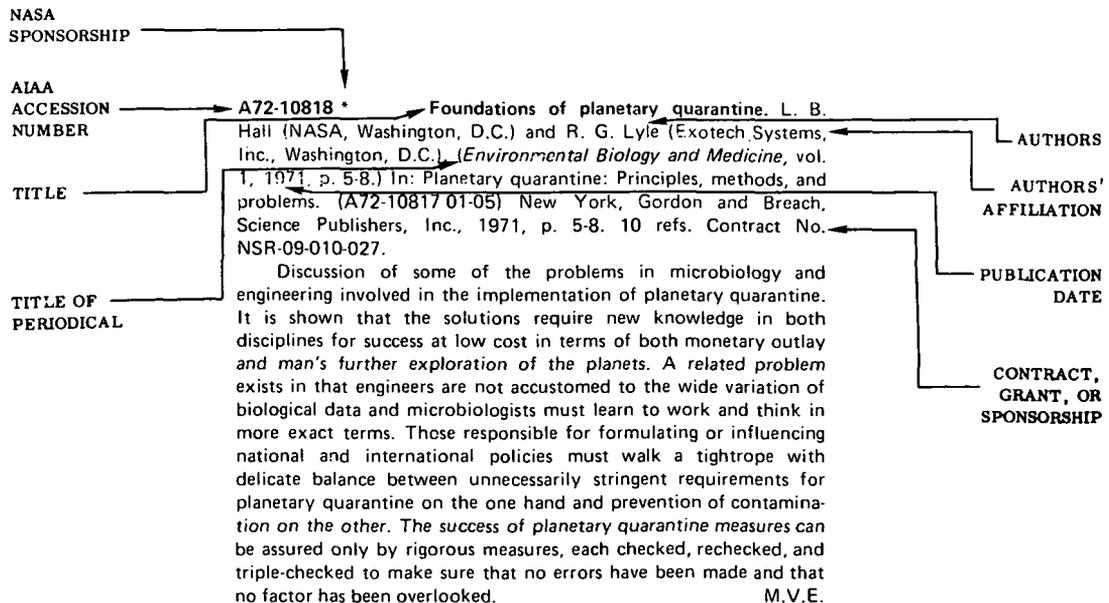
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TYPICAL CITATION AND ABSTRACT FROM IAA





AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 101)

APRIL 1972

IAA ENTRIES

A72-15800 **Significance of saccadic eye movements in flight medicine (Phänomene sakkadischer Augenbewegungen in ihrer Bedeutung für die Flugmedizin).** J. C. Aschoff (Ulm, Universität, Ulm, West Germany). *Zentralblatt für Verkehrs-Medizin, Verkehrs-Psychologie, Luft- und Raumfahrt-Medizin*, vol. 17, Oct. 1971, p. 129-137. 23 refs. In German.

Discussion of the special features of saccadic eye movements and of factors capable of influencing the saccade rate in jet pilots. The physiology of saccadic eye movements is reviewed, noting the dependence of the saccade rate and duration on the saccade amplitude. The results of studies of the saccade rate required by jet pilots during landing are cited. A diurnal periodic fluctuation of the saccade rate is noted in these pilots. It is found that, although the saccade rate cannot be changed for the better by means of medication or training exercises, it can be negatively affected by such factors as alcohol or tranquilizers. A.B.K.

A72-15809 * **Fungal leaching of titanium from rock.** M. P. Silverman and E. F. Munoz (NASA, Ames Research Center, Moffett Field, Calif.). *Applied Microbiology*, vol. 22, Nov. 1971, p. 923, 924. 5 refs.

Penicillium simplicissimum is found to solubilize up to 80% of the titanium in granitic rocks but less than 2% of the titanium in basaltic rocks. These findings were made in investigating the interactions of microorganisms with rocks and minerals of the biosphere in studies aimed at developing experiments for the detection of extraterrestrial life. M.V.E.

A72-15810 * **Origin and development of plasma membrane derived invaginations in *Vinca rosea*** I. P. Mahlberg, C. Walkinshaw (Indiana University, Bloomington, Ind.), and K. Olson (NASA, Lunar Receiving Laboratory, Houston, Tex.; Indiana University, Bloomington, Ind.). *American Journal of Botany*, vol. 58, no. 5, 1971, p. 407-416. 30 refs. PHS Grant No. S05-FR07031; Contract No. NAS9-9211.

The occurrence, morphology, and possible ontogeny of plasma-membrane-related structures are described which can develop into invaginations or intravacuolar formations. An underlying study of meristematic tissues from the shoot of *Vinca rosea* supports the interpretation that endocytosis does occur in plant cells and that it is appropriate to refer to these structures as endocytoses. The function of these invaginations or their content remains to be elucidated. M.V.E.

A72-15812 **Two techniques for assessment of subjective probability distributions - An experimental study.** C.-A. S. Ståel von Holstein (Stockholm, Universitet; Ekonomiska Forskningsinstitutet, Stockholm, Sweden). *Acta Psychologica*, vol. 35, Dec. 1971, p. 478-494. 10 refs. Research supported by the Bank of Sweden Tercentenary Fund.

Subjects were asked to assess their subjective probability distributions for unknown parameters of Bernoulli processes. The processes were generated by random devices like, for instance, irregular dice. The assessments were based on two assessment techniques. One asked for the median and quartiles of the distributions, the other asked for the impact of four hypothetical samples. The main purpose of the study was to study the resulting two sets of distributions. The results show substantial differences between the distributions using the two techniques but these differences decreased as the experiment progressed. (Author)

A72-15887 * # **Analytical solutions to the problem of transient heat transfer in living tissue.** A. Shitzer and J. C. Chato (Illinois, University, Urbana, Ill.). *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/HT-36*. 11 p. 32 refs. Members, \$1.00; nonmembers, \$3.00. Research supported by the Hebrew Technical Institute; Grant No. NGR-14-005-103.

An analytical model of transient heat transfer in living biological tissue is considered. The model includes storage, generation, conduction, and convective transport of heat in the tissue. Solutions for rectangular and cylindrical coordinates are presented and discussed. Transient times for reaching the 'locally fully developed' temperature profile were found to be of the order of 5 to 25 min. These transients are dominated by a geometrical parameters and, to a lesser extent, by a parameter representing the ratio of heat supplied by blood flow to heat conducted in the tissue. (Author)

A72-15888 # **Engineering radiation heat transfer properties of human skin.** R. F. Boehm (Utah, University, Salt Lake City, Utah) and D. B. Tuft. *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/HT-37*. 7 p. 51 refs. Members, \$1.00; nonmembers, \$3.00. PHS Grant No. RR-07092.

A comprehensive listing of radiation properties of human skin is given. Included are data for reflection, emission, transmission, and complex index of refraction. This paper constitutes a summary and evaluation of the literature spanning several decades. It is supplemented with calculations of engineering properties where they have not been given previously. Where comparisons can be made, the calculated values agree very well with values determined experimentally. (Author)

A72-15946 # **Mechanical impedance and its variation in the restrained primate during prolonged vibration.** A. B. Broderson and

H. E. von Gierke (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D. C., Nov. 28-Dec. 2, 1971, Paper 71-WA/BHF-8.* 10 p. 12 refs. Members, \$1.00; nonmembers, \$3.00. (AMRL-TR-71-67)

The paper investigates biomechanical parameters of the sitting primate and their temporal changes during sinusoidal vibration (6-30 Hz). Impedance and phase angle decrease with time. While resonances occur initially at several frequencies, response changes significantly within 10 min and only one resonance remains after 1 hr. High frequency impedance response is mass-like. The authors derive a simple model of impedance response and discuss implications for future biomechanical and physiological modeling in view of high frequency mass characteristic and temporal biomechanical changes. (Author)

A72-15947 * # Analytical and experimental investigations of human spine flexure. C. A. Moffatt, S. H. Advani (West Virginia University, Morgantown, W. Va.), and C.-J. Lin (Technology, Inc., San Antonio, Tex.). *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/BHF-7.* 13 p. 24 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS2-5062; Grant No. NGL-49-001-001.

The authors report on experiments to measure the resistance of fresh human spines to flexion in the upper lumbar and lower thoracic regions and evaluate results by using a combination of strength of materials theory and effects of shear and comparing with data reported by other authors. The test results indicate that the thoraco-lumbar spine behaves approximately as a linear elastic beam, without relaxation effects. The authors formulate a simple continuum dynamic model of the spine simulating aircraft ejection and solve the resulting boundary value problem to illustrate the importance of the flexural mode. A constant cross-section, the selected model is a sinusoidally curved elastic beam with an end mass subjected to a Heaviside axial acceleration at the other end. The paper presents transient response results for the spinal model axial and bending displacements and axial force. (Author)

A72-15948 * # Prediction of flow profiles in arteries from local measurements. S. C. Ling and H. B. Atabek (Catholic University of America, Washington, D.C.). *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/BHF-3.* 8 p. Members, \$1.00; nonmembers, \$3.00. PHS Grant No. HE-12083-03; Grant No. NGL-09-005-067.

This paper develops an approximate numerical method for calculating flow profiles in arteries. The theory takes into account the nonlinear terms of the Navier-Stokes equations as well as the large deformations of the arterial wall. The method, assuming axially symmetric flow, determines velocity distribution and wall shear at a given location from the locally measured values of the pressure, pressure gradient, and pressure-radius relation. The computed results agree well with the corresponding experimental data. (Author)

A72-15949 # Dynamics of flow across natural mitral valve. E. L. Yellin, R. W. M. Frater, W. H. Epstein (Yeshiva University, Bronx, N.Y.), and C. S. Peskin. *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/BHF-2.* 9 p. 21 refs. Members, \$1.00; nonmembers, \$3.00. NIH Grants No. He-11565; No. 5T5-6M-1674.

The natural mitral valve has been studied in vivo in its normal and pathologic states. Phasic pressures, flows, and cusp motion have been studied simultaneously and synchronously in large mongrel dogs. A physical model that has been developed describes the dynamics of the cardiohemic system in terms of nonlinear resistance, compliance, and inertance. Not only can the data be analyzed in these terms, but also pressure-flow curves simulating the in vivo results can be produced by an electrical analog. (Author)

A72-15954 # Analysis for hydrodynamic model of human systemic arterial circulation. V. A. Rogers (University City Science Institute, Philadelphia, Pa.) and G. D. Moskowitz (Drexel University, Philadelphia, Pa.). *American Society of Mechanical Engineers, Winter Annual Meeting, Washington, D.C., Nov. 28-Dec. 2, 1971, Paper 71-WA/AUT-13.* 9 p. 12 refs. Members, \$1.00; nonmembers, \$3.00.

The authors present an analysis for a hydrodynamic model of the human systemic arterial circulatory system that can be used to develop a mechanical system to test artificial heart pumps. More than 100 model segments account for 27 major arteries. Arterial flow and vessel motion are included in the derivation of expressions for segment flow impedance. System branching has also been included. Comparisons are shown for the model and the human femoral artery and ascending aorta. (Author)

A72-16013 Sudden coronary death - The occurrence of platelet aggregates in the epicardial arteries of man. J. W. Haerem (Ullevål Hospital, Oslo, Norway). *Atherosclerosis*, vol. 14, Nov.-Dec. 1971, p. 417-432. 28 refs. Research supported by the Norwegian Council on Cardiovascular Diseases and the J. L. Tiedemanns Tobaksfabrik-Johan H. Andresens Medisinske Fond.

A study has been carried out in order to explore whether platelet aggregates in the human coronary circulation might play a role in the pathogenesis of sudden coronary death. The frequency and size of platelet aggregates in the epicardial arteries were compared in patients who had suddenly died of coronary disease and in those who had died of noncoronary diseases. In order to explore whether local factors in the coronary arteries might contribute to the formation of platelet aggregates, the association between platelet aggregates and acute coronary thrombi, and between platelet aggregates and atherosclerotic stenosis, was especially studied. It is suggested that in some instances of sudden coronary death, where acute lesions in the epicardial arteries are small or absent, platelet aggregates in the coronary circulation may play a role in the pathogenesis of the fatal event. O.H.

A72-16047 # An analog model of the thermoregulation of a human being at rest and at work on the basis of experimental data (Ein analoges Modell der Thermoregulation des Menschen bei Ruhe und Arbeit aufgrund experimenteller Daten). K. Behling. Hamburg, Universität, Physiologisches Institut, Doktor der Naturwissenschaften Dissertation, 1971. 59 p. 26 refs. In German.

Development of an analog model which gives a quantitative description of the temperature control in the human body. The human body is represented by two blocks which are assumed to be homogeneous with respect to temperature and mass distribution. The two blocks represent abstractions of the core and the shell of the body. The heat transfer between the two blocks and the ambient medium is described by a system of two differential equations. In this simple form the model reproduces all the essential findings of the experiments with and without fluid substitution in regions of temperate climate. For regions of extreme climate corrections are made which take into account the shell-to-core ratio, the deviation of the calculated values of the heat transfer number and the O₂ increase (calculated from correlation analyses) from the experimental values in cold climates, and the incomplete evaporation of sweat in warm climates. The corrections are introduced into the model with the aid of function generators of an analog computer. The model then reproduces the experimental results in a satisfactory manner even in extreme climates. A.B.K.

A72-16080 * Stress, fighting and neuroendocrine function. R. L. Conner, S. Levine (Stanford University, Stanford, Calif.), and J. Vernikos-Danellis (NASA, Ames Research Center, Moffett Field, Calif.). *Nature*, vol. 234, Dec. 31, 1971, p. 564-566. 12 refs. NASA-NIH-supported research.

Plasma concentrations of pituitary adrenocorticotrophic hormone (ACTH) and adrenocortical steroids in rats after testing in the shock-induced fighting paradigm were examined. The investigations provide data consistent with the view that psychological aspects of the stressful situation are important in determining the effects of shock on physiological function. The data indicate that the pituitary-adrenal response can be attenuated by the expression of an organized pattern of behavior. G.R.

A72-16126 **Theory and experiment in exobiology. Volume 1.** Edited by A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). Groningen, Wolters-Noordhoff Publishing, 1971. 160 p. \$11.20.

Topics covered include chemical and physical problems related to the formation of compounds necessary to living systems, techniques involved in the detection of extraterrestrial organic compounds, mechanisms by which ionizing radiation may have been effective in producing the molecules necessary for life, organic catalysts which are presently regarded as predecessors of contemporary enzymes, concentrative processes, the origin of biological phosphates, and the exobiology of porphyrins. Lunar sample analyses attempting to detect carbon compounds and the chemistry and photochemistry of the atmosphere of Jupiter are discussed, along with planetary exploration and exobiology. F.R.L.

A72-16127 * **The role of ionizing radiation in primordial organic synthesis.** C. Ponnamperna (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.) and M. Sweeney (Santa Clara, University, Santa Clara, Calif.). In: *Theory and experiment in exobiology. Volume 1.* Groningen, Wolters-Noordhoff Publishing, 1971, p. 1-40. 209 refs.

Attempt to reveal how ionizing radiation may have been effective in producing the molecules necessary for life. In examining the sequence of events leading to the appearance of the first organisms the problem is considered in two parts: the formation of the small molecules such as amino acids, purines, pyrimidines, and carbohydrates; and the condensation of these molecules to give rise to polypeptides and polynucleotides. It is concluded that in the accumulation of organic compounds on the early earth ionizing radiation was not only a substantial part of the available energy, but was also an effective form of energy. F.R.L.

A72-16129 **Concentrative processes and the origin of biological phosphates.** A. W. Schwartz and H. Deuss (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: *Theory and experiment in exobiology. Volume 1.* Groningen, Wolters-Noordhoff Publishing, 1971, p. 73, 75-81. 24 refs.

Consideration of concentrative processes and dehydration mechanisms, of which evaporation would seem to offer the greater driving force for prebiological reactions. A consequence of the concentrative process described would have been the production of locals which would uniquely favor the synthesis of condensation polymers. It is considered to be certain that the undisturbed regions of the ocean must have played an indispensable role in the development of life. But the dynamic interrelationship between atmosphere and hydrosphere, the constant formation, dehydration, and reformation of diverse inorganic and organic locals by means of primitive meteorological phenomena may have been a necessary process in the origin of life. F.R.L.

A72-16130 **Exobiology of porphyrins.** G. W. Hodgson (Calgary, University, Calgary, Alberta, Canada). In: *Theory and experiment in exobiology. Volume 1.* Groningen,

Wolters-Noordhoff Publishing, 1971, p. 83-103. 82 refs. Research supported by the National Research Council of Canada.

Discussion of porphyrins, which are tetrapyrrole pigments of marked biological significance. Porphyrins exist extraterrestrially if the data presently available are confirmed. The biosynthesis of porphyrins, organic and random synthesis, porphyrin synthesis in stellar atmospheres, the synthesis of porphyrins in interstellar and interplanetary space, on planets, and on the moon are considered. F.R.L.

A72-16150 **The visual persistence of a moving stroboscopically illuminated object.** R. Efron (U.S. Veterans Administration Hospital, Martinez, Calif.) and D. N. Lee (Edinburgh, University, Edinburgh, Scotland). *American Journal of Psychology*, vol. 84, Sept. 1971, p. 365-375. 13 refs. Research supported by the Boston City Hospital; Contract No. Nonr-1866/52/.

'perceptual moment' hypothesis with the concept of 'persistence of vision.' The experimental results were formally consistent with either concept. However, the perceptual-moment hypothesis that fits the data is one in which the duration of the 'moment' is variable and determined by stimulus properties rather than by a constant, central, neural clock - a finding which undercuts the heuristic value of the hypothesis. (Author)

A72-16152 * **Circulatory responses to hypoxia in experimental myocardial infarction.** M. Schroll, S. C. Robison, and D. C. Harrison (Stanford University, Palo Alto, Calif.). *Cardiovascular Research*, vol. 5, Oct. 1971, p. 498-505. 30 refs. NIH Grants No. He-09058; No. He-5709; No. He-5866; Grant No. NGL-05-020-305.

Three levels of decreased arterial oxygen saturation elicited a graded circulatory response in dogs, manifested by stepwise increases in cardiac output, left ventricular dp/dt, and stroke volume, and decreases in systemic vascular resistance. Responses to similar hypoxia challenges after experimental myocardial infarction were qualitatively similar but quantitatively less. Although the circulatory compensation for hypoxia was less effective after myocardial infarction, no further deterioration of the haemodynamics was noted. (Author)

A72-16153 **Effects of stellate stimulation and hypoxia on haemodynamics and coronary circulation.** A. I. Obeid, H. Smulyan, and R. H. Eich (New York, State University, Syracuse, N.Y.). *Cardiovascular Research*, vol. 5, Oct. 1971, p. 506-512. 26 refs. PHS Grant No. He-05410-10.

The effects of left stellate ganglion stimulation on haemodynamics and coronary blood flow were studied in dogs, and compared with hypoxia produced by arterial anoxia. Both left stellate stimulation and hypoxia resulted in an increase in coronary blood flow and myocardial oxygen consumption, but the increment in coronary blood flow was much more pronounced during hypoxia. Coronary resistance was significantly reduced during hypoxia but not altered during left stellate stimulation. This suggests an inadequate coronary vasodilator response during left stellate stimulation, probably secondary to a vasoconstrictor effect of the sympathetic nerves. This vasoconstrictor effect interferes with maximum vasodilatory response to hypoxia that is induced by sympathetic stimulation. (Author)

A72-16154 **Determination of cardiovascular velocities by dopplercardiometry. I - The normal tracing and effects of age.** D. M. Abelson, J. Jaffee, and P. J. Murray (Royal Postgraduate Medical School, London, England; Graduate Hospital, Philadelphia, Pa.). *Cardiovascular Research*, vol. 5, Oct. 1971, p. 535-544. 19 refs.

Research supported by the John A. Hartford Foundations; NIH Grant No. MO-1-FR-00322.

Cardiac velocity measurements were made in normal subjects using a Doppler ultrasonic probe, the output of which was amplified and passed through a zero-crossing detector. A characteristic sequence of signals - the velocity dopplercardiogram or VDCG - was obtained. The velocity of some signals was diminished in older subjects. (Author)

A72-16155 **Determination of cardiovascular velocities by dopplercardiometry. II - Detection of impaired left ventricular function.** D. Abelson, D. Bernbaum, J. F. Gunning, and A. Mohiuddin (Royal Postgraduate Medical School, London, England; Graduate Hospital, Philadelphia, Pa.). *Cardiovascular Research*, vol. 5, Oct. 1971, p. 545-549. 10 refs. Research supported by the John A. Hartford Foundation; NIH Grant No. MO-1-FR-00322.

Study of 13 patients with different forms of heart disease by Doppler auscultation and Doppler cardiometry, as well as cardiac catheterization and cine-angiography. It is found that patients with hemodynamic evidence of impaired left ventricular function showed reduced pitch and amplitude of the early systolic (beta sub 1) Doppler signal. (Author)

A72-16162 * **Olfactory bulb units - Activity correlated with inhalation cycles and odor quality.** F. Macrides and S. L. Chorover (MIT, Cambridge, Mass.). *Science*, vol. 175, Jan. 7, 1972, p. 84-87. 34 refs. NSF Grant No. GB-24828; NIH Grants No. 5-RO1-MH-07923; No. 5-TO1-GM-01064; Grant No. NGL-22-009-308.

Single olfactory bulb units were studied in two macroscopic species of rodents under conditions intended to preserve the cyclical stimulation which normally accompanies nasal breathing. Patterns of unit activity related to the inhalation cycle were observed in all animals, often in the absence of specific stimuli, and could not be explained in simple mechanical terms. Distinctive changes in these patterns occurred in response to certain odors, and were generally independent of changes in the overall firing frequency. These findings indicate that a change in the overall firing frequency of unit discharges is neither a necessary nor sufficient measure of responsiveness to odors in the rodent olfactory bulb, and that stimulus-specific temporal distributions of unit firing may be involved in olfacto-endocrine activities. (Author)

A72-16230 # **An optical effect in the blood stream (Ob odnom opticheskom effekte pri techenii krovi).** V. A. Levto, A. S. Popel', S. A. Regirer, and N. Kh. Shadrina. *Akademiia Nauk SSSR, Izvestiia, Mekhanika Zhidkosti i Gaza*, Nov.-Dec. 1971, p. 161-165. 9 refs. In Russian.

Light scattering as a function of time, erythrocyte aggregation rates and hydrodynamic characteristics was investigated in fresh ox, pig and horse blood samples prepared by oxygen saturation and centrifugation and containing different erythrocyte concentrations. An assembly comprising a monochromator, a photocell and an oscillograph recorder was used in light scattering measurements at a wavelength of 650 plus or minus 4 nm. The light scattering readings were referred to an opaque glass reference standard taken for 100% scattering. Indications of a direct relation between light scattering and erythrocyte aggregation rates were apparent in the experiments. V.Z.

A72-16357 # **Intensity of phospholipid exchange in the rat brain and liver during histotoxic hypoxia (Intensivnost' obmena fosfolipidov mozga i pečeni krys pri gistotoksicheskoj gipoksii).** L. M. Antonov and S. V. Gasteva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol.

200, Oct. 11, 1971, p. 1229-1232. 11 refs. In Russian.

Study of the effect of potassium cyanide on the phospholipid exchange in brain and liver tissue of albino rats. It is found that the animals poisoned by KCN could be divided into two groups, depending on body temperature. In those rats in which no significant changes in body temperature were observed after introduction of KCN the phospholipid exchange rate in the brain was reduced by 35% in comparison with the control, while in the case of rats with pronounced hypothermia the reduction amounted to 57.3%. It is concluded and confirmed by a separate experiment (where rats were placed in a refrigerator) that a reduction in body temperature accentuates the reduction of the phospholipid exchange which develops even in the absence of hypothermia and is the result of the cyanide intoxication. It is demonstrated that in the metabolic reaction involving the brain phospholipids two factors are seen to be at work - namely, the toxic action of the cyanide itself and hypothermia, while in the case of phospholipid exchange in the liver a different picture is observed in that only hypothermia plays a role in this process and KCN poisoning with retention of normothermia does not cause any changes in the phospholipid exchange rate. A.B.K.

A72-16358 # **Myorelaxation of animals through the injection of 3,5-dimethyl-4-bromopyrazol and the effect of extracardiac nerve stimulation on the heart under these conditions (Miorelaksatsiia zhivotnykh posredstvom vvedeniia 3,5-dimetil-4-brompirazola i vliianie razdrazheniia ekstrakardial'nykh nervov na serdtse v etikh usloviakh).** V. V. Parin, B. M. Fedorov, I. I. Grandberg, Iu. M. Batulin, and N. A. Podrezova (Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 200, Oct. 11, 1971, p. 1252; 1253. In Russian.

Description of experiments in which myorelaxation was brought about in rabbits and dogs by administering various doses of 3,5-dimethyl-4-bromopyrazol through intraabdominal injection. An attempt is made to develop a model of myorelaxation in these animals and in the case of dogs, to ascertain the effect of this myorelaxant on the phenomena occurring during direct stimulation of the vagus and sympathetic nerves. It is shown that the injection of 3,5-dimethyl-bromopyrazol into dogs in doses causing deep myorelaxation has no effect on the phenomena occurring during direct stimulation of extracardiac nerves. A.B.K.

A72-16388 # **Myokinase activity in myocardial infarction.** S. Kędrzowa and E. Worsztynowicz-Jałowicz (Akademia Medyczna, Lublin, Poland). (*Polski Tygodnik Lekarski*, vol. 25, no. 45, 1970.) *Polish Medical Journal*, vol. 10, no. 4, 1971, p. 805-811. 14 refs. Translation.

Studies were conducted on 29 patients with myocardial infarction, including 23 men and 6 women aged from 40 to 77 years. The investigations included the determination of the activity of creatine phosphokinase (CK) and aspartate aminotransferase (AspAT). The myokinase (MK) activity started to rise as early as 5 hours after the onset of infarction. From the third day onwards it began to decrease. MK was normal again on the eighth day. CK activity was raised in all cases on the second day, while AspAT activity was raised in 88.8% of all cases. These investigations show that the determination of MK activity is superior to CK as a test in the diagnosis of myocardial infarction. G.R.

A72-16450 # **Synergic control of computer-manipulators.** M. Marić, M. Gavrilović, and D. Radovanović (Institut Mihailo Pupin za Automatizaciju i Telekomunikaciju, Belgrade, Yugoslavia). In: Symposium on Automatic Control in Space, 4th, Dubrovnik, Yugoslavia, September 6-10, 1971, Proceedings. Belgrade, Izdavačko Preduzeće Tehnika, 1971, p. 7.29-7.33. Re-

search supported by the U.S. Department of Health, Education, and Welfare.

Consideration of systems where the human operator continuously controls the manipulator but in concurrence with the computer. Attention is given to organizational and computational aspects of the external synergy, and the results of evaluation of the proposed system are summarized. F.R.L.

A72-16610 Practical considerations concerning exercise ECG telemetry equipment. P. A. Hurzeler (Montefiore Hospital and Medical Center, N.Y.) and L. R. Zohman. *Medical Research Engineering*, vol. 10, Oct.-Nov. 1971, p. 14-18. 5 refs. PHS Grant No. RD-1994-M; NIH Grant No. HO-00599.

Several sources of interference and unreliability encountered with multichannel radio-telemetry of ECGs during exercise monitoring are pointed out, along with some suggested procedures for avoiding them. Some of these sources such as extraneous voltages due to perspiration, have not previously been reported. Others, such as turn-on transients, are better known, but frequently overlooked. Still others, such as the need for millivolt calibration, are well known but have been included for completeness. M.V.E.

A72-16629 # Rescue of flight vehicle crews after emergency landings on land and water (Spasenie ekipazhei letatel'nykh apparatov posle ikh vynuozhdennogo prizemleniia i privodneniia). V. G. Volovich and M. P. Tumanov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 3-9. 18 refs. In Russian.

Conditions affecting spacecraft and aircraft crew survival after an emergency landing are discussed, including adverse environments in desert, arctic regions, forest, sea, tropical jungles and other uninhabited areas. The water and food requirements of the human organism, protection from heat and cold, survival supplies and equipment, medical and first aid items, and search, rescue and evacuation are also considered. V.Z.

A72-16630 # Role of visceral afferentation in vestibular system activity (Rol' vistseral'noi afferentatsii v deiatel'nosti vestibularnoi sistemy). V. S. Raitses and A. M. Dutov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 9-14. 28 refs. In Russian.

Chronic experiments were conducted on rabbits in a study of the effect of stimulation of mechanoreceptors of the stomach and rectum on the posture-tonic and vestibular-oculomotor reflexes in response to vestibular apparatus stimuli. A moderate visceral stimulation of the receptors was found to reduce the threshold of vestibular excitation, to increase the reflex reaction time, and to shift the muscle discharge maximum toward the lower labyrinth excitation levels. The increased frequency and amplitude of the rotatory and past-rotatory nystagmi are interpreted as indications of an increased excitability of the vestibular apparatus under such conditions. V.Z.

A72-16631 # Effect of hypoxia on the diurnal mitotic activity rhythm of the marrow erythropoiesis system (Vliianie gipoksii na sutochnyi ritm mitoticheskoi aktivnosti sistemy eritropoeza kostnogo mozga). S. Baranski, K. Kwarecki, J. Roziński, and S. Szmigelski (Institut Aviatsonnoi Meditsiny, Warsaw, Poland). *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 14-17. 13 refs. In Russian.

The mitotic activity of this system is studied in guinea pigs exposed to light of various intensities or kept for 14 days at an altitude of 7,000 m in a pressure chamber. A well pronounced stimulation of the mitotic activity was observed in test animals under these conditions. V.Z.

A72-16632 # Reaction of the human organism to inhaling gas mixtures containing 3 to 9% CO₂ (Reaktsiia organizma cheloveka pri dykhanii gazovymi smiesiami, soderzhashchimi 3-9% CO₂). I. I. Malkiman, V. N. Poliakov, and V. K. Stepanov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 17-22. 14 refs. In Russian.

Respiration rates, minute breathing volume, respiration volume, CO₂ partial pressure, heart beat rates, and maximum and minimum arterial pressures were measured in 31 healthy male subjects who inhaled air containing 3 to 9% CO₂ for 60 to 100 min in a total of 70 experiments. EKGs, pulmonary ventilation, and CO₂ contents in the inhaled and alveolar air were also determined during the experiments. Exposures of up to 1.5 hr caused no complaints and disorders in all subjects when the CO₂ concentrations were 3 to 6%, while various stress symptoms, notably a marked increase in the minute breathing volume, were observed at higher CO₂ concentrations. V.Z.

A72-16633 # Effect of various gas media on active glucose transport in the small intestines of rats (Vliianie razlichnykh gazovykh sred na aktivnyi transport gliukozy v tonkom kishechnike krys). O. I. Babkina and K. V. Smirnov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 22-26. 23 refs. In Russian.

A technique proposed by Wilson and Wiseman (1954) was used to study glucose transport in segments of small intestines of rats after exposure to hypoxia, hypercapnia in 20% CO₂, and hyperoxia at 4 atm 100% O₂. All these exposures, especially hypoxia, stimulated the glucose transport in the rats. V.Z.

A72-16634 # Effect of hypokinesia on the neurosecretory system of the hypothalamus and hypophysis in rats (Vliianie gipokinezii na gipotalamogipofizarnuiu neurosekreternuiu sistemu krys). L. A. Andrianova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 26-29. 10 refs. In Russian.

Observation of the activation of this neurosecretory system in rats subjected to 3, 15, 45, and 60-day constraints of muscular activity. Discharge of neurosecretory material from the posterior section of the hypophysis and increased antidiuretic hormone contents in the blood were established in the rats. V.Z.

A72-16635 # A mathematical description of radiation damage processes and of hemopoietic system recovery (Matematicheskoe opisanie protsessov luchevego porazheniia i vosstanovleniia krovetvornoi sistemy). R. A. Kuzin, G. F. Nevskaia, V. I. Popov, V. A. Sakovich, A. V. Shafirkin, and V. V. Iurgov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 29-33. 5 refs. In Russian.

A mathematical model is proposed to describe changes in leucocyte populations of the blood after general or partial exposure of the organism to radiation when the transport of leucocytes from the hemopoietic system into the cardiovascular system is described by the Blair model (1964). Local irradiation levels and damage probability in individual organs can be determined when the proposed model is used. The model was applied in data treatment when various parts of partially shielded dogs were exposed to 250-MeV proton doses of 350 rad. Persisting damage, healing rates, and leucocyte life were estimated with the aid of this model after exposures. V.Z.

A72-16636 # Effect of ATP during prolonged irradiation (Deistvie ATF pri prolongirovannom oblučenii). V. D. Rogozkin, M. V. Tikhomirova, and L. M. Ostroumova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 33-36. 16 refs. In Russian.

Solution of sodium salt of ATP was injected intramuscularly in

albino mice, guinea pigs and dogs before exposure for 13 to 72 hr at rates of 0.27, 0.5, and 1.0 rad/min to total doses of 570 to 1200 rads of Co60 or Cs137 gamma radiation. Survival rates, apparent radiation damage, hemopoietic function and spleen weight were used as criteria of protective action of ATP injections. Radiation damage was less severe and survival rates were 40% higher in injected dogs than in control dogs. V.Z.

A72-16637 # Preparation and efficiency evaluation of silver-coated filters used for water disinfection and conservation (Poluchenie i otsenka effektivnosti poserebrennykh fil'trov dlia obezrazhivaniia i konservatsii vody). V. V. Shaiderova, S. V. Chizhov, Iu. E. Siniak, A. A. Ballod, and N. A. Sokolova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 36-40. 6 refs. In Russian.

Description of a contact method of water disinfection by metallic silver obtained by reduction of silver nitrate with ascorbic acid, hydroquinone, formaldehyde and potassium sodium tartrate on activated carbon and ion-exchange resin surfaces. Filter efficiency tests indicated a good performance of silver-coated ion exchange resin filters prepared with ascorbic acid and hydroquinone. V.Z.

A72-16638 # Time deficit as a stress factor during an operator's mental activity in the man-flight vehicle system (Defitsit vremeni kak stress-faktor pri umstvennoi deiatel'nosti operatora v sisteme 'chelovek-letatel'nyi apparat'). K. K. Ioseliani. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 40-43. 11 refs. In Russian.

The efficiency in handling combinations of control signals on a panel was evaluated in experiments with a group of 250 healthy subjects performing various task sequences under stress due to time pressure. According to the quality of their operational behavior the subjects were graded in a high performance group of 135, a medium performance group of 95, and a low performance group of 20, with 8 subjects being too hasty and 12 subjects being too slow in the last group. V.Z.

A72-16639 # Duration of the circadian cycle from the standpoint of a hypothesis concerning its information and energy cost (Dlitel'nost' sutochnogo tsikla s tochki zreniia gipotezy ego informatsionno-energeticheskoi stoimosti). S. I. Stepanova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 44-50. 6 refs. In Russian.

Discussion of a hypothesis concerning the stability of the 'information and energy cost' of the human circadian cycle. The hypothesis postulates that upon any change in the sleep-wakefulness cycle its information and energy cost (the sum total of energy used and information processed per diem) is invariant. From the standpoint of this hypothesis a human being cannot adapt himself to a day shorter than 12 or longer than 52 hours. An equation to be used in calculating the optimum duration of the circadian cycle of a given man with respect to the energy cost of his working hours is presented. The question of whether it is advisable to change the normal 24-hour cycle in prolonged space missions is discussed, bearing in mind the possibility of decreased or increased mental and psychic stresses to which an astronaut is subjected during certain stages of space flight. A.B.K.

A72-16640 # A comparison of human tolerance to frontal and sagittal head tilts in rotating systems (Svravnenie perenosimosti frontal'nykh i sigittal'nykh naklonov golovy cheloveka vo vrashchaishechikhsia sistemakh). F. A. Solodovnik. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 51-53. 13 refs. In Russian.

Study of the vestibular stability of test subjects rotated in a chair with their heads tilted in the sagittal and frontal planes. The chair was rotated at a rate of 180 deg/sec, and the subjects tilted their heads every 5 sec at an angle of 30 deg/sec. The experiments demonstrated that the subjects developed motion sickness much faster when their heads were tilted frontally rather than sagittally. A comparison of the directions of the inertial displacement of the endolymph in the vertical semicircular canals and the resultant of linear accelerations gave evidence that stimulation of the vertical semicircular canals and otoliths differed greatly during rotation with the head tilted sagittally and frontally. A.B.K.

A72-16641 # The forces acting on the receptor formation of the vestibular apparatus during head movements (O silakh, deistvuiushchikh na retseptornye obrazovaniia vestibuliarnogo apparata pri dvizheniakh golovoi). V. N. Krut'ko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 53-56. In Russian.

Derivation of formulas for determining the forces acting on the receptor formations of the vestibular apparatus on the basis of a mathematical analysis of the natural movements of the human head. It is shown that head movements are accompanied by transfer and relative accelerations, as well as by Coriolis accelerations. An example is presented showing how the forces acting on the otoliths and semicircular canals during an assigned head movement can be calculated. A.B.K.

A72-16642 # A study of in-flight acceleration sensations and methods of controlling them (Issledovanie aktseleratsionnykh oshchushchenii v polete i metody vozdeistviia na nikh). Iu. F. Udalov, V. F. Zhernavkov, O. P. Khalatov, and N. A. Chelnokova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 57-62. 14 refs. In Russian.

In-flight study of the pathogenesis of illusory acceleration sensations and of the possibility of developing a pathogenetic therapy for relieving these sensations. Postflight examinations revealed a decrease in the amino acid level, an increase in the protein metabolism rate, and a change in the pyridoxin metabolism, which suggested that their utilization increased during flight. After flight, the vestibular tolerance declined, and the state of the vestibular analyzer changed. It is suggested that these variations are related to metabolic conditions. This was verified experimentally by inducing pyridoxin deficiency in the body (by administering cycloserine). The latter disturbed acceleration sensations and caused inadequate (illusionary) feelings. The changes were eliminated by administering pyridoxal combined with ATP. This drug combination was effective in treating metabolic changes induced by flight effects. Thus a pyridoxal-ATP combination may be regarded as a drug which can be used to improve the metabolism and to prevent in-flight disturbances of it. A.B.K.

A72-16643 # Dependence of the nature of a craniocerebral trauma on the impact conditions (Zavisimost' kharaktera cherepno-mozgovoi travmy ot uslovii udarnogo vozdeistviia). B. A. Rabinovich, L. N. Sholpo, and E. Ia. Shcherbakova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 62-68. 11 refs. In Russian.

Evaluation of the case histories of a large number of patients who suffered craniocerebral traumas, noting the relation between the clinical pattern of the trauma and the physical parameters of the impact. The severity of the trauma was evaluated on the basis of the condition of the patient immediately after the accident and during the disease. At an impact velocity of 3.0 to 10.5 m/sec the severity of a craniocerebral trauma was found to depend significantly on the occurrence of fractures in the cranial base and the degree of pathogenetic involvement of intracranial structures adjacent to the cranial base, including main carotid vessels. These injuries did not

occur during impacts of the frontal zone but occurred nearly always during impacts of the temporal and occipital regions at a rate of over 5.5 m/sec. A.B.K.

A72-16644 # Rate of elimination of metabolites in a human subject wearing an isolation garment /with various physical loads and food rations/ (Skorost' vydeleniia produktov metabolizma u cheloveka, nakhodiashchegosia v izoliruiushchem snariazenii /pri razlichnoi fizicheskoi nagruzke i ratsionakh pitaniia/). S. M. Gorodinskii, A. V. Sedov, A. N. Mazin, G. A. Gaziev, A. P. Kleptsova, and L. I. Zhukova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 68-72. 5 refs. In Russian.

Study of the effect of various food rations on the elimination dynamics of metabolites in human subjects at rest or performing physical labor while wearing an isolation garment. Test subjects were given special diets and kept either at rest or performing work at a rate of 200 or 400 kcal/hr in a normal atmosphere. Under these conditions the rate at which they eliminated volatile and gaseous toxic compounds was measured. The subjects who ate the special diets exhibited a significant decrease in the elimination of hydrogen sulfide, acetone, phenol, ammonia, and amines as compared with subjects who ate ad libitum. The special diets did not affect the rate of elimination of carbon monoxide and carbon dioxide. A.B.K.

A72-16645 # Synthesis of oxidation-reduction polymers and their use in eliminating organic impurities from aqueous solutions (Sintez oksilitel'no-vosstanovitel'nykh polimerov i ikh ispol'zovanie dlia ochistki vodnykh rastvorov ot organicheskikh primesei). E. E. Ergozhin, B. A. Zhubanov, S. R. Rafikov, Iu. E. Siniak, V. F. Stolbov, and V. V. Krasnoshchekov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 73-77. 13 refs. In Russian.

Synthesis of polycondensation oxidation-reduction polymers of ordinary and macroporous structure, and preliminary study of the possibility of using them to eliminate from aqueous solutions organic impurities contained in atmospheric moisture condensates. A scheme for synthesizing oxidation-reduction polymers from a reaction between a solution of hydroquinone and phenol in ethyl alcohol with concentrated hydrochloric acid and formaldehyde. It is found that with an increase in the length of the hydrocarbon radical the capacitance of the polymers with respect to sorbed compounds increases, and when the polymers are used to eliminate atmospheric moisture condensates from high-molecular-weight compounds the polymers are more effective than activated charcoal. A.B.K.

A72-16646 # Catalytic oxidation of certain gaseous products of pyrolysis of human wastes (Kataliticheskoe okislenie nekotorykh gazoobraznykh produktov piroliza otkhodov zhiznedeiatel'nosti cheloveka). G. S. Siniak, P. V. Lisovskii, G. I. Chizhikova, M. A. Vitashkina, E. I. Karpova, B. G. Gusarov, and L. L. Zablotskii. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 77-80. 6 refs. In Russian.

Study of the ability of hopcalite, copper-chromium, copper-cobalt, platinum, and palladium catalysts to achieve complete oxidation of the vapor-gas phase formed during thermal treatment of human wastes. The oxidizing properties of the catalysts were studied on individual gases - methane, hydrogen, and carbon monoxide. Catalysts of higher activity were used to oxidize a real gas mixture. It was found that the oxidation reaction of the gas mixture is completed at 350 C only with the palladium catalyst. A.B.K.

A72-16647 # Possibility of the development of disbacteriosis in guinea pigs and rats under the action of a magnetic field (O vozmozhnosti razvitiia disbakterioza u morskikh svinok i krysv pri

vozeistvii magnitnogo polia). V. M. Katola and A. N. Kovalevskaia. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 80-82. In Russian.

Intestinal microflora was studied periodically in guinea pigs and rats kept for 7 months in a steady 2500-oe magnetic field with a 29 oe/cm gradient. Occurrences of intestinal disbacteriosis and autoinfection were observed in some of the animals. Escherichia populations increased in the first weeks of exposure and then normalized in an adaptation process with time. V.Z.

A72-16648 # Autolysis rate in the tissues of animals during hypokinesis (Intensivnost' autoliza tkanei zhivotnykh pri gipokinezii). I. V. Fedorov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 82-84. In Russian.

Study of the autolysis rate in the tissues of immobilized rats at various stages of hypokinesis. It is found that during the first weeks of hypokinesis the tissue disintegration rate in rats, or autolysis rate, not only does not increase, but actually decreases. At the same time, the overall background of free amino acids in the tissues does not change. In later periods of hypokinesis (eighth to ninth week) the tissue disintegration rate increases, while the free amino acid background decreases significantly. A.B.K.

A72-16649 # Effect of illumination on the radiation effect in cabbage after proton and gamma irradiation (Vliianie osveshcheniia na radiatsionnyi effekt u listovoi kapusty posle oblucheniia protonami u gamma-luchami). I. S. Skukina, Iu. I. Shaidorov, and V. N. Nekrasova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 84-87. 13 refs. In Russian.

Radiation effects were studied in cabbage plants exposed to illumination levels of 1600 to 7100 lux after exposures to proton and gamma radiation of 10,000 rad. Measurements of biomass growth, height and foliage in irradiated plants exposed to light during growth indicated a radiation protective effect of exposures to light of certain intensities. V.Z.

A72-16650 # Somnifacient and toxic effect of barbamyil in mice subjected to 33 day hypokinesia and isolation (O snotvornom i toksicheskom deistvii barbamiila pri 33-sutochnoi gipokinezii i izoliatsii u myshei). L. A. Kravchuk. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 87-89. In Russian.

Abdominal barbamyil injections were given in somnific doses to albino mice kept without motion constraints, or with moderate and strict motion constraints in cages of different sizes. Lethal doses of barbamyil were injected on the 33rd day of the experiment. The effect of barbamyil was generally milder in mice without motion constraints than in mice kept under hypokinesia. V.Z.

A72-16651 # Effect of water regenerated from human urine on the erythropoiesis of fish and rats (Vliianie na eritropoez ryb i krysv vody, regenerirovannoi iz mochi cheloveka). L. A. Telitchenko and M. M. Boichenko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 5, Sept.-Oct. 1971, p. 89, 90. In Russian.

Comparative study of the effect of ordinary tap water and water regenerated by various means from human urine on the erythropoiesis of fish and rats. It is found that the greatest changes in the erythropoiesis of both fish and rats are observed in animals which drank water regenerated physicochemically from urine, while the smallest changes are observed in the case of fish which drank water regenerated biologically from urine diluted in a 1:40 ratio and in the case of rats which drank water regenerated biologically from urine diluted in a 1:80 ratio. A.B.K.

A72-16665 Using the man to test unmanned vehicles. W. G. Seeman (U.S. Naval Air Development Center, Aeromechanics Dept., Warminster, Pa.) and F. H. Moody (Lear Siegler, Inc., Astronics Div., Santa Monica, Calif.). In: Symposium on Test and Evaluation of Automatic Control Systems, Saint Mary's College of Maryland, Saint Mary's City, Md., August 31-September 2, 1971, Technical Papers. California, Md., Society of Flight Test Engineers, 1971, 14 p.

Discussion of the design philosophy which allows an aircraft converted from manned control to drone operation to operate in either mode, and the advantages which could be obtained by using this type of vehicle as a test bed for unmanned systems. The specific example of a T-33A jet trainer converted to the QT-33A drone is cited to demonstrate the manner in which the various data sources and the human operator provide flexibility in flight testing of unmanned systems. F.R.L.

A72-16674 # Some effects of involuntary eye movements. R. E. Greenwood (MIT, Cambridge, Mass.). *Optical Society of America, Journal*, vol. 62, Jan. 1972, p. 101-103. 6 refs. NIH Grant No. 5-PO1-GM-15006-03.

This is a theoretical investigation of how involuntary eye movements may affect the visual image. Saccades introduce transients for all but very low spatial frequencies. These transients may be important for brief periods of time, but do not affect decisions based on long-time averages. Drift and tremor distort high spatial frequencies, but have little or no effect on images having low spatial frequencies. Both of these movements can radically alter an image, but not if the image contains low spatial frequencies and only if it exhibits exactly appropriate temporal frequencies. (Author)

A72-16678 Electrocardiography in a radiation environment. V. A. Kieffer and C. L. Turbyfill (Defense Atomic Support Agency, Armed Forces Radiobiology Research Institute, Bethesda, Md.). *Telemetry Journal*, vol. 7, Dec.-Jan. 1972, p. 17-19. 6 refs. Contract No. DA-49-146-XZ-453.

A telemetry system has been developed that is capable of recording the electrocardiogram (ECG) of unrestrained animals in an intense radiation environment. Surgical implantation of the electrodes and transmitter are described for the monkey (*Macaca mulatta*). The transmission and reception of the signal representative of the electrical activity of the heart is discussed. (Author)

A72-16748 # Study of the condition of a pilot during flight from his oxygen uptake (Izuchenie sostoiianiia letchika v polete po raskhodu kisloroda). A. T. Pronin. *Voенно-Meditsinskii Zhurnal*, Oct. 1971, p. 65, 66. In Russian.

A graph is given for calculating oxygen uptake by pilots vs flight time and altitude. The ratio of actual oxygen uptake to rated oxygen uptake can be determined by using this graph. It is indicated that oxygen uptake fluctuations can be large during the performance of different flights by individual pilots and are still larger in different pilots, ranging up to 120%. V.Z.

A72-16749 # Modeling of cockpit depressurization conditions on flight simulators (Modelirovanie uslovii razgernetizatsii kabiny na pilotazhnykh trenazherakh). V. F. Zhernavkov, V. G. Kuznetsov, Z. A. Kirillova, R. N. Makarov, and V. N. Poliakov. *Voенно-Meditsinskii Zhurnal*, Oct. 1971, p. 66-69. In Russian.

Respiratory adaptation to the automatic shift to pure oxygen excess pressure following cockpit depressurization was studied on a flight simulator in pilots wearing pressure suits. Tables indicating EKG reactions to this condition are given, showing the diversity of these reactions in individual subjects. V.Z.

A72-16775 # Effects of the factors of 'Zond' automatic station spaceflights on chlorella cell survival and mutability (Vliianie faktorov kosmicheskikh poletov na avtomaticheskikh stantsiakh 'Zond' na vyzhivaemost' i mutabil'nost' kletok khlorelly). E. N. Vaulina, I. D. Anikeeva, I. G. Gubareva, and G. A. Shtraukh. *Kosmicheskie Issledovaniia*, vol. 9, Nov.-Dec. 1971, p. 940-945. 7 refs. In Russian.

A marked decrease of survival rates and much more frequent mutations were observed in chlorella cells kept in darkness in a mineral medium during the flight of Zond 5. These observations were reversed in a similar experiment on Zond 7 and were between the two extremes on Zond 6, even though the experimental conditions in all flights were maintained similar. This inconsistency is explained by causes unrelated to flight, notably by exposure of the chlorella cultures to adverse temperature variations during the transportation of the material between the laboratory and the launching and landing sites. V.Z.

A72-16776 # Effect of the factors of Soyuz 5 satellite vehicle spaceflight on chlorella cells (Vliianie faktorov kosmicheskogo poleta na korable-sputnike 'Soyuz-5' na kletki khlorelly). I. D. Anikeeva and E. N. Vaulina. *Kosmicheskie Issledovaniia*, vol. 9, Nov.-Dec. 1971, p. 946-948. 7 refs. In Russian.

Increased proportions of cells producing anomalous numbers of nonequivalent autospores were detected in chlorella cell cultures kept in darkness in an agar-agar medium on the Soyuz 5 spaceship during its orbital flight. Survival rates and mutability were also lower in experimental cells than in control cells. It is believed however that these variations were caused by deficient experimental techniques rather than by flight-related factors. V.Z.

A72-16777 # Effects of space flight factors and of ethylenimine on oat seeds (Vliianie faktorov kosmicheskogo poleta i etilenimina na semena iachmenia). K. P. Garina and N. I. Romanova. *Kosmicheskie Issledovaniia*, vol. 9, Nov.-Dec. 1971, p. 949-952. In Russian.

In oat seeds carried by Soyuz 5 chromosome aberrations were more frequent and germination was faster than in control seeds. Stimulation was still higher in seeds treated with ethylenimine before the flight. Chromosome aberrations and germination normalized after post-flight storage of the exposed seeds. V.Z.

A72-16781 # Audiology in aeromedical functional diagnostics (Die Audiologie in der luftfahrtmedizinischen Funktionsdiagnostik). J. Kressin. *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 7, no. 11, 1971, p. 517-520. 6 refs. In German.

It is shown that the routine examinations of medical diagnostics for testing the sense of hearing are not sufficient for the evaluation of the pilot. It is important to use also diagnostic tests which take into consideration the particular environmental situation existing in the cockpit. These tests in conjunction with such methods as the EEG, ERG, and the ENG should ensure a diagnosis of stress-produced impairments in a number of phases of the central nervous system. Various areas of audiometry are considered in relation to their usefulness for the testing of pilots and other members of the flying personnel. G.R.

A72-16786 Partial molar volumes of oxygen and carbon monoxide in blood. W. O. Fenn (Rochester, University, Rochester, N.Y.). *Respiration Physiology*, vol. 13, Nov. 1971, p. 129-140. 11 refs. PHS Grant No. GM-12791-05.

Before and after equilibrating blood or cell suspensions with O₂,

or CO₂ measurements were made of the weight of a constant volume in a pycnometer, or the volume of a constant weight in a volumeter. In this way it was found that 1 mole of O₂ in the presence of hemoglobin does not occupy a volume of 31 ml as it does in water, but appears to occupy no volume at all. Either the Hb molecule and its surrounding water decreases in volume to compensate for the volume occupied by the oxygen or the oxygen fits into a void in the Hb molecule. The average partial molar volume of oxygen in blood in 116 experiments was 0.4 plus or minus 3.5 ml per mole. Carbon monoxide behaves much like oxygen with an average partial molar volume in Hb of 4.6 plus or minus 2.6 ml/mole instead of 32.8 as in water. (Author)

A72-16787 **Visualization of extracellular lining layer of lung alveoli by freeze-etching.** P. Untersee, J. Gil, and E. R. Weibel (Bern, Universität, Berne, Switzerland). *Respiration Physiology*, vol. 13, Nov. 1971, p. 171-185. 21 refs. Swiss National Science Foundation Grants No. 3,5,68; No. 5261,3n.

Previous demonstration of a duplex extracellular lining layer of alveoli on fixed and embedded lung tissue suffered from the fallacy that (1) the air-liquid interface was disturbed at one step or another, and (2) the tissue had to be chemically treated. The present study was undertaken to check on the effect of these methodical inadequacies. Air-filled lung tissue was quick-frozen in Freon near liquid nitrogen temperature, cleaved in high vacuum, the freeze-etched fracture surface replicated, and the replicas examined by electron microscopy. Chemical treatment was eliminated in three stages: elimination of (1) embedding, (2) embedding and fixation, whereby glycerol was applied as cryoprotective agent, and (3) freezing of untreated lung tissue. In all three instances the existence of a duplex lining layer of alveoli with a base layer and a surface film could be confirmed. The film appeared to be continuous as evidenced by a smooth surface of alveoli viewed face on. Some evidence for the existence of tubular myelin figures *in vivo* is presented. (Author)

A72-16788 **Ventilation in man at onset of work employing different standardized starting orders.** J. I. Jensen, H. Vejby-Christensen, and E. S. Petersen (Århus Universitet, Århus, Denmark). *Respiration Physiology*, vol. 13, Nov. 1971, p. 209-220. 19 refs. Research supported by the Medical Research Council of Denmark.

Rapid ventilatory responses, defined as the ventilatory rise computed from the first complete respiratory cycle after the onset of work on a bicycle ergometer, were studied in five subjects. The experimental procedure was standardized by using protocols previously recorded on tape. Five protocols, each lasting 45 min and consisting of eight commands in random sequence, were used on five different days. Four types of command were given: a verbal order, a visual order, with or without prewarning the subject by an audible count-down, and finally a control-order consisting solely of the prewarning. Following the control-orders no ventilatory changes were observed, while the three different starting-orders uniformly were followed by: a rapid ventilatory rise, a plateau, and a slower secondary rise. The magnitude of the rapid rise showed great individual variation related to the absolute work load employed. (Author)

A72-16789 **Respiratory oscillations in chemoreceptor discharge in the control of breathing.** A. M. S. Black and R. W. Torrance (Oxford University, Oxford, England). *Respiration Physiology*, vol. 13, Nov. 1971, p. 221-237. 33 refs.

Experimental investigations have been carried out in cats to determine whether the level of ventilation is affected by the exact phase relation between the activity of the respiratory center and the

oscillations in the discharge of chemoreceptors. It has been found that the respiratory center responds with short latency and short afterdischarge to short bursts of impulses in peripheral chemoreceptor afferents. The response depends on the phase of respiration at which the burst of impulses is set up. When the phase relation between oscillations in chemoreceptor discharge at the frequency of lung ventilation and the discharge of the respiratory center was altered, the discharge of the center was altered. The phase relation may change with exercise and so be of importance in determining ventilation in exercise. O.H.

A72-16790 **Breathing pattern during CO₂ inhalation obtained from motion of the chest and abdomen.** R. Gilbert, J. H. Auchincloss, Jr., G. Baule, D. Peppi, and D. Long (Upstate Medical Center; Syracuse University, Syracuse, N.Y.). *Respiration Physiology*, vol. 13, Nov. 1971, p. 238-252. 12 refs. Research supported by the Heart Association of Upstate New York and PHS.

A method is described for obtaining tidal volume from movements of the chest and abdomen utilizing electromagnetic sensors. Tidal volume obtained from these sensors was linearly related to tidal volume simultaneously obtained with a spirometer within an error of 14%. With this method, the ventilation-tidal volume relationship was studied during CO₂ inhalation. At high ventilations the tidal volume tended to level off and increases in ventilation occurred primarily as a result of increases in frequency. The value of tidal volume and the ratio of tidal volume to vital capacity at which leveling off of the tidal volume occurred was variable among individuals and often differed in the same individual on different occasions. Added resistive and elastic loads altered the curves in the direction of minimal respiratory force or minimal respiratory work. The use of a mouth-piece, directional valve, and nose clip did not alter the relationship. There was no sex difference in the proportions of the total tidal volume contributed by chest and abdomen motion and these proportions did not change significantly with increasing ventilation in the majority of subjects. (Author)

A72-17098 # **Pilot performance in flight (Rabotosposobnost' letchika v polete).** N. Rudnyi. *Aviatsiya i Kosmonavtika*, Nov. 1971, p. 24, 25. In Russian.

The emotional aspects of the performance of a pilot under conditions of high stress in emergency situations are discussed. It is shown that the ability of pilots to cope with unexpected critical situations can be improved by psychophysiological training methods and special simulator and flight programs. V.P.

A72-17128 **Gonadotropin secretion during sleep in normal adult men.** R. T. Rubin, A. Kales, R. Adler, T. Fagan, and W. Odell (Hershey Medical Center, Hershey, Pa.; California, University, Los Angeles; U.S. Navy, Medical Neuropsychiatric Research Unit, San Diego; Harbor General Hospital, Torrance, Calif.). *Science*, vol. 175, Jan. 14, 1972, p. 196-198. 38 refs.

Study of luteinizing hormone and follicle stimulating hormone release during sleep in normal young men. The release occurred in unrelated, random, arrhythmic peaks, with no consistency from night to night in the same subject. Release of luteinizing hormone was modestly but significantly larger (14%) during rapid-eye-movement (REM) sleep than it was in non-REM sleep, but release of follicle stimulating hormone was not clearly related to stages of sleep. M.V.E.

A72-17129 **Human taste papilla stimulation - Stability of quality judgments over time.** N. B. McCutcheon and J. Saunders

(New York, State University, Albany, N.Y.). *Science*, vol. 175, Jan. 14, 1972, p. 214-216. 7 refs.

The sensitivity of human taste papillae to two or more chemical stimuli has been investigated. Individual papillae are found to produce stable response patterns (in terms of quality and intensity) over a month's time. The response pattern does not appear to be affected by turnover of receptor cells. Von Bekesy's (1966) technique of stimulation was employed. M.V.E.

A72-17174 # A new treatment of the pulmonary diffusing capacity by the single breath method. S. I. Takahashi (Hokkaido University, Sapporo, Japan). *Japanese Journal of Physiology*, vol. 21, Oct. 1971, p. 507-516.

Description of two new treatments which were attempted in the measurement of the pulmonary diffusing capacity in regard to the total lung capacity and the inspiration time. The alveolar gas volume was calculated by using the alveolar He concentration, which was measured originally in order to obtain the initial alveolar CO concentration. The inspiration time was corrected by use of a nomogram reported in a previous paper. As a result of measurements made in 18 normal subjects it was clarified that, when the alveolar gas volume was calculated through the above procedure, the effects of the error of He measurement on both the alveolar volume and the initial CO concentration counterbalanced each other and its effect on the diffusing capacity was somewhat reduced. On the other hand, the correction of inspiration time resulted in a 2 to 8% increase in the calculated diffusing capacity values. (Author)

A72-17175 # Auditory temporal masking - An electrophysiological study of single neurons in the cat's cochlear nucleus and inferior colliculus. T. Watanabe and Z. Simada (Tokyo Medical and Dental University, Tokyo, Japan). *Japanese Journal of Physiology*, vol. 21, Oct. 1971, p. 537-549. 5 refs. Research supported by the Japan Broadcasting Corp.

Study of the physiological mechanism of auditory temporal masking by single-unit analysis in the cat's cochlear nucleus and inferior colliculus. Forward masking was found at the levels of both the cochlear nucleus and the inferior colliculus; the mechanism can be explained by the phenomena of postexcitatory inhibition and synaptic inhibition. Backward masking may involve central processes because it was not demonstrable in the cochlear nucleus. At the midbrain collicular region, it was found that there were three modes that could explain backward masking. (Author)

A72-17214 # Relation between the fluctuations of electroencephalogram-phase duration asymmetry and the respiration rhythm (Sviaz' kolebanii asimmetrii dlitel'nostei faz elektroentsefalogrammy s dykhatel'noi ritmikoi). A. A. Genkin (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 200, Oct. 1, 1971, p. 1003-1006. 19 refs. In Russian.

EEGs of five subjects were compared with their pneumograms over long periods of rest, mental activity, hypnosis and sleep. EEG-phase asymmetry fluctuation frequency was measured as the number of asymmetry maxima referred to one minute period of observation. EEGs and pneumograms were taken at 40 to 120 sec intervals in a series of 90 measurements. Histograms of respiration rates and EEG-phase asymmetry fluctuations indicated an inverse relation between the former and the latter at the recovery of wakefulness. V.Z.

A72-17215 # Increased heat production by muscular contractions due to noradrenalin (O povyshenii teploprodukttsii myshechnykh sokrashchenii pod vlianiem noradrenalina). M. A.

Iakimenko, E. Ia. Tkachenko, K. P. Ivanov, and A. D. Slonim (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 200, Oct. 1, 1971, p. 1007, 1008. 18 refs. In Russian.

Subcutaneous noradrenalin injections were made in two groups of albino rats kept for 6 weeks at 2 to 4 C for cold adaptation, or at 24 to 25 C. Statistical analysis of heat production measurement data for a total of 579 reactive muscular contractions prior to and after injections indicates an increase in heat production after muscular contractions in injected rats especially in those subjected to cold adaptation. V.Z.

A72-17380 Asymmetrical hypertrophic cardiomyopathy simulating mitral stenosis. R. Shabetai (Kentucky, University, Lexington, Ky.) and S. Davidson (Peter Bent Brigham Hospital, Boston, Mass.). *Circulation*, vol. 45, Jan. 1972, p. 37-45. 18 refs. NIH Grants No. HE-05598-07; No. HE-05771-04; No. HE-05354-12.

Hypertrophic cardiomyopathy usually involves the left ventricle more severely than the right, and when asymmetrical may produce the syndrome of idiopathic subaortic stenosis. Less commonly, clinical manifestations of inflow-tract obstruction predominate and produce a syndrome that may be mistaken for mitral stenosis, principally because of an apical diastolic rumbling murmur. The probability of this diagnostic error and the risk of a consequent unnecessary operation can be reduced by appreciating the significance of the clues to left ventricular disease revealed by the electrocardiogram and the chest roentgenogram. The correct diagnosis is established following ventriculographic and hemodynamic studies. G.R.

A72-17381 Sudden death related to myocardial infarction. T. N. James (Alabama, University, Birmingham, Ala.). *Circulation*, vol. 45, Jan. 1972, p. 205-214. 43 refs. PHS-supported research.

Sudden death as it relates to myocardial infarction (not necessarily acute) is discussed on the premise that most such deaths are due to a lethal electrical disturbance of the heart. The three sections of the first part deal with the rhythm of the heart, conduction in the heart, and neural control of the heart. In these sections consideration is made of those factors which stabilize cardiac electrical performance, and conversely how these factors may be deranged into electrical instability. In the second part a practical discussion is organized to interrelate the principles presented on maintenance and derangement of electrical stability of the heart; the electrical reserve of the heart, some unstabilizing factors, and clinical considerations are the subjects for this integrating synthesis. The entire review is designed to provide the clinical cardiologist a framework of reference in which logical decisions can be made in caring for the patient who has coronary disease and in whom myocardial infarction will be, is, or has been a complication. By a fuller appreciation of principles underlying maintenance of electrical stability of the heart, the risk of dying suddenly from electrical instability may be reduced. (Author)

A72-17410 Differences in the dissipation of the effect of adaptation to two kinds of field displacement during head movements. H. Wallach and K. J. Frey (Swarthmore College, Swarthmore, Pa.). *Perception and Psychophysics*, vol. 11, no. 1A, Jan. 1972, p. 31-34. NIH-supported research.

Study of subjects simultaneously adapted to horizontal and to vertical target displacements of equal rate during head turning about a vertical axis. The adaptation effects measured by one-trial tests immediately after the adaptation period were about equal. But retests after a time lapse of 10 and 20 min, during which subject sat immobile and with eyes closed, showed a greatly different rate of

dissipation of the two adaptation effects. After a lapse of 20 min, the effect of adaptation to horizontal target displacements had been reduced to 37% whereas the effect of adaptation to vertical displacements at this final test still stood at 80% of the initial measurement. The decline over 20 min in the latter case was so small that it could readily be ascribed to an effect of the two tests that preceded the final test. These two tests represented an effective exposure to natural viewing conditions and hence caused an unlearning of the adaptation, an effect whose existence was previously demonstrated in work with the one-trial test. (Author)

A72-17411 **Adaptation in distance perception based on oculomotor cues.** H. Wallach and K. J. Frey (Swarthmore College, Swarthmore, Pa.). *Perception and Psychophysics*, vol. 11, no. 1B, Jan. 1972, p. 77-83. NSF Grant No. GB-5958.

It is shown experimentally that the relation between oculomotor adjustments and the distances they signify can be changed by adaptation to glasses that cause alteration of the oculomotor adjustments with which objects are viewed. This changed relation manifests itself in marked alterations of size perception. Results of size estimates obtained by two different size perception tests before and after the adaptation period are analyzed, and the reason for the different amounts of size change obtained in each test is studied.

V.P.

A72-17412 **Frequency-specific color adaptation in the human visual system.** B. G. Breitmeyer and L. A. Cooper (Stanford University, Stanford, Calif.). *Perception and Psychophysics*, vol. 11, no. 1B, Jan. 1972, p. 95, 96. 11 refs. NIH Grant No. R01-NS-08924.

Following prolonged exposure to two vertical grating patterns differing in spatial frequency - one pattern illuminated in green light alternated with the other pattern illuminated in red light - human observers will sometimes report seeing desaturated complementary colors when presented with a neutrally illuminated test field consisting of adjacent halves of the two adapting gratings. The number of such color reports increases as the difference between the spatial frequencies of the adapting gratings increases. This frequency-specific chromatic aftereffect is similar to that obtained with orientation-specific color adaptation and may be mediated by neural 'channels,' sensitive to both color and frequency input, which are similar to units known to exist in the visual systems of lower organisms. (Author)

A72-17413 **Perceived common rotary motion of ambiguous stimuli as a criterion of perceptual grouping.** B. Gillam (Columbia University, New York, N.Y.). *Perception and Psychophysics*, vol. 11, no. 1B, Jan. 1972, p. 99-101. 11 refs. PHS Grant No. 5-R01-EY-00391-03; Contract No. N00014-67-A-0108-0009.

Apparent common behavior of contours with respect to a property for which each contour is ambiguous (in this case direction of rotary motion in depth) was used as a criterion of the unitary processing of the contours or 'grouping.' Grouping was found to decrease as a monotonic function of the difference in line orientation and, for fixed orientations, to decrease as a monotonic function of line separation. These results are tentatively attributed to the distribution of line detectors in the projection area. (Author)

A72-17414 **The nature of adaptation in distance perception based on oculomotor cues.** H. Wallach, K. J. Frey (Swarthmore College, Swarthmore, Pa.), and K. A. Bode (Educational Testing Service, Princeton, N.J.). *Perception and Psychophysics*, vol. 11, no. 1B, Jan. 1972, p. 110-116. 7 refs. NSF Grant No. GB-5958.

Additional experiments revealed that adaptation to glasses changing the accommodation and convergence with which objects are viewed leads not only to large changes in size perception, but also to two further effects: a change in stereoscopic depth perception, and a change when distance is represented by a response of the subject's arm. Experiments confirming the origin and nature of these effects are described. V.P.

A72-17425 **The effect of age on the electrocardiogram.** E. Simonson (Mount Sinai Hospital; Minnesota, University, Minneapolis, Minn.). *American Journal of Cardiology*, vol. 29, Jan. 1972, p. 64-73. 39 refs. NIH Grants No. HE-11325; No. HE-05491.

There are significant electrocardiographic age trends in adult healthy populations from the third to the fifth decade in QRS and T amplitudes (decrease with age) and direction (left axis shift with age) in conventional electrocardiographic leads, which flatten out after age 50. The decrease of amplitudes is more pronounced in men than in women. Age trends of intervals are absent or small. However, the incidence of premature supraventricular and ventricular beats increases with age. Overweight accelerates the age trends. Diagnostic implications are discussed, particularly for recognition of left ventricular hypertrophy. In the majority of studies, the effect of age is more pronounced in populations with high prevalence of coronary artery disease than in populations with low incidence. G.R.

A72-17437 **Photo-optical data acquisition in biomedical research.** A. H. Gott (Aerospace Corp., San Bernardino, Calif.). In: Photo-optical instrumentation: Present and future developments; Proceedings of the Seminar-in-Depth, Tokyo, Japan, June 25-28, 1970. Redondo Beach, Calif., Society of Photo-optical Instrumentation Engineers, 1971, p. 127-138. 14 refs. NIH Grant No. HE-12188-01.

Description of four current and two planned examples of heart research data acquisition using optical techniques. The techniques already developed deal with the determination of left ventricle volume by cineangiography, a determination of the performance of the left ventricle papillary muscles between the base of the ventricle chamber and the mitral valve by means of heart markers acting as optical filters, a technique for implanting canine left ventricle markers, and the use of the X-ray tomograph to acquire three-dimensional heart cross-section data. The two techniques still under development deal with ultrastructure image enhancement by alteration of the modulation transfer function and the multispectral observation of the fiber energy output of an excised muscle. A.B.K.

A72-17601 **Interactions of the horizontal and vertical human oculomotor systems - The saccadic systems.** R. Feinstein and W. J. Williams (Michigan, University, Ann Arbor, Mich.). *Vision Research*, vol. 12, Jan. 1972, p. 33-44. 18 refs. Research supported by the University of Michigan.

Subjects were instructed to track a spot of light moving in both horizontal and vertical directions. The temporal relation between the horizontal and vertical eye motions was recorded by a light reflection technique. The horizontal and vertical saccadic systems were found to be complexly interrelated. The phenomenon of the Psychological Refractory Period was observed. A possible mechanism of the interaction of the orthogonal saccadic systems is discussed. V.Z.

A72-17602 **Spatial frequency channels in the human visual system - Effects of luminance and pattern drift rate.** N. Graham (Rockefeller University, New York, N.Y.). *Vision Research*, vol. 12, Jan. 1972, p. 53-68. 24 refs. NSF Grant No. GB-24100; NIH Grant No. NB-06050.

The effect of adaptation to sinusoidal gratings on contrast thresholds of such gratings was used as a measure of the sensitivity of multiple visual-system channels of humans to patterns at low mean luminance or at high drift rates. The channels were found to behave in conflict with retinal ganglion cell physiology in that they remained selectively sensitive to narrow ranges of spatial frequency even when the luminance was low or the drift rate was high. V.Z.

A72-17603 **Reversibility of perceived motion - Selective adaptation of the human visual system to speed, size and orientation.** H. Erke and H. Gräser (Saarland, Universität, Saarbrücken, West Germany). *Vision Research*, vol. 12, Jan. 1972, p. 69-87. 78 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Transfer experiments with size and speed variations, with orientation variation and with variation of the size of figure and of the diameter of pins were conducted in a study of human-vision selective adaptability using Brownian-type pin configurations and their shadows as the key elements of the experimental setup. The results suggest the existence of neural subsystems performing motion analysis in the human visual cortex. It is also theorized on the basis of the results that the adaptation process of orientationally adjusted motion detectors is different for oblique and vertical orientations. V.Z.

A72-17604 **Visual adaptation - A case of nonlinear summation.** R. M. Glantz (Rice University, Houston, Tex.). *Vision Research*, vol. 12, Jan. 1972, p. 103-109. 17 refs.

Retinular cell adaptation is discussed showing that receptor adaptation is due to the saturation of the response range of the receptor membrane. This conclusion is extended to dark adaptation and to the increment threshold. The critical role of decay of transient depolarization to a lower steady-state value in visual adaptation is analyzed. Response adaptation is believed to be essential in preventing a very rapid saturation of the dynamic response range of the photoreceptor. It is also maintained that the first derivative of the intensity-voltage (I-V) function of photoreceptors determines the light adaptation threshold. V.Z.

A72-17605 **Darkness enhancement in intermittent light - An experimental demonstration.** A. Glad and S. Magnussen (Oslo, Universitetet, Oslo, Norway). *Vision Research*, vol. 12, Jan. 1972, p. 111-115. 12 refs. Research supported by the Norges Almenvitenskapelige Forskningsråd.

Description of an experimental assembly for measuring changes in subjective darkness of low luminance periods during an intermittent photic stimulation of vision by flickers. The components of the assembly include a cardboard screen, an iris diaphragm, a motor, an opal glass, a projector, a partition wall and a rotary sector disk. The observer is to adjust the steady-field luminance to match the intermittent-field dark-period luminance by using the iris diaphragm. The dependence of subjective darkness on flicker frequency is determined by this technique, showing the existence of a 'darkness' enhancement effect which is analogous to the Brücke-Barley effect. The theoretical implications of this finding are discussed briefly. (Author)

A72-17673 # **Auto- and cross-correlational analysis of neuron reactions in the vasomotorial center to an adequate stimulation of the vestibular apparatus (Avto- i krosskorrelatsionnyi analiz reaktsii neironov sosudodvigatel'nogo tsentra na adekvatnoe razdrazhenie vestibuliarnogo apparata).** S. N. Malikova and M. D. Venttsel'.

Biulleten' Eksperimental'noi Biologii i Meditsiny, vol. 72, Oct. 1971, p. 9-11. 5 refs. In Russian.

The relation between the pulsed activity of neurons in the vasomotorial center and pulsed arterial pressure waves is analyzed in cats in a rocking stand under accelerations of 0.8 to 1.2 g. Autocorrelation functions are calculated for the observed two types of neuron reactions. V.Z.

A72-17674 # **Functional condition of precortical arteries during experimental hypo- and hyperkinesia (Funktsional'noe sostoianie prekortikal'nykh arterii pri eksperimental'noi gipo- i gipertenzii).** G. I. Mchedlishvili and D. G. Baramidze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 72, Oct. 1971, p. 14-16. 9 refs. In Russian.

A substantial contraction of vascular segments located between the precortical arteries of the cerebrum was observed during an arterial hypertension produced in rabbits by slow intravenous infusion of noradrenalin. The gap between precortical arteries showed no significant changes during a hypertension produced in rabbits by bloodletting from larger arteries. V.Z.

A72-17675 # **Comparative study of the biological action of various types of radiation - 600 MeV protons, X rays, and gamma rays (Sravnitel'noe issledovanie biologicheskogo deistviia raznykh vidov izlucheniia - Protonov 660 Mev, Rentgenovykh i gamma-luchei).** B. A. Lavrov, Iu. M. Filippov, and B. I. Ianovskaia. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 72, Oct. 1971, p. 47-49. 9 refs. In Russian.

Changes in the weight of the spleen and gonads and in the ascorbic acid contents of the spleen, gonads, and marrow were determined in rats which received 400-rad doses of X rays and 600 MeV protons or 600-rad doses of gamma rays and X rays. The damage produced by X rays in hemopoietic tissues was heavier than the damage produced by the same doses of protons. The gonads were more sensitive to 660 MeV protons than the spleen and the marrow. The damage produced in gonads by equal doses of gamma-rays and protons was practically equal. V.Z.

A72-17676 # **Contribution of blood stream turbulence to the production of cardiac murmur (Znachenie turbulentnosti toka krovi dlia vzniknoveniia serdechnogo shumal).** T. S. Vinogradova (Moskovskii Oblastnoi Nauchno-Issledovatel'skii Klinicheskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 72, Oct. 1971, p. 50-52. 12 refs. In Russian.

The dependence of the cardiac murmur level on the Reynolds number of the blood stream is established by an analysis of background cardiograms of a group of patients with congenital vitium cordis. Low-amplitude murmur was detected at Reynolds number below 1200, middle amplitude murmur - at Reynolds numbers from 1200 to 1800, and high amplitude murmur - at Reynolds numbers above 1800. The origin of cardiac noise is traced to blood stream turbulence. V.Z.

A72-17711 * **Motivation in vigilance - Effects of self-evaluation and experimenter-controlled feedback.** J. S. Warm, F. H. Kanfer, S. Kuwada, and J. L. Clark (Cincinnati, University, Cincinnati, Ohio). (*Midwestern Psychological Association, Meeting, Detroit, Mich., May 1971.*) *Journal of Experimental Psychology*, vol. 92, Jan. 1972, p. 123-127. 17 refs. NIH Grant No. MH-17902-02; Grant No. NGL-36-004-014.

Vigilance experiments have been performed to study the relative efficiency of feedback operations in enhancing vigilance performance. Two feedback operations were compared - i.e., experimenter-controlled feedback in the form of knowledge of results (KR) regarding response times to signal detections, and subject-controlled feedback in the form of self-evaluation (SE) of response times to signal detections. The subjects responded to the aperiodic offset of a visual signal during a 1-hr vigil. Both feedback operations were found to enhance performance efficiency: subjects in the KR and SE conditions had faster response times than controls receiving no evaluative feedback. Moreover, the data of the KR and SE groups did not differ significantly from each other. The results are discussed in terms of the hypothesis that self-evaluation is a critical factor underlying the incentive value of KR in vigilance tasks. O.H.

A72-17715 Human factors and artificial gravity - A review. H. R. Ramsey (Martin Marietta Corp., Denver, Colo.). (*Human Factors Society, Annual Meeting, 14th, San Francisco, Calif., Oct. 14-16, 1970.*) *Human Factors*, vol. 13, Dec. 1971, p. 533-542. 35 refs.

Unusual mechanical and perceptual phenomena resulting from rotation of a spacecraft to induce artificial gravity are examined. The effects of these phenomena on the performance of a space station crew are discussed. General guidelines are presented to aid the designer in floor layout and in the design and orientation of crew stations and translation aids. Some possible mission constraints resulting from incomplete or radius-specific adaptation are discussed. O.H.

A72-17716 Adaptation to speed stress in an immediate memory task. J. M. McKendry and P. M. Hurst (Institute for Research, State College, Pa.). *Human Factors*, vol. 13, Dec. 1971, p. 543-552. 13 refs. Contracts No. AF 33/616/-7892; No. Nonr-4423/00/.

The problem has been examined of whether man can adapt to speed stress which is severely taxing his channel capacity and, if so, which is the kind of adaptation that takes place. Attention was focused upon a task analogous to a pilot maneuvering a high-performance aircraft while attending to a series of gauges, meters, and electronic sensor displays. Results show that extensive practice reduces the time required to respond accurately to a set of stimulus elements; the more complex the stimuli, the smaller the reduction. Whenever the minimal response time was surpassed, both performance accuracy and the amount of information transmitted per minute fell to a degree that was disproportionately greater than increases in input speed relative to the minimal response time (channel capacity). Response times related to performance accuracy indicated that when the number of stimulus elements in immediate memory exceeded seven, chances of a correct response were practically zero. O.H.

A72-17718 International Symposium on Visual Processes in Vertebrates, Universidad de Chile, Santiago, Chile, November 30-December 4, 1970, Proceedings. Symposium sponsored by the Universidad de Chile, the Johns Hopkins University, the Oak Ridge National Laboratory, the Organización de Los Estados Americanos, the Comisión Nacional de Investigación Científica y Tecnológica, the National Academy of Sciences, the Atomic Energy Commission, the Ford Foundation, the National Science Foundation, the Deutsche Forschungsgemeinschaft, the University of Ottawa, the Hungarian Health Ministry, the Université de Paris, the Fundación Marqués de Urquijo, and the Akademiai Nauk SSSR. *Vision Research*, vol. 11, Supplement no. 3, 1971. 528 p.

The topics discussed concern the patterns of interconnections of neurons, especially in the retina, the lateral geniculate nucleus, the

superior colliculus, and, to a lesser degree, in the visual cortex. Many fundamental problems of the processing of visual information in these centers are considered, including synaptic contacts in vertebrate retinas, the function of horizontal and amacrine cells in the retina, mechanisms of visual adaptation, spike activity in the retina, cortical representation of the visual field, and the relation between evoked potentials and the processing of visual information.

A.B.K.

A72-17719 Synaptic organization of the vertebrate retina. J. E. Dowling and F. S. Werblin (Johns Hopkins University, Baltimore, Md.). (*International Symposium on Visual Processes in Vertebrates, Universidad de Chile, Santiago, Chile, Nov. 30-Dec. 4, 1970.*) *Vision Research*, vol. 11, Supplement no. 3, 1971, p. 1-15. 50 refs. Research supported by the Research to Prevent Blindness, Inc.; NIH Grants No. NB-05336; No. EY-00470; Grants No. AF-AFOSR-1264-67; No. AF-AFOSR-1747-69.

Review of recent findings by electron microscopy concerning the synaptic contacts in vertebrate retinas. In the outer plexiform layer, receptors contact bipolar dendrites and horizontal cell processes. In most species, horizontal cell synapses onto bipolar dendrites and other horizontal cell processes are observed. In the inner plexiform layer, bipolar terminals contact ganglion cell dendrites and amacrine cell processes. Amacrine processes make feedback synapses on bipolar terminals, feed-forward synapses on ganglion cell dendrites, and lateral synapses on other amacrine processes. The frequency of amacrine synapses varies between species and can be correlated with ganglion cell complexity. Ganglion cells of two types are encountered. One type shows center-surround organization; its receptive field resembles that of the bipolars. The second type responds transiently to on and off; its activity resembles the amacrine responses. The latter type of ganglion cell often shows directionally selective responses to moving spots, suggesting that the amacrine cell is involved in mediating complex ganglion cell responses such as motion and directional sensitivity. A.B.K.

A72-17720 On the mechanisms of visual adaptation. A. L. Byzov and L. P. Kuznetsova (Akademia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). (*International Symposium on Visual Processes in Vertebrates, Universidad de Chile, Santiago, Chile, Nov. 30-Dec. 4, 1970.*) *Vision Research*, vol. 11, Supplement no. 3, 1971, p. 51-63. 22 refs.

Investigation of the contrast sensitivity of the visual system of human subjects and animals near the adaptation level in order to trace the full dynamics of light and dark adaptation. In human subjects, contrast sensitivity is found to be highest near the adaptation level and decreases on both sides of this level. The same can be shown in summed spike responses in the optic nerve of the frog: the R log I function is steepest near the adaptation level in any state of adaptation. The R log I functions were also measured in the horizontal cells of the turtle retina. The function measured by transients (on- and off-peaks) is very steep near the adaptation level and shifts along the I scale if the adapting light is changed. On the other hand, the R log I function measured by plateau steady potentials is much less steep and does not shift during adaptation to a new background. It is assumed that both the transients and the shift of the R log I function are due to the feedback (perhaps a positive one) between horizontal cells and receptors. Polarization of a horizontal cell can vastly change the local ERG, as well as give rise to 'current ERG.' This shows that horizontal cells take part in the processing of signals in bipolars and may be partly responsible for adaptation shifts of the R log I function of the visual system. A.B.K.

A72-17721 Electroretinogram and spike activity in mammalian retina. W. M. Kozak (New York, State University, Buffalo, N.Y.; Polska Akademia Nauk, Instytut Biologii Doświadczal-

nej, Warsaw, Poland). (*International Symposium on Visual Processes in Vertebrates, Universidad de Chile, Santiago, Chile, Nov. 30-Dec. 4, 1970.*) *Vision Research*, vol. 11, Supplement no. 3, 1971, p. 129-149. 42 refs. Research supported by the State University of New York and the Rockefeller Foundation.

Investigation of mechanisms underlying the timing of the retinal ganglion cell spikes in pretigeminal and Urethan cat preparations and in isolated, perfused rat retina, using electrophysiological methods with computer analysis. A close correlation is found to exist in the cat between the rapid oscillatory ERG components (wavelets) produced by brief flashes or step functions of light (on-oscillations), and spike firing and evoked potentials in the optic tract and lateral geniculate nucleus. Experiments on isolated, perfused retina showed that the timing of the ganglion cell spike firing was closely related to the period of the ERG on-oscillations. The frequency of oscillations changed with temperature in a similar way both in the perfused retina and in the cat ERG in situ. Calcium-free perfusate abolished the oscillations. Nembutal slowed the frequency of oscillations and eventually abolished them both in the isolated retina and in the retina in situ. Computer analysis of the power spectra of the ERG on- and off-effects showed distinct spectral peaks. The interpretation of these spectra and implications concerning the fundamental frequency of oscillations in the ERG are discussed. A.B.K.

A72-17722 **Comparative studies on cortical representation of vision.** C. N. Wooley (Wisconsin, University, Madison, Wis.). (*International Symposium on Visual Processes in Vertebrates, Universidad de Chile, Santiago, Chile, Nov. 30-Dec. 4, 1970.*) *Vision Research*, vol. 11, Supplement no. 3, 1971, p. 365-382. 46 refs. NIH Grant No. 5-PO1-NS-06225.

Study of the relations between the visual field and the striate area of the cerebral cortex in the cat and other animals. A new map of visual areas I and II of the cat's cerebral cortex is presented in figurine style. Comparative findings on V I and V II for the outer surface of the hemisphere in marmoset and slow loris are also given. The validity of classifying V II with A II and S II is questioned, and the possible locus, between the striate cortex and the retrosplenial limbic cortex, for a 'true' V II is suggested. The general plan of representation of the visual field in V I, V II, and in the posterior middle temporal visual area, believed to be homologous with the suprasylvian sulcal area of Clare and Bishop (1954), is illustrated for rabbit, cat, and owl monkey. A.B.K.

A72-17723 **Evoked potentials and central processing of visual information.** E. García Austt, W. Buño, Jr., and A. Vanzulli (Hospital de Clínicas, Montevideo, Uruguay). (*International Symposium on Visual Processes in Vertebrates, Universidad de Chile, Santiago, Chile, Nov. 30-Dec. 4, 1970.*) *Vision Research*, vol. 11, Supplement no. 3, 1971, p. 457-477. 24 refs.

Observation of two different responses evoked in man by transient visual stimuli - namely, the occipital visual evoked response (OVER) and the vertex visual evoked response (VVER). Both of these responses are shown to be related to the processing of sensory information. The OVER is concomitant with some processing of the specific visual information. Its wave shape is modified when changes are determined in the visual perception, the stimulus significance, and the program the subject is performing. The VVER is concomitant with a subsequent processing of the sensory information and is not specific for visual stimulations. It can be evoked by stimulating other sensory modalities. VVER amplitude, duration, and complexity bear a close relation to the complexity of the subjective program and the amount of uncertainty in the stimulus situation. Neither of these responses is directly related to motor performance. A.B.K.

A72-17736 # **Phylo-ontogenetic laws of the maturation of corticopetal projections of the visual cortex (Filo-ontogeneticheskie**

zakonomernosti sozrevaniia kortiko-petal'nykh proektsii zritel'noi kory). F. A. Ata-Muradova and T. I. Belova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 200, Oct. 21, 1971, p. 1483-1486. 12 refs. In Russian.

Evoked potentials in response to light signals were measured in anesthetized rabbits 1 to 20 days old in a study of the effect of structural and functional complications of the visual system on the ontogeny of the organism. Portions of *substantia medullaris* were removed from the brain by a pipette to trace the genesis of evoked potential components. The successive development of structures of the visual duct was observed on dyed samples of visual portions of the brain. Complete correlation was established between the successive development of evoked response components and the heterochronous process of selective maturation of subcortical structures generating these components. V.Z.

A72-17765 **The interpretation and meaning of laboratory determinations of the effect of duration on the judged acceptability of noise.** H. J. Parry and J. K. Parry (Lockheed-California Co., Burbank, Calif.). *Journal of Sound and Vibration*, vol. 20, Jan. 8, 1972, p. 51-57. 21 refs.

Laboratory determinations of the effect of duration on the judged acceptability of noises have produced conflicting, if not confusing, results. Further, there is the question of application of so-called duration corrections to the prediction of community response to vehicle noises. The laboratory experiments are reviewed in detail to provide a firm understanding of the present status of that data. This investigation develops the very strong implication that judging duration in terms of equivalent noise levels is, in reality, a type of cross-modality experiment wherein the subject is simply measuring duration. There is some evidence that only above the speech interference level is the community concerned with noises of different duration. (Author)

A72-17808 # **Calibration of condenser microphones under increased atmospheric pressures.** W. G. Thomas, M. J. Preslar (North Carolina, University, Chapel Hill, N.C.), and J. C. Farmer (Duke University, Durham, N.C.). *Acoustical Society of America, Journal*, vol. 51, Jan. 1972, pt. 1, p. 6-14. 7 refs. Navy-supported research.

The sensitivity and frequency response characteristics of type-L standard laboratory microphones were measured with an electrostatic actuator at surface and at 12 different levels to 31 atm absolute (ATA) in a hyperbaric chamber. The microphones were measured in compressed air and a helium-air environment, with and without the capillary pin. In addition, one microphone remained at a depth of 31 ATA for 24 h to measure its stability under pressure. Results indicated a loss in sensitivity in compressed air and helium-air as a function of pressure. In a compressed-air environment a resonant peak occurred at 4000 Hz, which shifted to 8000 Hz in the helium-air environment. The microphones showed extremely close agreement between compression and decompression, between different pressurizations, and between different microphones. Also, there was no change in sensitivity over a 24-h period of pressurization at 31 ATA. Calibration data at several pressures are given. (Author)

A72-17816 **Psychological aspects of transmeridian flying.** B. McGann. Dublin, Institute of Psychology (Institute of Psychology, Paper 2), 1971. 92 p. 476 refs. \$2.60.

The theoretical and empirical background of factors affecting aircrew performance is studied. Following a short discussion on the psychology of skill, some of the factors are examined which cause deterioration in the skilled performance of transmeridian crew - i.e., anxiety, stress, disruption of circadian rhythms, and sleep loss. Fatigue is shown to be the short-term manifestation of such deterioration, and psychopathology the long-term one; a detailed discussion of these two topics is presented. Finally, two actual pilot studies done on a group of transatlantic aircrew are described. O.H.

A72-17818 # Evolution, gravitation, weightlessness (Evolutsiia, gravitatsiia, nevesomost'). P. A. Korzhuev. Moscow, Izdatel'stvo Nauka, 1971. 152 p. 76 refs. In Russian.

The influence of gravitational forces on the evolution of life on our planet is evaluated by studying the changes in the organism and physical properties of animals in the transition from a near-weightless aqueous medium to the hypergravitating conditions on land. Particular attention is given to the evolutionary changes in such mammals as whales which, after transferring from water to land, returned to life in water. The book should be of interest to biologists, biochemists, and physiologists. V.P.

A72-17865 Attitudes and motivations of air traffic controllers in terminal areas. R. C. Smith, B. B. Cobb, and W. E. Collins (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 1-5. 7 refs.

Samples of 614 journeymen terminal ATC specialists at 17 high-density IFR airports and 514 ATC trainees were administered a questionnaire which asked them to list what they liked best and what they liked least about ATC work in general; in addition, ATC specialists made similar lists for work at their assigned facilities. Responses were surveyed for clusters, and nine response categories were established. The frequency of responses assigned to each category was tabulated. With minor variations the pattern of responses from ATC specialists was highly similar from one facility to another. The categories of job challenge, job tasks, careers characteristics, and salary contained the most positive responses about ATC work, while the categories of management, work schedule, career characteristics, and job tasks had the most negative responses. Attitude patterns from trainees were similar. (Author)

A72-17866 * Passenger fluid volumes measured before and after a prolonged commercial jet flight. P. C. Johnson, W. R. Carpentier, T. B. Driscoll, C. K. LaPinta, J. A. Rummel, and C. F. Sawin (Texas Medical Center; NASA, Manned Spacecraft Center, Houston, Tex.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 6, 7. 12 refs.

Interstitial and intracellular fluid volumes were calculated from measured plasma volume, extracellular volume and total body water of six subjects before and after a 24-hour commercial overseas flight. No change occurred in these spaces or in peripheral hematocrit or total serum protein concentration. The subjective feeling of dehydration and the actual swelling of the lower extremities characteristically found among passengers at the end of a long trip of this type seems to represent a shift in body fluids to the dependent portions of the body rather than water retention or a decrease in the intravascular water volume. (Author)

A72-17867 * Comparison of the sensitivity to rotation of pilots and nonpilots. B. Clark (San Jose State College, San Jose, Calif.) and J. D. Stewart (NASA, Ames Research Center, Moffett Field, Calif.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 8-12. 22 refs.

Thirty-six airline pilots and 56 nonpilots were tested to determine their sensitivity to rotation. A staircase procedure was used to determine oculogyral illusion and perception of rotation thresholds, in a precision rotation device. The results indicated that (1) there were no significant differences between the two groups for either threshold measure, (2) the thresholds for the oculogyral illusion were significantly lower than the perception of rotation thresholds for both groups, and (3) changes in threshold as a function of age were minimal for 91 of the men. The validity and results of the tests are discussed with regard to the pilot's use of motion information in control tasks for aircraft and simulators. (Author)

A72-17868 Effects of simulated sonic booms on tracking performance and autonomic response. R. I. Thackray, R. M. Touchstone, and K. N. Jones (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 13-21. 25 refs.

Subjects were exposed to four simulated 'indoor' sonic booms over an approximate 30-minute period. The overpressure levels were 1.0, 2.0 and 4.0 psf (as measured 'outdoors') with durations of 295 milliseconds. Subjects performed a tracking task during the exposure period and continuous recordings were obtained of heart rate and skin conductance. No evidence of performance impairment was found for any of the overpressure levels. Rather, performance improved significantly following boom stimulation along with heart-rate deceleration and skin conductance increase. The obtained pattern suggests that the simulated booms may have elicited more of an orienting or alerting response than a startle reflex. Since faster rise times of the simulated booms might have increased loudness sufficiently to change these results considerably, care should be taken to avoid drawing unwarranted conclusions, relative to general sonic boom effects, on the basis of these findings alone. (Author)

A72-17869 # Effects of hypercapnia and physical deconditioning on musculoskeletal protein in man. J. P. Ellis, Jr., B. E. Welch, and J. M. Prescott (USAF, School of Aerospace Medicine, Brooks AFB; Texas A & M University, College Station, Tex.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 22-27. 8 refs.

A recently developed automated chromatographic method for quantifying urinary peptides and free amino acids was used to ascertain the effects of confinement, physical deconditioning, and hypercapnia on a group of three healthy male subjects. A 4-day control period preceded a 15-day experimental period, during which time the subjects were housed in a small airtight environmental chamber. The chamber air was the same as room air, except for the middle third of the experiment during which time it was adjusted so as to contain 3% carbon dioxide. The following urinary excretion trends were found: (1) a generalized reduction in amino acids and amino-peptides, (2) a sharp rise, followed by an abrupt fall, in one hydroxyproline peptide, and (3) a less marked but progressive increase in another hydroxyproline peptide. (Author)

A72-17870 Aircraft noise and the community - Some recent survey findings. A. A. Burrows and D. M. Zamarin (Douglas Aircraft Co., Long Beach, Calif.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 27-33. Research sponsored by the McDonnell Douglas Independent Research and Development Program.

This paper presents the results of two surveys conducted in the communities surrounding Los Angeles International Airport. By means of in-depth interviews, a qualitative and quantitative measure of respondents' attitudes towards aircraft noise and its effect on their lives was obtained. Results are presented for awareness and disturbance from aircraft noise during daily activities, emotional reactions generated, complaints, economic effects, changes in aircraft noise over time, awareness of noise abatement activities, and so forth. In general, the major effect of aircraft noise was upon activities involving active or passive communication. Other findings included (1) a majority of respondents are not bothered or are only slightly disturbed by aircraft noise, (2) few respondents have made a formal complaint about aircraft noise, and there is limited awareness of noise abatement activity, (3) the majority of residents were aware of the existence of noise before moving in, and (4) few respondents felt their property value had decreased. (Author)

A72-17871 Color defective vision and day and night recognition of aviation color signal light flashes. J. A. Steen and M. F. Lewis (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 34-36. 7 refs.

In a previous study we reported the efficiency with which various tests of color defective vision predict performance during daylight conditions on a practical test of ability to discriminate aviation signal red, white, and green. In the current study subgroups of the subjects used in the previous investigation were tested with the signal light gun at night. Comparisons of the efficiency of each of seven tests of color defective vision in predicting performance under day and night conditions are reported. In general the commercial tests were less efficient in predicting performance at night than in the daytime. This reduction in efficiency may be attributed to an increase in the false alarm rate of each test. (Author)

A72-17872 * **Ultra micro chemical method for the detection of small quantities of microbial cells.** V. Goppers and H. J. Paulus (Minnesota, University, Minneapolis, Minn.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 37-41. 9 refs. Grant No. NGL-24-005-160.

A rapid method has been developed for the detection of small quantities of microbial cells by chemical techniques. The method utilizes the quantification of adenosine triphosphate extracted from bacterial cells on thin layer chromatography. The evaluation is performed directly on thin-layer chromatograms with the use of a microscope photometer to measure the intensity of the emitted light produced by exciting adenosine triphosphate with ultraviolet light at 360 nm. The actual analysis of the microbial cells requires about 45 minutes. The quantities of adenosine triphosphate measured under specific conditions are about .01 picograms. (Author)

A72-17873 **Behavior and physiology of the monkey (*Macaca mulatta*) following 2500 rads of pulsed mixed gamma-neutron radiation.** C. L. Turbyfill, R. M. Roudon, and V. A. Kieffer (U.S. Armed Forces Radiobiology Research Institute, Bethesda, Md.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 41-45. 14 refs.

Six monkeys, trained for a shock motivated visual discrimination task, and surgically implanted to monitor aortic and venous pressures, carotid flow, heart rate and respiratory rate were irradiated with a 2500-rad (MTD) dose of mixed gamma-neutron radiation. One animal showed no performance decrement and one animal showed complete performance decrement within a few minutes following irradiation. Animals displaying performance decrements suffered an acute decrease in aortic pressure. The first physiological indication of the ensuing incapacitation period was a rapid fall of diastolic pressure followed by a decrease in systolic pressure. A second behavioral decrement was observed in five of the six animals at approximately 40-45 minutes postirradiation. The respiratory rate was in general significantly increased following irradiation. No significant changes were observed in carotid flow or venous pressure. (Author)

A72-17874 **Adrenocortical steroids during acute exposure to environmental stresses. I - Disappearance of infused cortisol. II - Uptake and release of infused cortisol by the hind limb of dogs.** G. A. Courtney and S. F. Marotta (Illinois, University, Chicago, Ill.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 46-55. 64 refs. Contract No. NR-101-580.

An investigation has been performed of the removal rates of injected cortisol from the plasma of dogs exposed to a variety of environmental stresses. Blood samples were withdrawn at various times after cortisol infusion, and the plasma was analyzed for 17-hydroxycorticosteroid (17-OHCS). The disappearance of 17-OHCS in plasma was calculated according to an open two-compartment model with a fast and slow component. An investigation was also undertaken to ascertain the ability of tissues of the femoral bed (mainly skeletal muscle) to extract cortisol when large quantities of the steroid were infused into animals subjected to various environmental stresses. O.H.

A72-17875 **Coenzyme A aberration in marginally hyperoxic space capsule environments.** D. V. Lassiter, J. P. Jordan, R. L. Coleman, and J. B. Simmons, II (Oklahoma, University, Oklahoma City, Okla.; Colorado State University, Fort Collins, Colo.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 56-61. 37 refs.

Groups of male Holtzman rats were exposed to four artificial breathing mixtures: (1) 5 psia-100% oxygen, (2) 5 psia-oxygen-neon, (3) 5 psia-oxygen-nitrogen, and (4) one-Ata-oxygen-nitrogen. Coenzyme A (both acetylated and unacetylated) was greatly reduced in the brains of the animals exposed to the 5 psia-100% oxygen environment. Proportionally, an even greater decrease occurred in acetyl coenzyme A. No significant deviations occurred in any of the other three breathing mixtures. The aberration observed in animals exposed to the 5 psia-100% oxygen environment was caused by the increased partial oxygen pressure. Apparently nitrogen can mask the toxic effects of a marginally hyperoxic environment. (Author)

A72-17876 **Radiographic and pathologic studies for aseptic bone necrosis in dogs incurring decompression sickness.** E. Reeves, A. E. McKee, J. A. Stunkard, and P. W. Schilling (National Medical Research, Center, Naval Medical Research Institute, Bethesda, Md.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 61-66. 29 refs.

A group of 19 mongrel dogs have been compressed to their 'bends threshold' depth for at least five hours and then brought to sea level pressure with no-stop decompression. Such procedures have resulted in signs of decompression sickness 50% of the time. Recompression with dog treatment tables has resolved all signs of decompression sickness in all but two of the 361 cases of decompression sickness. Radiography of the limbs, shoulder, and hip joints of these animals was made yearly for five years. Necropsy was performed at the end of the five year period on 18 animals with histologic sections made of the organs, limbs, shoulder, and hip joints for microscopic examination. Bone changes seen radiographically consisted of hip and elbow dysplasias, and exostotic changes in shoulder and knee joints. The predominant pathologic bone lesions seen in this study were erosion and necrotic foci of the articular cartilage. (Author)

A72-17877 **Microwave cataractogenesis - A critical review of the literature.** W. C. Milroy and S. M. Michaelson (Rochester, University, Rochester, N.Y.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 67-75. 59 refs.

Concern with the possible hazards of exposure to microwave radiation has recently been on the rise. Legislation to protect the public from hazardous exposure to microwaves has been enacted and even stricter controls have been proposed. The lens of the eye has been considered one of the most sensitive organs to microwave radiation. A review of the Western and Soviet bloc literature on microwave cataractogenesis is presented as well as an analysis of the value of this literature in terms of standard setting and hazard evaluation. (Author)

A72-17878 # **Functional hypoglycemia - A potential cause of unconsciousness in flight.** M. E. Raichle and W. H. King (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 76-78. 6 refs.

Functional hypoglycemia, the only common form of spontaneous hypoglycemia, was diagnosed in a student pilot with an episode of unexplained unconsciousness during +Gz acceleration. The episode occurred two hours after a high carbohydrate meal. Subsequent centrifuge evaluation revealed a 24% decrement in rapid onset and a 19% decrement in slow onset +Gz tolerance with dietary induced hypoglycemia. The diagnostic criteria and aeromedical significance of this condition are discussed. (Author)

A72-17879 **Physiological and psychological implications of syncope resulting from altitude-chamber training - A case report.** G. M. Stone and D. E. Furry (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Institute, Pensacola, Fla.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 79, 80.

During initial altitude chamber training a student naval aviator experienced a loss of consciousness at 7,000 feet during the descent phase of the training profile. The subsequent aeromedical evaluation revealed a significant history of syncopal episodes, prior to entry into military service. Cardiovascular studies demonstrated a specific physiological mechanism inducing a presyncopal crisis, and psychiatric evaluation established a lack of motivation for further flight training. These factors coupled with the history of numerous syncopal episodes precluded his continuing in the flight training program. (Author)

A72-17880 **Roentgenography in the human factors investigation of fatal aviation accidents.** L. R. Simson, Jr. (USAF, Air Training Command, Randolph AFB, Tex.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 81-85. 6 refs.

The aircraft accident necropsy should be directed toward uncovering the cause of the accident, evaluating factors peculiar to the flight environment, relating injury patterns to aircraft and equipment design, diagnosing preexisting disease, and insuring positive victim identification. Post-mortem roentgenograms provide landmarks for conducting the necropsy in cases of massive trauma or conflagration. Anatomic sites such as maxillary and frontal sinuses, important in flight physiology but not routinely examined at necropsy, are readily visualized. The osseous system records magnitude, direction, and rate of onset of mechanical forces much more vividly than soft tissues. Roentgenographic features prove useful in victim identification in the absence of fingerprints or records of reparative dentistry. One case is presented in detail. (Author)

A72-17881 **Postexercise electrocardiograms, coronary heart disease, and airline pilots.** G. E. Garrison and W. H. Gullen (Georgia, Medical College, Augusta, Ga.). *Aerospace Medicine*, vol. 43, Jan. 1972, p. 86-91. 14 refs.

Depression of the S-T segment in postexercise electrocardiograms on apparently healthy individuals is definitely correlated with an increased subsequent rate of coronary heart disease and a shortened life expectancy. However, the sensitivity of annual postexercise electrocardiograms as the initial indicator of coronary heart disease is only 7%. Applying existing data to the population of airline pilots suggests that pilots with consistently normal annual postexercise electrocardiograms would have 14 times as many dangerous cardiac disabilities as would occur among pilots with abnormal tests. (Author)

A72-17949 **Sensory integration of auditory and visual information.** W. G. Dougherty, G. B. Jones, and G. R. Engel (Waterloo, University, Waterloo, Ontario, Canada). *Canadian Journal of Psychology*, vol. 25, Dec. 1971, p. 476-485. 10 refs. National Research Council of Canada Grant No. APA-216.

Two experiments are described which demonstrate an integrative action in the recognition of verbal material as a result of an interaction between hearing and vision. In the first experiment, the bisensory recognition of simultaneously presented auditory and visual verbal information is measured as a function of auditory and visual recognition alone. It is shown that bisensory performance is superior to performance predicted by a model assuming that the two modalities are processing the information independently. In the second experiment, a paradigm of the theory of signal detectability is used, and it is shown that, when the stimuli are equivalent, the results are consistent with a model in which bisensory processing occurs integratively on a common decision axis. M.V.E.

A72-17959 **Biomechanics - A survey of the blood flow problem.** Y. C. Fung (California, University, La Jolla, Calif.). In: *Advances in applied mechanics*. Volume 11. New York, Academic Press, Inc., 1971, p. 65-130. 270 refs.

Consideration of the problems of blood flow, focusing attention on the question of proper mathematical formulation of the problems. Therefore the constitutive equations of the various tissues involved, the geometrical configurations and dimensions of the system, and the possible boundary conditions are discussed. The mathematical framework of the problems of wave propagation in arteries and peristalsis in small vessels is considered, and the scope of the existing literature on physiologically important problems is reviewed. F.R.L.

A72-17987 # **Histochemical analysis of the glycogen distribution in the frog retina (Gistokhichimicheskii analiz raspredeleniia glikogena v setchatke glaza liagushki).** A. L. Shabadash and S. A. Shabadash (Akademiiia Nauk SSSR, Laboratoriiia Problem Upravleniia Funktsiiami v Organizme Cheloveka i Zhiivotnykh, Moscow, USSR). *Akademiiia Nauk SSSR, Doklady*, vol. 201, Nov. 1, 1971, p. 217-219. 9 refs. In Russian.

Determination of the content and distribution of glycogen in the retina of *Rana ridibunda* and *Rana temporaria*, using an in situ method of fixing the retina by intravascular injection of a special mixture which prevents decomposition of the glycogen in the tissue. The presence of glycogen is noted in all retinal formations (photoreceptor, nerve, and neuroglial) and specific structures and functional features characteristic of them, and obvious dynamic changes in the polysaccharide distribution and level due to the reaction of the eye to illumination conditions are observed. A.B.K.

A72-17993 # **New data on the relationship between electrographic effective and trace processes and short-time memory (Novye dannye o vzaimootnoshenii elektrograficheskikh nalichnykh i sledovyykh protsessov i kratkovremennoi pamiati).** L. G. Voronin and V. F. Konovalov (Akademiiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino-na-Oke, USSR). *Akademiiia Nauk SSSR, Doklady*, vol. 201, Nov. 11, 1971, p. 503-506. In Russian.

Effective reaction to complex stimuli and trace phenomena produced by these stimuli were studied on 35 subjects, 16 to 25 years of age. The electrical activity of the visual and Rolandian cortical regions and the Tarkhanov galvanocutaneous reaction were recorded with an eight-channel electroencephalograph. Tactile, acoustic, and proprioceptive agents were used as the complex stimuli. The results indicate that electrographic changes in the dynamics of the galvanocutaneous reaction seem to reflect the formation and reproduction of traces solely at the short-time memory level. The transition of stimulation traces to the long-time memory region is accompanied by an attenuation of the electrographic reactions. V.P.

A72-17994 # **Recording of blood content variations and the possibility of determining the total volume of blood in the organism by measuring the electrical resistance of the human body (K voprosu o registratsii izmeneniia kolichestva krovi i vozmozhnosti opredeleniia obshchego ob'ema krovi v organizme putem izmereniia elektricheskogo soprotivleniia tela cheloveka).** G. M. Iakovlev, N. L. Chernykh, and E. A. Petrakovskaia (Tomskii Meditsinskii Institut, Tomsk, USSR). *Akademiiia Nauk SSSR, Doklady*, vol. 201, Nov. 11, 1971, p. 510-512. In Russian.

Electrical impedance was measured in the tissues of the antebrahium and the shin of 79 subjects when portions of blood were drawn from the venous canal. The experiments were designed to assess the possibility of determining the loss of the overall blood content in a human body by this technique. The results were not satisfactory. V.Z.

A72-17996 **Synaptic transmission (La transmission synaptique).** L. Tauc (CNRS, Paris, France). *Sciences* (Paris), vol. 11, Sept.-Dec. 1971, p. 49-61. 12 refs. In French.

Discussion of synapses, by means of which information is passed from one neuron to another. A study of the nervous system of a marine gasteropod mollusk, *Aplysia*, is described, which was performed because study of the mechanism of synaptic transmission in the higher vertebrates is very difficult. It is shown that different types of synapses liberate different chemical transmitters between the neurons. Attention is given to two-phase potential, the receivers, electrical interaction, constant modification, and electrophysiological conditioning. F.R.L.

A72-17997 **Does the brain function as a hologram (Le cerveau fonctionne-t-il comme un hologramme).** P. J. van Heerden. *Sciences* (Paris), vol. 11, Sept.-Dec. 1971, p. 62-68. 9 refs. In French.

Discussion of the hologram, which can treat a volume of data in a way comparable to that presumed to operate in human intelligence, as a means of understanding the functioning of the brain. Recognition signals, Pavlovian qualities, and the functioning of intelligence are considered. A mathematical model is presented which involves the theory of inductive prediction, the suppression of paradoxes, and an eidetic memory. F.R.L.

A72-18057 # **Factor analysis of the relations between the quantitative EEG indices of the frontal and occipital regions in connection with the problem of the general properties of the nervous system (Faktornyi analiz sootnoshenii mezhdu kolichestvennymi pokazateliami EEG lobnoi i zatylochnoi oblasti v sviazi s problemoi obshchikh svoistv nervnoi sistemy).** V. D. Nebylitsyn and N. I. Aleksandrova (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Nov. 1971, p. 1577-1586. 18 refs. In Russian.

Study of the factors of intraindividual (interzonal) variability of a group of quantitative EEG parameters - mainly indices derived from autocorrelation function - during recordings of biocurrents of the frontal and occipital regions of the brain. A factor analysis of the matrix of the intercorrelations between the values of these parameters shows that the frequency-time EEG indices of both leads are united by a common factor. The amplitude indices of these two leads are united by another common factor. In contrast to this, the stationarity and periodicity indices of the autocorrelation function may be divided into two independent factors, one corresponding to the frontal lead, and the other to the occipital lead. It is suggested that the stationarity and periodicity parameters of the autocorrelation function may possibly be related to the force level of the corresponding neuron ensembles and that interzonal differences in the level of the force property exist between the anterior and posterior regions of the brain. A.B.K.

A72-18058 # **Changes in the RNA content in different regions of the brain of *Citellus erythrogenus* during hibernation (Izmenenie soderzhaniia RNK v razlichnykh otdelakh golovnogo mozga *Citellus erythrogenus* pri zimnei spiachke).** T. M. Semeshina (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Nov. 1971, p. 1616-1620. 18 refs. In Russian.

Study of the RNA dynamics in various regions of the brain of a type of ground squirrel in the active state and at various times during hibernation. In active squirrels in the month of June the RNA content in the frontal and medial zones of the cortex is considerably higher than in the hippocampus and hypothalamus. At the start of hibernation (October) the RNA content in the hippocampus decreased somewhat, while no reliable differences in comparison with active squirrels were observed in the cortex. With deepening

hibernation a further decrease in the RNA content occurred in the hippocampus, and the quantity of RNA in the frontal zone of the cortex decreased. At a later stage (February) the quantity of RNA in the hypothalamus decreased, but in the remaining stages of hibernation (March and April) the RNA level remained the same as in active squirrels. It is concluded that RNA participates in adaptive mechanisms acting in the brain during hibernation. A.B.K.

A72-18059 # **Changes in heart pacemaker activity during intense muscular exertion (Mathematical model/ (Izmeneniia aktivnosti voditelia ritma serdtsa pri intensivnoi myshechnoi rabote (Matematicheskaia model').** V. L. Karpman, V. G. Lioshenko, and V. L. Utkin (Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Nov. 1971, p. 1685-1690. 15 refs. In Russian.

Development of a mathematical model which describes the dynamics of a system which controls the heart rhythm during physical exertion. The proposed model is constructed on the basis of an analysis of transient processes, starting from the assumption that the behavior of the sino-atrial node (and a number of other cardiodynamics parameters) during muscular exertion may be described by a third-order linear differential equation. The model obtained makes it possible to predict the optimal heart rhythm for various work situations. The special features of the operation of the pacemaker under transient and steady conditions are discussed. A.B.K.

A72-18060 # **Functional inequality of erythrocytes in relation to the variability of their content in the blood (Funktional'naia neravnoznachnost' eritrotsitov v sviazi s variabel'nost'iu ikh soderzhaniia v krovi).** A. I. Kliorin, L. A. Tiunov, and M. A. Akhmatova (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Nov. 1971, p. 1691-1694. 30 refs. In Russian.

Study of the relation between the catalase activity in the erythrocytes and the number of erythrocytes in human subjects and albino rats. It is found that the catalase activity is maximal in the erythrocytes of those subjects in which the erythrocyte content is at the lower limit of the norm. As the erythrocyte content increases and approaches the upper limit of the norm, the catalase activity decreases. This correlation is somewhat more pronounced in humans than in rats. It is concluded that an 'insufficiency' in the erythrocyte number is compensated by an increase in the activity functions of each individual erythrocyte. A.B.K.

A72-18061 # **Effect of hyperoxia on the erythropoietic properties of blood plasma flowing from the kidney (Vliianie giperoksii na eritropoieticheskie svoistva plazmy krovi, ottekaushchei ot pochki).** A. M. Volzhskaia and V. I. Voitkevich (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Nov. 1971, p. 1695-1699. 15 refs. In Russian.

Study of the effect of high oxygen partial pressure on the erythropoietic properties of the plasma of both arterial and venous blood flowing directly from rabbit kidneys. It is found that after rabbits have been kept for 40 hours in a hyperoxic medium (90% oxygen in inhaled air at normal atmospheric pressure), the erythropoietic activity of the arterial blood plasma becomes considerably less than before hyperoxia, while blood plasma from a kidney vein even has an inhibiting effect on the mitotic activity of erythroblast cells in a bone marrow culture. These findings attest to the fact that under the action of hyperoxia the kidneys not only cease to form erythropoiesis-stimulating agents, but possibly begin to produce an inhibitor of erythropoiesis. A.B.K.

A72-18062 # Indices of acid-base equilibrium under conditions of intense muscular exertion (Pokazateli kislotno-shcheloch-nogo ravnovesiia v usloviakh intensivnoi myshechnoi raboty). Ia. P. Piarnat, A. A. Viru, T. K. Savi, A. P. Pisuke, and K. K. Luukas (Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 57, Nov. 1971, p. 1717-1722. 19 refs. In Russian.

Study of the shifts in the acid-base balance in athletes performing muscular labor of steadily increasing power on a veloergometer. Using the Astrup micromethod, it is established that both during and after muscular exertion the pH shift and the standard bicarbonate content were less pronounced in more highly trained individuals. The CO₂ partial pressure in the blood decreased during exertion primarily in athletes with a high level of maximum oxygen uptake.

A.B.K.

A72-18150 A mathematical-physical model for the initial behavior of surface and internal tissue subjected to pressure-density variations induced by laser irradiation. S. F. Borg (Stevens Institute of Technology, Hoboken, N.J.). *Medical Research Engineering*, vol. 10, Sept. 1971, p. 20-22. 12 refs.

A model is assumed to account for one facet of the complicated laser-biological interaction phenomena - namely, the transmission of pressure waves through tissue following laser-pulse impact. The model utilizes a similarity transformation which leads to a mathematical-physical solution for the very-early-time portion of the behavior. Pressure-density variations are obtained as well as an estimate of the time of crater formation. 'Q' switched laser energy - i.e., energy delivered in the order of nanoseconds - is assumed. Furthermore, it is assumed that the amount of energy delivered does not vaporize or 'spatter' the tissue although these effects could be approximated using extensions of the given model. The results are theoretical and should be checked experimentally.

(Author)

A72-18158 Tranquilizers and flight duty (Tranquilizer und Flugdienst). H. Schulte-Wintrop. *Wehrmedizinische Monatsschrift*, vol. 16, Jan. 1972, p. 2-5. 12 refs. In German.

Attempt to determine from the literature possible deleterious effects of tranquilizers on the in-flight performance of pilots. Although no direct influence of tranquilizers on flight safety has been demonstrated conclusively, it is concluded that such an effect is to be expected with the use of diazepam or if doses are too high. A potentiating effect by alcohol was described in some cases, but it seems that the influence of alcohol alone was the deciding factor. Ataractica of the chlorodiazepoxide type were found to be ineffective in the treatment of stress reactions in student pilots. The use of certain tranquilizers in the treatment of airsickness and other kinds of kinetoses seems to be promising. The prescribing of tranquilizers for pilots should be refrained from until the effect of tranquilizers on the multiple claims of flight duty is clarified.

A.B.K.

A72-18159 Microalgae for human nutrition (Mikroalgen für die menschliche Ernährung). C. J. Soeder (Kohlenstoffbiologische Forschungsstation, Dortmund, West Germany). (*Gesellschaft für Wehrmedizin und Wehrpharmazie, Wissenschaftliche Tagung, Hamburg, West Germany, May 30, 1970.*) *Wehrmedizinische Monatsschrift*, vol. 16, Jan. 1972, p. 10-14. 25 refs. In German.

Consideration of the possibility of obtaining protein-rich nutritive materials for human consumption from protozoa. The possibility of obtaining a protein-rich food substitute from microalgae cultures is considered, and a method of experimental production of such cultures is described. The results of experiments to determine the protein value of microalgae cultures fed to animals and humans are cited, as well as some clinical findings regarding the use of microalgae as a component of special diets for patients. Finally, the use of microalgae as a food in developing countries suffering food shortages is considered.

A.B.K.

A72-18185 * Synergistic inactivation of viruses by heat and ionizing radiation. R. Trujillo and V. L. Dugan (Sandia Laboratories, Albuquerque, N. Mex.). *Biophysical Journal*, vol. 12, Jan. 1972, p. 92-113. 69 refs. NASA-supported research. NASA Order W-12853.

Viral inactivation by heat and/or ionizing radiation is analyzed in terms of a kinetic model. The phenomenon of synergistic viral inactivation observed when viruses are exposed to the simultaneous application of heat and ionizing radiation is interpreted within the framework provided by this three-term model. Data on the inactivation of T4 bacteriophage by heat and/or ionizing radiation is presented, and the kinetic model is used to provide a description of observed dose rate and temperature dependences. Extension of the model to other viral systems inactivated by heat and ionizing radiation is considered, and the general applicability of these analyses suggests that the kinetic model may well serve as an extension of target theory in describing the radiobiological effects of ionizing radiation.

(Author)

A72-18191 # A theory of the human mind based on a merger of physics and psychology. J. H. Greidanus. *Koninklijke Nederlandse Akademie van Wetenschappen, Proceedings, Series B - Physical Sciences*, vol. 74, no. 5, 1971, p. 445-460. 8 refs.

Development of a theory of human mind based on the hypothesis that a subjective process in a human mind is continuously recorded per component cell of the nervous system in microphysical symbols over the life span. The theory of quantum mechanics is used to evaluate the molecular biology aspects of this hypothesis, on the assumption that discharges and inhibitions occur on the microphysical level. It is also assumed that the associated material and mental processes become complementary modes of a single unified psycho-physical process subject to a combined psychological and physical description. The theory is supported by conventional neurological data and is believed to provide a generalized physical interpretation to virtually all fundamental properties of human mind.

V.Z.

A72-18196 The distensibility of mesenteric venous microvessels. P. Gaehtgens and U. Uekermann (Köln, Universität, Cologne, West Germany). *Pflügers Archiv*, vol. 330, no. 3, 1971, p. 206-216. 34 refs.

Evaluation of the distensibility characteristics of terminal venous microvessels aimed at furthering knowledge about their role in microcirculation. The results obtained suggest that venous microvessels represent the most distensible elements of the venous vascular system.

M.V.E.

A72-18197 Evaluation of the thermodilution technique for measuring coronary sinus blood flow. H. O. Kirzel, I. Amende, K. Schriber, A. Rhiner, H. P. Krayenbühl, and W. Rutishauser (Medizinische Poliklinik; Chirurgische Klinik, Zurich, Switzerland). *Pflügers Archiv*, vol. 330, no. 3, 1971, p. 257-264. 15 refs. Research supported by the Swiss National Fund for Scientific Research.

In anesthetized open chest dogs reciprocal temperature changes during constant-infusion thermodilution was compared with coronary sinus flow metered by graduated cylinder and stopwatch. The reproducibility of the thermodilution method was found to be fairly good. It is believed that this technique will allow accurate measurement of coronary sinus blood flow.

M.V.E.

A72-18198 # Early diagnostics of cerebral arteriosclerosis in flying personnel (Ranniaia diagnostika ateroskleroza sududov golovnogo mozga u letnogo sostava). E. T. Malyshekin, K. K. Ioseliani, and Iu. A. Smirnov. *Voenna-Meditsinskii Zhurnal*, Nov. 1971, p. 52-54. 7 refs. In Russian.

Description of a test program under which early symptoms of cerebral arteriosclerosis were examined in a group of 65 aircrew members with hypertonia, neurocirculatory dystonia, myocarditic cardiosclerosis, and other related complaints. Effects of these conditions on flight performance, as shown by the tests, are discussed. V.Z.

A72-18199 # Study of pilots' activity during the modeling of emergency situations (Izuchenie deiatel'nosti letchikov pri modelirovanii avariinykh situatsii). V. A. Egorov and P. L. Zazulina. *Voенno-Meditsinskii Zhurnal*, Nov. 1971, p. 55-59. 6 refs. In Russian.

The psychophysiological potentials of pilots were examined in simulated emergency situations on a test stand with a set of multicolored flashlight signals and a panel of buttons to be pressed in response to specific emergencies given by unpredictable signal sequences. The simulated emergencies were an engine breakdown at takeoff, a second-engine breakdown on third turn, two-engine landing, horizon failure, cockpit depressurization, and fire. The variables studied were motor reaction time, signal selection time, error number and type, and processed information amount and rate. The performance was about equally higher in pilots 36 to 45 years old and somewhat lower in pilots 31 to 35 and 46 to 50 years old. V.Z.

A72-18200 # A universal vestibulometric swing (Universal'nye vestibulometricheskie kacheli). S. S. Markarian, I. A. Sidel'nikov, N. I. Popov, and E. P. Timoshin. *Voенno-Meditsinskii Zhurnal*, Nov. 1971, p. 81-83. In Russian.

Description of a swinging stand with a rotating seat for obtaining measured doses of separate or combined receptor stimulation in the otolith apparatus and semicircular labyrinth ducts with simultaneous physiological data recording. The stand provides a wide range of linear, angular, and Coriolis accelerations as well as the recording of 15 physiological parameters. V.Z.

A72-18201 A multistage process for computing virtual dipolar sources of EEG discharges from surface information. M. R. Schneider (Institut National des Sciences Appliquées, Villeurbanne, Rhône, France). *IEEE Transactions on Biomedical Engineering*, vol. BME-19, Jan. 1972, p. 1-12. 32 refs. Research supported by the Institut National des Sciences Appliquées and the Hôpital Neurologique.

A mathematical model consisting of a homogeneous spherical conductive medium is used to simulate the human head. A current dipole situated in the interior of the sphere produces on the surface a theoretical distribution of potential similar to certain EEG activities recorded on the human scalp. A systematic multistage process is proposed for calculating the dipole parameters. M.V.E.

A72-18315 # Problems of human biology (Problemi biologii liudini). V. D. Dishlovii. *Akademiia Nauk Ukrains'koi RSR, Visnik*, vol. 34, Nov. 1971, p. 30-39. In Ukrainian.

Human life is discussed in a general framework encompassing philosophical concepts, structural and functional organization of the organism, evolutionary processes, stages of development, interaction with the physical environment, and forms of social behavior. Natural regulatory mechanisms and processes governing the development of life forms are quoted to illustrate the necessity for rational control of means by which man affects the physical environment. T.M.

A72-18616 * # Advancements in medicine from aerospace research. F. T. Wooten (Research Triangle Institute, Research Triangle Park, N.C.). In: *Space for mankind's benefit; Proceedings of the First International Space Congress*, Huntsville, Ala., November 15-19, 1971. Preliminary Volume. Huntsville, Ala., Huntsville Association of Technical Societies, 1971, p. 18-1 to 18-8. Contract No. NASw-2273.

Discussion of a NASA-sponsored medical program under which work is done by multidiscipline teams to provide an interface between aerospace and medicine. A prosthetic urethral valve, an ear oximeter for measurement of oxygen content in the blood, a radiation dosimeter and an electromyographic muscle trainer are noted as the products of this program. V.Z.

A72-18617 # Domestic applications for aerospace waste and water management technologies. F. DiSanto and R. W. Murray (General Electric Co., Valley Forge, Pa.). In: *Space for mankind's benefit; Proceedings of the First International Space Congress*, Huntsville, Ala., November 15-19, 1971. Preliminary Volume. Huntsville, Ala., Huntsville Association of Technical Societies, 1971, p. 19-1 to 19-20.

Review of some of the aerospace developments in solid waste disposal and water purification which are applicable to specific domestic problems. An overview of the management techniques used in defining the need, in utilizing the available tools, and in synthesizing a solution is provided. Specifically, several water recovery processes will be compared for domestic applicability - e.g., filtration, distillation, catalytic oxidation, reverse osmosis, electro-dialysis, etc. Also, solids disposal methods will be discussed - e.g., chemical treatment, drying, incineration, wet oxidation, etc. The latest developments in reducing household water requirements and some concepts for reusing water will be outlined. (Author)

A72-18618 * # Breathing metabolic simulator. R. G. Bartlett, Jr., C. M. Hendricks, and W. B. Morison (IBM Corp., Federal Systems Div., Gaithersburg, Md.). In: *Space for mankind's benefit; Proceedings of the First International Space Congress*, Huntsville, Ala., November 15-19, 1971. Preliminary Volume. Huntsville, Ala., Huntsville Association of Technical Societies, 1971, p. 20-1 to 20-11. Research supported by the U.S. Bureau of Mines and NASA.

Description of a device for simulation of the human breathing and metabolic parameters required for the evaluation of respiratory diagnostic, monitoring, support and resuscitation equipment. The remotely controlled device allows wide variations in breathing rate and depth, breath velocity contour, oxygen uptake and carbon dioxide release to simulate conditions from sleep to hard work, with respiration exchange ratios ranging from hypoventilation to hyperventilation. It also reduces the cost of prolonged testing when simulation chambers with human subjects require three shifts of crews and standby physicians. Several block diagrams of the device and subsystems are given. V.Z.

A72-18626 * # Medical technology advances from space research. S. L. Pool (NASA, Manned Spacecraft Center, Houston, Tex.). In: *Space for mankind's benefit; Proceedings of the First International Space Congress*, Huntsville, Ala., November 15-19, 1971. Supplement. Huntsville, Ala., Huntsville Association of Technical Societies, 1971, p. 1-21.

NASA-sponsored medical R & D programs for space applications are reviewed with particular attention to the benefits of these programs to earthbound medical services and to the general public. Notable among the results of these NASA programs is an integrated

medical laboratory equipped with numerous advanced systems such as digital biotelemetry and automatic visual field mapping systems, sponge electrode caps for electroencephalograms, and sophisticated respiratory analysis equipment. V.Z.

A72-18703 # **A contribution to the mathematical theory of the artificial biped motion.** M. Vukobratović. In: Applications of the theory of nonlinear oscillations in mechanics; International Conference on Nonlinear Oscillations, 5th, Kiev, Ukrainian SSR, August 25-September 4, 1969, Transactions. Volume 3. Kiev, Izdanie Instituta Matematiki AN USSR, 1971, p. 160-173.

In the paper the biped machine motion has been described by a relatively exact mathematical model. Thanks to an assumed gait algorithm and a compensation system that maintains the former a considerably complex mechanical system has been reduced to a maximally simplified system possessing all the functions needed to achieve a stationary gait. In this way, the mathematical model of a biped gait has been represented by two nonlinear differential equations with variable coefficients. Based on the dynamic analysis of such systems the necessary and sufficient conditions of equilibrium during motion have been defined. The exposed statements have been confirmed by an example processed on the digital computer.

(Author)

A72-18720 # **The influence of vibrations on human organism from the view-point of random theory.** K. Piszczek. In: Applications of the theory of nonlinear oscillations in mechanics; International Conference on Nonlinear Oscillations, 5th, Kiev, Ukrainian SSR, August 25-September 4, 1969, Transactions. Volume 3. Kiev, Izdanie Instituta Matematiki AN USSR, 1971, p. 602-617. 8 refs.

The harmful influence of vibrations on human organisms has been investigated, considering transverse vibrations of a beam transmitted to a hand of a man. The problem has been analyzed based on the Fokker-Planck equation. Results are presented graphically; the effect of the vibrations, which depends mainly on their amplitude and frequency, is defined by curves which represent different degrees of harmfulness. O.H.

A72-18728 # **Method of studying the reactions of a human operator considered as an oscillatory system to harmonic and random vibrational action (Metody issledovaniia reaktsii cheloveka-operatora kak kolebatel'noi sistemy na garmonicheskoe i sluchainoe vibratsionnoe vozdeistvie).** K. V. Frolov. In: Applications of the theory of nonlinear oscillations in mechanics; International Conference on Nonlinear Oscillations, 5th, Kiev, Ukrainian SSR, August 25-September 4, 1969, Transactions. Volume 3. Kiev, Izdanie Instituta Matematiki AN USSR, 1971, p. 695-703. 17 refs. In Russian.

Results of an experimental study of the dynamic responses and functional state of a human operator subjected to harmonic and random vibrational excitation. A number of problems involved in obtaining objective estimates of the effect of vibrations of various types and spectral compositions on human operators are considered. Some possible ways of constructing human-operator models which are essentially nonlinear oscillatory systems of complex dynamical structure are indicated, and methods of investigating these models are suggested. A.B.K.

STAR ENTRIES

N72-14043*# Sandia Labs., Albuquerque, N.Mex. Planetary Quarantine Applied Science Div.

A STUDY OF THE DRY HEAT RESISTANCE OF NATURALLY OCCURRING ORGANISMS WIDELY DISPERSED ON A SURFACE

Daniel M. Garst and Kermit F. Lindell Dec. 1971 18 p refs (NASA Order W-12853)

(NASA-CR-124832; SC-RR-71-0742) Avail: NTIS CSCL 06M

Although *Bacillus subtilis* var. *niger* is the standard test organism for NASA planetary quarantine sterilization studies, it was found that some naturally occurring soil organisms are more heat resistant. The separation of these organisms from soil particles is described. Experiments are discussed which were designed to show that the heat resistance is a natural characteristic of the organisms, rather than a condition induced by the clumping effect of agglomerated particles and organisms.

Author

N72-14044*# Martin Marietta Corp., Denver, Colo. Aerospace Group.

EXPERIMENTAL SYSTEM FOR THE CONTROL OF SURGICALLY INDUCED INFECTIONS, OPERATING AND MAINTENANCE INSTRUCTIONS D203613-004

Marvin D. Tevebaugh 13 Oct. 1971 34 p (Contract NASw-2210)

(NASA-CR-125097; MCR-71-326) Avail: NTIS CSCL 06E

An experimental portable system used to control surgically induced infections is described. The system consists of a portable clean room comprised of a laminar flow filter system consistent with Federal standards; a helmet-shoulder pad assembly; a communication system; a helmet ventilation system; a transparent walled enclosure; and surgical gowns. Guidelines for the set up and operation of such equipment are given along with corrective steps to use in case of system malfunctions. Cleaning procedures, maintenance requirements, and disassembly and transfer particulars are included.

E.H.W.

N72-14045# Joint Publications Research Service, Washington, D.C.

BIOPHYSICAL EXPLANATIONS OF THE EFFECT OF MAGNETIC FIELDS ON BIOLOGICAL OBJECTS

I. L. Degen 7 Jan. 1972 15 p refs Transl. into ENGLISH from Vestn. Akad. Nauk Ukr. SSR (Kiev), no. 9, 1971 p 27-34 (JPRS-54880) Avail: NTIS

A review is presented of biological experiments on the effects of a magnetic field on various physiological components. In particular, its effects on blood, cells, and ribonucleic acids are noted.

K.P.D.

N72-14046*# Western Michigan Univ., Kalamazoo.
SCHEDULE-INDEPENDENT FACTORS CONTRIBUTING TO SCHEDULE-INDUCED PHENOMENA

R. R. Hutchinson and G. S. Emley Apr. 1970 39 p refs Prepared in cooperation with Fort Custer State Home (Grants NGR-23-014-001; NGR-23-010-004; NSF GB-18413; Contract N00014-70-A-0183) (NASA-CR-119248; AD-728436) Avail: NTIS CSCL 05J

Research in comparing the contingent and the noncontingent application of biologically-relevant, or primary reinforcer type, events is reported. A squirrel monkey was restrained in a special chair permitting relative freedom of the torso, upper extremities, and head, while severely restricting the general mobility of the animal, and particularly the tail. The monkey was subjected to painful electric shock by electrodes in contact with his tail, and the response was basically measured in terms of manipulative responses and biting a rubber hose suspended in front of the subject's face, or the biting attack behavior. Unconditional effects, conditional effects, and differential influences of stimuli upon different response classes were studied, along with some differential effects of several drugs upon different response classes. Among the findings is that a progressive increase in some aspect of conditional stimulation results in a general progressively heightened tendency toward action until, at maximal levels, a major inversion to suppression occurs.

N.E.N.

N72-14047*# Battelle-Northwest, Richland, Wash.
THE MEASUREMENT OF RADIATION EXPOSURE OF ASTRONAUTS BY RADIOCHEMICAL TECHNIQUES

R. L. Brodzinsai [1970] 8 p refs Sponsored in part by NASA (Contract AT(45-1)-1830)

(BNWL-SA-3608; NASA-CR-125100) Avail: NTIS CSCL 06R

The principal gamma-ray-emitting radioisotopes produced in the body of astronauts by cosmic-ray bombardment which have half-lives long enough to be useful for radiation dose evaluation are Be-7, Na-22, and Na-24. The sodium isotopes were measured in the preflight and postflight urine and feces, and those feces specimens collected during the manned Apollo missions, by analysis of the urine salts and the raw feces in large crystal multidimensional gamma-ray spectrometers. The Be-7 was chemically separated, and its concentration measured in an all Na(Tl), anticoincidence shielded, scintillation well crystal. The overall sensitivity of the experiment was reduced by almost all variables such as low concentrations of excreted cosmogenic radionuclides, high concentrations of injected radionuclides, low sample sizes, long delay periods before analysis, and uncertain excretion rates. The astronaut radiation dose in millirads, as determined by this technique, for the Apollo 7, 8, 9, 10, 11, 12, and 13 missions was 330, 160, <315, 870 ± 550, 31, 110, and <250 respectively. In view of these limitations this technique would be best applied to cases of unusually high exposures, such as that encountered from solar flares.

Author

N72-14048# Air Force Cambridge Research Labs., Bedford, Mass.

VISUAL SENSATIONS INDUCED BY RELATIVISTIC MUONS

P. J. McNulty Jul. 1971 14 p refs (AF Proj. 8600-08-01)

(AD-729449; AFCRL-71-0377; AFCRL-ERP-361;

DoD-Element-61102F; DoD-Subelement-681300) Avail: NTIS CSCL 20/8

Light flashes induced by the passage of a pulse of extremely relativistic muons were recently observed in an experiment at the Brookhaven A.G.S. The flashes are similar to the bright diffuse lightning behind the cloud type of phosphene described by astronauts. Arguments are presented to show that the probable mechanism of these flashes is Cerenkov radiation.

Author (GRA)

N72-14049# Defense Documentation Center, Alexandria, Va.
ENVIRONMENTAL POLLUTION. NOISE POLLUTION; NOISE EFFECTS ON HUMAN PERFORMANCE, VOLUME 1

Bibliography Report, May 1947 - Oct. 1969

Aug. 1971 102 p refs
(AD-729850; DDC-TAS-71-31-1-Vol-1) Avail: NTIS
CSCL 06/19

This is Volume I of two volumes on Environmental Pollution: Noise Pollution - Noise Effects on Human Performance in a series of annotated bibliographies on Environmental Pollution. Noise effects on humans such as motor reactions, hearing, speech, sleep, perception, nervous system, visual signals and fatigue are presented. Corporate Author-Monitoring Agency, Subject, Title, and Report Number indexes are included.

Author (GRA)

N72-14050# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE BIODYNAMICS AND BIONICS DIVISION, 1963 - 1970

Richard J. Zember, ed. Oct. 1970 49 p refs
(AF Proj. 7231; AF Proj. 7232; AF Proj. 7233)
(AD-729859) Avail: NTIS CSCL 06/19

Publications resulting from the research activities of the Biodynamics and Bionics Division of the Aerospace Medical Research Laboratory are listed for the time period from 1963-1970. The bibliography is divided into six technical areas: Biodynamics (General data, theories, multistress); Bioacoustics (Effects of noise on man and communities); Vibration (Pathological, physiological and performance effects; protection); Impact (Human tolerance, protection); Bionics/Biocybernetics (Neurophysiology, Theoretical Biology, Models of biological capabilities, pattern recognition, etc.); Miscellaneous (Instrumentation, computer programs, etc.).

Author (GRA)

N72-14051# Office of Naval Research, London (England).

EUROPEAN SCIENTIFIC NOTES, VOLUME 25, NO. 7

John G. Foss and Victoria S. Hewitson 31 Jul. 1971 42 p refs
(AD-729288) Avail: NTIS CSCL 14/2

The monthly publication presents brief articles concerning recent developments in European scientific research. It is hoped that these articles (which do not constitute part of the scientific literature) may prove of value to American scientists by disclosing interesting information well in advance of the usual scientific publications.

Author (GRA)

N72-14052# Bunker-Ramo Corp., Westlake Village, Calif.

DEVELOPMENT OF A HUMAN PERFORMANCE RELIABILITY DATA SYSTEM

David Meister and Robert G. Mills (AMRL) Wright-Patterson AFB, Ohio AMRL Jun. 1971 20 p refs Presented at the Reliability and Maintainability Conf., 10th, held 28-30 Jun. 1971 Based on final rept. on contract cited
(Contract F33615-70-C-1518; AF Proj. 7184)
(AD-730910; AMRL-TR-71-74; Task-718409) Avail: NTIS
CSCL 05/10

A study was performed to determine the requirements for and the elements of a human performance reliability (HPR) data system. The heart of the HPR system is a taxonomic structure for classifying behavioral studies. 140 studies from a variety of sources were coded using this taxonomy. To test the efficiency of this data bank to provide answers to system development questions a number of tests were performed to determine the relevance of the data retrieved to the questions asked. The results of these tests indicated that it is possible to expand the HPR data base provided one is not restricted to a probabilistic metric.

Author (GRA)

N72-14053*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

THE GEMINI PROGRAM BIOMEDICAL SCIENCES EXPERIMENTS SUMMARY

Edward O. Zeitler and Thomas G. Rogers, comps. (ITT Federal Elec. Corp., Houston, Tex.) Sep. 1971 256 p refs
(NASA-TM-X-58074) Avail: NTIS CSCL 05E

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5. BONE DEMINERALIZATION P. B. Mach, G. P. Vose (Tex. Woman's Univ.), F. B. Vogt (Tex. Inst. for Rehabil. and Res.), and P. A. LaChance p 45-85 refs
6. CALCIUM AND NITROGEN BALANCE, EXPERIMENT M007 G. D. Whedon (Natl. Inst. of Health), L. Lutwak (Cornell Univ., Ithaca, N.Y.), W. F. Neuman (Rochester Univ., N.Y.), and P. A. LaChance p 87-110 refs
7. INFLIGHT EXERCISE AND WORK TOLERANCE, EXPERIMENT M003 L. F. Dietlein and R. M. Rapp p 111-124 refs
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10. HUMAN OTOLITH FUNCTION, EXPERIMENT M009 A. Graybiel and E. F. Miller II (Naval School of Aviation Medicine) p 155-170 refs
11. VISUAL ACUITY AND VISIBILITY, EXPERIMENTS S008 AND D013 S. Q. Duntley, R. W. Austin, J. H. Taylor, and J. L. Harris (Calif. Univ., San Diego) p 171-203 refs
12. RADIATION AND ZERO-GRAVITY EFFECTS ON HUMAN LEUKOCYTES AND NEUROSPORA CRASSA M. A. Bender, F. J. de Serres, P. C. Gooch, I. R. Miller, D. B. Smith, and S. Kondo (Oak Ridge Natl. Lab.) p 205-235 refs
13. FROG EGG GROWTH, EXPERIMENT S003 R. S. Young and J. W. Tremor (NASA, Ames Res. Center, Moffett Field, Calif.) p 237-244 refs
14. SEA URCHIN EGG FERTILIZATION AND DEVELOPMENT R. S. Young (NASA, Ames Res. Center, Moffett Field, Calif.) p 245-247

N72-14054*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

CARDIOVASCULAR CONDITIONING, EXPERIMENT M001

Lawrence F. Dietlein and William V. Judy *In its* The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 3-30 refs

(Expt-M001) Avail: NTIS CSCL 05E

Based on preflight and postflight data, it is concluded that pulsatile cuffs are not effective in lessening postflight orthostatic intolerance. This conclusion is based on the higher heart rates observed during subsequent tilts. It is well established that syncope itself is a poor indicator of the extent of cardiovascular deconditioning. Pulsatile cuffs did lessen the extent of postflight pooling of blood in the legs of test subjects (as determined by the strain-gauge technique).

Author

N72-14055*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

INFLIGHT PHONOCARDIOGRAM, EXPERIMENT M004

Lawrence F. Dietlein *In its* The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 31-44 refs
(Expt-M004) Avail: NTIS CSCL 06B

Electrocardiographic and phonocardiographic data were obtained from both the Gemini 4 and 5 crewmembers. The objective of Experiment M004 was the measurement and correlation of the various phases of the electrical and mechanical activity of the cardiac cycle, in an effort to gain insight into the cardiac functional status of crewmembers during long-duration space flight. Author

N72-14056*# Texas Womens Univ. Research Inst., Denton, c04
BONE DEMINERALIZATION

Pauline B. Mack, George P. Vose, Fred B. Vogt (Tex. Inst. for Rehabil. and Res.), and Paul A. LaChance (NASA. Manned Spacecraft Center, Houston, Tex.) *In* NASA. Manned Spacecraft Center The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 45-85 refs

(Expt-M006) Avail: NTIS CSCL 06S

Crew members of the Gemini 4, Gemini 5, and Gemini 7 missions were compared regarding skeletal changes in three major anatomic sites with respect to changes in skeletal density during space flight. Bone-mass changes have been found for the command pilot and the pilot of each mission in the conventional os calcis section, in the combined sections covering 60 percent of the os calcis, and in hand phalanges 5-2 and 4-2. Comparison of radiographically determined losses in X-ray absorbance with X-ray absorbance losses in healthy young men subjected to bedrest immobilization for the same length of time showed that losses for the crewmembers exceeded losses for the bedrest subjects in all cases; this was an indication that restriction of body movement did not represent the only factor involved. Author

N72-14057*# National Institutes of Health, Bethesda, Md.
CALCIUM AND NITROGEN BALANCE, EXPERIMENT M007 c04

G. Donald Whedon, Leo Lutwak (Cornell Univ., Ithaca, N. Y.), William F. Neuman (Rochester Univ., N. Y.), and Paul A. LaChance (NASA. Manned Spacecraft Center, Houston, Tex.) *In* NASA. Manned Spacecraft Center The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 87-110 refs

(Expt-M007) Avail: NTIS CSCL 06S

The collection of data on the response of the skeletal and muscular systems to 14-day space flights was evaluated for loss of calcium, nitrogen, and other metabolically related elements. Considerable interindividual variability was demonstrated in all experimental factors that were measured. Calcium balance became less positive and urinary phosphate excretion increased substantially in flight despite a reduction in phosphate intake. Patterns of excretion of magnesium, sodium, potassium, and chloride were different for each subject, and, in part, could be correlated with changes in adrenocortical steroid production. The principal hormonal change was a striking decrease during flight in the urinary excretion of 17-hydroxycorticosteroids. Dermal losses of calcium, magnesium, sulfate, and phosphate were insignificant during all three phases. Author

N72-14058*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.
INFLIGHT EXERCISE AND WORK TOLERANCE, EXPERIMENT M003

Lawrence F. Dietlein and Rita M. Rapp *In its* The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 111-124 refs

(Expt-M003) Avail: NTIS CSCL 05E

The response of the cardiovascular system to a known exercise workload is used as index of the general physical condition of crewmembers during long duration space flight. Day-to-day evaluations of pulse rates before and after exercise periods were not remarkable. The response of the cardiovascular system to a calibrated workload was relatively constant for a given individual during space flights of as many as 14 days in connection with the Gemini Program. Author

N72-14059*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

BIOASSAY OF BODY FLUIDS, EXPERIMENT M005

Lawrence F. Dietlein and Elliott S. Harris *In its* The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 125-145 refs

(Expt-M005) Avail: NTIS CSCL 06S

Preflight and postflight urine and plasma samples from the Gemini 7 and Gemini 9 crewmembers were analyzed. Electrolyte and water retention observed immediately postflight was consistent with the assumption that the Gauer-Henry atrial reflex was responsive to a change from the weightless to the unit-gravity environment. Immediately postflight, plasma 17-hydroxycorticosteroid concentrations were increased and plasma uric acid concentration was decreased. The increased excretion of 17-hydroxycorticosteroids immediately postflight probably was caused by the stress of entry. The postflight increase of plasma protein, and the slightly smaller increase of plasma electrolytes postflight, was consistent with an inflight water and electrolyte loss that resulted in postflight retention of water and electrolytes. Author

N72-14060*# Baylor Univ., Houston, Tex. Coll. of Med.

ANALYSIS OF INFLIGHT SLEEP, EXPERIMENT M008

Peter Kellaway *In* NASA. Manned Spacecraft Center The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 147-154

(Expt-M008) Avail: NTIS CSCL 05E

The feasibility of recording the electroencephalogram during space flight is demonstrated. The precise information that is collected with the electroencephalograph regarding the duration, depth, and number of sleep periods implies that electroencephalogram monitoring should be considered for routine use in the long-duration space flights that are contemplated for the Apollo Program and other programs. The importance of such information in the direction and execution of the flight, both to the medical monitors and to the crewmembers, is obvious. Author

N72-14061*# Naval School of Aviation Medicine, Pensacola, Fla.

HUMAN OTOLITH FUNCTION, EXPERIMENT M009 c04

Ashton Graybiel and Earl F. Miller, II *In* NASA. Manned Spacecraft Center The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 155-170 refs

(Expt-M009) Avail: NTIS CSCL 06P

The experiments that were performed during the Gemini 5 and 7 missions resulted in quantitative information concerning otolithic function and orientation of four subjects exposed to an orbiting spacecraft environment for prolonged periods of time. Preflight counterrolling measurements revealed significant differences between crewmembers with regard to the basic magnitude of otolith response. However, after the flight, each crewmember maintained his respective preflight level of response. This was indicative that no significant change in otolithic sensitivity occurred as a result of the flight, or at least no change persisted long enough to be recorded several hours after recovery. The EVLH data recorded for each subject confirmed the

N72-14062

observation that a coordinate space sense exists even in a weightless environment if contact cues are adequate. However, it was noted that the apparent location of the horizontal within the spacecraft may not agree necessarily with its physical correlate in the spacecraft. Author

N72-14062*# California Univ., San Diego. Scripps Inst. of Oceanography.

VISUAL ACUITY AND VISIBILITY, EXPERIMENTS S008 AND D013

Seibert O. Duntley, Roswell W. Austin, John H. Taylor, and James L. Harris *In* NASA. Manned Spacecraft Center The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 171-203 refs

(Expt-S008; Expt-D013) Avail: NTIS CSCL 05E

Data from the inflight vision tester showed that no change was detected in the visual performance of any of the four crewmembers of the Gemini 5 and 7 missions. Results from observations of the side near Laredo, Texas, confirmed that the visual performance of the crewmen during space flight was within the statistical range of their preflight visual performance. The results also demonstrated that visual data collected in the laboratory can be combined with environmental optical data to predict correctly the limiting visual capability of humans to discriminate small objects on the surface of the earth in daylight. Author

N72-14063*# Oak Ridge National Lab., Tenn.
RADIATION AND ZERO-GRAVITY EFFECTS ON HUMAN LEUKOCYTES AND NEUROSPORA CRASSA c04

Michael A. Bender, F. J. DeSerres, P. Carolyn Gooch, I. R. Miller, D. B. Smith, and Sohei Kondo *In* NASA. Manned Spacecraft Center The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 205-235 refs

(Expt-S004) Avail: NTIS CSCL 06S

The two parts of this experiment have resulted in proof that neither orbital space flight nor any of the stresses connected with it produced significant, unpredicted genetic damage, at least insofar as chromosomal-aberration production is a valid measure of this general type of effect. Furthermore, the Gemini 11 results lead to the conclusion that no synergistic effect exists between radiation and factors that are associated with space flight. No significant difference was found between dose-effect curves for survival or mutation induction of the inflight and ground-based samples irradiated on filters. Thus, like the blood experiment, this part of the experiment failed to result in data that were appropriate for confirmation of the apparent synergism that was observed in the Gemini 3 blood experiment. Also, the *Neurospora crassa* experiment provided conclusive data that there is no difference in the genetic effects of irradiation during space flight and the genetic effects obtained in ground-based experiments. Both the Gemini 11 blood experiment and the *Neurospora crassa* experiment thus have failed to result in data confirmatory of the apparent synergism observed on the Gemini 3 mission. Author

N72-14064*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

FROG EGG GROWTH, EXPERIMENT S003 c04
Richard S. Young and J. W. Tremor *In* its The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 237-244

(Expt-S003) Avail: NTIS CSCL 06C

The objective of experiment was to determine the effect of weightlessness on the ability of a fertilized frog egg to divide normally and to differentiate and form a normal embryo. This

experiment was first attempted on the Gemini 8 mission and was completed only partially because of the early termination of that mission. Author

N72-14065*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

SEA URCHIN EGG FERTILIZATION AND DEVELOPMENT c04

Richard S. Young *In* its The Gemini Program Biomed. Sci. Expt. Sum. Sep. 1971 p 245-247

(Expt-S002) Avail: NTIS CSCL 06C

The effects of subgravity (much less than unit gravity) on fertilization, cell division, differentiation, and growth of a relatively simple biological system (eggs of the sea urchin *Arbacia punctulata*) were considered. The experiment was flown on Gemini 3 and recovered as scheduled. However, the experiment objectives were not achieved, primarily for mechanical reasons. Author

N72-14066# Joint Publications Research Service, Washington, D.C.

SPACE BIOLOGY AND MEDICINE, VOLUME 5, NO. 5, 1971

O. G. Gazonko, ed. 22 Dec. 1971 147 p refs Transl. into ENGLISH of *Kosmicheskaya Biol. Med.*, Med. Publishing House, Moscow, v. 5, no. 5, 1971 p 3-90 (JPRS-54768) Avail: NTIS

Aerospace medical and exobiological factors of manned space flight are considered. The effects of physiological and psychological stresses, confining life support systems, radiation exposures, and regenerated breathing atmospheres on the human body are accentuated.

N72-14067# Joint Publications Research Service, Washington, D.C.

RESCUE OF SPACECRAFT CREWS AFTER THEIR FORCED LANDING ON LAND OR AT SEA

V. G. Volovich and M. A. Tumanov *In* its Space Biol. and Med., vol. 5, no. 5, 1971 22 Dec. 1971 p 1-8 refs

Avail: NTIS

Environmental factors acting on the human body are considered in the rescue of spacecraft crews after emergency landings on land or at sea. Regions with external climatic-meteorological conditions under which man's self-sustaining existence is particularly complex are: deserts, tropical zones of the oceans, and arctic areas. Consolidated portable emergency supplies consist of food rations, water, equipment for distilling and storing water, radio and signaling devices, pharmaceuticals, boat or raft, personal necessities, and camping equipment if feasible. The greatest emphasis is placed on search facilities for rescuing crews and the timely discovery, medical treatment, and evacuation of those flying crews after emergency landings. G.G.

N72-14068# Joint Publications Research Service, Washington, D.C.

ROLE OF VISCERAL AFFERENTATION IN VESTIBULAR SYSTEM ACTIVITY c04

V. S. Raytses and A. M. Dutov *In* its Space Biol. and Med., vol. 5, no. 5, 1971 22 Dec. 1971 p 9-17 refs

Avail: NTIS

Chronic experiments were performed on rabbits to study the effect of stimulating gastric and rectal mechanoreceptors on postural-tonic and vestibular-oculomotor reflexes of the labyrinth evoked in response to vestibular excitation. Visceral irritation of moderate intensity decreased the vestibular apparatus stimulation threshold, increased the reflex time, and shifted the maximum of muscular discharges toward weaker labyrinthal stimulation. They also increased the frequency and amplitude of rotational and post-rotational nystagmus, thus indicating an increase in vestibular excitability under these circumstances. The mentioned parameters of postural-tonic and vestibular-oculomotor reflexes declined in response to relatively weak visceral stimulation. Author

N72-14069# Joint Publications Research Service, Washington, D.C.

EFFECT OF HYPOXIA ON THE DIURNAL RHYTHM OF MITOTIC ACTIVITY IN THE BONE MARROW ERYTHROPOIETIC SYSTEM c04

S. Baranski, K. Kwarezki, Ya. Rozinski, and S. Smigelski *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 18-22 refs

Avail: NTIS

Experiments performed on guinea pigs under varying illumination conditions and on animals kept for 14 days at an elevation of 7,000 m revealed a distinct relationship between the mitotic activity of bone marrow cell erythropoiesis and the illumination pattern. They also demonstrated hypoxic stimulation of the erythropoietic system. Author

N72-14070# Joint Publications Research Service, Washington, D.C.

REACTION OF THE HUMAN BODY DURING BREATHING OF GAS MIXTURES CONTAINING 3-9% CO₂

I. I. Malkiman, V. N. Polyakov, and V. K. Stepanov *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 23-29 refs

Avail: N11S

The toxic effects of carbon dioxide on the human body are investigated by studying the body reactions of humans breathing atmospheres containing from 3 to 9 percent CO₂. Evaluations of physiological functions in relation to the CO₂ concentration in the inhaled gas mixture show that all subjects easily tolerate 3 to 6 percent of carbon dioxide. Second degree toxic reactions are observed when gas mixtures contain more than 7 percent CO₂: this is characterized by stressing of all physiological body functions. However, the degree of poisoning symptoms depends also in individual sensitivity to such an exposure. G.G.

N72-14071# Joint Publications Research Service, Washington, D.C.

EFFECT OF DIFFERENT ATMOSPHERES ON ACTIVE TRANSPORT OF GLUCOSE IN THE SMALL INTESTINE OF RATS c04

O. I. Babkina and K. V. Smirnov *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 30-36 refs

Avail: NTIS

Experiments conducted with segments of the small intestine in rats gave evidence that a preliminary exposure of the animals to a modified atmosphere (hypoxia-ascent to an altitude of 12,000 m; hypercapnia--20% CO₂; hyperoxia--100% O₂ at a pressure of 4 atm) accelerated the active transport of glucose. Exposure to a hypoxic atmosphere induced the greatest changes. Author

N72-14072# Joint Publications Research Service, Washington, D.C.

EFFECT OF HYPOKINESIA ON THE HYPOTHALAMIC HYPOPHYSEAL NEUROSECRETORY SYSTEM IN RATS c04

L. A. Andrianova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 37-41 refs

Avail: NTIS

Animals exposed to hypokinetic conditions exhibited an activation of the hypothalamic-hypophyseal neurosecretory system at early stages during exposure. The reaction was characterized by release of the neurosecretory substance from the hypophyseal posterior lobe and in increase in the antidiuretic hormone concentration in the blood. Author

N72-14073# Joint Publications Research Service, Washington, D.C.

MATHEMATICAL DESCRIPTION OF RADIATION DAMAGE AND RECOVERY PROCESSES IN THE HEMOPOIETIC SYSTEM c04

R. A. Kuzin, G. F. Nevskaya, V. I. Popov, V. A. Sakovich, A. V. Shafirkin, and V. V. Yurgov *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 42-47 refs

Avail: NTIS

A mathematical model describing changes in the leukocyte count after total or partial body irradiation is reported. The proposed model makes it possible to take into account irradiation of different organs and the probability of their damage. This model is used in analyzing the results of an experiment in which dogs were irradiated with 250-MeV protons in a dose of 350 rads when partial body shielding was used. The degree of residual damage, recovery rate, and percentage of total bone marrow in different body regions and leukocyte lifetimes were determined. The latter two parameters determined using the proposed model are in good agreement with data calculated by the use of the other methods. Author

N72-14074# Joint Publications Research Service, Washington, D.C.

EFFECT OF ATP DURING PROLONGED IRRADIATION c04

V. D. Rogozkin, M. V. Tikhomirova, and L. M. Ostroumova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 48-53 refs

Avail: NTIS

The effect of ATP was studied during prolonged irradiation (0.28 to 1.0 R/min) of mice, guinea pigs and dogs. ATP administration gave the most distinct and positive effect in dogs. ATP administration during prolonged gamma irradiation of dogs with lethal doses increased their survival by 40 percent (in comparison with the control) and alleviated the development of acute radiation damage. Author

N72-14075# Joint Publications Research Service, Washington, D.C.

PRODUCING AND EVALUATING THE EFFECTIVENESS OF SILVERED FILTERS FOR DECONTAMINATING AND PRESERVING WATER

V. V. Shaydorova, S. V. Chizhov, Yu. Ye. Sinyak, A. A. Ballod, and N. A. Sokolova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 54-60 refs

Avail: NTIS

The experimental characteristics are given for the contact method of decontaminating water using silver reduced on the surface of activated charcoals and ion exchange resins using ascorbic acid, hydroquinone and formaldehyde. It was established that the dynamics of dissolving of ionic silver from silvered surface is dependent on the chemical nature of the sorbent and on the method for reducing the silver. In this method the decisive role is played by impurities present on the sorbent surface. A filter consisting of a silvered KU-2 x 8 cationite, reduced by hydroquinone, and AG-5 activated charcoal exhibited a stable rate of washing of silver from the surface. Author

N72-14076# Joint Publications Research Service, Washington, D.C.

TIME DEFICIT AS A STRESS FACTOR IN MENTAL ACTIVITY OF AN OPERATOR IN A MAN FLIGHTCRAFT SYSTEM

K. K. Isoeliani *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 61-66 refs
Avail: NTIS

The mental activity of an operator who experienced a time deficit was studied by observing his sensorimotor activity in perceiving stimuli in a broad visual field. Determined was the rate limit at which the subject retained a capacity for working at a maximum level. The study was made with 250 healthy male subjects in the age group 25 to 45 years. Subjects were classified into three groups which differed substantially in their rate of mental activity: high, moderate and low. While working at the maximum rate the subjects exhibited unequal neuropsychic stress and uneven performance. When an individual man-operator was engaged in complex and continuous work the time deficit appeared to be a stress factor which made his functioning in the man-flightcraft system more difficult. Author

N72-14077# Joint Publications Research Service, Washington, D.C.

DURATION OF THE DAILY CYCLE ANALYZED WITH RESPECT TO ITS INFORMATION ENERGY COST c04

S. I. Stepanova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 67-76 refs
Avail: NTIS

Stability of the information and energy cost in the human daily (circadian) cycle is analyzed. It is postulated that with any change in the sleep-wakefulness cycle its information and energy cost is invariable. According to this hypothesis a human being cannot adapt to a day shorter than 12 hours or longer than 52 hours. An equation to be used in calculating the optimum duration of the circadian cycle of a particular individual with respect to the energy cost of his working hours is derived. The question of whether it is advisable to change the normal 24-hour cycle during prolonged space missions is considered. Author

N72-14078# Joint Publications Research Service, Washington, D.C.

COMPARISON OF TOLERANCE OF FRONTAL AND SAGITTAL HEAD TILTS IN MAN IN ROTATING SYSTEMS

F. A. Solodovnik *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 77-81 refs
Avail: NTIS

The vestibular tolerance of subjects who were rotated with their heads tilted in the sagittal and frontal planes was studied. The chair was rotated at a rate of 180 deg/sec and the subjects tilted their heads every 5 seconds at an angle of 30 deg. The experiments demonstrated that the subjects developed motion sickness much faster when their heads were tilted frontally. A comparison of the directions of inertial displacement of the endolymph in the vertical semicircular canals and and the

resultant of linear accelerations gave evidence that the stimulation of the vertical semicircular canals and otoliths differed greatly when the head was tilted sagittally and frontally during rotation. Author

N72-14079# Joint Publications Research Service, Washington, D.C.

FORCES ACTING ON VESTIBULAR APPARATUS RECEPTOR FORMATIONS DURING HEAD MOVEMENTS

V. N. Krutko *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 82-86 refs
Avail: NTIS

On the basis of a mathematical analysis of natural movements of the human head formulas were derived for determining the forces affecting vestibular apparatus receptor formations. It was found that head movements are accompanied by transfer and relative accelerations as well as by Coriolis accelerations. An example of the computation of forces affecting the otoliths and semicircular canals during a stipulated head movement is given. Author

N72-14080# Joint Publications Research Service, Washington, D.C.

IN-FLIGHT ACCELERATION SENSATIONS AND METHODS FOR CONTENDING WITH THEM

Yu. F. Udalov, V. F. Zhernavkov, O. P. Khalatov, and N. A. Chelnokova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 87-96 refs
Avail: NTIS

Post-flight examinations revealed a decrease in the amino acid level, an increase in the intensity of protein metabolism, and a change in pyridoxine metabolism which suggested that its use increased during flight. After flight, vestibular tolerance decreased and the state of the vestibular analyzer changed. It is suggested that the mentioned variations are related to metabolic conditions. This was verified experimentally by inducing pyridoxine deficiency in the body causing disturbed acceleration sensations and inadequate (illusory) feelings. The changes were eliminated by administering pyridoxal combined with ATP. This drug combination was effective in treating metabolic changes induced by flight effects. Author

N72-14081# Joint Publications Research Service, Washington, D.C.

DEPENDENCE OF THE NATURE OF CRANIOCEREBRAL TRAUMA ON IMPACT CONDITIONS

B. A. Rabinovich, L. N. Shollo, and Ye. Ya. Shcherbakova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 97-105 refs
Avail: NTIS

Case histories of 317 subjects with craniocerebral trauma were examined. Impact parameters were determined from the accident descriptions. With an impact velocity of 3.0 to 10.5 m/sec, the severity of the craniocerebral trauma depended to a considerable degree on the occurrence of fractures in the cranial base and on the degree of pathogenetic involvement of intracranial structures adjacent to the cranial base, including the main carotid vessels. These injuries did not occur when impacts were in the frontal zone and nearly always occurred in the case of impacts in the temporal and occipital regions with a velocity of more than 5.5 m/sec. Author

N72-14082# Joint Publications Research Service, Washington, D.C.

RATE OF ELIMINATION OF METABOLIC PRODUCTS FROM MAN CONFINED IN INSULATING GEAR (FOR

DIFFERENT PHYSICAL LOADS AND DIETS)

S. M. Gorodinskiy, A. V. Sedov, A. N. Mazin, G. A. Gaziyeu, A. P. Kleptsova, and L. I. Zhukova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 106-111 refs

Avail: NTIS

Test subjects were given special diets and kept either at rest or performing work at a rate of 200 and 400 Cal/hour in a normal atmosphere. Under these conditions the rate at which they released volatile and gaseous toxic compounds was measured. The subjects who consumed the diets exhibited a significant decrease in the exhalation of hydrogen sulfide, acetone, phenol, ammonia and amines in comparison with subjects who ate as they chose. The diets did not affect the rate of elimination of carbon monoxide and carbon dioxide. Author

N72-14083# Joint Publications Research Service, Washington, D.C.

SYNTHESIS OF REDOX POLYMERS AND THEIR USE FOR PURIFYING AQUEOUS SOLUTIONS FROM ORGANIC IMPURITIES

Ye. Ye. Yergozhin, B. A. Zhubanov, S. R. Rafikov, Yu. Ye. Sinyak, V. F. Stolbov, and V. V. Krasnoshchekov *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 112-118 refs

Avail: NTIS

The synthesis of polycondensation redox polymers with an ordinary and macroporous structure and a preliminary study of the possibility of their use for purifying aqueous solutions from the organic impurities present in a condensate of atmospheric moisture are reported. It is shown that with an increase in length of the hydrocarbon radical the capacity of the polymer for sorbed compounds increases. Author

N72-14084# Joint Publications Research Service, Washington, D.C.

CATALYTIC OXIDATION OF SOME GASEOUS PRODUCTS OF PYROLYSIS OF WASTES OF HUMAN VITAL FUNCTIONS

G. S. Sinyak, P. V. Lisovskiy, G. I. Chizhikova, M. A. Vitashkina, Ye. I. Karpova, B. G. Gusarov, and L. L. Zablotskiy *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 119-124 refs

Avail: NTIS

A study was made of the applicability of catalysts (hopcalite, copper-chromium, copper-cobalt, platinum and palladium) in bringing about deep oxidation of the vapor-gaseous phase formed during the thermal treatment of human wastes. Oxidizing properties of the catalysts were studied for individual gases: methane, hydrogen, and carbon monoxide. Catalysts with higher activity were used to oxidize a real gas mixture. It was found that the gas mixture oxidation reaction is completed at 350 deg only when using a palladium catalyst. Author

N72-14085# Joint Publications Research Service, Washington, D.C.

POSSIBILITY OF THE DEVELOPMENT OF DYSBACTERIOSIS IN GUINEA PIGS AND RATS UNDER THE INFLUENCE OF A MAGNETIC FIELD c04

V. M. Katola and A. N. Kovalevskaya *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 125-127 refs

Avail: NTIS

Prolonged exposure of animals to a magnetic field with a strength of 2,500 oe with a gradient of 23 oe/cm can in some cases lead to the appearance of enteric dysbacteriosis in guinea pigs and rats. A general observation is that an increase in the number of coliform bacteria in the intestine of these species of

animals is observed during the second or third week of the experiment. Further exposure in a magnetic field leads to body adaptation in the animals and a normalization of intestinal microflora. Author

N72-14086# Joint Publications Research Service, Washington, D.C.

INTENSITY OF TISSUE AUTOLYSIS IN ANIMALS DURING HYPOKINESIA c04

I. V. Fedorov *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 128-130 refs

Avail: NTIS

The total content of free amino acids in the tissues prior to incubation and after 15-22 days of hypokinesia was at the same level as in healthy animals, virtually coinciding even in absolute mean numbers. On the 51st-59th days of hypokinesia the content of free amino acids in all the investigated tissues exhibited a reliable decrease ($P < 0.05$). Author

N72-14087# Joint Publications Research Service, Washington, D.C.

EFFECT OF ILLUMINATION ON THE RADIATION EFFECT IN LEAF CABBAGE AFTER IRRADIATION BY PROTONS AND GAMMA RAYS c04

I. S. Skukina, Yu. I. Shaydorov, and V. N. Nekrasova *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 131-136 refs

Avail: NTIS

The effectiveness of protons and gamma radiation is dependent on the condition for illumination of the irradiated plants. This dependence was expressed more clearly with irradiation by protons than in the case of gamma radiation. Author

N72-14088# Joint Publications Research Service, Washington, D.C.

SOPORIFIC AND TOXIC EFFECT OF AMOBARBITAL SODIUM DURING 33-DAY HYPOKINESIA AND ISOLATION OF MICE c04

L. A. Kravchuk *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 137-140 refs

Avail: NTIS

A study was made of white male mice weighing 17-19 g. There were 30 animals in each of the three groups: the first was a control, the second was for reproducing the conditions of isolation, and the third was for simulating hypokinesia with insulation. It was found that the condition of the mice in the first, second, and third groups was dissimilar with respect to sensitivity to amobarbital sodium in relation to mean soporific doses, speed of onset of its action, time of onset and duration of sleep, and the mean toxic dosage. The breadth of the therapeutic effect of amobarbital sodium differed insignificantly in all animal groups. Author

N72-14089# Joint Publications Research Service, Washington, D.C.

EFFECT EXERTED ON ERYTHROPOIESIS IN FISH AND RATS BY WATER REGENERATED FROM HUMAN URINE c04

L. A. Telitchenko and M. M. Boychenko *In its Space Biol. and Med.*, vol. 5, no. 5, 1971 22 Dec. 1971 p 141-142 refs

Avail: NTIS

The effects of biological and physicochemical methods of water generation from human urine on the erythropoietic

systems of fish and rats were observed by changes in equilibrium between young and old erythrocytes during animal blood formations. Graphic representations of erythrocytic osmotic resistances with time showed that the greatest changes in fish and rats were caused by water regenerated in a psychochemical distillation method. G.G.

N72-14090# Advisory Group for Aerospace Research and Development, Paris (France).

CLINICAL CAUSES FOR GROUNDING

Heinz S. Fuchs Nov. 1971 192 p refs Presented at the AGARD Aerospace Med. Panel Specialist Meeting, Oporto, Portugal, 21-22 Jun. 1971

(AGARD-CP-89-71) Avail: NTIS

Papers given at the AGARD Aerospace Medical Panel Specialist Meeting held in Oporto, Portugal from 21 to 22 June 1971 are presented. The subject was divided into two parts: the general aspects of clinical causes for grounding in the various air forces, and the specific aspects of grounding according to medical specialties. Each paper is followed by a discussion. A technical summary and an evaluation are included at the end.

N72-14091# Italian Air Force Medico-Legal Inst., Milan.
STATISTICAL SURVEY ON THE CLINICAL CAUSES OF TEMPORARY GROUNDING AND PERMANENT UNFITNESS OF IAF AIRCREWS

Gaetano Rotondo *In* AGARD Clinical Causes for Grounding Nov. 1971 29 p refs

Avail: NTIS

An analytical study of the clinical causes that most frequently lead to temporary or permanent loss of fitness among flying personnel was undertaken. A wide statistical survey was made on morbidity, or rather some aspects of morbidity, in the personnel of the Italian Air Force, among the various categories or groups of categories connected with the flying service in general, and with particular regard to pilots. Such a study was undertaken with the hope of detecting the physio-psychic causes that have most weight and incidence in giving rise to unfitness for military service and for flying. It would then be possible to make practical suggestions in order to reduce the incidence of these causes and their disabling effects. Author

N72-14092# Royal Naval Air Medical School, Hillhead (England).
CLINICAL CAUSES FOR GROUNDING: A REVIEW OF ROYAL NAVAL EXPERIENCE, 1962 - 1970

I. H. Colley and F. St. C. Golden *In* AGARD Clinical Causes for Grounding Nov. 1971 11 p refs

Avail: NTIS

The clinical causes for permanent grounding in the British Fleet Air Arm, for the period January 1962 to December 1970 inclusive were examined. Clinical groundings constitute 13% of the total groundings for all reasons. Psychiatric illness is responsible for 58% of clinical groundings and was the major cause of wastage in trained aircrews. Author

N72-14093# Belgian Air Force, Brussels.
ANALYTICAL STUDY OF THE CAUSES OF MEDICAL UNFITNESS OF FLYING PERSONNEL IN THE BELGIAN AIR FORCE [ETUDE ANALYTIQUE DES CAUSES D'INAPTITUDE MEDICALE DU PERSONNEL NAVIGANT DE LA FORCE AERIENNE BELGE]

J. Bande and R. Moorthamers *In* AGARD Clinical Causes for Grounding Nov. 1971 11 p *In* FRENCH

Avail: NTIS

A comprehensive analysis was made of the causes of temporary and permanent unfitness, in cases treated by the ad hoc Medical Commission of the Belgian Air Force from 1965 to 1971. The study concerned 635 subjects, of whom 29.5% had a number of different disabilities; 7.6% of the cases were the object of permanent grounding and 12.9% were permanently limited in their fitness for the air service. 40% of the cases were accident victims. Of 904 disabilities, the pathology of the locomotor system was the most frequent, involving afflictions of both the neuropsychiatric and digestive systems. After eliminating accident cases, the most frequent pathology was of the digestive and respiratory tracts. A study of the correlation between age of the subject and the length of disability as a function of pathological class gave no conclusive results. Transl. by K.P.D.

N72-14094# Naval Air Station, Norfolk, Va.
A REPORT OF AVIATOR GROUNDING AND AVIATOR SALVAGE IN HIGH PERFORMANCE FIGHTER AIRCRAFT
Romaine L. Bendixen *In* AGARD Clinical Causes for Grounding Nov. 1971 8 p refs

Avail: NTIS

The role of the flight surgeon in the United States Navy, and particularly the role of the dually designated physician-pilot, is considered in the evaluation, treatment, and disposition of aviators flying in high performance jet fighter aircraft. Personal observations and experiences of the author as a pilot instructor-flight surgeon with a McDonnell F-4 (Phantom II) training squadron form the basis for the presentation and discussion of several cases involving the question of grounding for major clinical reasons. An integral part of these discussions is an attempt to demonstrate the value of the pilot-physician. This report covers a relatively short span of time, October 1967 through July 1969, but is particularly significant in the number of interesting cases that arose requiring evaluation and disposition. Author

N72-14095# School of Aerospace Medicine, Brooks AFB, Tex.
USAF AEROMEDICAL CONSULT SERVICE EXPERIENCE IN CAUSES FOR GROUNDING OVER THE PAST FIFTEEN YEARS

Malcolm C. Lancaster *In* AGARD Clinical Causes for Grounding Nov. 1971 7 p refs

Avail: NTIS

A marked change in the factors that relate to medical grounding of flyers in the United States Air Force (USAF) has occurred over the past 15 years. The increasing age of the flying population is the major causative factor producing this change. Improved diagnostic techniques and an increase in the fund of information about normals and individuals with early disease also had a significant influence upon both the types of problems evaluated and their disposition. The experience of USAF School of Aerospace Medicine over a period of 15 years is reviewed, and the trends and factors related to medical criteria for grounding USAF flyers are discussed. Author

N72-14096# Office of the Surgeon General (Air Force), Washington, D.C.

CAUSES FOR MEDICAL GROUNDING OF PILOTS AND NAVIGATORS IN THE UNITED STATES AIR FORCE, 1969
Robert A. Farmer and Howard R. Unger *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p

Avail: NTIS

Specific indices and measures of the health of USAF-rated officers are computed from biometric data provided by the flight surgeon's medical recommendations. These data are discussed in relation to the health of Air Force flyers and the practice of

aerospace medicine in the U.S. Air Force. Similarities and variations of medical practice and management are considered. Comparisons of the rates of removal and noneffective ratios by rating, age, and command are presented. Author

N72-14097# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

CLINICAL CAUSES FOR PERMANENT GROUNDING OF AIRCREW WITHIN THE GERMAN ARMED FORCES

H. J. Grunhofer and K. R. Mueller *In* AGARD Clinical Causes for Grounding Nov. 1971 9 p

Avail: NTIS

All clinical causes for permanent grounding of German armed forces pilots and other aircrew members were examined and analyzed statistically. The causes for medical disqualifications are divided into diagnostic groups or according to specific functions of organs and/or organ systems. Special emphasis is given to waivers and to certain psychological aspects. There were 24,396 physical examinations studied over a period of 11 years. Author

N72-14098# Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France). Service de Sante des Armees.

STATISTICAL ANALYSIS OF UNFITNESS OF FLYING PERSONNEL IN THE FRENCH AIR FORCE [STATISTIQUE DES INAPTITUDES DU PERSONNEL NAVIGANT DE L'ARMEE DE L'AIR FRANCAISE]

J. Nathie, P. M. Pingannaud, and A. Gibert *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p *In* FRENCH

Avail: NTIS

The physical fitness of flying personnel in the French Air Force is supervised by the Centers for Medical Evaluation of Flying personnel. A general study of 60,811 review evaluations made by the centers from 1960 to 1969 show that, among 1400 causes of observed unfitness (temporary unfitness excluded), the most numerous were neuropsychiatric disorders (381 causes) and inadequacy of the visual function (379 causes). These conclusions were made precise in a detailed study of the results in 1969, during which year 72 subjects were declared unfit. It appears that unfitness of neuropsychiatric origin is essentially motivated by psychological or psychosomatic difficulties. The disabilities recorded rarely led to the elimination of flying personnel, the majority being eventually discharged or reclassified into another specialty. The importance of statistical problems is emphasized and their solution by electronic data processing methods is proposed. Transl. by K.P.D.

N72-14099# Hellenic Air Force General Hospital, Athens (Greece). Dept. of Internal Medicine.

MEDICAL ASPECTS OF GROUNDING AND NONEFFECTIVENESS IN HELLENIC AIR FORCE PILOTS

C. E. Giannopoulos and H. G. Vissoulis *In* AGARD Clinical Causes for Grounding Nov. 1971 5 p refs

Avail: NTIS

Based upon statistics from Greek pilots' individual health files, hospital records, and the Aviation Supreme Medical Board's certifications, a ten year analytical study of the medical causes of admissions, waivers, suspensions, and permanent groundings is presented. Data on the medical causes for elimination from flying training are also discussed comparatively. From an average strength of 642 rated pilots, 24 were permanently grounded for medical reasons. The major cause was due to sensory deficiencies which accounted for 9 groundings, or 37.5% of the total. Peptic ulcer disease is the most frequent cause for noneffectiveness and accounts for several permanent groundings.

The incidence of coronary heart disease is exceptionally low and should be attributed to the younger age distribution of the surveyed population. The elimination of two cadets for thalassemia minor and the finding of several cases of thalassemia trait among rated pilots brings into focus the problem of thalassemia, endemic in certain areas of Greece. Author

N72-14100# Naval Aerospace Medical Inst., Pensacola, Fla. **THE US NAVY SPECIAL BOARD OF FLIGHT SURGEONS: KEEP THEM FLYING SAFELY**

M. D. Courtney *In* AGARD Clinical Causes for Grounding Nov. 1971 12 p

Avail: NTIS

In 1957 the United States Navy's Bureau of Medicine and Surgery directed the establishment of the Special Board of Flight Surgeons. This board consists of specialists in aerospace medicine and related fields who can make recommendations concerning the physical qualifications of Navy and Marine Corps aircrew personnel, which are necessary for them to continue in duty involving flying. The composition of the Special Board and its method of operation are described, and the kinds of cases referred to it for the past fourteen years and the recommendations made for the disposition of these cases are reviewed. Author

N72-14101# School of Aerospace Medicine, Brooks AFB, Tex. **CHANGING CONCEPTS IN MEDICAL REASONS FOR GROUNDING IN THE USAF AEROMEDICAL CONSULT SERVICE**

John H. Triebwasser *In* AGARD Clinical Causes for Grounding Nov. 1971 9 p refs

Avail: NTIS

Flying safety is the major factor underlying medical decisions regarding a given aviator's fitness to fly. Over the past 15 years medical concepts were modified as experience with an older population and newer diagnostic techniques was gained. The incidence of degenerative disease has increased parallel with the age of the USAF aircrew member. Increasing emphasis must be placed on the early diagnosis of those conditions that could result in sudden incapacitation. Experience in aerospace medicine is limited to a younger, more healthy, population than that found in a hospital. The significance of several electrocardiographic findings usually associated with disease in a sick population is not necessarily of the same importance in the Air Force patient population. Four conditions that were considered representative of significant organic heart disease are considered. These are electrocardiographic repolarization changes, cardiac arrhythmias, acquired bundle branch block, and aortic valvular insufficiency. Author

N72-14102# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

CARDIOLOGIC FINDINGS AS CAUSE FOR GROUNDING

H. W. Kirchhoff and A. Dietz *In* AGARD Clinical Causes for Grounding Nov. 1971 3 p

Avail: NTIS

The routine cardiology program performed at the Institute of Aviation Medicine of the German Air Force to determine fitness for military flying duty is described. It is comprised of an overall clinical examination, an electrocardiogram taken at rest, and the so-called master two-step test. If required, the physician may order additional electrocardiographic, mechanocardiographic, and functional medical tests. Armed forces regulation serves as the criterion for the final assessment and lists all findings which preclude, or render questionable, flying duty. Author

N72-14103# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

NEW FINDINGS CONCERNING THE IMPORTANCE OF ARRHYTHMIAS

A. Dietz *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p

Avail: NTIS

Long term electrocardiograms (EKG's) are recorded at the Institute of Aviation Medicine of the German Air Force for any subject showing rhythmic cardiac disturbances. Long term registration is superior to routine EKG's with respect to recording arrhythmias. The advantages and techniques of long term EKG's are considered. Author

N72-14104# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

INCIDENCE OF CORONARY RISK FACTORS IN PILOTS OF THE BUNDESWEHR

Klaus Jung *In* AGARD Clinical Causes for Grounding Nov. 1971 10 p

Avail: NTIS

A group of 1000 pilots of different types of aircraft were examined with respect to distribution of various parameters, which, in extreme cases, constituted coronary risk factors. Cigarette consumption, serum cholesterol level, systolic and diastolic blood pressure, physical activity, body weight, vital capacity, fasting blood sugar level, automesnia, and family predisposition were studied in detail. For the sum of risk factors, the distributions were considered for total group, separate age groups, pilots grouped according to types of aircraft flown (total and in separate age groups), and for pilots under 30 years of age grouped according to aircraft flown and training status. Coronary stress is barely increased compared to a normal population. Prop pilots are, at least coronarily, jeopardized to the same extent as jet pilots. This is particularly true for older age groups. The greatest increment of psychophysical stress effects on the coronary system occurs between the start of training and the first flying experience, independent of the aircraft type flown. Author

Author

N72-14105# Office of the Surgeon General (Air Force), Washington, D.C.

SUSPENSIONS OF PILOTS AND NAVIGATORS FROM FLYING STATUS FOR MEDICAL REASONS IN THE UNITED STATES AIR FORCE, 1969

Robert A. Farmer and Howard R. Unger *In* AGARD Clinical Causes for Grounding Nov. 1971 7 p

Avail: NTIS

The age distribution, causes, numbers, and diagnostic categories of medical suspensions of flying personnel in the U. S. Air Force which occurred in 1969 are discussed. Identification of preventive and clinical medical practices and policies which may prevent or remove the medical cause of the suspension are made possible by the study. Author

Author

N72-14106# Royal Air Force Central Medical Establishment, London (England).

CURRENT NASAL AND AURAL INDICATIONS FOR GROUNDING

P. F. King *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p refs

Avail: NTIS

The current indications for aircrew grounding due to nasal and aural disorders are described. The importance of careful preliminary selection is emphasized. The decreasing incidence of nasal infection was noted, together with the increasing part played by nasal allergy. The question of chronic bronchitis,

bronchiectasis, and asthma, which complicate nasal disease, is discussed. Of the commoner aural lesions, otosclerosis as a cause of permanent grounding and the effect of stapedectomy are considered. Chronic otitis media and the indications for grounding, compared with those permitting continued flying, are examined. The relative and absolute indications for grounding in cases of chronic otitic barotrauma are discussed. Perceptive deafness and labyrinthine causes of vertigo and their influence on fitness to fly are also described. Author

Author

N72-14107# Institute of Aviation Medicine, Fliegehorst (West Germany).

CAUSES FOR PERMANENT GROUNDING AND REJECTION IN THE ENT DEPARTMENT OF THE INSTITUTE OF AVIATION MEDICINE OF THE GERMAN AIR FORCE

G. Froehlich *In* AGARD Clinical Causes for Grounding Nov. 1971 3 p

Avail: NTIS

From 1959 to 1968 there were 22,800 periodic reexaminations of pilots and student pilots of the German armed forces. 55 or 0.24% of these were permanently grounded. In this group, 38 were students with marked high-tone hearing losses due to impact noise at the shooting range. The remainder suffered from recurrent barotitis (9), vestibular disease (3), chronic sinusitis (2), allergic rhinitis (1), and Meniere's disease (1). The rates for permanent rejections of applicants for flight training decreased considerably after the adoption of more flexible hearing standards in 1966. Again most of the rejections were due to considerable hearing losses caused by impact noise. In a sample of 2000 initial examinations, the rejection rates were highest among young Army officers and Army NCO's and lowest among Air Force applicants. The main causes for temporary grounding of applicants were sinusitis, marked septal deviations, catarrhal otitis media, and chronic tonsillitis. All these cases were accepted for flying training if there was full recovery after proper treatment. Cases with simple mastoidectomy and small atrophic scars of the tympanic membrane are acceptable, as well as cases with tympanoplasty type 1, provided the ears are functionally normal. Author

Author

N72-14108# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

OPHTHALMOLOGICAL CAUSES FOR GROUNDING: A 10 YEARS REPORT

Diétrich Kuerschner *In* AGARD Clinical Causes for Grounding Nov. 1971 4 p

Avail: NTIS

From 1959 to 1969, 51 pilots in the German Air Force were permanently grounded on the basis of ophthalmological diagnoses. The total number of examinations made was 24,396. These 51 cases were classified according to diagnosis. They were as follows: anomalies of refraction (28), anomalies of color sense (3), anomalies of accommodation (1), anomalies of stereopsis (1), blepharitis (1), anomalies of pupillary function (1), cataract (2), aphakia (2), retinal diseases, including 2 retinal detachments (7), and glaucoma (5). Author

Author

N72-14109# Canadian Armed Forces Inst. of Environmental Medicine, Toronto (Ontario).

DIABETES MELLITUS IN FLYING PERSONNEL

W. J. C. Stevenson *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p refs

Avail: NTIS

The Central Aircrew Medical Board at the Canadian Forces Institute of Environmental Medicine assessed fifteen aircrew members in the past ten years who were referred because of

abnormal glucose tolerance observed following incidental findings of reducing substances in the urine at time of routine urinalysis. The clinical findings, investigation procedures, and followup are discussed for two of the fifteen cases. These were referred because evidence suggested possible adult onset of diabetes mellitus. Four of the fifteen were permanently grounded; the remainder were returned to flight duties. One individual case was followed for ten years without development of the overt disease or any associated symptomatology. Reference is made to Canadian Air Force policy in dealing with cases of diabetes mellitus in aircrew members. Author

N72-14110# Royal Air Force, Farnborough (England).
PSYCHIATRIC CASUALTIES AMONG AIRCREW OF THE ROYAL AIR FORCE OF GREAT BRITAIN FOR TEN YEARS 1959 TO 1968

P. J. O'Connor *In* AGARD Clinical Causes for Grounding Nov. 1971 4 p
Avail: NTIS

The causes of 262 permanent groundings for psychiatric illness in the Royal Air Force are discussed in detail for the ten years 1959 to 1968. One quarter of the cases were grounded for psychotic illness and three quarters for neuroses and personality disorders. Psychiatric wastage accounts for 10% of the total medical wastage. Author

N72-14111# Institute of Aviation Medicine, Fliegehorst (West Germany).

PSYCHOLOGICAL CAUSES FOR GROUNDING WITH SPECIAL CONSIDERATION OF PSYCHOSOMATIC SYNDROMES AND FEAR OF FLYING

K. Gerbert and H. P. Goerres *In* AGARD Clinical Causes for Grounding Nov. 1971 7 p refs
Avail: NTIS

One third of all groundings of pilots in the German Air Force within the last ten years was due to psychological reasons. This number is surprisingly high, considering the fact that the aviation psychologists do not routinely see every pilot. It is the task of the psychologists to select potential washouts and to investigate the causes of psychophysical performance decrements. Anxiety and fear are analyzed as flying stress reactions. Author

N72-14112# Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).

FLIGHT GROUNDING FOR PSYCHOLOGICAL AND PSYCHIATRIC REASONS [LES INTERDICTIONS DE VOL POUR RAISONS PSYCHOLOGIQUES ET PSYCHIATRIQUES]

Rene Gelly *In* AGARD Clinical Causes for Grounding Nov. 1971 6 p *In* FRENCH
Avail: NTIS

Two sorts of psychopathology exist among aviators. The first is general, independent of the subject's professional life, and is associated with other aspects of his life. The second is a specific psychopathology which is due to the difficulties of aeronautic adaptation and which occurs almost uniquely in the domain of the subject's professional life. Observations made for French Air Force personnel in 1969 were collected and divided into classes, in order to study the distinction implied in diagnosis, prediction, treatment, and deciding flight aptitude in psychological cases. The classes considered were the general psychiatry of flying personnel and their specific psychopathology. Information on diagnostics, aptitude decisions, and development over a year of observation was also collected. Therapy and medical-administrative suggestions are presented for the two pathologies. Transl. by K.P.D.

N72-14113*# General American Transportation Corp., Niles, Ill. Systems Engineering Dept.

DESIGN AND FABRICATION OF A PROTOTYPE FOR AN AUTOMATIC TRANSPORT SYSTEM FOR TRANSFERRING HUMAN AND OTHER WASTES TO AN INCINERATOR UNIT ONBOARD SPACECRAFT, PHASE A

L. J. Labak, G. A. Remus, and R. Mansnerus Dec. 1971 88 p
(Contract NAS2-6386; GARD Proj. 1523)
(NASA-CR-114393) Avail: NTIS CSCL 06I

Three transport system concepts were experimentally evaluated for transferring human and nonhuman wastes from a collection site to an incineration unit onboard spacecraft. The operating parameters, merits, and shortcomings of a porous-pneumatic, nozzle-pneumatic, and a mechanical screw-feed system were determined. An analysis of the test data was made and a preliminary design of two prototype systems was prepared. Author

N72-14114*# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif. Advance Biotechnology and Power Dept.

PROGRAM OPERATIONAL SUMMARY: OPERATIONAL 90 DAY MANNED TEST OF A REGENERATIVE LIFE SUPPORT SYSTEM

J. K. Jackson, J. R. Wamsley, M. S. Bonura, and J. S. Seeman Washington NASA Jan. 1972 102 p refs
(Contract NAS1-8997)

(NASA-CR-1835; MDC-G2282) Avail: NTIS CSCL 06K

An operational 90-day manned test of a regenerative life support system was successfully completed. This test was performed with a crew of four carefully selected and trained men in a space station simulator (SSS) which had a two gas atmosphere maintained at a total pressure of 68.9, 10 psia, and composed of oxygen at a partial pressure of 3.05 psia with nitrogen as the diluent. The test was planned to provide data on regenerative life support subsystems and on integrated system operations in a closed ecology, similar to that of a space station. All crew equipment and expendables were stored onboard at the start of the mission to eliminate the need for pass-in operations. The significant accomplishments of the test, some of the pertinent test results, some of the problem areas, and conclusions are presented. Author

N72-14115*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

THE INTEGRATION OF THE ORBITING PRIMATE EXPERIMENT WITH THE INTEGRATED MEDICAL AND BEHAVIORAL LABORATORY MEASUREMENT SYSTEM FOR A MANNED SPACE FLIGHT Final Report

R. B. Maine, J. M. Lagerwerff et al 22 Nov. 1971 163 p refs
(Contract NAS1-10593)

(NASA-CR-111996) Avail: NTIS CSCL 06B

The orbiting primate experiment (OPE) - integrated medical and behavioral laboratory measurement system (IMBLMS) study investigates the feasibility of combining the OPE with IMBLMS on-board an earth orbiting space vehicle, which vehicle is periodically visited by an astronaut crew, including a scientist-astronaut. The scientific objectives of the combined OPE-IMBLMS system are defined, recommendations for measurements are given, and a logical measurement sequencing and grouping is offered. A review of the existing capabilities of the two separate programs is presented with emphasis on the interfaces and integration requirements of the combined system. Data management techniques are detailed and a conceptual design for the combined system is delineated. Recommendations and conclusions are that it is entirely feasible and cost effective to place up to three dual primate experiments on-board a manned orbiting space vehicle. Utilization of the IMBLMS capability will result in substantially increased medical data yield from the primates which data are directly comparable to those obtained from the astronauts, and that the development of the necessary hardware lies within the present state-of-the-art. Author

N72-14116# Civil Aeromedical Inst., Oklahoma City, Okla.
ALCOHOL AND DISORIENTATION-RELATED RESPONSES. 5: INFLUENCE OF ALCOHOL ON POSITIONAL, ROTARY, AND CORIOLIS VESTIBULAR RESPONSES OVER 32-HOUR PERIODS

Ronald J. Hill (Okla. Univ., Oklahoma City, Dept. of Otorhinolaryngology), William E. Collins, and David J. Schroeder Oct. 1971 18 p refs
 (FAA-AM-71-39; Task-AM-A-71-PSY-27) Avail: NTIS

Influences of alcohol on both static and dynamic vestibular responses over 32-hour post-drinking periods. Thirty male subjects were divided into three groups of ten each: Control (no alcohol), Bourbon, and Vodka. Each group underwent eye-movement monitoring for responses to positional, rotational, and Coriolis stimulation. The subjects were tested immediately prior to ingestion of the test or the control beverage and for regular intervals up to 32 hours hours thereafter. Blood-alcohol levels were determined by gas chromatography. The usual PAN I and PAN II nystagmic responses were noted and, additionally, a direction-changing, positional nystagmus was obtained 24-32 hours after the ingestion of alcohol. Responses were generally depressed to angular accelerations and to Coriolis stimulation. There was no differential vestibular effect between congener and non-congener beverages. Author

N72-14117*# Franklin Inst., Philadelphia, Pa.
SPACE AND RELATED BIOLOGICAL AND INSTRUMENTATION STUDIES Final Report, Mar. 1970 - Nov. 1971
 R. J. Gibson and R. M. Goodman Nov. 1971 49 p refs
 (Contract NSR-039-005-018)
 (NASA-CR-125095; F-B2299) Avail: NTIS CSCL 06B

Research and experimental effort was carried out on high-density photo-optical recorder design, implantable pH electrodes and the magnetic/doppler blood-flow sensor. Author

N72-14118# California Univ., Berkeley. Dept. of Civil Engineering.

SOME NUMERICAL ASPECTS IN THE IDENTIFICATION OF A CLASS OF NONLINEAR VISCOELASTIC MATERIALS: A PROBLEM SUGGESTED IN BIOMECHANICS

Nestor Distefano Aug. 1971 22 p refs
 (Grant GM-16197-03)
 (TR-71-25) Avail: NTIS

An identification problem in the field of nonlinear viscoelasticity is presented and discussed. The material under study is assumed to follow the law of elasticity given by a nonlinear Volterra integral equation. The functions g and f are given in parametric form, i.e., they depend in a known form on a number of unknown constants which, together with the constant E (modulus of instantaneous elasticity), form a vector a . Using a number of available, generally independent input-output pairs (σ_i , ϵ_i), it is then necessary to find the vector for which the distances of the predicted outputs and the corresponding experimental functions, under a suitable metric, are a minima. Emphasis is placed on conceptual and numerical aspects of the problem. Applications in the field of biomechanics are stressed. Numerical experimental data are presented. Author

N72-14119# Colorado State Univ., Fort Collins. Fluid Dynamics and Diffusion Lab.

DESIGN OF DIGITAL LOW-PASS AND BAND PASS FILTERS FOR BIOMEDICAL DATA SERIES

P. C. Chang and K. S. Su Feb. 1971 27 p refs Presented at the Biomedical Conf., San Diego, Calif., 22 Feb. 1971
 (Contract AT(11-1)-1813)
 (Conf-710217-1; UTEC-CE-71-18) Avail: NTIS

The design of zero phase-shift digital lowpass and bandpass filters for biomedical data series is presented. These filters are functioned by convoluting the data series properly truncated sinc functions. The design is based upon the principle that the Fourier transform of a sinc function is an ideal lowpass filter with a rectangular window, and the difference of two such lowpass filters of different cut-off frequencies yields a bandpass filter with suitably chosen narrow band width. The practical consideration by choosing a suitable length of sinc function for biomedical data series and the frequency response of the resulting filters are described. Finally, application examples are given to demonstrate the procedure of digital computation and the characteristics and usefulness of the designed filters. Author

N72-14120# Ballistic Research Labs., Aberdeen Proving Ground, Md. Exterior Ballistics Lab.

A MATHEMATICAL MODEL OF OPTICAL ILLUSIONS AND FIGURAL AFTEREFFECTS

Evan Harris Walker Mar. 1971 46 p refs
 (RDT/E Proj. 170-61102-A-33-D)
 (AD-728141; BRL-1536) Avail: NTIS CSCL 06/16

Optical illusions constitute errors that accompany the brain's data reduction processes involved in pattern discrimination. The acquisition of an understanding of the cause of these visual aberrations will provide knowledge about the pattern recognition algorithms used by the eye and central nervous system which can aid efforts to model the brain's functions. The disparity between the 'apparent' line and the actual line that occurs in the case of peripheral vision is sufficient to produce the perceptual errors that occur in the Poggendorff, Hering and Muller-Lyer illusions. The magnitude of the Poggendorff illusion as a function of the line angle is derived and experimentally tested. The equations are further developed and used to derive Pollack's experimental results on figural after effects. The use of these concepts allows a degree of modeling of the central nervous system data reduction processes that may be of value in the development of pattern recognition for computer use. Author (GRA)

N72-14121# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

NOISE AND HUMAN PERFORMANCE

Walter F. Grether Jun. 1971 50 p refs
 (AF Proj. 7222)
 (AD-729213; AMRL-TR-70-29) Avail: NTIS CSCL 05/10

The possible effects of noise on human performance have been the subject of considerable research dating back to 1916. Thus interest has been stimulated by concern about noise in factories, offices, schools, aircraft and other military vehicles. Two very direct and harmful effects of noise, permanent hearing loss and auditory masking, are treated only briefly in this review. Special attention is given to the so-called nonauditory effects on such performance measures as reaction time, vigilance, time estimation, tracking, manual manipulation, intellectual capacities, and industrial work tasks. Overall, the research data on noise and human performance appear rather contradictory and inconsistent. While many studies have found no performance impairment, and even improvement, there are some types of measures that rather consistently show decrements from exposure to noise. Some theoretical explanatory mechanisms to account for effects of noise on performance are included in the review. Author (GRA)

N72-14122# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

AIRBORNE VISUAL RECONNAISSANCE AS A FUNCTION OF ILLUMINATION LEVEL

James L. Porterfield, Herschel C. Self, Steve A. Heckart, E. P. Hanavan, and Don F. McKechnie Jun. 1971 24 p refs

(AF Proj. 665; AF Proj. 7184)

(AD-728629; AMRL-TR-71-9) Avail: NTIS CSCL 05/10

An investigation was made of inflight visual detection of ground target sites and identification of specific targets as a function of apparent scene illumination. Individuals from three groups of six subjects each searched for tactical target sites in rolling farm and woodland, and identified and counted the targets at the sites located. One group observed under full sunlight illumination, a second group wore goggles with neutral density filters that cut the transmitted by 400 times full moonlight, and a third group wore goggles that reduced the light down by .0008 to an apparent illumination of 40 times full moonlight. The apparent scene illumination for both the groups that wore goggles was between that of the lower limit of civil twilight and sunrise or sunset. The subjects observed from the nose position of a B-50 flying at 180 knots ground speed and 3,500 feet above ground level. There were 25 target sites at various locations, all within two miles of the aircraft flight path, along the 96-mile track length. Each site contained various numbers and types of simulated tactical targets. The mean percent of target sites detected was 36 under sunlight illumination, 22 under the simulated 400 times full moonlight condition, and 9 under 40 times full moonlight. The mean percent of targets identified at the sites that were detected was 60 under sunlight, 34 under 400 times full moonlight, and 27 under 40 times full moonlight.

Author (GRA)

N72-14123# Computer Image Corp., Denver, Colo.
**THE INVESTIGATION AND SIMULATION OF DYNAMIC,
INTERACTIVE DISPLAYS OF ACOUSTIC SIGNALS Annual
Summary Report, 1 Jul. 1970 - 30 Jun. 1971**

Frank David Wells 1 Jul. 1971 44 p refs

(Contract N00014-68-C-0383; NR Proj. 196-111)

(AD-728056) Avail: NTIS CSCL 05/10

Twenty-four psychological tests were conducted to evaluate the potential of animated visual displays for assisting subjects in learning to recognize and identify acoustic signals. A two-dimensional visual format was used to present the amplitude variations of frequency components comprising the signals over sixteen frequency bands of the audio spectrum. Two types of bandpass filter systems were employed for extracting the frequency information: (1) an analog cochlea having electrical properties analogous to the human ear, and (2) a set of 16 bandpass filters having uniform amplitude response characteristics. Results of the tests showed that bisensory presentations of nonredundant visual and auditory stimuli significantly improved the performance of subjects as compared to other modalities tested. Descriptions and block diagrams of the systems for generating the displays are given. A system was completed for generating a quasi three-dimensional display of amplitude variations for 16 spectrum channels over several seconds of immediately preceding time and is now undergoing tests. These tests indicate that this time history display is superior to the two-dimensional format for portraying auditory information in the visual domain. A block diagram and a description of the system is given.

Author (GRA)

N72-14124# Army Aeromedical Research Lab., Fort Rucker, Ala.

**THE TESTING OF THERMAL PROTECTIVE CLOTHING IN
A REPRODUCIBLE FUEL FIRE ENVIRONMENT, A
FEASIBILITY STUDY**

John D. Albright, Francis S. Knox, III, David R. DuBois, and George M. Keiser Jun. 1971 116 p refs Submitted for publication

(DA Proj. 3A0-062110-A-819)

(AD-729362; USAARL-71-24) Avail: NTIS CSCL 06/17

The report sets forth the conceptual design for a facility intended for development and evaluation of thermal protective clothing in a reproducible fuel fire environment. The methods developed relate thermal characteristics of fabrics to biomedical

aspects of burn prevention. A number of bioengineering problems are identified, the resolution of which is expensive and time consuming. It is concluded that construction of the facility designed is technically feasible. Due to the magnitude and complexity of the bioengineering problems identified, and because of advances in laboratory testing methods, however, construction of such a facility is not considered to be a prudent expenditure of public funds at this time. Operationally oriented bioengineering/aeromedical evaluation of thermal protective clothing systems remains essential.

Author (GRA)

N72-14125# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

HUMAN FACTORS ENGINEERING Final Report

1 Sep. 1971 23 p refs Supersedes AD-725555, MTP-10-2-505, 19 Jul. 1967

(AMCR Proj. 310-6)

(AD-729855; AD-725555; MTP-10-2-505) Avail: NTIS CSCL 05/5

The document outlines procedures for evaluating the human factors associated with use of general equipment. Author (GRA)

N72-14126# Navy Experimental Diving Unit, Washington, D.C.

**PRELIMINARY SURVEY OF DIVER ANTHROPOMETRICS
Final Report**

Hugh T. Beatty, Thomas E. Berghage, and Donald R. Chandler 1 Jun. 1971 28 p

(AD-729664; NEDU-RR-7-71) Avail: NTIS CSCL 05/5

Anthropometric data for Navy divers were collected and analyzed for mean, standard deviation, skewness and kurtosis. The data were analyzed by computer percentiles calculated and printed out.

Author (GRA)

N72-14127# Air Force Systems Command, Wright-Patterson AFB, Ohio.

**TRAINING TO IMPROVE ENDURANCE IN EXHAUSTING
WORK OF MEN WEARING PROTECTIVE MASKS: A
REVIEW AND SOME PRELIMINARY EXPERIMENTS
Technical Report, Jul. - Oct. 1970**

F. N. Craig, W. V. Blevins, and H. L. Froehlich Jul. 1971 25 p refs

(AD-729787; EA-TR-4535) Avail: NTIS CSCL 06/17

In order to identify some of the problems involved in protective mask training, small groups of medical volunteers were tested in exhausting work before and after 3 or 8 days of training. The men wore M9 and M17 masks with filters removed and with various inspiratory and expiratory resistances added. In addition to the resistance of the filter, the facepiece without the filter had a degrading effect on endurance. Available evidence indicates that physical fitness is a factor in endurance while wearing the protective mask. In inexperienced men the ratio of endurance when masked to endurance when unmasked is not affected by fitness.

Author (GRA)

N72-14128# Virginia Univ., Charlottesville, Dept. of Psychology.
**AN INVESTIGATION OF THE EFFECTIVE INTENSITY OF
FLASHING LIGHTS Final Report**

Edward J. Rinalducci and Kent E. Higgins Jun. 1971 52 p refs

(Contract DOT-CG-83635-A; CG Proj. 712102)

(AD-728587; USCG-712102-002) Avail: NTIS CSCL 05/10

The effective intensity of flashing lights was examined as a function of duration and area at threshold and suprathreshold illuminance levels and against different background luminances. In the first experiment the perceived brightness of a flashing

point source of varying duration was equated to the brightness of a standard point source of a fixed duration. The intensity-time function obtained showed the well-known Broca-Sulzer effect only at suprathreshold levels. The data indicated that the maximum effect was found to occur at shorter durations with an increase in standard source illuminance. In the second experiment, the perceived brightness of a flashing light of fixed duration and varying area was equated to the brightness of a standard source of fixed area and duration. The intensity-area function obtained demonstrated a phenomenon which appeared analogous to the Broca-Sulzer effect, but in terms of area rather than time. The data indicated that brightness increased with area up to about 2' and then decreased between 5'-7' after which brightness appeared to be independent of size. Author (GRA)

N72-14129# Air Force Human Resources Lab., Brooks AFB, Tex.

IDENTIFYING ITEM VALIDITY INDICES UTILIZING A MULTIVARIATE MODEL Technical Report, Feb. - Apr. 1971

Pat-Anthony Federico Apr. 1971 14 p refs

(AF Proj. 1121)

(AD-729763; AFHRL-TR-71-16; Task-112103) Avail: NTIS CSCL 05/10

The study demonstrates and discusses a new procedure for performing item analysis which uses multiple discriminant analysis to establish efficiently and effectively an index of item validity. Application of this statistical technique to data derived from an attitude survey of three groups of students enrolled in technical training courses yielded the following results: It disclosed those stimulus items which were responsive enough to discriminate among criterion groups; it partitioned the total discriminatory power of the items into two homogeneous components; it yielded data for arriving at a special weighting scheme for scoring the final attitude form; and it located the positions of the criterion groups relative to the two orthogonal dimensions of the attitude universe. Author (GRA)

N72-14130# Naval Aerospace Medical Research Lab., Pensacola, Fla.

EARLY APTITUDE-ACHIEVEMENT DISCREPANCIES AS PREDICTORS OF LATER VOLUNTARY WITHDRAWAL FROM NAVAL AVIATION TRAINING

Richard E. Doll 7 Jun. 1971 10 p refs

(AD-728389; NAMRL-1134; NAVMED-MF 12.524.002-5013D) Avail: NTIS CSCL 05/9

During recent years there has been a marked increase in the drop-on-request (DOR) rate among aviation officer candidates (AOC's). This type of attrition has been exceedingly difficult to predict because of a lack of good measures of motivation. This study examines the hypothesis that any substantial discrepancy between aptitude and achievement may well be a product of motivation and that scores based on such discrepancies may be useful in identifying potential DOR's. Quadrant analysis of two independent samples showed the high aptitude-low achievement quadrant to have a higher DOR rate than any other quadrant. It is recommended that this type of analysis be incorporated as a secondary selection tool upon completion of the environmental indoctrination stage of training. Author (GRA)

N72-14131# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

HUMAN ESTIMATION OF PROPORTIONAL DISTANCES AND DISTANCE RATIOS WITH THE AID OF A REFERENCE LENGTH

Nilss M. Aume Jun. 1971 32 p refs

(AF Proj. 7184)

(AD-730283; AMRL-TR-70-78) Avail: NTIS CSCL 06/6

Two experiments were conducted to investigate human ability to estimate the location of a target point. In the first experiment, a lateral distance between two remote points was displayed, and subjects were required to define, by means of a sighting device, a second lateral distance bearing a prescribed ratio to the first. In the second experiment, subjects were required to estimate the ratio of two displayed distances. Both experiments were conducted on an indoor, table-top range. A reference distance and a ratio aided accuracy in estimating distances. The findings suggest the value of a physically present reference distance for communicating the location of an obscure point. Author (GRA)

N72-14132# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

AIRBORNE VISUAL RECONNAISSANCE WITH YELLOW SUNGLASSES

Steve A. Heckart, E. P. Hanavan, James L. Porterfield, Herschel C. Self, and Don F. McKechnif Jun. 1971 19 p refs

(AF Proj. 7184)

(AD-730290; AMRL-TR-71-36) Avail: NTIS CSCL 05/5

The study investigated airborne visual reconnaissance with and without yellow sunglasses under conditions of moderate haze and high ambient, midday illumination. One group of five observers wore Bausch and Lomb Kalichrome C yellow glasses. A second group of five observers did not wear yellow glasses. The observers searched from the side scanner stations of a B-50 aircraft for tactical target sites located on rolling farm and woodland terrain. The aircraft flew at 180 knots ground speed, 3500 feet above ground. The mean percent of target sites detected by both the group that wore yellow glasses and the group that did not was 69 percent. For the sites detected, the group with yellow glasses identified 55 percent of the targets; the group without yellow glasses identified 70 percent. Because of large within group variance, this difference was not statistically significant. Thus, this study found yellow sunglasses to be of no value as an aid to visual reconnaissance in an area search task under conditions of high ambient illumination and moderate haze. Author (GRA)

N72-14133# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

INVESTIGATION OF INPUT NOISE APPROXIMATIONS ON HUMAN RESPONSE MODELING M.S. Thesis

Paul F. Torrey Jun. 1971 81 p refs

(AD-730142; GGC/EE/71-24) Avail: NTIS CSCL 05/8

A study was conducted to investigate the validity of approximating random Gaussian-distributed inputs used in human response modeling by sums of discrete sinewaves. An ideal rectangular power density spectrum was simulated using both filtered Gaussian-white-noise and sums of discrete sinewaves. These two input spectra were used in the same compensatory tracking task, and the resultant normalized tracking error and qualitative operator observations were used to show that there was no apparent differences in the effects of the two types of input spectra. In addition, parameter tracking was used to collect frequency response data on the discrete rectangular input spectrum. Parameter tracking data obtained with a first-order-filter continuous input was used to approximate results obtained with other input spectra of both the continuous and discrete type, which contained power in the crossover region. Author (GRA)

N72-14134# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

OPTIMAL SELECTION OF STABILITY AUGMENTATION SYSTEM PARAMETERS TO REDUCE THE PILOT RATINGS FOR THE PITCH TRACKING TASK M.S. Thesis

Teddy C. Hollis Jun. 1971 100 p refs

(AD-730143; GGC/EE/71-10) Avail: NTIS CSCL 01/3

A method for determining the optimal stability augmentation system (SAS) parameters for minimizing the pilot rating for the pitch tracking task is presented. The pilot rating prediction method is discussed. The Newton-Raphson method for finding the pilot parameters is introduced. The cost function used for finding the optimal SAS parameters is formulated to include SAS rate and deflection constraints. The optimization procedure is applied to the USAF/CAL T-33 variable stability airplane. Two different SAS configurations (pitch rate and pitch rate plus normal acceleration) are examined for six different flight conditions. The results show that the pilot rating predictions are reduced and a comparison with the military specifications show that the short period handling qualities are improved. Author (GRA)

SUBJECT AND EJECTION SEAT Final Report, 1 Mar. 1970 - 15 Apr. 1971
Edward G. U. Band Aug. 1971 67 p refs
(Contract F33615-70-C-1420: AF Proj. 7231)
(AD-730907; WR-71-11; AMRL-TR-71-7) Avail: NTIS CSCL 01/3

A model of a seated human subject and ejection seat is proposed. The body is represented by a lumped parameter system consisting of five masses. The aerodynamic and dynamic forces, deflections and trajectories of this body are calculated for two zero speed and two high speed ejections, using different rocket characteristics. The adverse effects of suddenly applied accelerations is very evident when compared with constant acceleration. The model and the computer program described in the report may readily be adapted to further studies of ejection from high speed aircraft including limb flailing, rocket thrust characteristics etc. Author (GRA)

N72-14135# School of Aerospace Medicine, Brooks AFB, Tex. **STUDIES OF SEMIAUTOMATIC TRACKING**
A. I. Nazarov 1971 22 p refs Transl. into ENGLISH from Vopr. Psikhologii (USSR), v. 15, pt. 4, 1969 p 161-172
(AD-730193; SAM-TT-R-1110-0971) Avail: NTIS CSCL 05/8

Studies of tracking, no longer the concern of a narrow range of specialists, have led toward expansion of the concept of tracking itself, and to more general problems concerning the control of complex systems. The problem of coupling of man with machine, a key problem in systems engineering, has become inseparable from the problem of tracking and is sometimes directly reduced to the latter. Secondly, the methods of study used earlier only for analysis of tracking processes have become productive in the study of varied forms of human operator activity. The first section of the article on semiautomatic tracking analyzes certain characteristics of tracking as a special form of the process of regulation. The second section discusses theoretical models of tracking. GRA

N72-14138# Army Aeromedical Research Lab., Fort Rucker, Ala.

STATIC COMPARISON OF VERTICAL TAPE AND VERTICAL LIGHT EMITTING DIODE DISPLAYS Final Report

Robert H. Schrimsher, Andrew S. Martin, Kurt E. Lidke, Mark A. Hofmann, and Erwin G. Braun Aug. 1971 76 p refs
(DA Proj. 3A0-62110-A-819)
(AD-730316; USAARL-72-3) Avail: NTIS CSCL 05/8

The study was performed in three parts. The first part consisted of comparing a prototype light emitting diode vertical display with a current vertical tape display, for reading speed and accuracy, under two viewing angles, three levels of illumination, and two time conditions. The results indicated that the sixteen (16) aviators (subjects) over-estimated the LED instrument while the vertical tape instrument was under-estimated. In addition, absolute errors in reading were greater for the LED display than they were for the vertical display. Time conditions and angles did not have a significant effect, while illumination level for the LED's was of importance. Part II consisted of a human factors facial design evaluation for one vertical tape display and four prototype LED displays. All displays were found to be deficient when compared to military standards and research recommendations. Part III consisted of a photometric evaluation of the four LED displays. The results showed that these displays were unacceptable for viewing under high ambient light conditions and that gross luminance differences between individual diodes existed within the same display. Author (GRA)

N72-14136# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.

A MODEL FOR OPTIMIZING THE EFFECTIVENESS OF MAN-MACHINE DECISION MAKING IN A PATTERN RECOGNITION SYSTEM

Richard M. Fenker, Jr. and Selby H. Evans Jun. 1971 16 p refs
(Contract DAAD05-68-C-0176; DA Proj. 1T0-61102-B-81-A; THEMIS Proj. 367)
(AD-730944; HEL-TM-8-71) Avail: NTIS CSCL 06/4

Typical pattern-recognition processes can be separated into several components, some of which may be more readily automated than others. Humans seem to be particularly suited for the earlier parts of processing, such as delineating a part of the image to be recognized as a single object and adaptively selecting an effective feature space for a given task context. On the other hand, optimal decision processes--which give due weight to prior probabilities, take into account the differential costs of errors, and utilize efficient statistical classification procedures can now be automated on the basis of an already well developed body of knowledge. They may be better handled by machines than by men. Recent work suggests that a reasonable model for human pattern recognition can usefully incorporate processes such as mapping an unknown pattern into a subjective feature space and classifying it on the basis of its location in that space. In terms of this model and of the above considerations, the best point at which to tap into the human pattern recognition process may well be at the feature-space level rather than at the classification level. The paper proposes a method for relating this subjective feature to an objective feature space of a machine so that a human could serve as preprocessor and feature analyzer while the machine could carry out the statistical classification processes. Author (GRA)

N72-14139# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

PERFORMANCE, RECOVERY AND MAN MACHINE EFFECTIVENESS Semiannual Progress Report, 1 Mar.- 31 Aug. 1971

Richard A. Dudek 15 Sep. 1971 26 p refs
(Contract DAAD05-69-C-0102; Proj. Themis; DA Proj. 1T0-14501-B-81-A)
(AD-729964; THEMIS-603) Avail: NTIS CSCL 05/8

The goals at the research are the determination of optimal or near optimal work/rest schedules for individuals and crews to yield high performance with minimal decrement over time followed by recovery (after rest) to an acceptable high performance. The experimentation is further aimed at consideration of various task levels and differing conditions of environment. Experimentation in progress continues to focus attention on the assessment of human performance under continuous operations or relatively long term activity (2 hours or more of activity). Effects of circadian rhythms on performance will also be studied in connection with this project. GRA

N72-14137# Wyle Labs., Inc., Rockville, Md. Payne Div. **CALCULATION OF ROCKET POWERED TRAJECTORIES OF A PLANE OF SYMMETRY MODEL OF A HUMAN**

N72-14140# Texas Technological Univ., Lubbock. **THE PREDICTION OF INDIVIDUAL DIFFERENCES IN MONITORING PERFORMANCE** Ph.D. Thesis

Wayne Leslie Waag Aug. 1971 125 p refs
(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81-A)
(AD-730374) Avail: NTIS CSCL 05/8

The discipline of human factors engineering resulted in part from problems having their genesis in the second world war. The technology of war had advanced to the stage where weapon systems had become quite complex both in terms of their operation and maintenance. In many instances it was found that the operating requirements of the system far exceeded the capabilities of its human component. The resulting discipline took as its task the matching of system requirements to human capabilities. One solution, at least in part, has been the elimination of the human component altogether. Consequently many control systems have been designed so as to fully automate many important decision-making functions. Accordingly, man's role in the system has been reduced from an active to a passive component whose primary function is the monitoring of the system in order to insure its proper operation and to prevent certain malfunctions. Consequently the individual monitoring task has come to hold great importance in the proper functioning of many systems. Author (GRA)

N72-15026*# Avco-Everett Research Lab., Everett, Mass.
THE FLUID MECHANICS OF THROMBUS FORMATION
Washington NASA Jan. 1972 65 p refs
(Contract NASw-1894)
(NASA-CR-1938) Avail: NTIS CSCL 06P

Experimental data are presented for the growth of thrombi (blood clots) in a stagnation point flow of fresh blood. Thrombus shape, size and structure are shown to depend on local flow conditions. The evolution of a thrombus is described in terms of a physical model that includes platelet diffusion, a platelet aggregation mechanism, and diffusion and convection of the chemical species responsible for aggregation. Diffusion-controlled and convection-controlled regimes are defined by flow parameters and thrombus location, and the characteristic growth pattern in each regime is explained. Quantitative comparisons with an approximate theoretical model are presented, and a more general model is formulated. Author

N72-15027*# Scientific Translation Service, Santa Barbara, Calif.
EXAMINATIONS FOR DETERMINING MUSCLE ATROPHY THRESHOLD
Th. Hettinger Washington NASA Dec. 1971 8 p refs
Translation into ENGLISH from Intern. Z. Angew. Physiol. (W. Berlin), V. 16, 1955 p 52-56
(Contract NASw-2035)
(NASA-TT-F-14094) Avail: NTIS CSCL 06P

The atrophy threshold in human arm muscles was determined experimentally with six subjects. The arms were held in plaster casts for several days in several positions except during stress periods. Forces in the arm muscles were measured, and atrophy determined. Author

N72-15028*# Scripta Technica, Inc., Washington, D.C.
PROBLEMS OF PHYSIOLOGICAL OPTICS. VOLUME 15: PHYSIOLOGY OF VISION UNDER NORMAL AND EXTREMAL CONDITIONS
V. G. Samsonova, A. I. Bogoslovskiy, V. D. Glezer, V. V. Meshkov, and Ye. N. Semenovskaya, eds. NASA Nov. 1971 222 p refs
Transl. into ENGLISH of the book "Problemy Fiziologicheskoy Optiki, Tom 15: Fiziologiya Zreniya Normal'nykh i Ekstremal'nykh Usloviyakh" Acad. of Sci. USSR, Nauka Press, Leningrad, 1969
(Contract NASw-2036)
(NASA-TT-F-650) Avail: NTIS CSCL 06P

Physiological factors of human vision and the simulation of visual systems are discussed. Electrophysiological and optical research methods are used to study normal as well as extremal visual conditions.

N72-15029*# Scripta Technica, Inc., Washington, D.C.
COURSE OF DEVELOPMENT OF THE PHYSIOLOGY OF VISION AND OF PHYSIOLOGICAL OPTICS IN THE USSR OVER THE LAST 50 YEARS
V. G. Samsonova *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 1-5 Presented at the 5th Conf. on Physiol. Optics, 27 Oct. 1966

Avail: NTIS CSCL 06P

The history of the science of physiology of vision in the Soviet Union is reviewed. Author

N72-15030*# Scripta Technica, Inc., Washington, D.C.
SIMULATION OF THE COLOR VISION PROCESS IN MAN
D. A. Shklover *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 6-18 refs
Avail: NTIS CSCL 06P

A mathematical model for the human color vision process where the output signals correspond to experimental functions obtained under specific observational conditions is reported. The model is used to explain several characteristic features of the color vision system in man. An electronic analog is outlined which reproduces the main functions of the system and which can be used to develop photoelectric methods of color measurement. The electronic analog is applied to problems involving the color resolution of the eye under different circumstances. Author

N72-15031*# Scripta Technica, Inc., Washington, D.C.
CERTAIN PSYCHOPHYSIOLOGICAL PRINCIPLES OF COLOR PERCEPTION DESCRIBED BY A NONLINEAR MODEL
A. V. Matveyev *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 19-27 refs
Avail: NTIS CSCL 06P

A mathematical model of human vision based on the spectral sensitivity curves of three color-sensitive receivers (green, red, and blue) is formulated. Analysis of the model's equations shows that the curves for the dependence of perception on color are more linear for the red and green receivers than for the blue receiver. All achromatic tints are positioned along a hyperbola in perception space, bending toward the axis of the blue receiver. Author

N72-15032*# Scripta Technica, Inc., Washington, D.C.
DEDUCTIVE CONSTRUCTION OF A MODEL FOR THE LOWER METRIC OF COLOR
Yu. P. Shabanov-Kushnarenko *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 28-31 refs
Avail: NTIS CSCL 06P

A new formulation of Grassman's laws is presented in which the operation of color composition is not used and in which the logical equivalence of a model of vision statics to Grassman's laws as newly formulated is proven. Author

N72-15033*# Scripta Technica, Inc., Washington, D.C.
OPERATOR ANALYSIS OF ELECTRORETINOGRAMS
D. S. Melkonyan and L. G. Barsegyan *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 32-42 refs

Avail: NTIS CSCL 06P

It is shown that within certain frequency and illumination ranges, the light stimulus and the resulting potential are related by a function that can be described by a linear stationary operator, which is derived from an experimentally-determined APFC function. Author

N72-15034*# Scripta Technica, Inc., Washington, D.C.
POSSIBLE FORMS OF COLOR VISION

N. V. Lobanova *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 43-47 refs

Avail: NTIS CSCL 06P

The spectral sensitivities of twelve normal and deuteranomalous trichromats, as well as one protanomalous and one tritanomalous trichromat are described. Author

N72-15035*# Scripta Technica, Inc., Washington, D.C.
METHODS OF SPECTRAL INDICATION

Ye. B. Rabkin *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 48-53 refs

Avail: NTIS CSCL 06P

Schematic curves of saturation, visibility, electrical sensitivity, adisparopia, functional stability and color fatigue in the spectrum of normal trichromats are plotted. The indicated regularities in the features of the medium-wave portions of the spectrum and the reactions of the optical analyzer in the process of adaptation to them serve as a basis for the spectral equation. Author

N72-15037*# Scripta Technica, Inc., Washington, D.C.
COLOR DISCRIMINATION IN PERSONS WITH LOW VISUAL ACUITY

A. I. Kaplan *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 61-64 refs

Avail: NTIS CSCL 06P

Color discrimination was investigated in 230 children of school and preschool age with visual acuity either below 0.05 or equivalent to light perception only. Contrary to some data in the literature, normal color discrimination was found in children with a visual acuity below 0.05. In some subjects, different types of pathology of color discrimination were observed. Ye. B. Rabkin's charts can be used if the visual acuity is below 0.02. Author

N72-15038*# Scripta Technica, Inc., Washington, D.C.
MICROINTERVAL ANALYSIS OF THE DEVELOPMENT OF VISUAL PERCEPTION

P. O. Makarov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 65-69

Avail: NTIS CSCL 06P

Results of a microinterval analysis show a regular phased development of human visual color perception. The stages involved consist of preperception, achromatic perception, and chromatic perception. This pattern is evident in color discrimination in the presence of two stimuli. When two short stimuli (initially red and then green) sequentially affect the same retinal region, then the intensification of one (green) masks the appearance of the other weaker (red) stimulus. Author

N72-15039*# Scripta Technica, Inc., Washington, D.C.
INVESTIGATION OF THE CRITICAL DISCRETENESS INTERVAL OF THE VISUAL SYSTEM

L. P. Grigoryeva and Ye. N. Sokolov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 70-79 refs

Avail: NTIS CSCL 06P

The critical discreteness interval, i.e., the minimum time interval in which it is still possible to discriminate successive visual stimuli was analyzed. Studies involved the dependence of the interval on the location of the stimulus in the field of view, flare brightness, and conditions of adaptation. Significant shortening of the interval is demonstrated with increasing density of the receptor nerve elements of the retina, with increasing intensity of the afferent signal, and with rhythmic stimulation of the visual system. Author

N72-15040*# Scripta Technica, Inc., Washington, D.C.
THE RETINA AS AN INDICATOR OF CORTICAL INDUCTION PHASES

P. G. Snyakin and A. P. Anisimova *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 80-84 refs

Avail: NTIS CSCL 06P

Results of a study of positive and negative cortical induction as estimated by the retinal mobility index are reported. It is shown that retinal mobility is a good indication of induction intensity and can be used to express the activity of the acoustic, olfactory, and cutaneous analyzers. Retinal reactions reflect the formation of human conditioned reflexes as well as the phases of positive and negative induction between the sensory centers. Author

N72-15041*# Scripta Technica, Inc., Washington, D.C.
TIME OF VISUAL PERCEPTION UNDER THE ACTION OF THERAPEUTIC X-RAY DOSES ON THE DIENCEPHALO-HYPOPHYSIAL REGION

G. I. Nemtseyev and N. S. Kharon *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 85-90 refs

Avail: NTIS CSCL 06P

The visual perception time in 26 patients subjected to X-ray treatment of the diencephalic region was studied. Seventeen patients suffered endocrine exophthalmos and nine optochiasmal arachnoiditis with disturbed visual function. After irradiation all subjects exhibited reduced visual perception time, which is interpreted as resulting from a reduced excitability threshold of the interneuronal synapses of the visual tract. Author

N72-15042*# Scripta Technica, Inc., Washington, D.C.
FUNCTIONAL EFFICIENCY OF THE VISUAL ANALYSOR DURING WORK WITH MICROSCOPES

N. I. Zoz *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 91-94 refs

Avail: NTIS CSCL 05E

Working conditions and the functional efficiency of the visual analyzer were investigated in workers making semiconductor instruments in which several operations were performed with the aid of microscopes. Time and motion studies of the work process, investigations of the stability of color discrimination, visibility, and visual efficiency showed that the assembly of semiconductor instruments caused changes in the tested functions, and these changes increased throughout the working day. The quality of the lighting at such factories was reviewed and some recommendations were given for its improvement. Author

N72-15043*# Scripta Technica, Inc., Washington, D.C.
SHORT LATENCY PROCESSES IN THE VISUAL SYSTEM OF CATS

I. A. Shevelev *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 95-98 refs

Avail: NTIS CSCL 06C

Early changes preceding the development of the initial afferent flow were studied at all levels of the visual system of anesthetized cats on the basis of integral slow potentials. Responses of very short latency were found in the ganglionic layer of the retina and at higher levels of the visual system, indicating the existence of a system of cells and fibers transmitting stimuli with very short delays. On the basis of similarity between the recovery cycle of cortical responses to electrical stimulation of the optic nerve and cortical prepotentials, it is postulated that the latter are the result of changes in excitability of a small group of units with the shortest latency after their synchronized firing. Author

N72-15044*# Scripta Technica, Inc., Washington, D.C.
RECRUITING OF NEURONS OF THE RABBIT SUPERIOR COLLICULI IN RESPONSES

N. V. Dubrovinskaya *In its* Probl. of Physiol. Optics, Vol 15 Nov. 1971 p 99-104 refs
 Avail: NTIS CSCL 06C

Unit activity in the superior colliculi in response to single, paired, and repetitive photic stimuli was studied in waking rabbits by means of an extracellular tungsten microelectrode. Inhibition developed in 69 percent of units responding to a single flash. During rhythmic stimulation, the neurons differed in their lability. Prolonged rhythmic action is the condition of labilization of these units. Author

N72-15045*# Scripta Technica, Inc., Washington, D.C.
INFLUENCE OF PROLONGED PHOTIC AND ACOUSTIC STIMULI ON UNIT ACTIVITY IN THE LATERAL GENICULATE BODY OF RABBITS

T. G. Beteleva *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 105-112 refs
 Avail: NTIS CSCL 06C

Using tungsten microelectrodes, the activity of 11 units the lateral geniculate body was studied in waking rabbits during exposure to flashes at 80 Hz and clicks at 15-95 Hz. The duration of repetitive stimulation and of the intervals between stimuli was 5 min. In six of the eleven neurons this stimulation produced a lasting change in spontaneous activity, either an increase or decrease in its frequency, which is interpreted as a tonic change in unit activity of the lateral geniculate body. Author

N72-15046*# Scripta Technica, Inc., Washington, D.C.
HYPOTHALAMIC POTENTIALS EVOKED BY PHOTIC STIMULATION OF THE RETINA

A. S. Novokhatskiy *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 113-119 refs
 Avail: NTIS CSCL 06C

Direct anatomical couplings between the retina and hypothalamus via centripetal and centrifugal fibers are demonstrated in study of light-evoked potentials in various parts of the hypothalamus of 32 rabbits tested simultaneously. These evoked potentials were found to have a multicomponent structure and were observed most often in the evoked response from the supraoptic, periventricular, and mamillary nuclei. Comparison of the latencies of the electroretinography and evoked responses in the hypothalamus showed that the latency of the anterior nuclei of the hypothalamus often coincides with that of the ERG, while in the mamillary nucleus it averages 10 msec greater, and in the posterior portion is somewhat shorter. Author

N72-15047*# Scripta Technica, Inc., Washington, D.C.
LIGHT EVOKED POTENTIALS IN HEALTHY PERSONS AND IN PATIENTS WITH PATHOLOGICAL LESIONS IN VARIOUS PARTS OF THE VISUAL SYSTEM

Ye. N. Semenovskaya, A. I. Bogoslovskiy, and V. K. Zhdanov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 120-130 refs

Avail: NTIS CSCL 06P

Data relating to the site, character, and degree of the pathological focus at different levels of the visual system are compared with the results of a combined electrophysiological investigation of the organ of vision (based on evoked potentials and the electroretinogram). Patients with a pathological state of the optic nerve, with various diseases of the retina, with diencephalic disturbances of regulation of the intraocular pressure, and with glaucoma and amblyopia were investigated. It is shown that a careful study of cortical evoked potentials, together with the use of combined electrophysiological methods, can substantially facilitate the determination of the character and location of a lesion in the organ of vision. Author

N72-15048*# Scripta Technica, Inc., Washington, D.C.
PHOTOREACTIVITY OF THE PIGMENTED EPITHELIUM OF THE EYE

M. A. Ostrovskiy *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 131-135 refs
 Avail: NTIS CSCL 06P

Detection of free radicals in the pigmented epithelium and in a suspension of its melanoprotein granules when acted upon by visible light of physiological intensities is reported. When the light is switched off, the free radicals recombine and disappear, thus distinctly manifesting a reversibility effect - namely, the appearance and disappearance of radicals during repeated switching on and off of the light. The photoreactivity of the pigmented epithelium thus shown and certain features of the metabolism and structure of its cells and processes suggest that the pigmented epithelium may play a more significant physiological role in the regulation and realization of the photoreceptor act in the retinal cells than has hitherto been assumed. Author

N72-15049*# Scripta Technica, Inc., Washington, D.C.
NEW DATA ON THE MECHANISMS OF ACTION OF IONIZING RADIATION ON FUNCTIONAL PROPERTIES OF THE RETINA

G. G. Demirchoglyan *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 136-140 refs
 Avail: NTIS CSCL 06P

The effect of ionizing radiation on the frog retina was studied by recording ERGs from an isolated retina bathed in a nutrient fluid. During the action of the ionizing radiation the b-wave of the ERG was reduced. X-ray stimulation with an intensity of 5 R/sec and a duration of 1 sec evoked a response which was similar to the ERG of a retina exposed to a light stimulus of 0.05 lux of the same duration. Author

N72-15050*# Scripta Technica, Inc., Washington, D.C.
BASIC PROBLEMS OF THE PHYSIOLOGY OF THE VISUAL ANALYZER UNDER EXTREMAL CONDITIONS

Yu. P. Petrov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 141-147 refs
 Avail: NTIS CSCL 06P

A survey of the literature on studies of disturbances of visual functions due to action of certain extremal factors is reported. The effects of changes in gravitational conditions, changes in atmospheric pressure and gas composition, mechanical vibrations, and electromagnetic waves of various spectral ranges leading to disturbances such as contractions of the field of vision, reduction of visual acuity, impairment of color vision, hemorrhages, crystalline lens shifts, and pathological vasomotor effects are discussed. Possible mechanisms of these disturbances are suggested. Author

N72-15051*# Scripta Technica, Inc., Washington, D.C.
EFFECT OF SPACEFLIGHT FACTORS ON VISUAL FUNCTIONS

Yu. P. Petrov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 148-152 ref.
 Avail: NTIS CSCL 06P

Visual tasks confronting astronauts during space flight are studied, emphasizing the effect of physiological and physical factors acting at various stages of flight on the execution of these tasks. Methods by which the effects of these factors can be attenuated or by which disturbances of the visual functions can be compensated are discussed. Author

N72-15052*# Scripta Technica, Inc., Washington, D.C.
INVESTIGATION OF SPATIAL VISION OF A FLIGHT CREW

K. S. Petrov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 153-154

Avail: NTIS CSCL 06P

An estimation of the absolute distance perception of 100 pilots and navigators with emmetropic refraction and flight experience ranging from 5 to 25 years is given. The threshold values of absolute distance perception of the subjects are found to lie in the range from 10 to 12 m. It is suggested that this range be taken as the norm for spatial vision of a flight crew. Author

N72-15053*# Scripta Technica, Inc., Washington, D.C.
STUDY OF ACHROMATIC AND CHROMATIC VISUAL SENSITIVITY DURING SHORT PERIODS OF WEIGHTLESSNESS

L. A. Kitayev-Smyk *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 155-159 refs

Avail: NTIS CSCL 06P

Thirty men subjected to short periods of weightlessness preceded or followed by g forces were studied while flying in an aircraft along a parabolic trajectory for changes in their color perception. In the case of five of the subjects the field of vision and the light sensitivity were also studied. It was found that under conditions of weightlessness there was an increase in sensitivity to yellow and, to lesser extent, to red. At the same time, in a number of cases the sensitivity to blue-violet radiation decreased. The scotopic vision threshold also decreased, while the field of vision remained unchanged. Author

N72-15054*# Scripta Technica, Inc., Washington, D.C.
ROLE OF CONVERGENCE IN DISTANCE PERCEPTION DURING THE LANDING OF AN AIRCRAFT

Yu. V. Kamenshchikov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 160-163 refs

Avail: NTIS CSCL 06P

The role of convergence in distance perception was studied for the range from 30 to 50 m in the case of 100 men with normal binocular vision, emmetropic refraction, and visual acuity. It was found that in 75 percent of the men tested convergence increased the accuracy of estimating the distance from an object from 20 to 50 percent, while in 25 percent of the subjects convergence had no effect on the threshold of absolute distance perception. Author

N72-15055*# Scripta Technica, Inc., Washington, D.C.
STUDY OF DYNAMIC VISUAL ACUITY

M. G. Kozyrkova *In its* Probl. of Physiol. Optics, Vol. 15, Nov. 1971 p 164-168 refs

Avail: NTIS CSCL 06P

The visual acuity of 130 subjects ranging from 20 to 40 years of age was studied, who were required to track an object moving in a horizontal plane. It was found that for an object moving at the rate of 20 deg/sec with an observation time of 1 sec visual acuity was the same as in a stationary test. When the motion of the object was accelerated to 40 deg/sec or the observation time shortened to 0.5 sec, visual acuity was reduced by 0.1. Each subsequent 20 deg/sec increase in the rate of motion decreased visual acuity by 0.1 to 0.2. In addition, a quantitative study was made of the effects of the direction and duration of the test motion on visual acuity. Author

N72-15056*# Scripta Technica, Inc., Washington, D.C.
RESTORATION OF VISUAL ACUITY AFTER A BRIGHT LIGHT FLASH OF SHORT DURATION

V. A. Khitun, P. A. Korzun, V. I. Shostak, and Ye. A. Obukhova *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 169-171

Avail: NTIS CSCL 06P

Results on restoration of visual acuity after exposure to flashes of various duration, shape and brightness are presented. Author

N72-15057*# Scripta Technica, Inc., Washington, D.C.
CERTAIN FEATURES OF THE EFFECT OF SHORT TERM SUPER-BRIGHT LIGHT FLASHES AGAINST A BACKGROUND OF TOTAL DARK ADAPTATION

V. I. Shostak *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 172-174 refs

Avail: NTIS CSCL 06P

The restoration of light sensitivity in seven subjects exposed to flashes with brightnesses up to 7.2×10 to the 7th nits is studied. The electrical sensitivity of the eye, the ERG, the EEG, and the critical frequency of the disappearance of electrical phosphene are also considered. Averaged curves of dark adaptation after ten minutes of light adaptation to a globe brightness of 2500 apostilbs or after diffuse illumination by a flash with a brightness of 7×10 to the 7th nits for 2.1 msec are obtained, as well as curves for adaptation after illumination under conditions of shielding the central part of the retina. In the latter case the light sensitivity of the periphery is restored faster, thus attesting to the braking effect of the photopic afferent system on the scotopic system in the presence of super-bright stimuli. Author

N72-15058*# Scripta Technica, Inc., Washington, D.C.
ON THE PROBLEM OF THE REFRACTION OF THE FISH EYE

P. B. Bogatyrev *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 175-185 refs

Avail: NTIS CSCL 06P

Refraction was investigated in 11 species of freshwater fishes and 9 species of exotic aquarium fishes of different ages by the anatomical-optical method with rapid freezing of the eye. Type 1 comprises those fishes in whom the center of the crystalline lens coincides with the center of the retinal hemisphere. The refraction of such eyes is of the myopic type. The eyes of fishes of type 2 are capable of adjustment for sharp vision on very near objects and on objects at considerable distances. In them refraction is different along the different optic axes and emmetropic along the central axis. The eyes of the eel and the trout are of the third type; here the zones of sharp vision are differently arranged from that in fishes of type 2, but these fishes also possess the capacity for differential focussing for the simultaneous viewing of objects at different optic angles and at different depth. Author

N72-15059*# Scripta Technica, Inc., Washington, D.C.
HISTOCHEMICAL HETEROGENEITY OF RETINAL NEURONS EXEMPLIFIED BY DISTRIBUTION OF ACID PHOSPHATASE ACTIVITY

M. A. Ostrovskiy and S. Ye. Polyak *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 186-191 refs

Avail: NTIS CSCL 06P

The distribution of acid phosphatase activity in the frog retina was investigated histochemically in relation to functional differences in retinal neurons, and especially in cells of the inner nuclear layer. Deposits of lead sulfide, indicating the presence of enzyme activity, are clearly seen in the ganglion cells and in Mueller's fibers, and also in the horizontal cells of the inner nuclear layer. Practically no deposition of lead sulfide was observed in the bipolar cells of this layer or in the photoreceptors.

Author

N72-15060*# Scripta Technica, Inc., Washington, D.C.
A STUDY OF THE FUNDUS OCULI IN POLARIZED LIGHT
 R. M. Tamarova *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 192-199 refs

Avail: NTIS CSCL 06P

A description of the operational principle of two polarization instruments, an apparatus to photograph the fundus oculi and a maculotester, an instrument for subjective investigation of the macula retinae, is given. Data obtained by means of these instruments prove existence of areas having different forms of optical anisotropy in the fundus oculi.

Author

N72-15061*# Scripta Technica, Inc., Washington, D.C.
USE OF POLARIZED LIGHT TO STUDY THE ANATOMY, PHYSIOLOGY, AND PATHOLOGY OF THE FUNDUS OCULI
 D. I. Mitkikh *In its* Probl. of Physiol. Optics, Vol. 15, Nov. 1971 p 200-204 refs

Avail: NTIS CSCL 06P

Results of an ophthalmoscopic study of 60 patients using an apparatus with built-in polaroids to inspect and photograph the fundus oculi are given. It is found that the structure of the fundus oculi (in particular, the macula lutea) is more easily visible in polarized light, thus facilitating early diagnosis of various diseases of the optic nerve and the macula lutea. It is also noted that by varying the position of the polaroids it is possible to obtain both black-and-white and color photographs of the fundus oculi.

Author

N72-15062*# Scripta Technica, Inc., Washington, D.C.
METHODS OF INVESTIGATING THE ACCOMMODATION TIME IN MAN

A. A. Sychev *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 205-208 refs

Avail: NTIS CSCL 06P

A method of studying the accommodation time of the eyes during transfer of fixation from the near distance and also of determining the time of its increase and decrease after fitting optical glasses to the eyes is reported. The instrument incorporates an ordinary chronoreflectometer. The use of this method on five subjects showed that the time for de-accommodation after strengthening accommodation by 3.0 D is 0.58-0.69 sec in emmetropes and 0.95-1.11 sec in myopes. The time required for strengthening accommodation by 3.0 D in emmetropes is 1.10-1.20 sec and in myopes 1.07-1.16 sec.

Author

N72-15063*# Scripta Technica, Inc., Washington, D.C.
THE METHOD OF CONSTANT PERIODS

A. I. Ivanov *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 209-215 refs

Avail: NTIS CSCL 06P

This method for the determination of visual thresholds stems from the mechanism of sight itself, which reduces in the simplest cases to the temporal and spatial summation of photic stimuli on the retina and the transmission to the brain of signals in the form of discrete, more or less periodic action currents.

Author

N72-15064*# Scripta Technica, Inc., Washington, D.C.
COMPARISON OF THE BINOCULAR FUNCTIONS DURING ISOMETROPIA AND ANISOMETROPIA

Yu. Z. Rozenblyum *In its* Probl. of Physiol. Optics, Vol. 15 Nov. 1971 p 216-220 refs

Avail: NTIS CSCL 06P

The depth of interruption of binocular vision depends primarily on the degree of anisometropia and on the depth of amblyopia of the poorer eye. Binocular vision is somewhat worse in hypermetropic refraction than in myopic and unlike refraction. The most informative test characterizing binocular vision in anisometropia is the determination of the relative depth of objects in stereopairs. Stereoscopic vision can occur even in the absence of binocular fusion in other tests (color test and diploscope).

Author

N72-15065*# Montefiore Hospital, New York.
[SLEEP-WAKE CYCLE EFFECTS ON SLEEP STAGES, AND PLASMA CORTISOL AND GROWTH SECRETIONS]
 Research Report, 15 Jun. 1970 - 30 Nov. 1971

30 Nov. 1971 12 p refs

(Contract NAS9-10819)

(NASA-CR-115342) Avail: NTIS CSCL 06S

Studies were made of the effects of various stimuli on sleep stages and of secretion of a number of different hormones during sleep in human subjects. Among the stimuli were vestibular stimulation, the action of L-Dopa, and a three-hour sleep-wake cycle. Hormones observed included plasma cortisol, growth hormone, dehydroisoandrosterone, and luteinizing hormone. Relationships between sleep onset, the presence of Cushing's syndrome or sleep disorders, and ultradian rhythmicity, and hormone secretion were investigated. Sleep patterns and hormone secretion in normal subjects were also studied.

K.P.D.

N72-15066# Joint Publications Research Service, Washington, D.C.

BIOLOGICAL EFFECT OF A LASER ON THE SKIN

I. G. Lagunova, Ye. D. Savchenko, L. L. Likhovetskaya, N. N. Garvey, G. G. Shamayeva, and A. V. Klimov 14 Jan. 1972 8 p refs Transl. into ENGLISH of Med. Radiol., Moscow, Russian, no. 9, 1971 p 38-42

(JPRS-54936; UDS-615.849.19.015.4:612.79) Avail: NTIS

The effects of laser radiation on skin deterioration are investigated using rats as subjects. The rats were irradiated using a neodymium laser, operating in a free generating mode. The incident energy was approximately 100 to 120 joules with a density of 500 to 4000 joules/sq cm. Pulse duration was approximately one millisecond. After irradiation, the rats were divided into a controlled and an experimental group and observed for thirty days. Observational results show harmful tissue deterioration almost immediately after irradiation in both groups, with the control group showing the least effects. Microscopic examination revealed incorrect, distorted tissue regeneration in the animals, and that destructive changes occurred in direct relation to the density of the energy applied.

E.H.W.

N72-15067*# Translation Consultants, Ltd., Arlington, Va.
**ON THE PROPHYLACTIC ACTION OF SALTED DRINKS
 DURING WORK AT HIGH TEMPERATURES. PRESENT
 STATE OF THE PROBLEM**

L. Parmeggiani Washington NASA Jan. 1972: 20 p refs
 Transl. into ENGLISH from Med. Lavoro (Milan), v. 49, no. 4,
 Apr. 1958 p 245-258
 (Contract NASw-2038)
 (NASA-TT-F-14050) Avail: NTIS CSCL 06H

Prophylactic use of saline beverages during work at high temperatures was empirically introduced; the effectiveness of these drinks in preventing heat cramps was demonstrated in several experiments. Afterwards it was shown that the organism has a wide capacity of metabolic adaptation during work at high temperatures through the action of the adrenal cortex, the hypophysis and other mechanisms, and the indication of saline beverages was considered mostly in connection with working efficiency. It was shown that an exceeding salt intake induces a decrease of working efficiency of at least the same intensity as that due to dehydration. The effect of saline beverages is conditioned therefore by the dietary sodium intake, but the scarce investigations on dietary habits of workers, as presently available, do not give a clear answer on the opportunity of using beverages in industries and mines. Author

N72-15068*# National Aeronautics and Space Administration,
 Lewis Research Center, Cleveland, Ohio.
**CYCLOTRON PRODUCTION OF I-123: AN EVALUATION
 OF THE NUCLEAR REACTIONS WHICH PRODUCE THIS
 ISOTOPE**

Vincent J. Sodd (Nucl. Medicine Lab., Cincinnati, Ohio), Kenneth L. Scholz (Nucl. Medicine Lab., Cincinnati, Ohio), James W. Blue, and Henry N. Wellman (Div. of Medical Radiation Exposure, Cincinnati, Ohio) Rockville, Md. Bureau of Radiological Health Oct. 1970 45 p refs
 (NASA-Tm-X-67594; BRH/DMRE-70-4) Avail: NTIS CSCL 06R

The use of the various nuclear reactions is described by which I-123, a low radiation dose radiopharmaceutical, can be cyclotron-produced. Methods of directly producing I-123 and those which indirectly produce the radionuclide through the beta (+) decay of its neutral precursor, Xe-123. It is impossible to separate from the radioiodine contaminants, notably I-124, which occur in the direct method. Thus, it is preferable to produce pure I-123 from Xe-123 which is easily separated from the radioiodines. Among the characteristics of I-123 is the capability of reducing the patient dose in a thyroid uptake measurement to a very small percentage of that delivered by the more commonly used I-131. Author

N72-15069*# AiResearch Mfg. Co., Los Angeles, Calif.
TEKTITE 2 HABITABILITY RESEARCH PROGRAM
 D. P. Nowlis, E. C. Wortz, and H. Watters 14 Jan. 1972
 121 p refs
 (Contract NAS8-25100)
 (NASA-CR-123496; Rept-71-6192-1) Avail: NTIS CSCL 06S

Multi-level parameters relating to perceived life quality in an isolated research and residence quarters were measured using a variety of tests. The habitat under study, emplaced beneath the sea off the coast of St. John's Island as a part of the Tektite II program, was being used for marine research. The crew for each of the 10 missions consisted of one engineer and 4 scientists. One mission had an all-female crew. Mission length was either 14 or 20 days, and 4 engineers, in covering 6 missions, stayed in the habitat for periods of 30 days each. A personality test was taken before confinement in the habitat. Two attitude tests were filled out by the aquanauts while they were still in the habitat. Daily moods were monitored during all missions. Special observations were made of leisure time use. Standardized private debriefings were administered at the end of each mission to each aquanaut. Other behavioral observations made by another research team were intercorrelated with the other measures described above. Author

N72-15070*# Public Health Service, Phoenix, Ariz. Applied
 Microbiology and Planetary Quarantine Section.

**SERVICES PROVIDED IN SUPPORT OF THE PLANETARY
 QUARANTINE REQUIREMENTS OF THE NATIONAL
 AERONAUTICS AND SPACE ADMINISTRATION Technical
 Report, Oct. - Dec. 1971**

Martin S. Favero Feb. 1972 27 p
 (NASA Order W-13062)
 (NASA-CR-125419; Rept-36) Avail: NTIS CSCL 06M

The efficiency of a biodetection grinder, used to recover buried contamination, was tested using spacecraft components and laminated polystyrene strips containing *Bacillus subtilis* var. niger spores. The surfaces were decontaminated before tests. Results are given in tabular form. Tables are also given for heat resistance of bacteria spores, prevalence of bacteria in spacecraft before launch, and the types of bacteria found in Apollo 15 spacecraft components and command modules. E.H.W.

N72-15071# Los Alamos Scientific Lab., N.Mex.
**RESPIRATOR EFFICIENCY MEASUREMENT USING
 QUANTITATIVE DOP MAN TESTS**

E. C. Hyatt, J. A. Pritchard, and C. P. Richards 1971 20 p refs
 Presented at the Am. Ind. Hyg. Conf., Toronto, 24-28 May 1971
 (Contract W-7405-eng-36)
 (LA-DC-11959; Conf-710505-7) Avail: NTIS

The efficiency of high-performance dust respirators has been measured by sampling continuously from the interior of the facepiece while the wearer performed specified exercises in a quantitative aerosol man test chamber. The leakage into respirator facepieces equipped with high-efficiency particulate filters was measured with a light-scattering photometer and recorder. The four-decade photometer measured leakage of less than 0.01 percent to 100 percent in 2 seconds. The results indicate that this method of evaluating the fit of the respirator to the ultimate wearer provides an accurate and meaningful measurement of respirator efficiency for each person and respirator combination. Author (NSA)

N72-15072# Commissariat a l'Energie Atomique, Fontenay-aux-
 Roses (France).

**RELATIVE BIOLOGICAL EFFECTIVENESS OF 3-GeV
 PROTON BEAMS IN PRODUCING CATARACTS IN
 RABBITS**

G. Legeay, C. Haye, J. Drouet, and J. P. Bazin 1971 19 p refs
 In FRENCH Presented at the Intern. Congr. on Protect. against
 Accelerator and Space Radiation, Geneva, 26-30 Apr. 1971
 (CEA-CONF-1782; Conf-710423-7) Avail: AEC Depository
 Libraries

The production of cataracts in rabbits with monoenergetic beams was studied as a function of the relevant parameters. The experimental conditions and the physical, biological and ophthalmologic data are reviewed. The rabbits were divided into groups corresponding to different doses. The latency time parameter and the dose-effect correlation enabled the RBE to be determined. The latency time was determined as a function of the dose rate for the various stages in the irradiation with gamma rays and a 3 GeV proton beam; the response functions were then plotted using logarithmic coordinates. The RBE increases with decreasing doses. The time necessary for a cataract to appear and the degree of development depend upon the dose rate. NSA

N72-15073# Technische Hogeschool, Eindhoven (Netherlands),
 Dept. of Electrical Engineering.

**ON THE INSTANTANEOUS MEASUREMENT OF
 BLOODFLOW BY ULTRASONIC MEANS M.S. Thesis**

M. G. J. Arts May 1971 30 p refs
 (TH-71-E-20; ISBN-90-6144-020-3) Avail: NTIS

A method of estimating the average blood flow velocity

over a cross section of a blood vessel from the received signal of a Doppler flowmeter, using continuous ultrasonic radiation, is described. The method is based on the determination of the frequency shift averaged over the power density spectrum of the received signal. Instrumentation featuring an HF amplifier, automatic volume control, pass band limitation for LF signals, and zero calibration, enables measurements to be done without complete frequency analysis of the signal. ESRO

N72-15074# Army Foreign Science and Technology Center, Charlottesville, Va.

MATHEMATICAL SIMULATION OF BEHAVIOR BASED ON THE THEORY OF TENDENCIES (SET)

V. V. Chavchanidze 26 Aug. 1971 10 p refs Transl. into ENGLISH from Soobshcheniya Akad. Nauk Gruzin. SSR (Tiflis), v. 54, no. 2 May 1969 p 297-300
(AD-729863; FSTC-HT-123-461-71; ACSI-J-9461; T702301-2301) Avail: NTIS CSCL 05/10

Important theoretical questions, which are pertinent to the physiology and psychology of the functioning of the brain, have not been solved by well known basic models. This report considers the necessity of the development of a theory of the entire organism, not just the brain. Until now, an axiom for a general theoretical and mathematical model of human behavior has not been formulated. Author (GRA)

N72-15075# Texas Technological Univ., Lubbock.

EFFECTS OF DECISION CRITERIA ON HUMAN DECISION-MAKING PERFORMANCE M. A. Thesis

Robert Duane Ireland May 1971 54 p refs
(Contract DAAD05-69-C-0102; Proj. THEMIS)
(AD-729828) Avail: NTIS CSCL 05/10

The specific objectives of the study is to determine if a strengthening of criteria for acceptable decision-making performance does afford those individuals relatively tolerant of ambiguity an opportunity to widen the effective performance gap between their decision-making activities and those of their contemporaries relatively intolerant of ambiguity. Another objective is to determine those variables or parameters that could be appropriately utilized by organizations to select individuals who are in fact relatively tolerant of ambiguity. Author (GRA)

N72-15076# Johns Hopkins Univ., Baltimore, Md. Dept. of Pharmacology.

THE EFFECT OF MICROWAVE IRRADIATION ON THE TURNOVER RATE OF SEROTONIN AND NOREPINEPHRINE AND THE EFFECT ON MONODAMINE METABOLIZING ENZYMES Final Report, Jun. 1967 - May 1971

Solomon H. Snyder 26 Aug. 1971 23 p refs
(Contract DADA17-69-C-9144)
(AD-729161; Rept-2) Avail: NTIS CSCL 06/18

The research program was directed at detecting neurochemical alterations in laboratory animals exposed to microwave irradiation at levels of 10 mW/sq cm. At this low level of irradiation, it was found that after 7 days exposure for 8 hours per day, there was a marked slowing of the serotonin turnover rate which was accompanied by a slight decrease in the activity of tryptophan decarboxylase and 5-hydroxytryptophan decarboxylase. This suggests that microwave irradiation decreased the firing rate of serotonin neurons in the brain. Since these neurons are known to participate in the regulation of sleep and wakefulness as well as body temperature, the findings may account for certain of the behavioral effects purportedly produced by microwave exposure. Author (GRA)

N72-15077# Naval Medical Research Inst., Bethesda, Md.
TIMING BEHAVIOR IN THE ASSESSMENT OF ADAPTATION TO NITROGEN NARCOSIS Interim Report
Joseph Michael Walsh and Arthur J. Bachrach 9 Jul. 1971
30 p refs
(AD-729289; NAVMED-M4306.03-2040D-2) Avail: NTIS CSCL 06/19

Research in psychological changes associated with hyperbaric pressure - particularly the behavior changes identified as nitrogen narcosis - has yielded varying and often inconsistent results. One phenomenon reported frequently in nitrogen narcosis is an acclimatization or adaptation to the conditions of the dive; thus, experienced divers are found to be less affected by narcosis. Precise quantification and identification of the behaviors and the environmental conditions under which they occur has been lacking in most hyperbaric studies dealing with adaptation to narcosis. The present study is a preliminary one dealing with an experimental analysis of time behavior, using operant conditioning techniques. Timing behavior in albino rats is found to be disrupted in an initial exposure to 200 feet on air. Subsequent exposures reveal gradual adaptation to the chamber conditions, with return to levels of performance close to surface control. Author (GRA)

N72-15078# Edgerton, Germeshausen and Grier, Inc., Goleta, Calif.

LASER EYE EFFECTS: THE SUBVISIBLE RETINAL LESION Final Report, 1 Aug. 1969 - 31 Jul. 1971

William J. Mautner 14 Jul. 1971 93 p refs
(Contract DADA17-69-C-9013)
(AD-728852; EG/G-S-543-R) Avail: NTIS CSCL 06/5

The objective of this program was to investigate the effects of helium-neon and YAG laser radiation on the rabbit retina at exposure levels below those required to produce ophthalmoscopically visible lesions. The question of the existence of a subvisible retinal lesion was addressed using electroencephalographic (EEG) techniques' light microscopy, electron microscopy, and autoradiography. The characteristics of such a lesion and questions of reversibility were also investigated. The existence of the subvisible lesion was clearly established. Impairment of retinal function was seen by EEG at 50% of the visible lesion exposure threshold, while morphological and metabolic derangement was seen by microscopy and autoradiography at 83% of the visible threshold. A frequent return to normal was seen by the latter techniques in about 12 days, while general functional recovery was beginning to be seen by EEG in 14 days. YAG laser exposure produced an unexpected increase in potentials evoked from the exposed retina as seen in the EEG recordings. The reasons for this surprising result are not known. Electroencephalography is shown to be a sensitive and useful tool for the study of the subvisible retinal lesion. Author (GRA)

N72-15079# Army Environmental Hygiene Agency, Edgewood Arsenal, Md.

US ARMY TOPOGRAPHIC COMMAND OPTICAL DISTANCE MEASURING EQUIPMENT AGA MODEL 4 D GEODIMETER, FEBRUARY - APRIL 1971

David H. Sliney, Paul D. Tveten, and Robert Yacovissi Apr. 1971 10 p
(AD-729345; USAEHA-42-014-70) Avail: NTIS CSCL 06/18

An optical radiation hazards special study was performed on the AGA Model 4D Geodimeter used by the Field Surveys Division, USATOPCOM, during February April 1971. It was found that this device, which is used for the precise measurement of distance, emits an optical beam which is a potential ocular hazard if appropriate safeguards are not employed. It was recommended that personnel not view the direct beam even momentarily within a range of 3 m and that personnel not continuously stare into the beam within 300 m in the finder beam mode or 200 m in the operating beam mode. Precautions

relating to the use of a retroreflector at close ranges, directing the laser beam through glass, and the use of binoculars were given. Preplacement and periodic eye examinations for using personnel were also recommended. Author (GRA)

N72-15080# National Academy of Sciences-National Research Council, Washington, D.C. Committee on Hearing, Bioacoustics, and Biomechanics.

NON-AUDITORY EFFECTS OF NOISE

Karl D. Kryter, Gerd Jansen, Donald Parker, Horace O. Parrack, and George Thiessen Jun. 1971 31 p refs (Contract N00014-67-A-0244-0021) (AD-728426) Avail: NTIS CSCL 06/19

The report is a summary and evaluation of research findings that relate to any effects of noise other than to the ear and related structures. For example, included herein are research efforts concerned with psychological effects of noise, effects on task performance, effects on the cardio-vascular system, and on general health. This report also presents areas and types of research studies that may help to provide full answers to questions on the degree of noise control desirable with respect to the non-auditory effects of noise normally present in living and working environments. Author (GRA)

N72-15081# Texas Univ., Austin. Social Psychology Lab. **POLAC: A COMPUTER PROGRAM TO COMPUTE AUTO-CROSS-LAGGED AND POOLED WITHIN-CELL CORRELATIONS**

Roger Bakeman Jul. 1971 20 p refs (Contract N00014-67-A-0126-0001; ONR Proj. 171-804) (AD-730452; TR-15) Avail: NTIS CSCL 05/10

Program POLAC computes auto- and cross-lag intercorrelation. The program independently computes lagged correlation matrices for any number of treatment conditions (cells) and then computes a pooled within cell lagged intercorrelation matrix based on all cells. Missing observations, as defined by the user, may be excluded from the computations. The user specifies the lag(s) desired. Punched output may be obtained for use as input to multiple regression programs. Author (GRA)

N72-15082# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

COMPARISON OF A WEIGHTED AUDITORY RISK CRITERIA WITH OCTAVE-BAND ESTIMATES Final Report, Nov. 1970 - Mar. 1971

Donald C. Gasaway and Harrell C. Sutherland, Jr. Jul. 1971 21 p refs (AF Proj. 7755) (AD-731154; SAM-TR-71-19) Avail: NTIS CSCL 06/19

The recent trend toward adoption of A-weighted sound levels to identify degrees of auditory risk has prompted investigations to determine modifications which must be made when applying the A-weighted method to specific noise environments. This report compares recently proposed criteria based on A-weighted sound levels with critical limits based on octave-band data as proposed by Working Group 46 of the Committee on Hearing, Bioacoustics, and Biomechanics of the National Academy of Sciences, National Research Council. The use of CA as a correction factor to equate dbA levels with octave-band assessments is discussed. Noise conditions within the cockpits of fixed- and rotary-wing aircraft were used as the basis for the comparisons. Results indicate that use of A-weighted sound levels for estimating potentially hazardous exposures of the type encountered in aircraft must be approached with caution for two reasons: (1) Spectrum content of a given noise influences the degree of auditory risk associated with single values of dbA, and (2) the relationship between duration and intensity of noise is curvilinear, rather than linear as assumed by the Walsh-Healey Act provisions. Author (GRA)

N72-15083# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

VERIFICATION AND EXTENSION OF DISPLAY SCANNING AND REMNANT MODELS USING AIRCRAFT LATERAL AND LONGITUDINAL DYNAMICS AS CONTROLLED ELEMENTS M.S. Thesis

Luis A. Machuca and James H. Lind May 1971 260 p refs (AD-730154; GGC/EE/71-14) Avail: NTIS CSCL 05/10

An investigation of theoretical models of the human operator's scanning behavior and tracking performance while simultaneously controlling two closed-loop tasks using separate displays is undertaken. Two different two-display compensatory tracking situations are tested. The first uses transfer functions of K/s and K/(s-1) as controlled elements, and the resulting data is compared with that previously obtained under similar experimental conditions. The second uses the longitudinal and lateral dynamics of the F-4 as primary and secondary controlled elements, respectively, with a white noise input forcing function simulating a wind gust disturbance of selected bandwidths. Differences in the subject's scanning behavior, remnant, and tracking performance are noted for these two tracking situations. Scanning statistics show that pilots may adopt different average scanning and sampling strategies, and it is verified that the adjustable quasi-linear describing functions and remnant model proposed by STI do accurately predict the pilot's tracking performance under certain circumstances. It is shown that the pilot adjusts his scanning strategy in response to the tracking situation and that proposed scanning parameters may not accurately predict these changes. Possible mental processes for reconstruction are investigated and a weighted average form of reconstruction is outlined. Author (GRA)

N72-15084# School of Aerospace Medicine, Brooks AFB, Tex. **SOME DATA ON THE BIOLOGICAL EFFECT OF AND PROTECTION FROM LASER RADIATIONS**

A. A. Gorodetskii, B. R. Kirichinskii, I. P. Evdokimov, and V. M. Kolesnik 1971 9 p refs Transl. into ENGLISH from "Nekotorye Dannye o Biologicheskome Deistvii i Zashchite ot Izluchenii Opticheskikh Kvantovykh Generatorov" Gigiena Truda i Professionalnye Zabolevaniya (USSR), 1968 (AD-730194; SAM-TT-R-1111-0971) Avail: NTIS CSCL 06/10

The most pressing tasks in the area of investigation of the biological effect of laser radiation are studies of the phenomena occurring in the cells, organs and tissues of the organism at the moment of application of radiation; determination of the regularities controlling the processes of absorption of laser energy and converting it to other types of energy; study of processes occurring in tissues and organs of irradiated animals following irradiation; establishment of a scientific basis for the maximum permissible levels of radiation and further development of measures for protection from the effects of laser radiation. GRA

N72-15085# Texas A&M Univ., College Station. Agricultural Experiment Station.

THE EFFECT OF HELIUM-OXYGEN ATMOSPHERE ON THE DEVELOPING CHICK EMBRYO AND SUBSEQUENT GROWTH OF CHICKS Final Report, 1 Feb. 1967 - 30 Jun. 1970

Thomas M. Ferguson, David H. Miller, Juan Valera, and Charles E. Sewell, Jr. Brooks AFB, Tex. School of Aerospace Medicine. Jul. 1971 51 p refs (Contract F41609-67-C-0023; Task-793002) (AD-730278; SAM-TR-71-8) Avail: NTIS CSCL 06/19

Hatchability of chicken eggs in plastic chambers supplied with a flow-through of He-O₂ (79%:21%) or compressed breathing air was compared with hatches in a commercial incubator (air). In the commercial incubator, hatches averaged 89.6%: in He-O₂, 50.5%; and in air, 58.6%. Frequently, the He-O₂ embryo failed to utilize all the albumen in the egg; some delays in time for

hatch were observed. No gross or microscopic abnormalities were found attributable to the He-O₂ atmosphere, and chicks from the He-O₂ incubators showed no difference in growth, reproductive performance, or various physiologic measurements through 4 months of the F1 generation. The low hatchability in the plastic chambers (He-O₂ and air) as compared to eggs set in the commercial incubator, when considered with other observations, suggests that suboptimum conditions of physical factors were responsible for the results rather than any effect due to helium per se. Author (GRA)

N72-15086# School of Aerospace Medicine, Brooks AFB, Tex.
UNEVEN VENTILATION AS A CONTINUOUS DISTRIBUTION FUNCTION OF ALVEOLAR DILUTION Interim Report, Jun. 1968 - Dec. 1969

Philip D. Manfredi and Robert G. Rossing Aug. 1971 35 p refs

(Task-631902)

(AD-730279; SAM-TR-71-30) Avail: NTIS CSCL 06/16

Replicate nitrogen washout curves recorded in 10 normal subjects were analyzed both by the classical Fowler model and by a model which treats the alveolar dilution ratio as being a continuously distributed variable. The majority of the curves could be satisfactorily fitted by assuming the distribution function to be single and Normal (Gaussian); less frequently a bimodal function was required which was composed of two Normal distributions. Pulmonary clearance delay (PCD) values were derived from each model and also by a method of calculation directly from the raw data. The values obtained by all three methods agreed very well, and the three methods may be regarded as equivalent and interchangeable. By any of the three methods, all subjects except one showed on at least one occasion a PCD less than 10%, but frequently the second of the paired determinations was somewhat higher (up to 30%). One subject, although considered normal on the basis of routine clinical testing, showed values which ranged from 30%-100% delay. Author (GRA)

N72-15087# Human Resources Research Organization, Alexandria, Va.

ANALYSIS OF VISUAL DISCRIMINATIONS IN HELICOPTER CONTROL

J. R. Thielges and W. G. Matheny Jun. 1971 163 p refs
(Contract DAHC19-70-C-0012; DA Proj. 200-62107-A-712)
(AD-730500; HUMRRO-TR-71-13) Avail: NTIS CSCL 05/10

The visual Discrimination Analysis is a method of examining the cue structure of the helicopter pilot's visual environment. It is hypothesized that the critical cue is the relationship between two referents--a fixed internal referent placed on the helicopter windscreen and an external referent located on the ground plane. Cue value is analyzed through the geometric relationships of these referents for the six degrees-of-freedom: pitch, roll, yaw, altitude, range, and latitude. The pilot's ability to detect perturbation will depend upon its magnitude, initial state of the craft, location of the internal and external referents, and his threshold for detecting the relative motion of two points. A mathematical model is used to generate data for a sample analysis of pitch, and the data are graphed to explore referent placements that provide detectable cues. The information density plot is then developed as a means of examining the cue value of an entire field of external referents with respect to one or more internal referents. Author (GRA)

N72-15088# Naval Medical Field Research Lab., Camp Lejeune, N.C.

AN ASSESSMENT OF THE POTENTIAL VALUE OF HEAT ACCLIMATIZATION SPACES ABOARD THE LHAS, PHASE 3

John S. Douglas, Jr. and Philip J. Rasch Sep. 1971 21 p refs
(M Proj. 4311)

(AD-730472; NMFRL-Vol-21/No-21;

NAVMED-M4311.01-1003BAC5-3) Avail: NTIS CSCL 06/19

One group of troops performed calisthenics and running in place for one hour in a heat chamber maintained at 36.7C dry bulb and 31.1C wet bulb. Another group performed the same exercises outdoors in a cool ambient temperature. The training program lasted one hour a day for two weeks. Standard work assessment tests were conducted before and after training. The acclimatization procedure was found to produce significant reductions in resting and post-work rectal temperature and in post-work heart rate. Increased sweat production was also observed. Significant similar changes were not observed in the control group. Author (GRA)

N72-15089# Eye Research Foundation of Bethesda, Md.
THE EFFECT OF WAVELENGTH ON THE ORGANIZATION OF THE REPTILIAN VISUAL SYSTEM Final Report, 1 May 1969 - 30 Apr. 1970

David O. Robbins, C. R. Gavonius, and Robert M. Chapman
Wright-Patterson AFB, Ohio AMRL Jul. 1971 51 p refs

(Contract F33615-69-C-1685; Task-723303)

(AD-730286; AMRL-TR-70-140) Avail: NTIS CSCL 06/16

Spectral sensitivity curves were derived for cells isolated in the optic tectum of turtles. All cells were most sensitive to the red region of the visible spectrum with some cells showing a secondary peak in the blue-green region. The majority of cells showed an on-off response to wide field monochromatic stimulation. Plots of spectral sensitivity for on and off responses were often the same and the shapes of these curves suggested antagonistic inputs from spectrally different processes. In other cells, distinct differences were noted in the sensitivity functions for the on and off portions of the response, although both curves appeared to be the result of the combination of the same two visual pigments. In a third group of cells, a complete shift in the elicited response pattern was observed with stimulus wavelengths at one end of the spectrum eliciting an on response and at the opposite end, an off response. The data suggest that the reptilian optic tectum may be involved in hue discrimination. GRA

N72-15090# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

PSYCHOLOGICAL CORRELATES OF A MODEL OF THE HUMAN VISUAL SYSTEM M.S. Thesis

Arthur Phillip Ginsburg Jun. 1971 121 p refs

(AD-731197; GE/EE/71S-2) Avail: NTIS CSCL 05/10

A model of the human visual system is investigated for psychological correlates. A priori hypotheses from the model concerned with human identification of defocused letters as well as identification of rotated letters have been validated with the computer model. Gestalt principles of similarity, proximity, closure, and figure-ground perception as well as geometric illusions are explained in terms of spatial filter bandwidth using the optics homolog. The experimental results have allowed postulates which extend the model by means of another cortical transform and a spatial filter shape which is also psychologically correlated. It is further postulated that the human perceptual space is the image domain from spatially filtered transforms of object forms. It is concluded that the model provides a means of obtaining quantitative psychological correlates of the human visual system. Recommendations are made for additional investigations concerning psychological correlates. Author (GRA)

N72-15091# School of Aerospace Medicine, Brooks AFB, Tex.
EVOKED RESPONSES IN THE AUDITORY CORTEX OF THE CAT TO DIFFERENT SOUND ORIENTATION, PART 1
N. Yu. Alekseenko 1971 14 p refs Transl. into ENGLISH

from Zh. Vyshei Nervnoi Deyatelnosti (Moscow), v. 18, no. 4, 1968 p 642-649
(AD-730191; SAM-TT-R-1107-0971-Pt-1) Avail: NTIS CSCL 06/16

The evoked potentials (EP) were compared in the primary auditory and associative zones of the brain of anaesthetized cats under the acoustical clicks stimulation of the ipsi- or contralateral ear. Under various sound direction, the EP of identical cortex areas has a different form, differing from each other in the presence or absence of this or that component: the negative phase of the primary response, advance positive or negative oscillation, late positive-negative wave, etc. These differences of EP forms, appearing in the ectosylvian and in the suprasylvian gyri, indicate that the activity organization of the auditory cortex is different depending upon the direction of the acoustical stimuli. In the case of binaural stimulation, EP did not combine both forms but followed one of them, peculiar to either ipsi- or contralateral stimuli, while the effect from the stimulation of the other ear was inhibited. Thus, the spatial-temporal structure of the response in the auditory and associative zones of the cortex may contain information related to the side of the acoustic stimulation. Author (GRA)

N72-15092# School of Aerospace Medicine, Brooks AFB, Tex. **EVOKED RESPONSES IN THE AUDITORY CORTEX OF THE CAT TO SOUNDS FROM DIFFERENT DIRECTIONS. PART 2: QUANTITATIVE CHARACTERISTICS**
N. Yu. Alekseenko and I. P. Levshina 1971 13 p refs Transl. into ENGLISH from Zh. Vyshei Nervnoi Deyatelnosti (Moscow), v. 18, no. 6, 1968 p 1001-1008
(AD-730192; SAM-TT-R-1108-0971-Pt-2) Avail: NTIS CSCL 06/16

The summary evoked potentials in the auditory cortex (AI) of the narcotized cat differ in their quantitative characteristics depending on the side of monaural auditory stimulus. When the contralateral ear is stimulated, the latent periods of the various phases of the EP and the duration of its positive phase are shorter, the amplitude is higher and the thresholds of development of its individual components are lower than with stimulus of the ipsilateral ear by a sound of equal superthreshold intensity. The amplitudes and latent periods of the associative responses, tapped at the suprasylvian gyrus, show the same dependence on the ear to which the signal is applied. These differences in EP parameters indicate higher excitability of the elements which form it with contralateral stimulation; the participation of a larger number of such elements in this reaction, and their earlier synchronous involvement. It can be assumed that the difference in the characteristics of responses to monaural signals of various directions are superimposed on the binaural effect with binaural interactions, reinforcing it and may therefore facilitate in distinguishing the direction of a source of sound. Author (GRA)

N72-15093* Lundy Electronics and Systems, Inc., Glen Head, N.Y.
INERTIAL WASTE SEPARATION SYSTEM FOR ZERO G WMS Final Report
9 Dec. 1971 95 p refs
(Contract NAS9-11268)
(NASA-CR-115327; Rept-1506-4-R7) Avail: NTIS CSCL 06/16

The design, operation, and flight test are presented for an inertial waste separation system. Training personnel to use this system under simulated conditions is also discussed. Conclusions indicate that before the system is usable in zero gravity environments, a mirror for the user's guidance should be installed, the bounce cycle and bag changing system should be redesigned, and flange clips should be added to improve the user's balance. E.H.W.

N72-15094*# Scientific Translation Service, Santa Barbara, Calif.

ISOMETRIC EXERCISES: A MEANS OF PREVENTING MUSCULAR ATROPHY IN THE TREATMENT OF FRACTURES OF THE EXTREMITIES

Z. M. Atayev Washington NASA Dec. 1971 11 p refs Transl. into ENGLISH from Vopr. Kurortol. Fizioterapii i Lecheb. Fiz. Kult. (Moscow), v. 32, Mar.-Apr. 1967 p 140-145
(Contract NASw-2035)
(NASA-TT-F-14096) Avail: NTIS CSCL 05E

Tests using static tension of the muscles immobilized from traumas to prevent muscular atrophy were carried out. It was found that isometric tension of the muscles lasting 5 to 7 seconds, used in a general complex of physical exercises, is an effective means of preventing muscular atrophy. Author

N72-15095*# General Electric Co., Philadelphia, Pa. Space Div.

IMPROVED AESTHESIOMETER Patent Application

Robert W. Richardson and David B. Wright, inventors (to NASA) Filed 2 Dec. 1970 11 p
(Contract NASw-1630)
(NASA-Case-MSC-13609-1; US-Patent-Appl-SN-94347) Avail: NTIS CSCL 06B

An aesthesiometer for detecting and measuring cutaneous sensory perception is described. The instrument comprises an elongate tubular housing having a sleeve member extending axially from one end. On the other end of the tubular housing, a vernier counter adjustment is mounted with the operating mechanism disposed internally of the housing. Within the sleeve a thin wire-like member of monofilament stimulating element is telescopically positioned. One end of the monofilament stimulating element extends from the sleeve while the other end is mechanically coupled to the internal operating mechanism of the vernier counter adjustment. The cutaneous sensory perception of the subject is recorded with a single stimulating element. The sensory perception level may be noted by reference to the clocklike face and index mark on the housing. NASA

N72-15096*# Baylor Univ., Houston, Tex. Coll. of Medicine.
IMPROVED BIOMEDICAL ELECTRODE Patent Application
James D. Frost, Jr., inventor (to NASA) Filed 5 Nov. 1970 13 p

(Contract NAS9-9418)
(NASA-Case-MSC-13648-1; US-Patent-Appl-SN-87222) Avail: NTIS CSCL 06B

A disposable electrolyte saturated sponge electrode, used to collect biomedical data, is described. The electrolyte is composed of a metallic electrode disk carried in a rubber silicon base. The sponge is formed above the base. Advantages of the device include indefinite storage without deterioration or special arrangements, and simple procedures for installation and use. The electrode records physiological signals. E.H.W.

N72-15097*# General Electric Co., Philadelphia, Pa.

REACTION TESTER Patent Application

Harry H. Brown, inventor (to NASA) Filed 7 Oct. 1970 14 p
(Contract NASw-1630)
(NASA-Case-MSC-13604-1; US-Patent-Appl-SN-78717) Avail: NTIS CSCL 05E

A reaction tester is described for testing the simple and disjunctive reaction of a subject to light stimuli. It is in the form of a bar member which has spaced grooves for receiving the index fingers of a subject. Near the bottom of each groove are openings aligned along a transverse axis to a groove and a light beam is projected through the openings to a photo transistor. The subject's finger breaks the light beam and when the finger is moved relative to the groove, the light beam actuates the transistor. A logic circuit is provided to interconnect the reaction

key to a panel having neon light indicators. A ready light informs the subject that the test will begin. Then either the left or right, or both, lights are actuated through the logic circuit. A counter is started and when the subject reacts by moving the correct finger, the light indicator is extinguished and the counter is stopped. An incorrect reaction causes an error indicator to operate. NASA

N72-15098*# General Electric Co., Philadelphia, Pa. Space Div.

AUTOMATIC CONTROL OF LIQUID COOLING GARMENT BY CUTANEOUS AND EXTERNAL AUDITORY MEATUS TEMPERATURES Patent Application

Clay W. G. Fulcher, inventor (to NASA) Filed 12 Nov. 1971 20 p

(Contract NAS9-10963)

(NASA-Case-MS-C-13917-1; US-Patent-Appl-SN-198355) Avail: NTIS CSCL 06Q

An automatic control apparatus for a liquid cooling garment is described that is responsive to actual physiological needs during work and rest periods of a man clothed in the liquid cooling garment. Four skin temperature readings and a reading taken at the external portion of the auditory meatus are added and used in the control signal for a temperature control valve regulating inlet water temperature for the liquid cooling garment. The control apparatus comprises electronic circuits to which the temperatures are applied as control signals and an electro-pneumatic transducer attached to the control valve. NASA

N72-15099*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

THE EFFECT OF MODIFYING RESPONSE AND PERFORMANCE FEEDBACK PARAMETERS ON THE CNV IN HUMANS

David A. Otto (Stanford Univ.) and Larry J. Leifer Jan. 1972 16 p refs

(NASA-TM-X-62097) Avail: NTIS CSCL 05E

The effect on the CNV of sustained and delayed motor response with the dominant and nondominant hand in the presence and absence of visual performance feedback, was studied in 15 male adults. Monopolar scalp recordings were obtained at Fz, Cz, Pz, and bilaterally over the motor hand area. Results indicated that the magnitude of the CNV was greater in the delayed than sustained response task, greater in the presence than absence of feedback, and greater over the motor hand area contralateral to movement. Frontal CNV habituated in the sustained, but not the delayed response task, suggested that frontal negative variations in the former case signify an orienting response to novelty or uncertainty. The absence of habituation in the delay condition was interpreted in terms of the motor inhibitory function of frontal association cortex. Performance feedback appeared to enhance CNV indirectly by increasing the motivation of subjects. A multiprocess conception of CNV was proposed in which vortex-negative slow potentials reflect a multiplicity of psychophysiological processes occurring at a variety of cortical and subcortical locations in the brain preparatory to a motor or mental action. Author

N72-15100*# Techtran Corp., Glen Burnie, Md.
BIOTECHNICAL LIFE SUPPORT SYSTEM FOR SPACE OBJECTS

Washington NASA Jan. 1971 14 p refs Transl. into ENGLISH of the book "Biotechnicheskaya Sistema Zhivobespechniya Kosmicheskikh Obyektov" USSR Academy of Sciences, Moscow, Nauka Press, 1970 11 p (Contract NASw-2037)

(NASA-TT-F-14102) Avail: NTIS CSCL 06K

A mockup of a biotechnical life support system for space objects is described. It includes a sun simulator for growing plants, gas exchange apparatus, hothouse, chicken cultivator, algae cultivator, heat and moisture regulating system, lighting system, waste product collection system, bathroom with shower, and other components. Under present conditions, necessary supplies for space flights of up to 3 years weigh tens of tons. The system would weigh considerably less. Its principle is regeneration of substances necessary for maintenance of life at an adequate level for carrying out flight operations. Author

N72-15101# National Aviation Facilities Experimental Center, Atlantic City, N.J.

THE DEVELOPMENT OF A MOTION PICTURE MEASUREMENT INSTRUMENT FOR APTITUDE FOR AIR TRAFFIC CONTROL Final Report, Nov. 1970 - Nov. 1971

E. P. Buckley and Tom Beebe Jan. 1972 32 p refs

(Proj. 012-609-04X)

(FAA-RD-71-106) Avail: NTIS

A motion picture test for aptitude of human subjects to perform air traffic control duties is described. Estimates of reliability and validity as obtained from the administration of the test to 19 air traffic control specialists are discussed. Test results are presented in the form of charts and graphs. Author

N72-15102# Civil Aeromedical Inst., Oklahoma City, Okla.

PERSONALITY ASSESSMENT IN AVIATION: AN ANALYSIS OF THE ITEM AMBIGUITY CHARACTERISTICS OF THE 16PF AND MMPI

Roger C. Smith Jul. 1971 7 p refs

(FAA-AM-71-35) Avail: NTIS

The problem of item ambiguity (the degree to which an item elicits multiple interpretation) which may limit the utility of 16PF and MMPI devices when used in screening procedures is examined. Subjects completed either the 16PF or the MMPI while concurrently rating each item on a five-point ambiguity scale. The ambiguity for each item was determined and the relationship between ambiguity and sex of the respondent, the individual factor scales, and the scores of subjects on the scales was considered. The implications of the findings for item construction and use of the test in various applications were discussed. Author

N72-15103# California Univ., Livermore. Lawrence Radiation Lab.

SUGGESTED GUIDELINE FOR LOW DOSE RADIATION EXPOSURE TO POPULATIONS BASED ON BENEFIT-RISK ANALYSIS

Jerry J. Cohen Jun. 1971 21 p refs Presented at the 16th Ann. Health Phys. Soc. Meeting, New York, 14 Jul. 1971 (UCRL-72848; CONF-710710-8) Avail: NTIS

The basis for standards set by the International Commission on Radiological Protection, the National Council on Radiation Protection, and the Federal Radiation Council for the maximum permissible radiation dose of the general human population is critically reviewed. It is suggested that the recommendation of a maximum average radiation dose of 170 mrem/yr for human populations be abolished and replaced by the use of a new unit called the Mer. The Mer is defined as that amount of benefit required to justify an exposure to one rem. It is postulated that application of some form of benefit-risk analysis in deriving radiation guidelines would have the effect of placing low dose exposure risks into commonly comprehensive perspective. NSA

N72-15104# Army Foreign Science and Technology Center, Charlottesville, Va.

STUDY OF DYNAMIC VISUAL ACUITY

M. G. Kozyrkova 26 Aug. 1971 10 p refs Transl. into ENGLISH from Probl. Fiziol. Optiki (Moscow), v. 15, 1969 p 138-141
(AD-729865; FSTC-HT-23-446-71; ASCI-J-9467) Avail: NTIS CSCL 06/16

The resolution of the eye, determined on the basis of following moving objects, is called the dynamic visual acuity. Studies of dynamic visual acuity have shown that as the speed of the object increases the dynamic visual acuity deteriorates. Distinguishing moving objects is a much more complex problem than distinguishing fixed objects. Author (GRA)

N72-15105# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

EFFECTS OF WORK/REST SCHEDULES ON MONITORING PERFORMANCE IN THE HEAT Ph.D. Thesis

Amr K. Mortagy Aug. 1971 155 p refs
(Contract DAAD05-69-C-0102)

(AD-729829) Avail: NTIS CSCL 06/19

The purpose of the investigation was to study the effects of work/rest schedules on human performance in hot climates. A visual monitoring task was used as the performance criterion and two performance parameters were measured, percent correct detections and percent correct responses. Author (GRA)

N72-15106# Texas Technological Univ., Lubbock. Center of Biotechnology, Fatigue and Human Performance

THE BIOMECHANICS OF PUSHING AND PULLING TASKS

M. M. Ayoub and Joe W. McDaniel Aug. 1971 253 p refs
(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81-a; Proj. Themis)

(AD-729827; THEMIS-603) Avail: NTIS CSCL 06/16

A considerable amount of work has been done to determine the forces that man can exert on loads. However, very little has been done to determine the skeletal configurations an operator should assume in front of a load to be most efficient. This report investigates these skeletal configurations and selects an optimum for pushing as well as pulling of loads. It also includes a biomechanical analysis of the forces and torques developed at the joints as well as on the lower spine. Author (GRA)

N72-15107# RAND Corp., Santa Monica, Calif.

PILOT MANAGEMENT POLICY AND PILOT TRAINING RATES

W. A. Stewart Mar. 1971 109 p refs
(Contract F44620-67-C-0045)

(AD-729760; R-690-RR) Avail: NTIS CSCL 05/9

A study was made of the effects of lengthening the initial cockpit flying time for Air Force pilots. Changing the number of operational flying years required of career pilots, the number of years required of all pilots in their initial cockpit tours, and the timing of career rotation from cockpit to nonflying duty will change the number and cost of new pilots to be trained. Criteria by which the author assesses alternative pilot management policies include pilot quality, cost, career development, mobilization potential, acceptability, and replacement training rate--the number per thousand man-years at which new pilots must be trained to supply a given number of operational cockpit man-years. Lengthening initial cockpit tours could reduce training programs and initial training costs, improve quality, reduce recurrent advanced-pilot-training costs, and provide career pilots more time away from operational flying. Author (GRA)

N72-15108# Naval Ammunition Depot, Crane, Ind.

EFFECTS OF LOW INTENSITY MICROWAVES ON PERFORMANCE

John P. Jankovich 1 Jul. 1971 42 p refs

(AD-730105; NAD-CR-RDTR-187; Work-Unit-2) Avail: NTIS CSCL 05/10

The purpose of the investigation was to determine the effects of low intensity microwave frequency electromagnetic signals on performance. Animal experiments were devised exposing Rhesus monkeys to microwave radiation for 10-95 minutes, while performing an operant conditioned task which is a universally applied psychological technique to measure the performance in order to establish the effects of microwaves on activity level of the organism. The intensity levels of microwave exposure were 10mwatts/sq cm and 13mwatts/sq cm at 750 MHz, 3mwatts/sq cm and 8mwatts/sq cm at 1000 MHz frequencies. Exposure to microwaves was found to decrease the performance rate directly proportional to field intensity and exposure time. No difference was observed in the general detrimental effects of microwaves at the frequency of 750 MHz vs 1000 MHz, and under continuous vs pulsed (2-12 Hz) irradiation. Low intensity radiation (3 mw/sq cm) seemed to have a double effect on performance: stimulation during short exposure, inhibition during longer exposure. Further deterioration of performance can be expected in the execution of more complex psychological tasks than the one employed in the report, or under higher intensity levels. Author (GRA)

N72-15109# Naval Personnel and Training Research Lab., San Diego, Calif.

NEW CONCEPTS OF AVIATION APPRENTICESHIP QUALIFICATIONS Final Report

Joseph R. Heinzel Aug. 1971 102 p refs
(Proj. PF39.521.009.01.11)

(AD-729654; SRR-72-7) Avail: NTIS CSCL 05/9

Current Airman (AN) qualifications are applied equally to all Group IX (Aviation) ratings although they are actually fleet/squadron oriented and do not reflect realistic professional requirements applicable as an apprenticeship to all work areas in the aviation rating structure. Research was initiated to review current AN qualifications to determine the desirability and practicability of developing common core qualifications supplemented by rating-oriented items. Data initially gathered and analyzed indicated it was neither feasible to group AN qualifications into the aircraft maintenance, operational, and clerical areas nor to develop AN advancement qualifications which would be class 'A' service school oriented. The research approach was therefore revised to provide for the development of new AN advancement qualifications encompassing general aviation knowledge factors only. Author (GRA)

N72-15110# Dunlap and Associates, Inc., Santa Monica, Calif.

ADAPTIVE DISPLAYS

Charles R. Kelley and Daniel J. Prosin 30 Jul. 1971 72 p
(Contract F44620-69-C-0129; AF Proj. 9778)

(AD-729985; AFOSR-71-2357TR; FR-2; Rept-61102f; Rept-681313) Avail: NTIS CSCL 05/9

An adaptive display assists the human operator in detecting, diagnosing and adapting to changes in a system under his control or its environment. Adaptive displays generated by a fast-time predictive model of the controlled element were employed. In the first experiment, a time history display of the real system behavior painted on the same display surface as was the prediction from the fast time model permitted quicker recognition of small changes and made more accurate recognition of the extent of small or large ones. Errors in prediction notified the operator of the need to adapt. Subsequent experiments showed that a predictive display was valuable in adapting to slow continuous changes in a controlled element, such as changes in aircraft trim with fuel consumption, or quicker changes, such as involved in mode transitions as when VSTOL aircraft go from hover to cruise or the reverse. Author (GRA)

N72-15111# Naval Aerospace Medical Inst., Pensacola, Fla.
EFFECTS OF ALCOHOL INGESTION ON TRACKING PERFORMANCE DURING ANGULAR ACCELERATION
 William F. Collins, Richard D. Gilson, David J. Schroeder, and Fred E. Guedry, Jr. May 1971 24 p refs Sponsored in part by FAA Prepared in cooperation with Army Aeromedical Res. Lab., Fort Rucker, Ala.
 (MF Proj. 12.524.004)
 (AD-729679; NAMRL-1133; USAARL-71-20) Avail: NTIS CSCL 06/19

Following practice, two groups of 10 subjects each were given pre-(baseline) tests of tracking performance in both static (stationary) and dynamic (whole body angular acceleration) conditions. One group then received orange juice which contained 2.0 ml of 100-proof vodka per kg of subject weight; the other group drank orange juice with a few drops of rum extract added. All subjects were led to believe that they were receiving alcohol. Additional tests were conducted 1, 2, 4, 8, and 10 hours after drinking. All tests were in total darkness with the exception of the visual display which was illuminated to a level recommended for cockpit instruments. Static tracking error declined slightly for the control group, but increased over the pre-drinking level during the 1-, 2-, and 4-hour tests for the alcohol group; only the 1-hour scores differed significantly from the pre-scores for the alcohol group. In comparing the two groups, static tracking errors for alcohol subjects were significantly higher than those of control subjects only at the 4-hour session when the effects of alcohol were beginning to wane. However, in the dynamic tests, alcohol subjects made significantly more tracking errors than control subjects during the 1-, 2-, and 4-hour sessions. These data suggest that eye-hand coordination may show little or no impairment following alcohol ingestion in static situations, yet may be seriously degraded during motion. Author (GRA)

N72-15112# Navy Experimental Diving Unit, Washington, D.C.
SWIMMER SUPPORT SYSTEM DIVING PROCEDURES AND TABLES Final Report
 William H. Spaur and Edward T. Flynn, Jr. 17 Aug. 1971 10 p (AD-728759; NEDU-RR-10-71) Avail: NTIS CSCL 06/11

Diving tables and procedures are presented for use with swimmer delivery vehicles and open circuit, semi-closed circuit and closed circuit underwater breathing apparatus. Author

N72-15113# Navy Experimental Diving Unit, Washington, D.C.
NAVY-DUKE 600 FOOT SATURATION DIVE Final Report
 Edward T. Flynn, Jr. and James K. Summitt 25 May 1971 87 p refs
 (AD-729665; NEDU-RR-8-71) Avail: NTIS CSCL 06/11

Four U.S. Navy first class divers, a Medical Officer, and a civilian laboratory technician were compressed to a simulated depth of 600 feet of sea water in the Duke University Hyperbaric Complex. During the subsequent 7 days at 600 feet, two warm (90F) and 5 cold (43-49F) water experiments were conducted in order to assess the performance of the Mark IX semi-closed circuit UBA at depth. From these tests, it was concluded that the Mark IX could safely support a hard working diver in cold water at 600 feet, although the thermal sensitivity of the carbon dioxide canister limited the useful duration of the apparatus. In addition, the importance of heating the inspired gas during deep dives in cold water was noted. Author (GRA)

N72-15113# Navy Experimental Diving Unit, Washington, D.C.
NAVY-DUKE 600 FOOT SATURATION DIVE Final Report
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N72-15114# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

CREW PERFORMANCE IN EXTENDED OPERATION UNDER VIBRATIONAL STRESS Ph.D. Thesis
 Mohamed A. El-Nawawi Aug. 1971 234 p refs
 (Contract DAAD05-69-C-0102)
 (AD-729373) Avail: NTIS CSCL 06/19

The study was conducted in an attempt to investigate the effects of prolonged vibration on performance and recovery of different crews involved in the operation of a multi-station work system. Eight-, six-, and five-man crews were under investigation while operating a 4-station work system. The performance measure was a compensatory one-dimensional vertical tracking task. This task was performed under normal and vibrational environments. The simulated 4-station system's mission duration was taken as 4 hours, wherein performance data were collected. Crew recovery was monitored throughout a 20-minute period after mission completion. Two work cycles (60 minutes and 30 minutes) were used in the different crews' work schedules. The vibrational stress imparted to the crew members was a vertical sinusoidal type of 5 cps frequency, 0.16 inch constant amplitude (DA), and 0.20 g acceleration intensity level. The significant conclusions drawn from this study are listed. GRA

N72-15115# Monsanto Research Corp., Dayton, Ohio.
FOAM FLOTATION SYSTEMS FOR PERSONNEL WEARING BODY ARMOUR Final Report, Feb. 1969 - Sep. 1970
 I. O. Salyer, J. L. Schwendeman, A. Wojtowicz, R. T. Jefferson, and S. M. Sun Jul. 1971 116 p refs
 (Contract DAAG17-69-C-0017; DA Proj. 1F1-64207-DC-52)
 (AD-731000; USA-NLABS-72-3-CE; C/PLSEL-87) Avail: NTIS CSCL 06/7

A feasibility study was conducted on approaches to using foams in flotation systems for personnel wearing body armor. Flotation systems should be rapidly deployable (10 seconds) and provide flotation for at least six hours, even if damaged. The systems should not interfere with the wearer as he performs his duties. Three approaches were investigated: (1) the use of performed flexible foam; (2) instantly generated polystyrene foam; and (3) fast reacting two-component urethane foams. Only the performed flexible foam performed well when fabricated into a jacket and tested on a man. Author (GRA)

N72-15116# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

AN INTRODUCTION TO RELAXED HAND ANTHROPOMETRY
 John W. Garrett Aug. 1971 9 p ref
 (Task-718408)
 (AD-731183; AMRL-TR-67-217) Avail: NTIS CSCL 05/5

Anthropometric data comparing the length of the relaxed hand with the flat, straightened hand are presented. The correlation coefficient between the hand length in the two positions is not high. A forthcoming comprehensive research program on the anthropometry of the hand is revealed. Author (GRA)

N72-15117# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

DISPLAY DESIGN FOR ELECTRONIC COUNTERMEASURES APPLICATION: SCOPE SIZE AND THREAT DENSITY Final Technical Report, Oct. 1970 - Jan. 1971

David F. Thornburn, Earl D. Sharp, William N. Kama, and John P. Lyons Jul. 1971 29 p refs (Task-718410)

(AD-731186; AMRL-TR-71-69) Avail: NTIS CSCL 05/5

Subjects were required to identify threat symbols on a simulated electronic countermeasures (ECM) scope display while performing a single-axis, first-order, unstable compensatory tracking task. Performance with 3- and 4-inch-diameter display scopes was compared. A repeated-measures experimental design was used involving two different 30-minute test missions, each varying in threat density from 0 to 18. Twenty right-handed male college students served as subjects. By comparing subject performance at the various threat densities it was determined that 7 was the maximum number of threats that a subject could effectively process with each scope size. Results showed no statistically significant difference in performance between the 3-inch and the 4-inch scopes. Author (GRA)

Robert G. Mills and Michael A. Bauer (Dayton Univ.) Jul. 1971 37 p refs (Task-718409)

(AD-730609; AMRL-TR-71-103) Avail: NTIS CSCL 17/9

A semiautomatic radar surveillance system using a time-compression display was simulated. Subjects were required to detect targets entering the surveillance area (75 by 75 nautical miles), initiate automatic tracking of these targets, and reinitiate (maintain) lost tracks when automatic tracking failed. Four target introduction rates (1, 2, 3, and 4/minute), three levels of clutter density (0.016, 0.032, and 0.064 pieces/square nautical mile), and two levels of practice (replications) were investigated. Results indicate that increases in target introduction rate generally degrade subject performance (e.g., track initiation time increases), clutter has little effect on performance, track initiation is sensitive to practice, improving from the first replication to the second, and track maintenance is relatively insensitive to practice. The dynamic characteristics of surveillance tasks require the development of a queuing model to describe human performance in semiautomatic surveillance systems. Author (GRA)

N72-15118# Human Engineering Labs., Aberdeen Proving Ground, Md.

A REVIEW OF IMPULSE-NOISE RESEARCH AT THE HUMAN ENGINEERING LABORATORIES

David C. Hodge Apr. 1971 41 p refs Presented to Del. Valley Chapter, Acoustical Soc. of Am., Rose Tree, Pa., 6 Jan. 1971 (AD-731185; TN-4-71) Avail: NTIS CSCL 05/5

The significance of impulse-noise exposure as a severe Army problem is discussed. Efforts at alleviating these problems are reviewed under five subject categories: development of measurement techniques, conduct of temporary hearing loss investigations, noise suppression experiments, determination of the limits of hearing protection, and development of hearing damage-risk criteria. Author (GRA)

N72-15119# School of Aerospace Medicine, Brooks AFB, Tex. Otolaryngology Branch.

AEROMEDICAL REVIEW: PERSONAL EAR PROTECTION Final Report, Jul. 1968 - Jan. 1971

Donald C. Gasaway Aug. 1971 150 p refs (Task-77508)

(AD-731182; SAM-TR-71-13; SAM-Review-2-71) Avail: NTIS CSCL 06/17

Various aspects of personal ear protection are discussed and illustrated. Results obtained from a selective survey of available literature dealing with the topic of ear-protection devices and technics are presented. Numerous methods used for evaluating the attenuation characteristics of ear-protection devices are discussed. In addition to attenuation, additional features which influence overall acceptability of given types of devices are also discussed. Attenuation values representative of the majority of ear-protection devices thus far developed and studied in the United States are presented in illustrated form. The content of this review provides meaningful and comprehensive understanding of salient underlying features of attenuation, wearability, and overall effectiveness associated with the use of various ear-protection devices. The contents provide the reader with cognizance of the many variables which tend to modify and ultimately affect successful selection and use of personal ear-protection devices. Author (GRA)

N72-15120# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

AIRCRAFT TRACK INITIATION AND MAINTENANCE IN A SINGLE-OPERATOR SIMULATED SURVEILLANCE SYSTEM: TECHNICAL REPORT 1 Final Report

N72-15121# Wyle Labs., Inc., Rockville, Md.

NOTES ON THE INITIATION OF LIMB FLAILING Final Report, 1 Mar. 1970 - 15 Apr. 1971

Peter R. Payne Wright-Patterson AFB, Ohio AMRL Aug. 1971 21 p refs

(Contract F33615-70-C-1420; Task-723101)

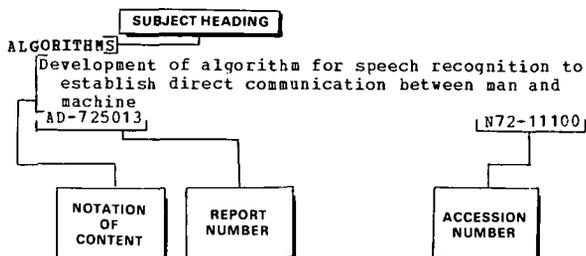
(AD-731195; Working-Paper-59111-8; WR-71-13; AMRL-TR-71-45) Avail: NTIS CSCL 06/7

An analysis is made of the aerodynamic forces tending to pull the limbs and head of an ejection seat occupant away from their rest position. Two distinct mechanisms are identified: forward acting pressure forces which are shown to act on the front of any body, and a forward acting force caused by an obstruction behind the body. Quantitative estimates of these forces show that they may far exceed the ability of the occupant to hold his limbs in position. Various possible remedies are discussed, including, for example, the use of flaps or spoilers to change the angle at which the flow separates from the limb or helmet should eliminate these forward acting forces, and hence prevent limb flailing for those ejections where the seat is pointing stably into the airstream. Such corrective action would not necessarily solve the limb flailing problem if the seat can acquire large angular spin rates, or a substantial angle of yaw to the flow. Author (GRA)

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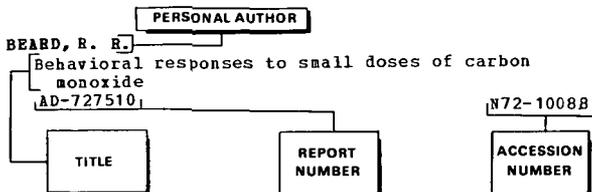
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