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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 108)

NOVEMBER 1972

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 108)

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 October 1972 in

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



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INTRODUCTION

This Supplement of *Aerospace Medicine and Biology* (NASA SP-7011) lists 326 reports, articles, and other documents announced during October 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, monthly supplements have been issued.

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

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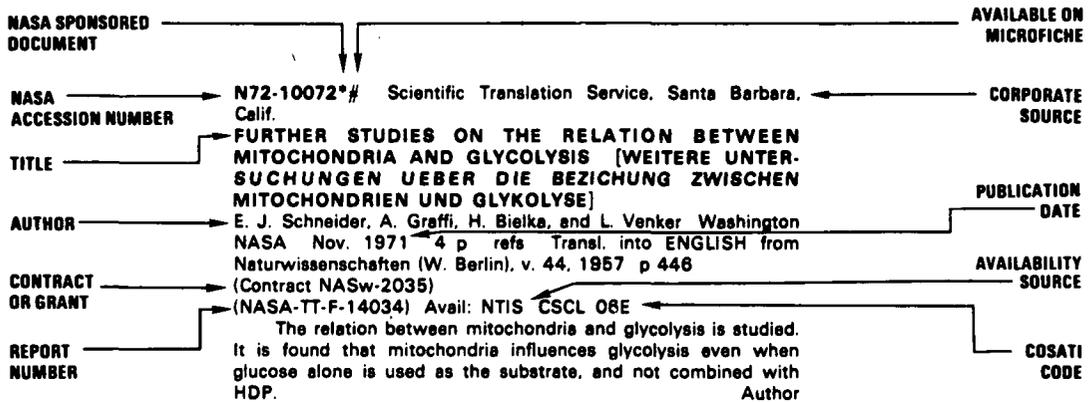
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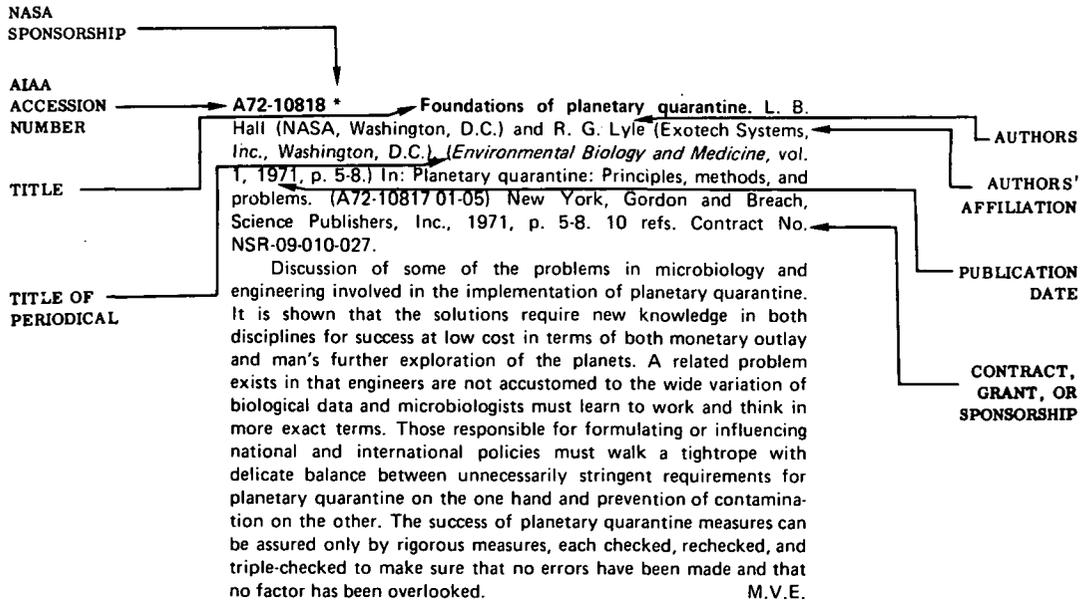
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TYPICAL CITATION AND ABSTRACT FROM STAR



TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY



A Continuing Bibliography (Suppl. 108) NOVEMBER 1972

IAA ENTRIES

A72-37243 Left ventricular dynamics during handgrip. I. Amende, H. P. Krayenbuehl, W. Rutishauser, and P. Wirz (Zürich, Universität, Zurich, Switzerland). *British Heart Journal*, vol. 34, July 1972, p. 688-695. 19 refs. Research supported by the Swiss National Fund.

Description of the effect of handgrip on the ejection dynamics of the left ventricle, especially on the relation between left ventricular stroke work and end-diastolic pressure in patients with and without cardiac dysfunction. In order to facilitate the hemodynamic comparisons, the influence of changes in heart rate was eliminated by right atrial pacing at rates as close as possible to those obtained under handgrip. The comparison of hemodynamic data at similar heart rate during handgrip and at rest (right atrial pacing) allows the characterization of an intermediate type of hemodynamic response that reflects 'abnormal' left ventricular dynamics. There is evidence that not only the diseased left ventricle but also the normal or nearly normal left heart mobilizes the Frank-Starling mechanism to overcome the acute pressure burden produced by handgrip. F.R.L.

A72-37244 'VI-like' and 'aVF-like' leads for continuous electrocardiographic monitoring. N. Cristal, M. Gueron, and R. Hoffman (Negev Central Hospital, Beer Sheva, Israel). *British Heart Journal*, vol. 34, July 1972, p. 696-698.

Description of a standardized method for continuous electrocardiographic monitoring. Tracings similar to VI and aVF leads of the conventional electrocardiogram can be recorded, and switching from one lead to the other does not require changes in the chest electrode positions. Easy reproduction of day-to-day tracings is an advantage of the method. (Author)

A72-37250 The neurophysiology of binocular vision. J. D. Pettigrew. *Scientific American*, vol. 227, Aug. 1972, p. 84-95.

The work discussed shows how the brain achieves the very first stages of binocular depth discrimination. The anatomy of binocular vision is considered, giving attention to the convergence of nerve fibers from corresponding regions of each eye on a single site in the brain. The experimental arrangement for studying binocularly activated neurons in the visual cortex is discussed, together with the significance of the speed and the direction of the moving stimulus, the amount of binocular overlap of an animal's two visual fields, questions of binocular parallax, and paired response fields. The preliminary results obtained provide some insight into the initial operations performed by the visual cortex in extracting the informa-

tion about disparity between small elements of the two retinal images. G.R.

A72-37273 Contour-contingent color aftereffects - Retinal area specificity. C. F. Stromeyer, III (Stanford University, Stanford, Calif.). *American Journal of Psychology*, vol. 85, June 1972, p. 227-235. 19 refs.

Investigation of the area specificity of McCollough's (1965) color effect by means of two experiments in which subjects were asked to judge whether or not a small test grating appeared colored as it was moved into various retinal locations relative to an adapted area. The test results indicate that McCollough's effect is highly area specific. M.V.E.

A72-37398 # The development of the choroid in man - Choroidal vascular system. K. Heimann (Köln, Universität, Cologne, West Germany). *Ophthalmic Research*, vol. 3, no. 5, 1972, p. 257-273. 26 refs.

Study of choroidal vasculature development, using intravascular injection of Indian ink and neoprene latex, in combination with conventional histology. It is found that the primitive choriocapillaris forms during the first two months; the layers above it, which ultimately become Haller's and Sattler's layers, form during the 3rd and 4th and during the 4th and 5th months, respectively; these layers contain both venous and arterial vessels at the very formation start. During the last 4 months of gestation, the density and differentiation of choroidal vessels continues to increase. Numerous interarterial and some sporadic arterio-venous anastomoses form in the region of the vascular tunic. M.V.E.

A72-37399 # Methods for measuring the HF oscillation frequency in ultrasound pulses of equipment for diagnostic ultrasonography. G. Herrmann and W. Buschmann (Charité Eye Hospital, Berlin, East Germany). *Ophthalmic Research*, vol. 3, no. 5, 1972, p. 274-282. 8 refs.

Reliability and simplicity evaluation of four different methods applied to resonance frequency determinations on transducer probes of ultrasound pulses from diagnostic ultrasonic equipment. Following a description of the methods, their merits are discussed in the light of presented measurement results. M.V.E.

A72-37400 # An automatic measuring and recording system for clinical electro-oculography. M. G. Holland and F. Clark (Tulane University, New Orleans, La.). *Ophthalmic Research*, vol. 3, no. 5, 1972, p. 311-319. 11 refs. Research supported by the Research to Prevent Blindness, Inc.; Grant No. NIH-EY-00494.

A72-37423 # Object code storage in the static portion of a short-time memory (Khranenie kodov ob'ektov v staticheskoi chasti kratkovremennoi pamiati). R. M. Granovskaia, I. Ia. Bereznaia, O. Iu. Vorob'ev, and Iu. I. Volkov. *Vychislitel'naiia Tekhnika i Voprosy Kibernetiki*, no. 6, 1971, p. 111-123. 10 refs. In Russian.

A short-time memory model which is capable of both classification and identification of objects is proposed as a basis for understanding the function of biological memory. Essential in this model is a single-input logical element chain with on-off neurons handling slow processes at frequencies of 100 Hz or below. A static-memory neuron network, and examination-code and storage-code recognition networks are discussed as ingredients of the memory model. V.Z.

A72-37424 # Models of neurons reacting to input signal alternation in space and time (Modeli neuronov, reagiruiushchikh na perepad vkhodnykh signalov v prostranstve i vremeni). R. M. Granovskaia and I. Ia. Bereznaia. *Vychislitel'naia Tekhnika i Voprosy Kibernetiki*, no. 6, 1971, p. 124-138. 12 refs. In Russian.

Demonstration that mathematical models of on-neurons, off-neurons, on-off-neurons, novelty neurons, and identity neurons can be inferred from a single primary model of an integral neuron by superposition of specific constraints of each particular neuron type on this single model. Procedures are given for constructing simple mathematical models for these neurons, showing their reactions to time-space variations in the state of their inputs. V.Z.

A72-37425 # Synthesis of a mathematical model of the neuron (Sintez matematicheskoi modeli neurona). R. M. Granovskaia and O. Iu. Vorob'ev. *Vychislitel'naia Tekhnika i Voprosy Kibernetiki*, no. 6, 1971, p. 139-156. 6 refs. In Russian.

Development of a procedure for constructing a network which simulates the work of neurons whose functions can be described by a certain functional which is determined on a set of all possible situations at the input of a given neuron. An algorithm for obtaining a formal neuron which simulates the work of a given neuron, and an algorithm representing a single threshold element of a neuron in the form of a network of threshold elements are derived. The algorithms are used in the synthesis of a mathematical model of the neuron. V.Z.

A72-37447 # Theory and practice of aviation medicine (Teoriia i praktika aviatsionnoi meditsiny). P. K. Isakov, D. I. Ivanov, I. G. Popov, N. M. Rudnyi, P. P. Saksonov, and E. M. Iuganov. Moscow, Izdatel'stvo Meditsina, 1971. 396 p. 126 refs. In Russian.

A study is made of both the theoretical aspects of aviation medicine and of the possibility of applying this knowledge in the actual work of aviation doctors. Among the topics discussed are flight conditions and the special features of the piloting profession; the effect of high-altitude factors, accelerations, and vibrations on the human organism; hygienic measures required in aviation; aviation toxicology, pharmacology, radiobiology, ophthalmology, and otolaryngology; special features of the psychophysiological and hygienic requirements for the cockpit area; onboard oxygen equipment and medical monitoring of the high-altitude training of flight personnel; devices for emergency evacuation of aircraft and medical monitoring of the preparation of flight personnel for forced evacuation; evacuation of wounded and sick by air; medical monitoring of flight safety; psychological screening of candidates for flight-training institutes; medical monitoring of the health of maintenance personnel; and medical analysis of the causes of accidents. A.B.K.

A72-37475 # Coronary flow determination in experimental conditions with the use of radioactive xenon. T. Kraska, W. Serzysko, J. Szczerban, R. J. Zochowski (Akademia Medyczna, Warsaw, Poland), and W. Kupsc (Akademia Medyczna; Polska Akademia Nauk, Instytut Matematyki, Warsaw, Poland). (*Kardiologia Polska*, vol. 14, no. 2, 1971.) *Polish Medical Journal*, vol. 11, no. 1, 1972, p. 49-58. 18 refs. Translation.

A72-37497 Analysis of left ventricular wall motion by reflected ultrasound - Application to assessment of myocardial function. I. G. McDonald (St. Vincent's Hospital, Melbourne,

Australia), H. Feigenbaum (Melbourne, University, Melbourne, Australia), and S. Chang (Indiana University, Indianapolis, Ind.). *Circulation*, vol. 46, July 1972, p. 14-25. 33 refs. Research supported by the University of Melbourne and St. Vincent's Hospital.

A72-37498 Evaluation of left ventricular function by echocardiography. N. J. Fortuin (Environmental Protection Agency, Div. of Effects Research, Chapel Hill, N.C.), W. P. Hood, Jr. (North Carolina, University, Chapel Hill, N.C.), and E. Craig (North Carolina Memorial Hospital, Chapel Hill, N.C.). *Circulation*, vol. 46, July 1972, p. 26-35. 30 refs. Contract No. PHS-CPA-70-129.

Description of a method for determining the ventricular function parameter of mean velocity of circumferential fiber shortening by echocardiography. The utility is substantiated with which this parameter and the echo-measured ventricular dimensions and derived volumes can aid in the clinical assessment of ventricular pump and muscle performance in ambulatory patients with cardiac lesions. M.V.E.

A72-37499 Echocardiography in the diagnosis of congenital mitral stenosis and in evaluation of the results of mitral valvotomy. N.-R. Lundstrom (Lund, University, Lund, Sweden). *Circulation*, vol. 46, July 1972, p. 44-54. 26 refs. Research supported by the Swedish National Association against Heart and Chest Diseases.

A72-37500 Coronary collateral circulation and myocardial blood flow reserve. S. B. Knoebel, P. L. McHenry, J. F. Phillips, and F. J. Pauletto (Marion County General Hospital; Indiana University, Indianapolis, Ind.). *Circulation*, vol. 46, July 1972, p. 84-94. 27 refs. Research supported by the Herman C. Krannert Fund, Indiana Heart Association, Northeast Indiana Heart Association, and American Medical Association; Grants No. PHS-HE-6308; No. PHS-HE-5363; No. PHS-HE-5749.

Experimental assessment of the effect of collateral circulation on myocardial blood flow reserve upon one hundred patients. The results of the study suggest that intercoronary collateral vessels contribute insignificantly, in statistical terms, to myocardial blood flow reserve. Bridge collaterals, however, do seem to contribute in selected patients. M.V.E.

A72-37600 Discontinuity of seen motion reduces the visual motion aftereffect. W. P. Banks and D. A. Kane (Pomona College, Claremont, Calif.). *Perception and Psychophysics*, vol. 12, no. 1 B, July 1972, p. 69-72. 12 refs. Research supported by Pomona College.

Study of the visual motion aftereffect induced by a rotating-spiral motion-picture film in film viewers. The created spiral aftereffect increased in strength and duration with the rate of motion, but at all rates of motion it declined as discontinuity of motion increased. The results are taken as evidence that motion aftereffects are caused by selective fatigue of small, directionally sensitive motion-receptive fields. M.V.E.

A72-37649 * Studies of the electron transport chain of extremely halophilic bacteria. VII - Solubilization properties of menadione reductase. J. K. Lanyi (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Journal of Biological Chemistry*, vol. 247, May 25, 1972, p. 3001-3007. 21 refs.

A72-37650 * Isolation of a polyvalent bacteriophage for *Escherichia coli*, *Klebsiella pneumoniae*, and *Aerobacter aerogenes*. K. A. Souza, H. S. Ginoza, and R. D. Haight (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field; San Jose State College, San Jose, Calif.). *Journal of Virology*, vol. 9, May 1972, p. 851-856. 24 refs.

A72-37721 * Survival of common terrestrial microorganisms under simulated Jovian conditions. P. Molton (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.) and C. Ponnampuruma (Maryland, University, College Park, Md.). *Nature*, vol. 238, July 28, 1972, p. 217, 218. NASA-supported research.

The microorganisms used in the experiments include *Escherichia coli* B, *Serratia marcescens*, *Aerobacter aerogenes*, and *Bacillus subtilis*. The survival of these microorganisms under simulated Jovian conditions indicates that there is a very real possibility of the contamination of Jupiter by a nonsterile spacecraft, provided that the planet can also permit growth of such contaminants. The apparent ease with which some very common organisms can survive for 24 hr suggests that, with adaptation, growth of anaerobic organisms may be a probability. G.R.

A72-37742 # Nuclein acid contents in cholinergic and adrenergic spinal cord neurons and in their glial satellite-cells during hypoxic hypoxia and a post-hypoxia period (Soderzhanie nukleino-nykh kislot v kholinergicheskikh i adrenergicheskikh neuronakh spinnoy mozga i ikh glial'nykh kletkakh-satellitakh pri gipoksicheskoi gipoksii i v postgipoksicheskii period). L. Z. Pevzner (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 203, Apr. 11, 1972, p. 1218-1221. 19 refs. In Russian.

A72-37757 # Pressure transducer for medical application (Druckwandler für medizinische Anwendung). K. Forke and D. Tzschoppe (VEB Kombinat Medizin- und Labortechnik, Dresden, East Germany). (*Fachkolloquium über Informationstechnik, 4th, Technische Universität Dresden, Dresden, East Germany, Jan. 14, 15, 1971.*) *Zeitschrift für elektrische Informations- und Energietechnik*, vol. 2, no. 2, 1972, p. 99-104. In German.

In the approach considered the measurement of the pressure in some part of the vascular system is conducted with the aid of a transducer located outside the body. Coupling elements for transferring the pressure from the interior of the body to the transducer are generally thin tubes consisting of a plastic material. Conditions for optimal measurement conditions are analyzed for the case involving a rigid tube as coupling element. The more complex conditions prevailing in the case of elastic tubes are briefly considered together with the design of a pressure transducer. G.R.

A72-37773 Systemic haemodynamics in borderline arterial hypertension - Responses to static exercise before and under the influence of propranolol. R. Sannerstedt and S. Julius (Michigan, University, Ann Arbor, Mich.). *Cardiovascular Research*, vol. 6, July 1972, p. 398-403. 14 refs. Research supported by the American Heart Association; Grants No. PHS-CD-00081-05; No. PHS-2-MO1-RR-42-09.

A72-37826 Differential effects of refractive errors and receptive field organization of central and peripheral ganglion cells. H. Ikeda and M. J. Wright (Royal College of Surgeons of England, London, England). *Vision Research*, vol. 12, Sept. 1972, p. 1465-1476. 27 refs. Research supported by the Godfrey Robinson Research Fund and Medical Research Council.

A72-37827 Mach bands measured by a compensation method. G. von Bekesy (Hawaii, University, Honolulu, Hawaii). *Vision Research*, vol. 12, Sept. 1972, p. 1485-1497. 35 refs. Grant No. PHS-NS-06890.

Psychological methods to measure Mach bands in man are examined. A compensation method considered uses a part of the stimulus to make the Mach bands disappear. The disappearance of the Mach bands occurs when the pattern of brightness becomes similar to the pattern of the stimulus. The width of the Mach bands as a function of observer distance is discussed together with the doubling of the brightness of the Mach bands, and the equipment needed for the compensation method. G.R.

A72-37828 Hering's law of equal innervation and the position of the binoculus. L. D. Pickwell (Bradford, University, Bradford, England). *Vision Research*, vol. 12, Sept. 1972, p. 1499-1507. 17 refs.

A72-37829 Chromatic adaptation of orientation- and size-specific visual processes in man. J. G. May (Louisiana State University, New Orleans, La.). *Vision Research*, vol. 12, Sept. 1972, p. 1509-1517. 22 refs.

The findings of Thomas and Kerr (1971) tend to indicate that the human visual system contains mechanisms that are selectively sensitive to size and spatial frequency. The question is investigated whether the orientation- and size-specific mechanisms can be selectively adapted to light of different wavelengths using some of the same psychophysical procedures which have led to their delineation. Two experiments were carried out in which the increment threshold for vertical test gratings was recorded after adaptation to gratings in various orientations or of various spatial frequencies. The data obtained show the possibility of a selective adaptation of the mechanisms to wavelength. G.R.

A72-37830 The generation of the late receptor potential - An excitation-inhibition phenomenon. A. J. Sillman, W. G. Owen, and H. R. Fernandez (California, University; Southern California, University, Los Angeles, Calif.). *Vision Research*, vol. 12, Sept. 1972, p. 1519-1531. 29 refs. Research supported by the Research to Prevent Blindness, Inc.; Grants No. PHS-EY-00331; No. PHS-EY-00706.

It is pointed out that the nature of the relationship between the visual pigment intermediates and the receptor response is at present little understood. It was, therefore, decided to study both the amplitude of the receptor potential of the isolated, perfused retina and the kinetics of bleaching of visual pigment solutions, using pH as the experimental variable common to each set of experiments. It was found in the investigation that the amplitude of the late receptor potential is inversely proportional to the rate of accumulation of metarhodopsin II. Such a relationship is indicative of a mechanism involving inhibition as well as excitation in the generation of the late receptor response. G.R.

A72-37831 Single stimulus and multiple stimulus threshold. E. L. Greve (Office of the Surgeon General RNAMC; Amsterdam, University, Amsterdam, Netherlands). *Vision Research*, vol. 12, Sept. 1972, p. 1533-1543. 32 refs. Research supported by the Office of the Surgeon General RNAMC.

The investigation discussed is concerned with the principle of multiple stimulus presentation for which the Visual Field Analyzer introduced by Friedmann (1966) offers the best possibilities in practice. None of the nine subjects studied showed a significant difference in the levels of the differential threshold for multiple-stimulus presentation and single-stimulus presentation. The intra-individual variation is discussed together with inter-individual variation, the influence of eccentricity, spatial presentation, and supraliminal stimuli. It is pointed out that the conclusions reached on the basis of the test results are only applicable to small round stimuli and not to lines or circles as used in some methods of visual field examination. G.R.

A72-37853 A system for the mass examination of electrocardiograms. T. Watanabe (Research Institute for Chronic Diseases, Gunma, Japan) and N. Nakamura (Ministry of International Trade and Industries, Electrotechnical Laboratory, Tokyo, Japan). *Medical and Biological Engineering*, vol. 10, May 1972, p. 321-325.

The characteristics of the new system include ease of operation, reliability, economy of operating expenses, speed of operation, and ease of transportation. A low-noise electrocardiograph for computer application is provided. Analog operation is used for an arrhythmia diagnosis, and digital processing for a general ECG analysis. A description of the principal circuits is given, taking into account the ECG amplifier, the arrhythmia detector, the analog-to-digital converter, the memory circuit, and the base-line correction circuit. G.R.

A72-37870 The incidence of hypertension and associated factors - The Israel ischemic heart disease study. H. A. Kahn (National Institutes of Health, National Eye Institute, Bethesda, Md.), J. H. Medalie, U. Goldbourt (Tel Aviv Medical School, Tel Aviv, Israel), H. N. Neufeld (Tel-Hashomer Hospital, Tel Aviv, Israel), and E. Riss (Rambam Hospital, Haifa, Israel). *American Heart Journal*, vol. 84, Aug. 1972, p. 171-182. 41 refs.

Use of available data from a large-scale prospective study focused principally on coronary heart disease to add to existing knowledge about hypertension incidence. Interest is centered on individual rather than group changes, and accordingly designated as risks for hypertension incidence were all individuals with 1963 blood pressures less than 140 mm systolic and less than 90 mm diastolic. Data are presented in support of a hypothesis that the size of the family group living together is inversely related to the risk of developing hypertension. F.R.L.

A72-37871 Prognostic value of an electrocardiographic sign in acute myocardial infarction. M. A. Mir (Queen Mary's Hospital, Kent, England). *American Heart Journal*, vol. 84, Aug. 1972, p. 183-188. 23 refs.

Demonstration that an ECG sign of infarction (M-complex), shown to be associated with a high incidence of arrhythmias and a high mortality rate, is related to a high frequency of complications and to an unfavorable prognosis. The sign appeared in 58 cases out of a total of 275 patients. Thromboembolism and 'cardiogenic shock' were very significantly frequent in these 58 patients. In the M-complex group, good prognosis was shown by those patients who had a previous history of infarction, in whom the M-complex occurred in the inferior region, and who showed a QT pattern within 24 hr. The survival rate was poor in those who had the M-complex in the anterior region, and in whom this persisted beyond 24 hr. F.R.L.

A72-37872 Interrelationship of hemodynamic alterations of valvular heart disease and renal function - Influences on renal sodium reabsorption. G. A. Porter, F. E. Kloster, J. D. Bristow, and H. E. Griswold (Oregon, University, Portland, Ore.). *American Heart Journal*, vol. 84, Aug. 1972, p. 189-202. 41 refs. Grant No. PHS-HE-06336-10.

A72-37876 An objective test for evaluating the functional state of the oculomotor system during somnolence states (Une épreuve objective pour apprécier l'état fonctionnel du système oculo-moteur au cours des états de somnolence). R. Angiboust, J. Rey, J.-C. Godinou, and J. Bourdarias (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 11-14. 7 refs. In French.

A72-37877 Renal polycystoma - Incidence among flight personnel (La polykystose rénale - Incidences dans le personnel navigant). R. Pannier, G. Leguay, and P. Willemin (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 15-17. 7 refs. In French.

A72-37878 Description of an easy and simplified test for electromyographic diagnosis of latent spasmophilia in flight personnel (Description d'une épreuve facilitante simplifiée pour le diagnostic électromyographique de la spasmophilie latente chez le personnel navigant). P. Pesquies, J. Houssais, A. Salvagniac, and A. Gibert. *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 19-23. In French.

A72-37879 Resumption of flight after retinal surgery (Reprise du vol après interventions chirurgicales rétinienne). G. Perdriel and J. P. Chevaleraud (Ministère des Armées, Service de

Santé des Armées; Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 25-28. In French.

Discussion of cases of peripheral retinal lesions which were surgically treated before the appearance of any functional symptomatology. The subjects were returned to flying duties. Cases of retinal detachment are described which set an identical problem. It appears that modern methods (photocoagulation, cryocoagulation, and lasers) make it possible to declare candidates fit who present unimportant lesions. As for detachments, a definitive and systematic declaration of unfitness should not be made. F.R.L.

A72-37880 Hypocapnic hypoxia effects on blood coagulation and fibrinolysis (Effets de l'hypoxie hypocapnique sur la coagulation sanguine et la fibrinolyse). M.-V. Strumza, J. Hainaut, and J. M. Strumza-Poutonnet. *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 29-32. 31 refs. In French.

A72-37881 Systematic detection of myocardial infarction in the course of medical screening of flight personnel (L'infarctus du myocarde de découverte systématique au cours de l'expertise révisionnelle du personnel navigant). P. Allard, J. Pataco-Crouzet, R. Carre, and F. Plas (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 33-37. 13 refs. In French.

A72-37882 Place of tropical pathology in medical assessment of aircrew (Place de la pathologie tropicale dans l'expertise médicale du personnel navigant). J. Pataco-Crouzet, P. Allard, R. Carre, J. Gres, and A. Gibert (Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 11, 1st Quarter, 1972, p. 39-44. In French.

Discussion of tropical illnesses which affect aircrew, and which arise from multiple stops, climatic changes, and variable diet. Particular attention must be given to foreign candidates and young French candidates who are natives of overseas departments. At the time of licence renewal, exotic infections are sources of indispositions of varying degrees of gravity with or without hospitalization. The most serious diseases are amebiasis and malaria. Many cases of the latter go unreported because those affected make use of synthetic suppressants in large doses. Attention is given to parasitosis, epidermomycosis, and viral and bacterial infections. F.R.L.

A72-37898 How United trains DC-10 pilots. G. McCulloch (United Air Lines, Inc., Chicago, Ill.). *Shell Aviation News*, no. 408, 1972, p. 2-6.

Review of the training given to DC-10 pilots on a sophisticated simulator which embodies all the modern features of the Boeing 747 simulator plus 'instant replay,' which allows the instructor to review the student's flying techniques. The course is based on 'phase of flight' rather than a systems approach. The Flight Guidance System (FGS) is taught in a series of building blocks spread over the whole 28 days of training. The syllabus is described in day-to-day detail. An hour in the simulator costs only about one-tenth as much as an hour in the DC-10 (\$2000). The visual system has day/night/dusk capability and unlimited changes in visibility and ceiling height. F.R.L.

A72-37949 # Automatism of a spontaneously active tissue (Pro avtomatituu spontanno aktivnoi tkanini). L. V. Reshod'ko (Kiiv'skii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrain's'koi RSR, Dopovidi, Serii B - Geologiya, Geofizika, Khimiia i Biologiya*, vol. 34, Apr. 1972, p. 368-371. 5 refs. In Ukrainian.

The automatism of a smooth muscle strip was examined by statistical simulation with a computer under conditions corresponding to the absence of inclinations toward spontaneous activity by individual cells of the muscle. The remaining properties of individual elements in the muscle matrix were subject to restrictions conform-

ing with the properties of real muscle cells. Contractile activity curves for this matrix are shown to exhibit a damped oscillatory behavior. This result indicates that the cause of undamped automatism in spontaneously active tissues is related to the spontaneous activity of their constituent cells. T.M.

A72-37992 # Vertical posture control mechanisms in man (O mekhanizmaxh regulatsii vertikal'noi pozy cheloveka). A. I. Litvintsev. *Avtomatika i Telemekhanika*, Apr. 1972, p. 71-83. In Russian.

Stabiligrams, mechanograms and electromyograms were recorded to investigate muscular activity control mechanisms in subjects who maintained a comfortable standing posture, a precise standing posture and a standing posture with closed eyes, with or without receiving jolts in sagittal or frontal directions. It was found that at least four muscular activity control mechanisms were active in the subjects as they tried to maintain their prescribed postures. LF and 10-Hz muscular activity bursts to maintain the posture, and concordant LF activity variations in talocrural and knee joints to maintain body equilibrium were the characteristic features of the control mechanisms. V.Z.

A72-38028 * The effect of chronic erythrocytic polycythemia and high altitude upon plasma and blood volumes. R. R. Burton and A. H. Smith (California, University, Davis, Calif.). *Society for Experimental Biology and Medicine, Proceedings*, vol. 140, July 1972, p. 920-923. 13 refs. Grant No. NGR-05-004-008.

Comparison of two kinds of physiological chronic erythrocytic polycythemias in order to differentiate the specific effect of erythrocytic polycythemia from the general effects of high altitude upon the plasma volume. The two kinds were produced hormonally in female chickens, at sea level, or by protracted high-altitude exposures. It appears that the vascular system of the body may account for an increase in red blood cell mass either by reduction in plasma volume, or by no change in plasma volume, resulting in differential changes in total blood volumes. F.R.L.

A72-38029 Effect of beta-adrenergic blockade on plasma volume in human subjects. S. Julius, A. V. Pascual, P. H. Abbrecht, and R. London (Michigan, University, Ann Arbor, Mich.). *Society for Experimental Biology and Medicine, Proceedings*, vol. 140, July 1972, p. 982-985. 14 refs. Research supported by the American Heart Association.

Study of data related to the role of the sympathetic nervous system in the regulation of plasma volume, which was measured before and after beta-adrenergic blockade with propranolol. In order to better understand observed changes in plasma volume an attempt was made to separate the effect of beta blockade on cardiac output, peripheral resistance, and central venous pressure from its other hemodynamic effects. It was observed that plasma volume in human subjects decreases after an intravenous injection of propranolol. F.R.L.

A72-38033 # Participation of cholinergic structures in the development of disturbances of the functional state of the cerebellum under the action of centripetal accelerations (Ob uchastii kholinergicheskikh struktur v razvitiu narusheniia funktsional'nogo sostoianiia mozzhechka pri vozdeistvii tsentrostremitel'nykh uskorenii). L. D. Klimovskaia and N. P. Smirnova. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Apr. 1972, p. 16-19. 18 refs. In Russian.

A72-38034 # Changes of the catecholamine content in the brain of albino rats under overstrain caused by running in a rotating drum (Izmenenie soderzhaniiia katekholaminov v golovnom mozge belykh krysh pri perenapriazhenii, vyzvanom beganiem vo vrashchaiushchemsia barabane). K. I. Pogodaev, N. F. Turova, V. M. Lebedev, and I. E. Semavin (II Moskovskii Meditsinskii Institut; I Moskovskii Meditsinskii Institut; Moskovskii Nauchno-

Issledovatel'skii Institut Psikhatrii, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Apr. 1972, p. 43, 44. 13 refs. In Russian.

A72-38035 # Morphological changes in the lungs and kidneys during prolonged intoxication of the organism by carbon tetrachloride (Morfologicheskie izmeneniia v legkikh i pochkakh pri dlitel'noi intoksikatsii organizma chetyrekhkhlorigim uglerodom). I. F. Kolpashchikova (Gor'kovskii Meditsinskii Institut, Gorki, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 73, Apr. 1972, p. 118-121. In Russian.

A72-38087 # Lipid peroxidation on the human skin surface following erythrogenic UV irradiation (Lipidperoxydation an der menschlichen Hautoberfläche durch erythemwirksame UV-Strahlung). H. Meffert and G. Reichmann (Klinik und Poliklinik für Hautkrankheiten, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 28, no. 4, 1972, p. 667-673. 30 refs. In German.

A72-38144 * Renin in differential diagnosis of hypertension. S. Oparil and E. Haber (Massachusetts General Hospital; Harvard University, Boston, Mass.). *American Heart Journal*, vol. 82, Oct. 1971, p. 568-570. 32 refs. Grants No. PHS-IF-03-HE-44850; No. PHS-HE-06664; No. NGR-22-016-007.

Renin is a proteolytic enzyme secreted by the kidney. Techniques for the direct measurement of renin content of human blood are not available at the present time. Two of the best known causes of remediable hypertension can be diagnosed from abnormalities in renin activity and aldosterone production. In renovascular hypertension, renin secretion is increased because of impaired glomerular perfusion. The renin activity assay, when applied in a carefully controlled fashion, is a useful screening test for treatable causes of hypertension. G.R.

A72-38147 * Dietary regulation of fatty acid synthesis in rat liver and hepatic autotransplants. J. C. Bartley and S. Abraham (Northern California, Children's Hospital Medical Center, Oakland, Calif.). *Biochimica et Biophysica Acta*, vol. 260, 1972, p. 169-177. 41 refs. Research supported by the American Cancer Society; Grants No. NGR-05-059-005; No. PHS-CA-11736.

A72-38148 # Active leisure and flight longevity (Aktivnyi otdykh i letnoe dolgoletie). A. Babiichuk. *Aviatsiia i Kosmonavtika*, June 1972, p. 24, 25. In Russian.

Consideration of the problem of maintaining pilot efficiency and health under conditions of little movement but high stress. The relation between the degree of job sedentariness and the state of health of the individual is illustrated by examples involving people other than pilots. The need for pilots to engage in an active, organized leisure, where they are kept on the go and made to perform numerous exercise routines, is stressed in order to improve their work efficiency and prolong their job longevity. An experiment involving the exposure of pilots to two weeks of active leisure is described, citing results which demonstrate the great effectiveness of this kind of leisure in achieving weight reductions and significant improvements in health indices. A.B.K.

A72-38150 * Language and speech capacity of the right hemisphere. M. S. Gazzaniga (New York University, New York, N.Y.) and S. A. Hillyard (California, University, La Jolla, Calif.). *Neuropsychologia*, vol. 9, 1971, p. 273-280. 13 refs. Grants No. NGR-05-009-083; No. PHS-1-ROL-MH-17883-01.

A72-38175 * The production and characterization of specific antibodies to aldosterone. B. Africa (Duke University, Durham, N.C.) and E. Haber (Massachusetts General Hospital; Harvard University, Boston, Mass.). *Immunochemistry*, vol. 8, 1971, p.

479-486. 19 refs. Contracts No. PHS-PH-43-67-1443; No. NAS9-10981; Grant No. NGR-22-016-007.

A72-38200 # Muscle-like structures and the problem of the polymer engine (M'iazopodibni strukturi i problema polimernogo dviguna). R. V. Beliakov. *Akademiia Nauk Ukrains'koi RSR, Visnik*, vol. 36, Apr. 1972, p. 38-48. 43 refs. In Ukrainian.

Review of studies of contractile and muscle-like elastic fibers and of their uses for the production of mechanical systems. Details are given on some autopulsation systems using such fiber for spring action. Direct and inverse problems of such systems are covered.

V.Z.

A72-38212 # Protein synthesis in the cell-free system of the human thyroid gland (Sintez belka v besketletochnoi sisteme shchitovidnoi zhelezy cheloveka). O. Saitmuratova and S. K. Khalikov. *Akademiia Nauk Uzbekskoi SSR, Institut Biokhimii, Uzbek SSR, Akademiia Nauk Uzbekskoi SSR, Doklady*, vol. 28, no. 12, 1971, p. 53, 54. 5 refs. In Russian.

A72-38220 Electrical stimulation of vestibular nuclei - Effects on light-evoked activity of lateral geniculate nucleus neurones. J. N. Papaioannou (Cambridge University, Cambridge, England). *Pflügers Archiv*, vol. 334, no. 2, 1972, p. 129-140. 27 refs. Research supported by the King's College.

A72-38229 # Frequency response studies of human and avian respiratory regulation. P. J. Stoll (California, University, Davis, Calif.) and J. S. Meditch (California, University, Irvine, Calif.). In: Joint Automatic Control Conference, 13th, Stanford, Calif., August 16-18, 1972, Preprints of Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1972, p. 108-111. 12 refs. Grant No. AF-AFOSR-72-2116.

The use of frequency response methods in the identification of the tidal volume/alveolar CO₂ subsystem in human and avian respiratory regulation is reviewed and critiqued. Attention is given to both experimental procedures in obtaining meaningful data from living subjects and the problems associated with the development and use of digital computer algorithms to perform the identification. Numerical results and their physiological significance are presented and discussed. Preliminary results from the avian studies show a frequency response of the same general form as for humans except that transport delays, which are significant in the human, are negligible in the former. (Author)

A72-38308 Improvement of the operational ability of complex man-machine systems through human engineering (Anthropotechnik zur Verbesserung der Betriebsfähigkeit komplexer Mensch-Maschine-Systeme). H. Arp (Stuttgart, Technische Hochschule, Stuttgart, West Germany). In: INTERKAMA 1971; International Congress with Exposition for Measurement Technology and Automation, 5th, Düsseldorf, West Germany, October 14-20, 1971, Reports. Munich, R. Oldenbourg Verlag, 1972, p. 171-181. 28 refs. In German.

Consideration of some of the foremost requirements of human engineering applications to the enhancement of operational effectiveness in man-machine systems. Following an introduction to the basic man-machine interface and interaction aspects and to their operational implications, the scientific foundations of human engineering system design are reviewed in the light of pertinent studies published in the course of the last 15 years. The prerequisites to good design and its problems are discussed with special attention to instrumental aids for process course prediction and information display control. Effective system operation and process control are shown to depend on adequate man-machine communication hardware and to be improvable through equipment that enhances the human operator's capability for parallel data processing and decision making. Special advantages are held forth by instrument-aided process course predictability.

M.V.E.

A72-38310 Communication - Man - Process control computer: Problems and solutions for dialog and control center planning (Kommunikation - Mensch - Prozessrechner: Probleme und Lösungen für Dialog und Leitstandplanung). J. Reetz (IBM Deutschland, Sindelfingen, West Germany). In: INTERKAMA 1971; International Congress with Exposition for Measurement Technology and Automation, 5th, Düsseldorf, West Germany, October 14-20, 1971, Reports. Munich, R. Oldenbourg Verlag, 1972, p. 198-207. In German.

The present situation in industry concerning applications of control center technology and process control computers, and the relation between them is examined, giving particular attention to enterprises manufacturing concrete. Certain problems which have to be solved to ensure efficient production are related to information flow, criteria for control room planning, and the operation of control rooms. The most important objectives for planners of control rooms and process control computers are listed. Problems for computer and control center personnel are discussed. Possibilities for solving the various problems with the aid of the functional devices of the new concept considered are investigated, and a description of the whole system is presented, taking into account process control computers and the program concept.

G.R.

A72-38464 # Automatically controlled delay in self-excited pulsating systems based on artificial muscles (Avtoregul'ovane zapizniuvannia v avtopul'satorakh na shtuchnikh m'iazakh). R. V. Beliakov. *Avtomatika*, vol. 17, Mar.-Apr. 1972, p. 8-15. 25 refs. In Ukrainian.

A72-38549 Our ancestors - The bacteria (Nos ancêtres - Les bactéries). G. Lucotte. *Science Progrès Découverte*, June 1972, p. 33-38. In French.

Exposition of the proposition that cases exist where a cytoplasmic heredity can be associated with certain organelles which, from this fact, play a role in heredity. On the other hand, there are analogies between typical bacterial structure and that of organelles. It appears that the cell is no longer the biological unit which was believed to be indivisible, but represents a world of such complexity that is necessary to resolve it into components which are smaller and simpler.

F.R.L.

A72-38551 * Evolutionary clock - Nonconstancy of rate in different species. T. H. Jukes and R. Holmquist (California, University, Berkeley, Calif.). *Science*, vol. 177, Aug. 11, 1972, p. 530-532. 13 refs. Grants No. PHS-HE-11553; No. NGR-05-003-460.

By using various methods for comparing polypeptide sequences we find that the evolutionary divergence of rattlesnake cytochrome c from cytochromes c of species in other classes has been more rapid than that of cytochrome c of another reptile, the snapping turtle. This suggests that the evolutionary rate of change of cytochromes c is species-dependent as well as time-dependent. (Author)

A72-38552 # Influence of inotropic alteration on the severity of myocardial ischemia after experimental coronary occlusion. T. Watanabe, F. Shintani, L. Fu, J. Fujii, H. Watanabe, and K. Kato (Cardiovascular Institute, Tokyo, Japan). *Japanese Heart Journal*, vol. 13, May 1972, p. 222-231. 28 refs.

A72-38567 # Calculating the perceived level of light and sound. S. S. Stevens (Harvard University, Cambridge, Mass.). *British Acoustical Society, Proceedings*, vol. 1, Summer 1972. 13 p. 22 refs.

Discussion of a recent attempt to describe the quantitative rules that govern the response of the ear to complex sounds, and review of certain significant similarities between vision and hearing. The stimulus energies of light and sound are both basically two-dimensional, varying as they do in frequency and intensity. The focus is on the magnitude of perceptions, i.e., on what is called brightness and loudness. Attention is addressed particularly to the manner in which the eye and the ear integrate across frequency.

M.V.E.

A72-38577 # Solutions of extremal problems by a biological control system (O reshenii ekstremal'nykh zadach biologicheskoi sistemoi upravleniia). L. N. Fitsner (Institut Problem Upravleniia, Moscow, USSR). (*Vsesoiuznyi Simpozium po Ekstremal'ny'm Zadacham*, 5th, Gorki, USSR, May 1971.) *Radiofizika*, vol. 15, no. 7, 1972, p. 1006-1015. 5 refs. In Russian.

Theoretical treatment of the activity of biological systems in controlling some extremal problems of the nervous and muscular systems, covering control search strategy, and quasi-invariance and variable limitations of biological controls. Special attention is given to the minimization of external stimuli such as are produced by electrical current in the human organism. A stimulation-control algorithm is developed for nervous and muscular systems of humans.

V.Z.

A72-38642 # Influence of temperature shocks on seed formation after irradiation of pollen from *Tradescantia paludosa*. O. A. Driánovska (Bulgarian Academy of Sciences, Dept. of Cytogenetics, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady*, vol. 25, no. 5, 1972, p. 681-683. 5 refs.

Demonstration that gamma radiation can overcome the incrossability between the diploid clone 6-50 and the tetraploid clone 131 (in doses of 1 and 5 kR). Temperature shocks have a restorative effect on haploid and diploid pollen at the higher doses as well (5 to 50 kR). Temperature shocks can increase fertility and overcome the incrossability between 6-50 and 131 at doses of 10 and 50 kR.

F.R.L.

A72-38646 Receptive fields of units in the visual cortex of the cat in the presence and absence of bodily tilt. G. Horn, G. Stöchler, and R. M. Hill (Cambridge University, Cambridge, England). *Experimental Brain Research*, vol. 15, no. 2, 1972, p. 113-132. 37 refs. Research supported by the Science Research Council; Grants No. PHS-MH-16215; No. PHS-NB-05653.

The receptive fields of units in the visual cortex of anaesthetized cats were studied using spots or slits of light. Some fields were found to be stable when they were repeatedly plotted, with the cat maintained in the horizontal position; other fields were not stable and the sharpness of spatial tuning varied, though the orientation of the axis did not shift. The findings are consistent with the view that the receptive fields of certain cells in the visual cortex are capable of being modified, one of the modifying influences being the orientation of the body in space.

M.V.E.

A72-38647 Synaptic patterns in the superficial layers of the superior colliculus of the monkey, *Macaca mulatta*. R. D. Lund (Washington University, Seattle, Wash.). *Experimental Brain Research*, vol. 15, no. 2, 1972, p. 194-211. 54 refs. Grants No. NIH-EY-00491; No. NIH-EY-00596; No. NIH-NB-04053; No. NIH-HD-02274.

Study of the synaptic pattern of the upper layers of the superior colliculus of the monkey intended to define whether the differences in pathways shown with the light microscope for the monkey compared with the rat can be confirmed using the electron microscope, and whether such differences may also be reflected in different synaptic patterns. For comparison purposes, further light microscope material has been prepared that shows degeneration patterns after retinal and cortical lesions, and, since ambiguity still exists as to the generality of the fine structural correlate of one of the degeneration reactions, some of the material stained for light microscopy has been examined by electron microscope. The results of these light and electron microscopic correlative studies include the finding that the neurofibrillar method used in this study stains neurofilaments, or a closely associated component, as may be expected from previous studies.

M.V.E.

A72-38648 Threshold excitation, temporal summation, and impulse response function in the retina of the cat - Temporal receptive fields of retinal ganglion cells (Schwellenerregung, zeitliche Summation und Impulsreaktionsfunktion in der Retina der Katze -

Temporale rezepptive Felder retinaler Ganglienzellen). B. Fischer, D. Krause, and H. U. May (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Experimental Brain Research*, vol. 15, no. 2, 1972, p. 212-224. 32 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

A72-38701 Regional lung function in man during immersion with the head above water. M. Arborelius, Jr., B. Lilja (Malmö General Hospital, Malmö, Sweden), U. I. Balldin, and C. E. G. Lundgren (Lund, Universitet, Lund, Sweden). *Aerospace Medicine*, vol. 43, July 1972, p. 701-707. 24 refs. Research supported by the Swedish Medical Research Council; Delegation for Applied Medical Defense Research, and Swedish Association Against Heart and Chest Disease. SMRC Project B70-40P-2633-02; DAMDR Project 30:071/69; DAMDR Project 16:071/70.

A72-38702 # Human tolerance to high, sustained +Gz acceleration. M. J. Parkhurst, S. D. Leverett, Jr., and S. J. Shubrooks, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, July 1972, p. 708-712. 23 refs.

Levels of 6.5 to 9.0 G for a duration of 45 seconds were sustained by a group of centrifuge subjects wearing standard personal protective clothing and using maximum voluntary M-1 maneuver. The amount of protection afforded the subjects at high-G levels was found to be dependent on (1) the type and amount of instruction in the performance of the M-1 straining maneuver, (2) amount of experience and confidence in performing the M-1 maneuver, and (3) overall physical endurance and muscular coordination of the subject. A marked increase in heart rate was observed during all runs. Changes in ECG patterns and cardiac arrhythmias were observed. This series of experiments indicates that man's ability to tolerate high, sustained G forces is greater than previously anticipated when using presently available protective techniques. (Author)

A72-38703 Peripheral venous renin activity during 70 deg tilt and lower body negative pressure. A. F. Fasola (Marion County General Hospital, Indianapolis, Ind.) and B. L. Martz (Indiana University, Indianapolis, Ind.). *Aerospace Medicine*, vol. 43, July 1972, p. 713-715. 23 refs.

A72-38704 Neurologic oxygen toxicity - Effects of switch of inert gas and change of pressure. B. A. Hills (Duke University, Durham, N.C.). *Aerospace Medicine*, vol. 43, July 1972, p. 716-723. 26 refs. Contract No. N00014-67-A-0251-0015.

A72-38705 Roentgenologic studies of the effects of rapid decompression and hypoxia on the gall bladder in cats. H. S. Fang, C. F. Chen, and H. M. Liu (National Taiwan University, Taipei, Nationalist China). *Aerospace Medicine*, vol. 43, July 1972, p. 732-734. Research supported by the National Science Council of Nationalist China.

A72-38706 # Relationships among isometric forces measured in aircraft control locations. L. L. Laubach, M. L. Thordsen (Webb Associates, Yellow Springs, Ohio), and K. H. E. Kroemer (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aerospace Medicine*, vol. 43, July 1972, p. 738-742. 17 refs. Contract No. F33615-71-C-1087.

Fifty-one male subjects participated in a study designed to measure the maximum ('peak') isometric forces that could be exerted at six locations of hand-operated aircraft controls. The subject sat in a simulated aircraft seat and exerted forces on a cylindrical handle. Forces were measured in two vertical and four to eight horizontal directions. Selected descriptive statistics are presented for each of the 44 force exertion measurements. The results show that the amount of force exertable depends decidedly on the location of the control and on the directions of force exertion. Correlations among the force exertions at the several locations were low, indicating that the forces exertable at a location must be determined experimentally rather than by regression analysis of other force data. (Author)

A72-38707 Positioning of aircrews - Ultima ratio of G protection. H. J. von Beckh (U.S. Naval Air Development Center, Crew Systems Dept., Warminster, Pa.). *Aerospace Medicine*, vol. 43, July 1972, p. 743-754. 43 refs.

Several tilting, supinating seats which have been tested in flight and on centrifuges are described and their biomedical adequacy assessed. Only those which assure unrestricted visibility in all directions will be accepted by the pilots. This can be achieved by an adequate selection of the pivot points, and other design criteria which are synthesized. Concerted effort of designers, aeromedical investigators and - last but not least - pilots is urged for the realization of such an integrated G-protective man-machine system. Supinating seats should also be provided for the crew of winged re-entry vehicles (Space Shuttle). For the passengers multidirectional G protective systems with escape capabilities should be developed.

(Author)

A72-38708 Myth of nitrogen equality in respiration - Its history and implications. J. H. Cissik and R. E. Johnson (Illinois, University, Urbana, Ill.). *Aerospace Medicine*, vol. 43, July 1972, p. 755-758. 50 refs.

The traditional open-circuit method for studying the human respiratory metabolism is based on the assumption that the minute volume of expired gaseous nitrogen is exactly equal to the minute volume of inspired gaseous nitrogen. A historical survey of research indicates that the accepted concept of nitrogen equality rests on very precarious grounds. All experimental evidence available since 1960 indicates that the classic open-circuit method of indirect calorimetry is invalid. The fact that only expired air volume is measured and the assumption that the volume of nitrogen expired is exactly equal to the volume of inspired nitrogen produce a large built-in error. Errors as large as 20% in the traditional Haldane calculations of oxygen consumption may be attributed to this assumption of nitrogen equality. The nitrogen equality concept is invalid, and the open-circuit calculation must be revised accordingly.

T.M.

A72-38709 # Cytologic aspect of RF radiation in the monkey. J. E. Prince, L. H. Mori, J. W. Frazer, and J. C. Mitchell (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, July 1972, p. 759-761. 10 refs.

A circulating lymphocytoid cell having a high mitotic potential was obtained from monkeys (*M. mulatta*) 71 hr after exposure to 10-27 MHz electromagnetic radiation for 30 min at a power density of 1.32 W/sq cm. Exposure was made in a coaxial guide powered by a 50 KWP transmitter operated in a pulsed mode (duty cycle of 17%).

(Author)

A72-38710 Precordial monitoring for pulmonary gas embolism and decompression bubbles. M. P. Spencer and H. F. Clarke (Virginia Mason Research Center, Seattle, Wash.). *Aerospace Medicine*, vol. 43, July 1972, p. 762-767. 16 refs.

A72-38711 Pulmonary air-trapping induced by water immersion. G. O. Dahlback and C. E. G. Lundgren (Lund, University, Lund, Sweden). *Aerospace Medicine*, vol. 43, July 1972, p. 768-774. 17 refs.

A72-38712 Helium effect on cardiac mitochondria of mice. I. K. Hawkins (Georgia Medical College, Augusta, Ga.). *Aerospace Medicine*, vol. 43, July 1972, p. 775-777. 13 refs.

Twenty male A/Jax mice, 50 (plus or minus five) days old at the onset, were exposed for 90 days at ambient pressure to the effect of substituting helium for nitrogen in respired air. Control animals were held under identical conditions, but their respiratory gas supply contained no helium. Electron micrographs of cardiac muscle from the helium treated animals showed varying degrees of diffuse disruption of the internal mitochondrial membranes and cristae. The mitochondrial disruptions were seen predominately in mitochondria adjacent to the transverse sarcotubular apparatus.

(Author)

A72-38713 Radiobiological problems caused by supersonic transport /With a survey of the first results established by tests performed on board the Concorde prototype/. R. P. Delahaye, R. Kaiser, and A. Pfister (Strasbourg, Centre de Recherches Nucléaires, Strasbourg-Cronenbourg, France). (*Aeronautical and Space Medicine Conference, Tel Aviv, Israel, Oct. 24-28, 1971.*) *Aerospace Medicine*, vol. 43, July 1972, p. 782-784. 8 refs.

The characteristics of solar and galactic cosmic radiation arriving at the earth orbit are discussed in terms of composition, variation with time and latitude, and intensity levels at different heights in the atmosphere. Results of measurements conducted with nuclear emulsions and photographic dosimetry are given in tables listing monthly doses from September 1970 to June 1971 at different stations in the aircraft. Total flight hours and flight hours above 12,000 m altitude are given for each recorded radiation dose. No radiobiological danger to crewmembers is evident from the data for this period at latitudes from 45 to 53 deg N.

T.M.

A72-38714 Search and rescue service in Denmark with special reference to accidental hypothermia. K. Jessen and J. O. Hagelsten (Royal Danish Air Force, Medical Services, Vaerloese, Denmark). *Aerospace Medicine*, vol. 43, July 1972, p. 787-791. 38 refs.

The S-61 helicopter has a maximal capacity of 15 stretchers with access to every head. During a 5-year period since 1966, the Helicopter Squadron of the Royal Danish Air Force has accomplished 1,148 missions. Because of the very cold sea surrounding Denmark special attention has been paid to accidental hypothermia, i.e., an unintentional lowering of the body temperature in a previously conscious person due to exposure. Slow rewarming was previously recommended in general to avoid rewarming collapse due to asystole or ventricular fibrillation. However, if the body core temperature is lower than 30 C, it seems more rational to rewarm the central parts and especially the neck region actively, while the extremities should not be heated.

(Author)

A72-38719 # Investigations concerning the problem of virtual contours in visual perception (Untersuchungen zum Problem virtueller Konturen in der visuellen Wahrnehmung). M. Stadler (Münster, Universität, Münster, West Germany) and J. Dieker (Heidelberg, Universität, Heidelberg, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 19, 2nd Quarter, 1972, p. 325-350. 52 refs. In German.

Virtual contours involve perceived brightness differences in homogeneously constituted visual fields. The figural after-effects produced by one of Kanizsa's figures (1955) and a number of its variations were determined in a study of the functional effectiveness of virtual contours. It was found that the presence of triangularity is the determining factor for the occurrence of the figural aftereffects. The actual presence of an objective contour, on the other hand, is not a necessary condition. It is pointed out that the virtual contour presents a particularly distinct triangle. Two fundamental objections against the experimental method employed and its assumptions are examined.

G.R.

A72-38816 Relation of the electrocardiogram to hemodynamic alterations in pulmonary embolism. K. M. McIntyre, A. A. Sasahara, and D. Littmann (U.S. Veterans Administration Hospital, West Roxbury; Harvard University, Boston, Mass.). *American Journal of Cardiology*, vol. 30, Aug. 1972, p. 205-210. 13 refs.

The electrocardiogram after embolism was examined in 20 consecutive cases of pulmonary embolism in a group of patients free of underlying cardiopulmonary disease, in order to establish the frequency of diagnostically useful changes and the relation of those changes to underlying hemodynamic states. The results indicate that: (1) the electrocardiogram arouses no clinical suspicion of pulmonary embolism in patients free of prior cardiopulmonary disease, and (2) the only role of the electrocardiogram may be in distinguishing between the two most frequent cardiopulmonary catastrophes, namely, acute myocardial infarction and acute massive pulmonary embolism.

M.V.E.

A72-38817 Determination of systolic time intervals using the apex cardiogram and its first derivative. G. Gabor, I. Porubszky, and P. Kalman (Hungarian Institute of Cardiology, Budapest, Hungary). *American Journal of Cardiology*, vol. 30, Aug. 1972, p. 217-221. 7 refs.

A72-38818 Temporal relation of the second heart sound to aortic flow in various conditions. R. D. Brough, Jr. and R. C. Talley (Texas, University, San Antonio, Tex.). *American Journal of Cardiology*, vol. 30, Aug. 1972, p. 237-241. 15 refs. Research supported by the San Antonio Heart Association.

A72-38819 Echocardiographic determination of left ventricular dimensions, volumes and performance. J. A. Murray, W. Johnston, and J. M. Reid (Washington, University, Seattle, Wash.). *American Journal of Cardiology*, vol. 30, Aug. 1972, p. 252-257. 14 refs. Research supported by the Washington State Heart Association and University of Washington.

A72-38824 Implantable blood pressure telemetry system. F. W. Casadei (Basel, Universität, Basel, Switzerland), M. Gerold (Hoffmann-La Roche Co., Ltd., Basel, Switzerland), and E. Bolding. *IEEE Transactions on Biomedical Engineering*, vol. BME-19, Sept. 1972, p. 334-341. 18 refs.

A telemetry system for long-term monitoring of the blood pressure of unrestrained animals is described. The wholly implantable transmitter is equipped with a pressure transducer suitable for chronic intravascular use. To achieve high performance and long battery life, a greater number of components were used than in conventional implantable devices. Pulse interval modulation is used with a mean sampling rate significantly higher than twice the maximum signal frequency. Together with a controlled pulse window in the receiver, an effective reduction of ignition spark interferences with the weak transmitted signal could therewith be achieved. Experimental data of the system are presented and the experience gained in implantation experiments on nine dogs is summarized.

(Author)

A72-38828 # Cryobiology - A review. D. E. Pegg (Clinical Research Centre, Harrow, Middx., England). In: *Advances in cryogenic engineering*. Volume 17. New York, Plenum Press, 1972, p. 116-136. 79 refs.

Description of some of the phenomena occurring when biological systems are cooled, both with and without freezing, consideration of the mode of action of various substances that protect against freezing injury, and review of the useful applications of this knowledge. Following an examination of the effects on cells and tissues of cooling at temperatures above 0 C and of freezing and ice crystallization in aqueous solutions, the protection of cells and tissues against freezing injury is discussed, along with the techniques used for their cold storage and thawing. The potentialities and limitations of currently used procedures in the banking of isolated cells and of tissues and organs are described. In conclusion, a brief note on cryosurgery is presented.

M.V.E.

A72-38900 Induced vestibular stimulation and the moon illusion. F. Phillip van Eyl (Institute for Perception, Soesterberg, Netherlands). (Midwestern Psychological Association, Meeting, Detroit, Mich., May 1970.) *Journal of Experimental Psychology*, vol. 94, Aug. 1972, p. 326-328. 9 refs.

Study of the responses to vestibular stimulation induced in three subjects by having them travel on a 3.8-sec parallel swing, with two luminous disks affixed to the swing in the subjects' median and horizontal plane and two other similar disks at angles of 40 and 80 deg, respectively. The results of an analysis of variance showed significant differences between the 0, 40, and 80 deg conditions and a significant interaction between these conditions and the subjects. Induced vestibular activity was not significant.

M.V.E.

A72-38926 # Influence of cooling of the sensomotor region of the cerebral cortex on the neurons of the mesencephalic reticular formation (Vliianie okhlazhdeniia sensomotornoj kory mozga na neirony mezentsefalicheskoj retikulirnoy formatsii). V. G. Zilov (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 481-487. 28 refs. In Russian.

A72-38927 # Proteinase activity in different regions of the brain during development and inhibition of a conditioned passive-avoidance reflex (Proteinaznaia aktivnost' v raznykh otdelakh golovnogo mozga pri vyrabotke uslovnogo refleksa passivnogo izbeganiia i ego tormozhenii). T. S. Glushchenko and N. V. Shiriaeva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 488-492. 10 refs. In Russian.

A72-38928 # RNA content in the cortex neurons in connection with the change in its function during the emergence of an animal from hypothermia (Soderzhanie RNK v neironakh kory v sviazi s izmeneniiem ee funktsii pri vykhode zhivotnogo iz gipotermii). N. V. Piven' (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 493-497. 34 refs. In Russian.

A72-38929 # Changes in the overall electrical activity of the mesencephalic reticular formation, the hippocampus, and the cerebral cortex under the influence of hydrocortisone and DOCA (Izmeneniia summarnoi elektricheskoi aktivnosti mezentsefalicheskoj retikulirnoy formatsii, gippokampa i kory golovnogo mozga pod vlianiem gidrokortizona i DOKA). N. M. Malysenko (Chernovitskii Meditsinskii Institut, Chernovtsy, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 503-510. 18 refs. In Russian.

A72-38930 # Influence of rhythmical photostimulation on lower-order monkeys with hyperkinesia of post-encephalitic origin (Vliianie ritmicheskoi svetovoi stimulatsii na nizshikh obez'ian s giperkineziami postentsefaliticheskogo proiskhozhdeniia). T. V. Danilov and N. N. Kudriavtseva (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 511-516. 21 refs. In Russian.

A72-38931 # Diurnal threshold fluctuations of human contrast sensitivity (Sutochnye kolebaniia porogov kontrastnoi chuvstvitel'nost cheloveka). E. N. Podolian (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 517, 518. In Russian.

The contrast discrimination capacity of the human eye was investigated by measuring the illumination levels required for a vision of 0.4 relative units at different hours of the day. The contrast discrimination thresholds of a group of subjects was maximum at 4 a.m. and minimum at 8 p.m., with a diurnal fluctuation amplitude of 0.08 lux.

V.Z.

A72-38932 # Evoked potentials in the auditory system of man (Vyzvannye potentsialy slukhovoi sistemy u cheloveka). S. N. Khechinashvili, Z. Sh. Kevanishvili, and O. A. Kadzhaia (Tbilisskii Gosudarstvennyi Institut Usovshenstvovaniia Vrachei, Tiflis, Georgian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 527-533. 22 refs. In Russian.

Auditory responses were studied in a group of 8 male subjects who received acoustic stimuli originated by 0.2 millisecond voltage pulses, in a shielded sound-proof chamber. Evoked auditory potentials from the ear drum, myogenic potentials and cortical responses were recorded by an oscillograph through silver micro-electrodes inserted in the ear, mastoidal region and cranial skin. Criteria for the discrimination of stimulation effects in the left and right ear are discussed on the basis of the recordings.

V.Z.

A72-38933 # Significance of the nature of an increase in physical strain as it affects the adaptation of an organism to intense muscular activity (Znachenie kharaktera uvelicheniia fizicheskikh nagruzok dlia adaptatsii organizma k intensivnoi myshechnoi deiatel'nosti). V. A. Pyzhova (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 534-539. 18 refs. In Russian.

A72-38934 # Variation of the acetylcholine content and of the cholinesterase activity in the blood under muscular strain (Izmenenie sodержaniia atsetilkholina i aktivnosti kholinesteraz v krovi pri myshechnoi nagruzke). V. P. Erez (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) and K. B. Binnitskaia (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 545-549. 9 refs. In Russian.

A72-38935 # Significance of the reversible aggregation of erythrocytes with respect to the variation of the electrical conductivity of the blood during its motion (O znachenii obratimoi agregatsii eritrotsitov v izmenenii elektroprovodnosti krovi pri ee dvizhenii). N. Kh. Shadrina, B. B. Zelikson, V. A. Levto, and E. I. Trifonova (Akademiia Nauk SSSR, Institut Fiziologii i Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 557-562. 8 refs. In Russian.

A72-38936 # Mechanism of the operative memory of the visual system (O mekhanizme operativnoi pamiatii zritel'noi sistemy). N. F. Podvigin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 592-594. 11 refs. In Russian.

Image recognition time measurements in experiments on humans are discussed in a study of the storage of stimuli in neuron chains of the visual system as a possible mechanism of the operative memory. It is concluded that stored information is most effectively used within the first 25 to 30 milliseconds of storage time, or after 90 to 100 milliseconds, with an interim memory gap. V.Z.

A72-38937 # Automatic classification of multiparameter experimental data (Avtomaticheskaiia klassifikatsiia mnogoparametricheskikh eksperimental'nykh dannykh). V. M. Klimenko, A. S. Kaplunovskii, and I. A. Neroslavskii (Akademiia Meditsinskikh Nauk SSSR, Severo-Zapadnyi Zaochnyi Politekhnikeskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 599-602. 7 refs. In Russian.

Discussion of a theoretical basis for the automatic separation of multiparameter data classes from a various-class data set, by using the probability threshold of data-element similarity as the separation criterion. A formula is given for the criterion, and diagrams are plotted to illustrate the separation procedure. V.Z.

A72-38938 # Device for eliminating the artifact of electrical stimulation when recording evoked pulse activity of neurons (Ustroistvo dlia isklucheniia artefakta elektricheskogo razdrzheniia pri registratsii vyzvannoi neironnoi impul'snoi aktivnosti). L. L. Katushonok, V. P. Lebedev, and N. S. Slepchuk (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 602-605. In Russian.

A72-38939 # Determination of the functional state of the auditory analyzer through the action of short-term acoustic stimuli of increasing intensity (Opredelenie funktsional'nogo sostoianiia slukhovogo analizatora vozdeistviem vozrastaiushchikh intensivnosti kratkovremennoi zvukovoi nagruzki). T. I. Bachurina (Voенно-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 608-612. 17 refs. In Russian.

A72-38940 # Determination of the elastic modulus of the left-ventricle myocardium with the aid of X-ray kymography

(Opredelenie modulia uprugosti miokarda levogo zheludochka s pomoshch'iu rentgenokimografii). Iu. N. Konstantinov, B. M. Astapov, and N. G. Gorbushin (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 612-614. 16 refs. In Russian.

A72-38941 # Quantitative determination of fluorescence within the eye without disrupting the integrity of the eyeball (Kolichestvennoe opredelenie fluorestseina vnutri glaza bez narusheniia tselosti glaznogo iabloka). A. A. Pshenichnova (VII Ob'edinennaia Glaznaia Bol'nitsa, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Apr. 1972, p. 614-617. 7 refs. In Russian.

A72-38957 Problems of the stability of biological systems (Problemy ustoiichivosti biologicheskikh sistem). Edited by B. N. Tarusov. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 19), 1972. 292 p. In Russian.

Relationships between environmental factors and the behavior of biological systems are examined within the framework of exobiological problems involving the development of stable life support systems and the presence of extraterrestrial life forms. General dynamic principles of the regulation of ecological systems are studied by applying mathematical modeling of biological processes and by defining thermodynamic aspects of irreversible processes. Special attention is given to problems of improving the efficiency of radiant energy utilization by algae under conditions of mass cultivation for the purpose of atmospheric regeneration in a closed environment. Limits imposed on the existence and function of life are examined, along with structural features of biological macromolecules.

T.M.

A72-38958 # Limits of the adaptability of life to extremal conditions /in connection with problems of exobiology/ (O predelakh adaptatsii zhizni k ekstremal'nym usloviyam /v sviazi s zadachami ekzobiologii/). S. I. Aksekov. In: Problems of the stability of biological systems. Moscow, Izdatel'stvo Nauka, 1972, p. 7-89. 206 refs. In Russian.

The roles played by environmental factors and by different features of living systems in the extension or restriction of limits imposed on the existence and function of life are examined with relation to practical problems of exobiology. Basic problems encountered in the search for extraterrestrial life and in research on conditions accompanying its origin and propagation are outlined. It is noted that the limits on life are imposed not only by the possibility of internal processes taking place within organisms but also by the presence of material transport processes in the ambient medium. Structural features of biological macromolecules and of water are shown to have specific significance for living systems. Possible extension of known limits on protein-nuclein-water life is discussed.

T.M.

A72-38959 # Energy and mass exchange characteristics of algae (Massoenergoobmennnye kharakteristiki mikrovdoroslei). I. V. Smirnov. In: Problems of the stability of biological systems. Moscow, Izdatel'stvo Nauka, 1972, p. 90-180. 63 refs. In Russian.

Mass cultivation of algae under varying ambient conditions is analyzed from a bioengineering viewpoint. Growth models for individual algae cells are examined with allowance for the illumination factor and for specific features of cell development. The illumination factor is related with the photosynthesis and photo-oxidation processes and with changes in cell chlorophyll content. Experimental results illustrate the dependence of the cell growth rate on the temperature of the suspension and on the intensity of illumination. The possibility of using algae for regenerating oxygen and carbon dioxide expired by humans in a closed environment is evaluated, and the effects of the carbon dioxide level on mass cultivation of algae in a lunar base environment are discussed. T.M.

A72-38960 # Kinetic regularities of the interaction among components in complex biological systems (O kineticheskikh zakonmernostiakh vzaimodeistviia komponentov v slozhnykh biologicheskikh sistemakh). A. B. Rubin. In: Problems of the stability of biological systems. Moscow, Izdatel'stvo Nauka, 1972, p. 181-288. 160 refs. In Russian.

The thermodynamic properties of open ecological systems and mathematical modeling of the behavior of such systems are examined within the framework of exobiological problems involving the development of stable life support systems and the discovery of extraterrestrial life forms. The establishment of an oscillatory state in closed systems of energy and mass exchange is shown to be possible, and energy criteria governing the stability of exchange processes are evaluated. Experimental and theoretical results are given from studies on the mechanisms that regulate the initial stages of light quantum storage in photosynthesizing organisms. T.M.

A72-39041 Evaluation of a total system - Optics plus operator. I. Overington and S. A. Gullick (British Aircraft Corp., Ltd., Filton, Bristol, England). In: Electro-optics '72; Proceedings of the Second International Conference, Brighton, England, February 29-March 2, 1972. Chicago, Industrial and Scientific Conference Management, Inc., 1972, p. 170-177. 11 refs.

Evaluation of the quality of a visual optical system is examined from the viewpoint of a human operator, and attention is given to difficulties encountered in relating this quality to the detection of targets under field conditions. Definition of image quality by investigation of resolution limits, by modulation transfer function measurements, and by measurement of wavefront aberrations is analyzed along with studies of human eye movements, retinal structure, and neural processes involved in target detection. Veiling glare is also discussed as an important factor affecting the system quality. Information which can be obtained from such studies is outlined in an attempt at demonstrating the scope of a comprehensive optical evaluation program. T.M.

A72-39042 Psychophysical image evaluation. F. Scott (Perkin-Elmer Corp., Norwalk, Conn.). In: Electro-optics '72; Proceedings of the Second International Conference, Brighton, England, February 29-March 2, 1972. Chicago, Industrial and Scientific Conference Management, Inc., 1972, p. 179, 180.

Description of a method for evaluating photographic images with respect to information content and the ease with which this information can be interpreted by a human viewer. The method is based on the use of a library of reference photographs that display the effects of relevant photographic and environmental factors in suitable increments of magnitude. A photograph of unknown quality is viewed with a comparison optical device, while simultaneously observing one of the photographs from the library of scored reference pictures. The human evaluators are expected to gain proficiency in searching the reference library for the best match with the test image. T.M.

A72-39143 * # Space station prototype environmental/thermal control and life system - A current overview. N. C. Willis, Jr. (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.) and J. M. Neel (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-35.* 7 p. Members, \$1.00; nonmembers, \$3.00.

The Environmental Thermal Control and Life Support System (ETC/LSS) for a space station has progressed through the design phase into the fabrication of hardware. An overview of the current status of this program is presented with emphasis on the impact and implementation of commonality and maintainability concepts as well as the interface with an on-board checkout system. The programmatic techniques and procedural modifications employed and anticipated are treated. (Author)

A72-39146 * # Research and Applications Modules Thermal Control System. R. I. Cross (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.) and D. J. Wanous (TRW Systems Group, Redondo Beach, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-31.* 10 p. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS8-27539.

Research and Applications Modules (RAMs) are shuttle-compatible payload carriers providing economical experiment/payload accommodations for earth orbital space research and application objectives. The RAM Thermal Control System (TCS) incorporates a pumped fluid coolant loop to provide the flexibility for the wide range of cooling loads and mission operations. The concept employs two fluids: water inside the habitable region to absorb heat, Freon 21 outside to reject heat through radiators. The external surfaces of RAM vehicles are effectively insulated. Therefore, virtually all internally generated heat is rejected through the radiators. The selected system is described along with key analysis techniques developed during the study. (Author)

A72-39147 # Thermal control concept evaluation for a ten-year life modular space station. R. P. Arras, G. E. Laubach, and J. P. Wright (North American Rockwell Corp., Space Div., Downey, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-30.* 14 p. Members, \$1.00; nonmembers, \$3.00.

Alternative thermal control concepts were examined for application to the North American Rockwell/NASA-MSC Modular Space Station preliminary design. Concepts included those based on totally passive elements utilizing heat pipes, hybrid concepts with pumped fluid internal heat transport loops coupled with a heat pipe radiator, and totally active type concepts with fluid flowing both internally and externally to the vehicle pressure hull. Comparison criteria included weight, power, reliability, maintainability, and flexibility with special emphasis given to the relative cost of each option. All concepts were compared. A centralized pumped fluid concept met all requirements without significant technical deficiencies and was among the least expensive evaluated. (Author)

A72-39148 # Thermal scale modeling of spacecraft radiators. J. B. Dietz (Vought Missiles and Space Co., Dallas, Tex.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-29.* 14 p. 13 refs. Members, \$1.00; nonmembers, \$3.00.

Very large system areas are currently anticipated on future manned spacecraft to reject waste heat. The utilization of thermal scale models to predict radiator system performance is discussed, and the criteria for modeling a fluid system with the combined effects of convection, conduction, and radiation in radiator panels are presented. The thermal scaling criteria are deduced for temperature preservation of the fluid from the governing energy and momentum equation relationships for two scale modeling techniques: fluid change and fluid preservation. Utilizing the developed scaling criteria, an analytical performance investigation of a potential space shuttle prototype radiator panel and two 0.4 scale models were conducted. (Author)

A72-39149 * # Development of a laboratory prototype spraying flash evaporator. J. L. Gaddis (Vought Missiles and Space Co., Dallas, Tex.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-28.* 9 p. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS9-12026.

A functional description of the flash evaporator that is being developed as a candidate for the Space Shuttle Environmental Control System thermal control is presented. A single evaporator configuration uses water as an evaporant to accommodate on-orbit

peak heat loads and Freon 22 for terrestrial flight phases below 120,000 ft altitude. Development history, test plans, and operational characteristics are described. Detailed information is included to show: design features, fabrication techniques used for a prototype unit, redundancy considerations, and the control arrangement.

(Author)

A72-39150 * # Lunar roving vehicle thermal control system. R. G. Elliott, C. J. Paoletti, and M. A. Britt (Boeing Co., Saturn/Apollo/Skylab Div., Huntsville, Ala.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-27.* 14 p. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS8-25145.

A thermal control system was incorporated into the Lunar Roving Vehicle (LRV) to maintain temperature sensitive components within appropriate temperature limits during the translunar transportation phase, lunar surface operation, and quiescent periods between lunar traverses. This paper describes the thermal control system and discusses its thermal characteristics during all phases of operation. The basic concept is a passive system which stores internally generated energy during operation with subsequent radiation to space. The external environments are regulated by selected radiative surface finishes. Multi-layer insulation blankets, space radiators, flexible thermal straps, and fusible mass heat sinks were designed to control the temperatures of the electronic components. (Author)

A72-39151 * # Multi-cycle plasma arc evaluation of oxidation inhibited carbon-carbon material for shuttle leading edges. J. E. Medford (Vought Missiles and Space Co., Dallas, Tex.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-26.* 12 p. 10 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS9-11224.

A72-39152 * # Design criteria for the modular space station environmental control and life support system selection. J. R. Jaax (NASA, Manned Spacecraft Center, Houston, Tex.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-25.* 9 p. 6 refs. Members, \$1.00; nonmembers, \$3.00.

A72-39153 * # Atmosphere revitalization in the space station prototype. R. B. Trusch, H. F. Brose (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.), and C. D. Thompson (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-24.* 11 p. 10 refs. Members, \$1.00; nonmembers, \$3.00.

The atmosphere revitalization group (ARG) for the space station prototype (SSP) environmental/thermal control and life support system (ETC/LSS) has been designed to meet a comprehensive set of requirements and constraints for a flight type mission. Design definition is for a modular vehicle temperature and humidity control subsystem, contaminant control equipment, a hydrogen depolarized cell CO₂ concentrator, a water electrolysis oxygen generation subsystem, CO₂ reduction equipment, and a pressure and composition control subsystem. Performance requirements are for support of a crew of six. Realistic leakage rates and metabolic activity cycles, cabin temperature selectability, and controlled cabin relative humidities are specified for the design. Operational aspects of the subsystem are discussed with emphasis given to the influence of a 180-day, maintainable requirement on system design. Consideration of flight vehicle type packaging, in flight maintenance, data management systems interface and fault detection capability, and electrical supply constraints is covered. (Author)

A72-39154 * # Potential applications of NASA-developed technology to problems of the environment. L. W. Ross (Denver,

University, Denver, Colo.) and J. N. Pecoraro (NASA, Office of Manned Space Flight, Bioenvironmental Systems Div., Washington, D.C.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-23.* 7 p. 10 refs. Members, \$1.00; nonmembers, \$3.00.

The life-support mission of NASA has the same broad objectives as the national imperatives toward environmental restoration: pure air, clean water, and reuse of resources. The major difference is the vast scale of the environment, compared to the very small scale of spacecraft, even including the largest space stations now projected. For this reason, the devices developed for manned spacecraft life support will be of much less interest than the techniques that have emerged from NASA-sponsored research and development. Several immediate applications in air and water purification can be cited, and several other long-term potential applications may also be considered. (Author)

A72-39155 # ECLSS concept selection for a shuttle launched modular space station. G. E. Laubach and G. C. Schaedle (North American Rockwell Corp., Space Div., Downey, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-22.* 18 p. Members, \$1.00; nonmembers, \$3.00.

The major ECLSS concept selection trade studies are presented for a 10-year shuttle launched modular space station which implements a comprehensive research program with an initial capability plateau of a six-man crew evolving to a growth plateau of a 12-man crew. In past space station activities, various concepts within the ECLSS, reaction control subsystem (RCS), and electrical power subsystem (EPS) have shown viable options with potential for functional integration. The ECLSS, RCS, and EPS were treated as an integrated subsystem to evaluate which combination of subsystems concepts best satisfied program goals at lowest cost. The results indicated several very competitive options from an overall cost standpoint with the electrochemical approaches with closed life support offering some performance advantages. (Author)

A72-39156 * # The Orbiter ETC/LSS in terms of the unique space shuttle requirements. J. Rousseau and W. Burriss (Garrett Corp., Los Angeles, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-21.* 11 p. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS9-11592.

Consideration of factors which have a significant impact on environmental and thermal control/life support system (ETC/LSS) design. The first area involves thermal management and consideration of the tradeoffs for heat sink selection and cabin atmosphere control (since both have a major effect on ETC/LSS weight and cost). Then consideration is given to system design sensitivity to varying crew size, use of air-cooled avionics, and other factors. (Author)

A72-39157 * # RAM environment control and life support subsystem. R. P. Arras (North American Rockwell Corp., Space Div., Downey, Calif.), B. F. North (General Dynamics Corp., Convair Astronautics Div., San Diego, Calif.), and J. Cody (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-20.* 8 p. Members, \$1.00; nonmembers, \$3.00.

The Research and Application Modules (RAMs) are shuttle payloads designed to provide economical manned facilities for earth orbital research and development. Support of the habitable environment in the sortie class RAMs can be accomplished by an independent ECLSS installation or by integration with the shuttle ECLSS. The RAM study evaluated advantages and disadvantages of various degrees of the two alternative installations. Selection of the optimum subsystem was made from an overall shuttle/RAM standpoint. These trade studies are presented and the resulting ECLSS support concept are discussed. (Author)

A72-39158 * # Comparative evaluation of environmental control and life support systems for the space shuttle orbiter. D. W. Morris (NASA, Manned Spacecraft Center, Crew Systems Div., Houston, Tex.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-19.* 7 p. Members, \$1.00; nonmembers, \$3.00.

A72-39159 # Requirements impact on the shuttle ETC/LSS. T. W. Herrala (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-18.* 8 p. Members, \$1.00; nonmembers, \$3.00.

Chronological review of the shuttle ETC/LSS project. The initial work consisted of that funded under NAS 1-10359, Space Shuttle EC/LSS Study conducted for the Langley Research Center. The impact of shuttle vehicle and program related requirements changes is discussed. Examples of these changes include the introduction of air-cooled electronics equipment, deletion of large cryogenic stores on the vehicle, variation of crew size and mission duration, and investigations of various reentry and atmospheric flight heat sinks. The results of these studies are synthesized into a final ETC/LSS schematic representative of status at the end of the phase B effort.

(Author)

A72-39160 * # Life support system definition for a low cost shuttle launched space station. W. G. Nelson and J. Cody (NASA, Marshall Space Flight Center, Huntsville, Ala.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-17.* 18 p. Members, \$1.00; nonmembers, \$3.00.

Discussion of the tradeoffs and EC/LS definition for a low cost shuttle launched space station to be launched in the late 1970s for use as a long-term manned scientific laboratory. The space station consists of 14-ft-diam modules, clustered together to support a six-man crew at the initial space station (ISS) level and a 12-man crew at the growth space station (GSS) level. Key design guidelines specify low initial cost and low total program cost and require two separate pressurized habitable compartments with independent lift support capability. The methodology used to select the EC/LS design consisted of systematically reducing quantitative parameters to a common denominator of cost. This approach eliminates many of the inconsistencies that can occur in such decision making. The EC/LS system selected is a partially closed system which recovers urine, condensate, and wash water and concentrates crew expired CO₂ for use in a low thrust resistojet propulsion system.

(Author)

A72-39161 * # An automated instrument for monitoring the quality of recovered water. J. E. Misselhorn, W. H. Hartung, S. W. Witz, and C. A. Saunders (Aerojet Medical and Biological Systems, El Monte, Calif.; NASA, Langley Research Center, Hampton, Va.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-16.* 10 p. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS1-10382.

A72-39162 # Flight trace contaminant sensor - A design study. M. Rotheram and M. Ruecker (Perkin-Elmer Corp., Pomona, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-15.* 7 p. Members, \$1.00; nonmembers, \$3.00.

The design of instrumentation to monitor atmospheric contaminants in spacecraft is discussed. Atmospheric contaminants are concentrated from the atmosphere on sorbents contained in the inlet system of a mass spectrometer. The contaminants are analyzed by mass spectrometry as they are desorbed by heating the sorbents. The design of an automated system to perform this analysis is described.

(Author)

A72-39163 * # The development of a 150,000 watt-inch variable conductance heat pipe for space vehicle thermal control. F. Edelstein, J. G. Roukis (Grumman Aerospace Corp., Bethpage, N.Y.), and J. D. Loose (NASA, Marshall Space Flight Center, Astronautics Laboratory, Huntsville, Ala.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-14.* 10 p. 9 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS8-27793.

A72-39164 * # Development of a waste collection system for the space shuttle. A. F. Behrend, Jr. (NASA, Manned Spacecraft Center, Houston, Tex.) and J. E. Swider, Jr. (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-13.* 11 p. 5 refs. Members, \$1.00; nonmembers, \$3.00.

The development of a waste collection system to accommodate both male and female crew members for the space shuttle is discussed. The waste collection system, with emphasis on the collection and transfer of urine, is described. Human-interface requirements, zero-gravity influences and effects, and operational considerations required for total system design are discussed.

(Author)

A72-39165 # Computer simulation of the space shuttle orbiter environmental thermal control system. R. S. Barker (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.) and J. J. Jasin (McDonnell Douglas Astronautics Co., St. Louis, Mo.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-12.* 18 p. 6 refs. Members, \$1.00; nonmembers, \$3.00.

A72-39166 * # Development of a desiccant CO₂ adsorbent tailored for shuttle application. P. J. Lunde, F. L. Kester, and J. S. Lovell (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-11.* 12 p. Members, \$1.00; nonmembers, \$3.00. Research supported by the United Aircraft Atmosphere Revitalization Independent Research and Development Program; Contract No. NAS9-11971.

A72-39167 * # Bosch CO₂ reduction unit research and development. R. F. Holmes, E. E. Keller, and C. D. King (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-10.* 11 p. 5 refs. Members, \$1.00; nonmembers, \$3.00. NASA-sponsored research.

Development of Bosch CO₂ reduction units for manned spacecraft application has been in progress for a decade. The Bosch process catalytically reacts CO₂ with H₂ to produce water and carbon. The water may then be electrolyzed to close the biological oxygen and process hydrogen loops. A critical problem has been to confine the reaction so that carbon does not block flow and stop the process. Reaction isolation within a replaceable catalyst cartridge has been successfully demonstrated. Objectives of the current development program are a 25% reduction in operating power, an 80% reduction in expendable weight, and minimized resupply volume.

(Author)

A72-39168 * # The Bosch process. H. P. Meissner and R. C. Reid (MIT, Cambridge, Mass.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-9.* 11 p. 26 refs. Members, \$1.00; nonmembers, \$3.00. NASA-supported research.

Many previous studies have been carried out to elucidate certain aspects of the Bosch process wherein CO₂ is reacted over an iron catalyst to form carbon and water at temperatures around 1100 F. These results are assembled, and with the aid of new experimental data, are used to analyze the various reactions involved. It is shown that CO₂ and H₂ will not usually react to deposit carbon unless water is removed in a recycle loop. The critical importance of large catalyst areas is stressed relative to catalyst pretreatment processes. It is shown that in most operating Bosch reactions, mass transfer controls the rate of reaction, and it is suggested that the carbon filaments found are the expected result of such a rate limiting process. Typical recycle gas mixtures are considered, and maximum water yields are determined from various cases. A few suggestions are made to improve Bosch reaction performance, and a number of unresolved problems are noted. (Author)

A72-39169 * # Water and waste management subsystem design for a space station prototype. L. Ziegler (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-8.* 12 p. 11 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS9-10273.

A72-39170 # Integrated water vapor electrolysis oxygen generator and hydrogen depolarized carbon dioxide concentrator development. J. C. Huddleston and F. H. Greenwood (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-7.* 14 p. Members, \$1.00; nonmembers, \$3.00.

A72-39171 # Integration of an automated onboard data management system with a manned spacecraft environmental thermal control and life support system. D. L. Sharp, C. H. Morris, III, and W. L. Perkins (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-6.* 7 p. Members, \$1.00; nonmembers, \$3.00.

A72-39172 * # Six-month test program of two water electrolysis systems for spacecraft cabin oxygen generation. R. J. Gillen (NASA, Manned Spacecraft Center, Houston, Tex.), B. M. Greenough (Lockheed Missiles and Space, Inc., Sunnyvale, Calif.), E. S. Mills (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.), W. G. Sanderson (Boeing Co., Houston, Tex.), and F. H. Schubert (Life Systems, Inc., Cleveland, Ohio). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-5.* 17 p. 6 refs. Members, \$1.00; nonmembers, \$3.00.

A72-39173 # Skylab regenerable carbon dioxide removal system. T. Coull (Garrett Corp., Los Angeles, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-4.* 10 p. Members, \$1.00; nonmembers, \$3.00.

A72-39174 # Development of a spacecraft wet oxidation waste processing system. R. B. Jagow (Lockheed Missiles and Space, Inc., Sunnyvale, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-3.* 14 p. 6 refs. Members, \$1.00; nonmembers, \$3.00.

A72-39175 * # Dry incineration of wastes for aerospace waste management systems. L. J. Labak, G. A. Remus (General American Transportation Corp., Niles, Ill.), and J. Shapira (NASA, Ames

Research Center, Environmental Control Research Branch, Moffett Field, Calif.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-2.* 11 p. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS2-5442.

A72-39176 * # Extended testing of compression distillation. R. A. Bambenek and P. P. Nuccio (Chemtrac, Inc., Rosemont, Ill.). *American Society of Mechanical Engineers, Environmental Control and Life Support Systems Conference, San Francisco, Calif., Aug. 14-16, 1972, Paper 72-ENAV-1.* 8 p. 5 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. NAS9-9191.

During the past eight years, the NASA Manned Spacecraft Center has supported the development of an integrated water and waste management system which includes the compression distillation process for recovering useable water from urine, urinal flush water, humidity condensate, commode flush water, and concentrated wash water. This paper describes the design of the compression distillation unit, developed for this system, and the testing performed to demonstrate its reliability and performance. In addition, this paper summarizes the work performed on pretreatment and post-treatment processes, to assure the recovery of sterile potable water from urine and treated urinal flush water. (Author)

A72-39217 # An aspect of the problem of pitch dependence on the duration of short sinusoidal signals. E. Rajcan (Komenskeho Universita, Trnava, Czechoslovakia). *Fyzikalny Casopis*, vol. 22, no. 4, 1972, p. 223-231. 12 refs. Research sponsored by Komenskeho Universita.

Experimental study of the effect of the duration of tone pulses with a rectangular envelope and an integral number of periods on their pitch at two values of the initial phase. It is shown that, in addition to other parameters, the initial phase also plays a role in the estimation of the pitch of tone pulses, especially at durations near the duration threshold for the tone pitch. No significant deviation of the PSEf (point of subjective equality for frequency) from the pulse frequency is found to occur when a tone pulse with a zero initial phase is shortened to the click-pitch duration threshold. The PSEf is found to increase when a tone pulse with an initial phase of 80 deg is shortened to below 32 msec. The PSEf deviation from the pulse frequency reaches its maximum near the tone-pitch duration threshold. A.B.K.

A72-39271 An electronic model of visual receptive fields. M. Yasuda, Y. Yamaguchi, K. Fukushima, and S. Nagata (NHK Broadcasting Science Research Laboratories, Tokyo, Japan). *Electronics and Communications in Japan*, vol. 54, July 1971, p. 84-91. 6 refs. Translation.

Discussion of a theoretical visual perception and image recognition model which can be realized when electronic circuits are used for simulation of retinal ganglion and cortical cell activities. Essential in this circuitry is the application of cascaded resistor mesh grids to reduce the number of couplings required to interconnect subcircuits. The selection of a suitable weighting function is made thereby possible for the couplings in the perception field. An electronic model of the retina with a circular reception field and time characteristics of the process of vision is constructed by this technique. V.Z.

A72-39275 Visual pattern analysis in machines and animals. H. B. Barlow (California, University, Berkeley, Calif.), R. Narasimhan (Tata Institute of Fundamental Research, Bombay, India), and A. Rosenfeld (Maryland, University, College Park, Md.). *Science*, vol. 177, Aug. 18, 1972, p. 567-575. 87 refs. Grant No. PHS-EY-00276; Contract No. Nonr-5144(00).

Aspects of physiological feature analysis are examined, taking into account trigger features of neurons at different anatomical locations in various vertebrate species, and receptive fields and trigger features for samples of cells from six places in the visual pathway of the cat. A local feature analysis by computer is discussed together with a relational structure analysis by computers, the psychology of

perception, and some possible developments. It is shown that there are similarities both in the details and in the general principles that underlie the operation of single neurons, computer programs, and perception. G.R.

A72-39323 # Study of bilateral cortical nerve connections between the preoreal gyrus and various cortical regions (K izucheniiu dvustoronnykh korkovykh nervnykh svyazei mezhdru proreal'noi izvilinoi i razlichnymi uchastkami kory bol'shikh polusharii). O. K. Akhmetelashvili (Tbilisskii Gosudarstvennyi Universitet, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 66, June 1972, p. 665-668. 10 refs. In Russian.

A72-39324 # Effects of free amino acid doses and of amino acid metabolism cofactors on the distribution of regional free amino acid resources in the brain and blood of animals (Vliianie nagruzki zhitovnykh svobodnymi aminokislottami i kofaktorami ikh obmena na raspredelenie regional'nogo fonda svobodnykh aminokislott v golovnom mozgu i v krovi). I. I. Ibragimov (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 66, June 1972, p. 697-700. 9 refs. In Russian.

A72-39325 # Techniques and procedure for differential ballistooscillography of extremities. A. M. Romanko, K. G. Berbichashvili, and Z. A. Okropiridze. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 66, June 1972, p. 733-736. 9 refs. In Georgian, with abstract in English.

Description of two sensor designs for independent simultaneous recording of ballistooscillograms of extremities. The sensors are used in a study of spike amplitude and phase shifts in ballistooscillograms as the characteristics of the symmetry function of the myogenic-vascular tonus of extremities. The principal circuit of the sensors is given. V.Z.

A72-39344 * Hemopoiesis in the pig-tailed monkey *Macaca nemestrina* during chronic altitude exposure. M. C. Buderer (California, University, Berkeley, Calif.; NASA, Manned Spacecraft Center, Environmental Physiology Laboratory, Houston, Tex.) and N. Pace (California, University, Berkeley, Calif.). *American Journal of Physiology*, vol. 223, Aug. 1972, p. 346-352. 36 refs. Grant No. NGL-05-003-024; Contract No. N00014-69-A-0200-1005.

Study of monkeys for 180 days at 3800 m altitude to examine their hemopoietic response. Plasma volume was found to be reduced while red cell volume increased steadily for four to five months. Reduction in mean corpuscular hemoglobin content was observed from day 30 to day 120 at altitude. Total plasma protein concentration was unchanged at altitude, but marked reduction in the albumin/globulin ratio occurred. Total circulating plasma protein and albumin were reduced in amount, whereas nonalbumin protein was unchanged. These results imply loss of albumin coupled with a corresponding loss of water from the blood and maintenance of normal plasma osmotic pressure. The body/venous hematocrit ratio was found to be reduced at altitude, possibly as a consequence of the expanded capillary volume of the body. The hemopoietic responses of the pig-tailed monkey at altitude require at least several months for completion, and closely resemble those seen in man; thus, the monkey can serve well for long-term studies of high-altitude acclimatization. (Author)

A72-39345 * Hematologic responses to hypobaric hyperoxia. E. C. Larkin, J. D. Adams, W. T. Williams, and D. M. Duncan (Texas, University, Galveston; USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *American Journal of Physiology*, vol. 223, Aug. 1972, p. 431-437. 23 refs. NASA-supported research. NASA Order T-74401-G.

Study of the effects of hypoxia, activity, and G forces on human hematopoiesis in an attempt to elucidate these phenomena more precisely. Eight subjects were exposed to an atmosphere of 100% O₂ at 258 mm Hg for 30 days, and thereafter immediately

exposed to transverse G forces, simulating the Gemini flights' reentry profile. All subjects displayed a significant continuous decline in red cell mass during the exposure period, as measured by the carbon monoxide-dilution method. The Cr51 method also indicated a decline in red blood corpuscle mass. The decrease in red cell mass was due to suppression of erythropoiesis and to hemolysis. After exposure to hyperoxia, all subjects exhibited elevated plasma hemoglobin levels, decreased reticulocyte counts, and decreased red cell survivals. CO production rates and urine erythropoietin levels were unchanged. Two hours after termination of exposure to hyperoxia, all subjects exhibited increased reticulocyte counts which were sustained for longer than two weeks. The progressive decrease in red cell mass was promptly arrested on return to ground level atmospheres. Within 116 days after exposure to hyperoxia, the hematologic parameters of all eight subjects had returned to control levels. (Author)

A72-39372 Supplementary cues and delayed-alternation performance of frontal monkeys. A. M. Gentile and J. S. Stamim (New York, State University, Stony Brook, N.Y.). *Journal of Comparative and Physiological Psychology*, vol. 80, Aug. 1972, p. 230-237. 9 refs. Grants No. PHS-MH-08064; No. PHS-MH-14300.

Rhesus monkeys that had sustained total or partial ablation of dorsolateral frontal cortex were tested in the Wisconsin General Testing Apparatus under variations of the delayed-alternation (DA) task involving supplementary articular-somesthetic or kinesthetic cues. There was improvement in DA performance when supplementary articular-somesthetic cues were introduced. Monkeys with ablation of sulcus principalis demonstrated improvement on DA when supplementary kinesthetic cues were provided; monkeys with total dorsolateral ablation did not. The findings were interpreted as supporting the concept of prefrontal cortex as a gnostic area of the kinesthetic analyzer. (Author)

A72-39391 # Hemodynamic indices in flight crew personnel during hypertonic sickness and atherosclerosis of coronary arteries (Gemodinamicheskie pokazateli u lits letnogo sostava pri gipertonicheskoj bolezni i ateroskleroze koronarnykh arterii). V. M. Kondrakov. *Voенno-Meditsinskii Zhurnal*, Apr. 1972, p. 57-59. In Russian.

A72-39409 # The resonance mechanism of the biological action of vibration (Rezonansnyi mekhanizm biologicheskogo deistviia vibratsii). S. N. Romanov (Akademiia Nauk SSSR, Institut Tsitologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 204, June 1, 1972, p. 983-986. In Russian.

Consideration of the nature of the action of mechanical vibrations on the structures of living systems of various organizational complexities. Studies were performed on a solution of native actomyosin, rat liver mitochondria, a muscle homogenate, a whole muscle, Protozoa, and warm-blooded animals (rats) subjected to vibrations ranging from 10 to 4000 Hz at a constant acceleration of 5 g for 30 min. New data are presented concerning the effect of vibrations on the ATP-ase activity of actomyosin. It is shown that vibration of a protein solution at a frequency of 200 Hz and an acceleration of 5 g causes fairly significant changes in the molecules which lead to the almost complete loss of enzyme activity. It is concluded that the mechanism of the biological action of vibrations is related to the occurrence of a resonance in the object investigated, and that the presence of this resonance can be estimated from the maximum biological effect occurring at a frequency characteristic of the given object. A.B.K.

A72-39410 # Does cessation of a negative stimulus lead to the activation of emotionally positive zones in the brain (Vedet li prekrashchenie negativnogo razdrasheniia k aktivatsii emotsional'no-pozitivnykh zon v mozgu). N. G. Mikhailova, T. G. Pimenova, and P. V. Simonov (Akademiia Nauk SSSR, Institut Vyshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Akademiia Nauk*

SSSR, *Doklady*, vol. 204, June 1, 1972, p. 1017-1020. 10 refs. In Russian.

Experimental study of the question of the activation of emotionally positive zones in the brains of rats after the cessation of negative influences. An attempt is made to verify the activation of emotionally positive zones by studying the functional state of structures stimulated by the animal itself during and after exposure to the negative stimulus. It is shown that immediately after the removal of painful stimuli the excitation of positive structures is attenuated and, consequently, it is difficult to speak of the formation of positive emotions as a consequence of the removal of negative influences. Thus the possibility of closing a conditioned avoidance reflex by activation of the positive emotion nervous apparatus seems unlikely. A.B.K.

A72-39460 **The mitral apparatus - Functional anatomy of mitral regurgitation.** J. K. Perloff (Georgetown University, Washington, D.C.) and W. C. Roberts (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *Circulation*, vol. 46, Aug. 1972, p. 227-239. 54 refs. Research supported by the Eric T. Paglin Memorial Fund for Cardiovascular Teaching and Research.

Review of the functional anatomy of the six components of the mitral apparatus, namely, the left atrial wall, annulus, leaflets, chordae tendineae, papillary muscles, and left ventricular wall. Each component is considered individually, in the context of the apparatus as a whole, in relation to the mode of closure of the normal mitral valve, and in the light of many acquired and congenital disorders that disturb the harmony of the finely coordinated mitral mechanism and render it incompetent. M.V.E.

A72-39461 **Relationship of pulmonary artery to left ventricular diastolic pressures in acute myocardial infarction.** S. H. Rahimtoola, H. S. Loeb, A. Ehsani, M. Z. Sinno, R. Chuquimia, R. Lai, K. M. Rosen, and R. M. Gunnar (Cook County Hospital; Abraham Lincoln School of Medicine; Illinois, University, Chicago, Ill.). *Circulation*, vol. 46, Aug. 1972, p. 283-290. 21 refs. Grants No. PHS-HE-08834-08; No. NIH-71-2478.

A72-39462 **An indirect method for evaluation of left ventricular function in acute myocardial infarction.** C. M. Agress, S. Wegner, J. S. Forrester, K. Chatterjee, W. W. Parmley, and H. J. C. Swan (Cedars-Sinai Medical Center; California, University, Los Angeles, Calif.). *Circulation*, vol. 46, Aug. 1972, p. 291-297. 26 refs. Research supported by the Marjorie Agress Research Committee for Heart; Grant No. NIH-HE-43-68-1333.

A72-39551 **Equal comfort contours for whole body vertical, pulsed sinusoidal vibration.** A. J. Jones and D. J. Saunders (Salford, University, Salford, Lancs., England). *Journal of Sound and Vibration*, vol. 23, July 8, 1972, p. 1-14. 15 refs. Research supported by the Science Research Council.

A72-39590 **The silent period in man during muscle lengthening produced by loading (Période de silence chez l'homme pendant l'allongement musculaire dû à une adjonction de charge).** C. Tardieu (Hôpital Raymond-Poincaré, Garches, Hauts-de-Seine; Institut National de la Santé et de la Recherche Médicale, France), J.-C. Tabary, C. Tabary, and G. Tardieu (Hôpital Raymond-Poincaré, Garches, Hauts-de-Seine, France). *Journal de Physiologie*, vol. 64, July 31, 1972, p. 131-145. 19 refs. In French.

Experimental study of the lengthening of the biceps brachii produced by loads of various amounts (100 g, 500 g, 1 kg). The electromyogram (EMG) of the biceps is found to vary little from one test to another: a moderate augmentation of activity is followed by a silent period and a resumption of activity. The silent period occurs when the muscle is more elongated than at the start of the mechanical stimulus and is even continuing to lengthen. This contradicts the hypothesis that a segmental fusar servomechanism of length or speed is a correct explanation of postural maintenance control. It is suggested that the EMG pattern observed depends mainly on initial perturbations. A.B.K.

A72-39591 **Sweat depression during controlled hyperthermia in man - Effects on the sweat rate and sweat electrolytes (La dépression sudorale au cours de l'hyperthermie contrôlée chez l'homme - Effets sur le débit et les électrolytes sudoraux).** R. Hénaud (Ministère des Armées, Service de Santé des Armées, Lyons, France). *Journal de Physiologie*, vol. 64, July 31, 1972, p. 147-163. 30 refs. In French.

Study of the phenomenon of sweat depression during heat acclimation by controlled hyperthermia in man. It is found that the sweat depression can appear at the very beginning of the heat treatment; it occurs all the earlier and all the more markedly the greater the initial sweat rate. The sweat depression is more pronounced in a hot humid environment than in a hot dry environment. An abrupt change from a humid environment to a dry environment partially suppresses the depression, which is therefore a rapidly reversible phenomenon. The excretion of the sweat electrolytes Na(plus), Cl(minus), and K(plus) differs according to whether short-term variations occurring during hyperthermia or long-term variations due to acclimation are being considered. In the short term, the excretion of Na(plus) is increased, while that of K(plus) is reduced, Cl(minus) remaining almost unaffected. In the long term, the electrolytic excretion varies in two stages: from the first to the fourth day of the heat treatment the electrolytic excretion varies passively with the sweat rate, but from the fifth day on the excretion decreases for the three ions while the sweat rate continues to increase. A.B.K.

A72-39700 **Energy metabolism of human muscle.** J. Keul, E. Doll, and D. Keppler. Research supported by the Deutsche Forschungsgemeinschaft. (Translation of *Muskelstoffwechsel*, Munich, Johann Ambrosius Barth, 1969.) Baltimore, University Park Press (Medicine and Sport. Volume 7); Basel, S. Karger AG, 1972. 324 p. 1059 refs. \$22.50.

The book discusses the transfer of energy in skeletal muscle, especially with reference to its functional importance. On the basis of data reported in the literature and the authors' measurements, an attempt is made to draw some conclusions concerning the metabolic processes in the muscle cell. The characteristics of 'white' and 'red' muscles, energy stores of the muscle cell and anaerobic energy supply, oxidative energy supply, hypoxia and energy supply, and the adaptation of the energy supply in muscle to physical activity are studied. The factors which limit the performance of the muscle cell are the substrate transported from the outside, the amount of energy-rich substrate in the muscle cell itself, the substrate turnover of the cell, and the contractile apparatus. F.R.L.

A72-39718 **Studies in pilot training - The anatomy of transfer.** R. E. Flexman, S. N. Roscoe, A. C. Williams, Jr., and B. H. Williges. *Aviation Research Monographs*, vol. 2, June 1972, p. 1-87. 20 refs.

Discussion of two contact flight and instrument flight experiments in a 1-CA-2 SNJ synthetic flight trainer which were performed on 12 subjects to obtain information on the transfer of trainees from ground-based simulators to piloting aircraft. Transfer rate and transfer effectiveness calculations are made in an attempt to evaluate the effectiveness of such experiments in defining the characteristics of such transfers. The need of further studies of transfer strategies and training techniques is noted. V.Z.

A72-39723 **Jet travel - Body and soul.** E. Pöppel (MIT, Brookline, Mass.). *New Scientist*, vol. 55, Aug. 3, 1972, p. 232-235.

The diurnal variations of several bodily functions were investigated. In the first part of the experiments considered, six subjects lived for four days under constant conditions in an isolated room. Their rectal temperatures were measured continuously, and their psychological functions were tested at three-hour intervals. Their rectal temperature, which shows a clear increase early in the morning, reaches a peak in the afternoon. It then decreases during the night. In the second part of the experiment, the same subjects spent another four days in continuous darkness in order to test

whether the diurnal variation is dependent on the presence of a light-dark cycle. It is found that the diurnal variation of at least some functions is not a passive response to the natural sequence of sleeping and waking.

G.R.

A72-39727 # Thyroglobulin content and variations in the proteolytic activity of the thyroid gland tissue in animals under hypoxic conditions (Soderzhanie tireoglobulina i izmenenie proteoliticheskoi aktivnosti tkani shchitovidnoi zhelezy zhivotnykh v usloviakh gipoksii). O. G. Lorents and L. N. Krugliak (Tadzhikskii Gosudarstvennyi Meditsinskii Institut, Dyushambe, Tadzhik SSR). *Akademiia Nauk Tadzhikskoi SSR, Doklady*, vol. 15, no. 2, 1972, p. 62-64. 9 refs. In Russian.

A72-39746 # A model corporate pilot physical program. R. Carpenter. In: Annual Corporate Aircraft Safety Seminar, 17th, Washington, D.C., April 17, 18, 1972, Proceedings. Arlington, Va., Flight Safety Foundation, Inc., 1972, p. 37-40.

A72-39749 # Visual simulation - A proven training method. W. P. Moran (American Airlines, Inc., New York, N.Y.). In: Annual Corporate Aircraft Safety Seminar, 17th, Washington, D.C., April 17, 18, 1972, Proceedings. Arlington, Va., Flight Safety Foundation, Inc., 1972, p. 58-63.

A simulator program is described which was divided into phases of general flight characteristics, basic maneuvers and instrument approaches, emergency procedures, infrequent (abnormal) maneuvers, and recapitulation of type (captain) ratings. As a result of the program, aircraft training and rating times per captain are down from averages of 18 to 20 hr to average times of 2.3 to 5.1 hr for various jet aircraft. Since the simulators were put in use, American Airlines has had no accidents resulting in fatalities, or major aircraft damage in either training or line operations. Flight training in an actual aircraft completes the program.

F.R.L.

A72-39804 Comparison of irregular vibrations of a limited frequency range with sinusoidal vibrations in regard to their effect on man (Vergleich regelloser Schwingungen eines begrenzten Frequenzbereiches mit sinusförmigen Schwingungen hinsichtlich der Einwirkung auf den Menschen). H. Dupuis, E. Hartung (Max-Planck-Institut für Landarbeit und Landtechnik, Bad Kreuznach, West Germany), and L. Louda (Institut für Arbeitshygiene und Berufskrankheiten, Prague, Czechoslovakia). *Ergonomics*, vol. 15, May 1972, p. 237-265. In German. Research supported by the Bundesministerium für Arbeit und Sozialordnung and Alexander-von-Humboldt-Stiftung.

Review of the results of a three-year worker health protection research program aimed at determining whether the safety evaluation criteria obtained under conditions of simple vertical sinusoidal vibrations could be applied to wider condition varieties, such as mixtures of various sinusoidal vibrations or random vibrations, imposed on seated persons. In the course of four experimental sequences, the frequency-dependent sensitivity of 'vibration-trained' subjects to sinusoidal vibrations was investigated with respect to: (1) perception of one component in a mixture of two vibration components; (2) the limit of tolerance (for an exposure duration of nearly 30 min) to mixtures of two sinusoidal vibration frequencies; (3) the magnitude of random vibration perception; and (4) the perception of simple sinusoidal vibrations to serve as reference for the three other tests. The results include the finding that man is more sensitive to random, 'uniformly irregular' vibrations than to sinusoidal ones.

M.V.E.

A72-39805 Behavioural characteristics of men in the performance of some decision-making task components. W. S. Vaughan, Jr. and A. S. Mavor (Wittenburg, Vaughan Associates, Inc., Landover, Md.). *Ergonomics*, vol. 15, May 1972, p. 267-277. 34 refs. Contract No. N00014-70-C-0118.

A72-39806 The measurement of three-dimensional body movements by the use of photogrammetry. M. I. Bullock and I. A. Harley (Queensland, University, Brisbane, Australia). *Ergonomics*, vol. 15, May 1972, p. 309-322. 14 refs.

Stereophotogrammetry is evaluated as a method of studying dynamic posture, the particular activity used during experimentation being the depression of a foot pedal, whose position and resistance was set to produce large-range trunk and pelvic movements in three dimensions. A description is given of the experimental procedure which was followed in order to measure the extent and direction of movements in three-dimensional space, to record velocities and to analyse the sequence and pattern of motion in the whole body. The procedures for acquiring, recording and reducing data, using stereophotography, stereoplotting and computation, are explained. An evaluation of the accuracy attained indicates that, with this particular equipment and geometrical configuration, measurements of small movements, of the order of 0.3 mm, have a standard error of 0.6 mm even when the subject moves at a rate of up to 30 cm per sec. Suggestions are given for possible improvements which could be made to the procedure and for the application of this method of study to investigations in the field of ergonomics. (Author)

A72-39807 A modified acetylene method for the determination of cardiac output during muscular exercise. L. G. C. E. Pugh (Medical Research Council, National Institute for Medical Research, London, England). *Ergonomics*, vol. 15, May 1972, p. 323-335. 21 refs.

A72-39808 Comparison of physical, biophysical and physiological methods of evaluating the thermal stress associated with wearing protective clothing. H. de V. Martin (Coal Development Establishment, Porton Down, Wilts., England) and R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Ergonomics*, vol. 15, May 1972, p. 337-342. 5 refs.

A72-39938 Medical observations during the use of the under-water laboratory 'Helgoland' in autumn 1971 (Medizinische Erfahrungen beim Einsatz des Unterwasserlaboratoriums 'Helgoland' im Herbst 1971). H. Oser (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *DFVLR-Nachrichten*, Aug. 1972, p. 307, 308. In German.

The laboratory remained under water for almost a week. The aquanauts lived continuously under conditions involving a pressure of 2.0 atm. The pressure corresponds to the environmental pressure at a depth of 10 m. The state of health of the astronauts was medically supervised. Infections involving parts of the ear made necessary almost daily medical inspections. A new oxygen control device used is considered together with decompression times required for various environmental conditions.

G.R.

A72-40075 # Effect of copper, cobalt and manganese salts on certain morphological-biochemical components of the blood in young sheep of the Hissar breed (Vliianie solei medi, kobal'ta i margantsa na nekotoryi morfo-biokhimicheskie sostav krovi Gissarskikh baranchikov). A. Kamalov (Tadzhikskii Sel'skokhoziustvennyi Institut, Dyushambe, Tadzhik SSR). *Akademiia Nauk Tadzhikskoi SSR, Doklady*, vol. 15, no. 3, 1972, p. 58-61. 7 refs. In Russian.

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STAR ENTRIES

N72-28030 National Lending Library for Science and Technology, Boston Spa (England).

RECOGNITION AND DIRECTION FINDING PROCESSES IN VESPERTILIONID BATS

G. N. Simkin Apr. 1972 20 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Biol. Pochvoved. (Moscow), no. 2, 1971 p 17-24

(NLL-RTS-6933) Avail: Natl. Lending Library, Boston Spa, Engl.: £ 1.80; 6 NLL photocopy coupons

The developmental aspects and evolution of echo location in Vespertilionid bats are discussed. Experimental results involving evolutionary adaptive modifications, recognition and location of flat targets, and recognition and location of volumetric targets are given. E.H.W.

N72-28031 National Lending Library for Science and Technology, Boston Spa (England).

THE SECRETION OF PEPSINOGEN AND AMYLASE IN PERSPIRATION

Kh. Kh. Abdurakhmanov 28 Feb. 1972 6 p Transl. into ENGLISH of a Russian rept. from the Faculty of Std. Physiol. and Nervous Diseases at the Andzhanskiy Med. Inst.

(NLL-DRIC-Trans-2580-(3623.66)) Avail: Natl. Lending Library, Boston Spa, Engl.: 1 NLL photocopy coupon

An attempt was made to use the amount of digestive enzymes present in perspiration as a diagnostic tool. Tests were made to determine the relationship of ferment secretions in sweat and the change in blood plasma content and the relationship of renal secretions to other factors affecting the secretion of digestive enzymes. Pepsinogen and amylase, and healthy people and people with various stomach disorders were used in the study. Results are given in tables. No clear cut diagnostic use of enzyme presence in perspiration was established. E.H.W.

N72-28032*+ National Aeronautics and Space Administration, Washington, D.C.

A CUMULATIVE INDEX TO A CONTINUING BIBLIOGRAPHY ON AEROSPACE MEDICINE AND BIOLOGY, JANUARY 1972

Jan. 1972 699 p refs

(NASA-SP-7011(98)) Avail: NTIS HC \$37.00 CSCL 06E

Subject coverage 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. Each entry consists of a standard citation accompanied by its abstract. Author

N72-28033*# Illinois Univ., Urbana. Engineering Experiment Station.

ANALYTICAL PREDICTION OF THE HEAT TRANSFER

FROM A BLOOD VESSEL NEAR THE SKIN SURFACE WHEN COOLED BY A SYMMETRICAL COOLING STRIP

J. C. Chato and A. Shitzer Dec. 1971 25 p refs

(Grant NGR-14-005-103)

(NASA-CR-127460; ME-TR-344) Avail: NTIS HC \$3.25 CSCL 06P

An analytical method was developed to estimate the amount of heat extracted from an artery running close to the skin surface which is cooled in a symmetrical fashion by a cooling strip. The results indicate that the optimum width of a cooling strip is approximately three times the depth to the centerline of the artery. The heat extracted from an artery with such a strip is about 0.9 w/m-C which is too small to affect significantly the temperature of the blood flow through a main blood vessel, such as the carotid artery. The method is applicable to veins as well. Author

N72-28034*# Midwest Research Inst., Kansas City, Mo. CLEAN ROOM TECHNOLOGY IN SURGERY SUITES

22 May 1971 218 p refs Conf. held at John F. Kennedy Space Center, Fla., 21-22 May 1971

(Contract NASw-1936; MRI Proj. 3332-E(D))

(NASA-CR-127442) Avail: NTIS HC \$13.00 CSCL 06E

The principles of clean room technology and the criteria for their application to surgery are discussed. The basic types of surgical clean rooms are presented along with their advantages and disadvantages. Topics discussed include: microbiology of surgery suites; principles of laminar airflow systems, and their use in surgery; and asepsis and the operating room. F.O.S.

N72-28035*# Martin Marietta Corp., Denver, Colo.

EXPERIMENTAL SYSTEM FOR THE CONTROL OF SURGICALLY INDUCED INFECTIONS Operating and Maintenance Instructions

May 1972 33 p Revised

(Contract NASw-2210)

(NASA-CR-127641; MCR-71-326-Issue-2-Rev) Avail: NTIS HC \$3.75 CSCL 06E

The experimental system is described, and the procedures for surgery usage and maintenance are outlined. Basically the system consists of the following: (1) a portable clean room comprised of a horizontal laminar flow filter system and a transparent walled enclosure, (2) a helmet-shoulder pad assembly, (3) a communications system, (4) a helmet ventilation system, and (5) surgical gowns. D.L.G.

N72-28036*# Martin Marietta Corp., Denver, Colo.

EXPERIMENTAL SYSTEM, AND ITS EVALUATION FOR THE CONTROL OF SURGICALLY INDUCED INFECTIONS Final Report

Marvin D. Tevebaugh and J. Phillip Nelson May 1972 93 p refs

(Contract NASw-2210)

(NASA-CR-127449; MCR-72-80) Avail: NTIS HC \$6.75 CSCL 06E

The effect is reported to design, fabricate, test and evaluate a prototype experimental system for the control of surgically induced infections. The purpose is to provide the cleanest possible environment within a hospital surgery room and eliminate contamination sources that could cause infections during surgery. The system design is described. The system provides for a portable laminar flow clean room, a full bubble helmet system with associated communications and ventilation subsystems for operating room personnel, and surgical gowns that minimize the migration of bacteria. The development test results consisting of portability, laminar flowrate, air flow pattern, electrostatic buildup, noise level, ventilation, human factors, electrical and material compatibility tests are summarized. The conclusions are that the experimental system is effective in reducing the airborne and wound contamination although the helmets and gowns may not be a significant part of this reduction. Definitive conclusions with regard to the infection rate cannot be made at this time. Author

N72-28037

N72-28037*# Michigan Univ., Ann Arbor. School of Natural Resources.

REMOTE SENSING OF CHANGES IN MORPHOLOGY AND PHYSIOLOGY OF TREES UNDER STRESS Annual Progress Report

Charles E. Olson, Wayne G. Rohde, and Jennifer M. Ward Berkeley, Calif. Calif. Univ. Forestry Remote Sensing Lab. 30 Sep. 1971 84 p refs Prepared for Calif. Univ., Berkeley, Forestry Remote Sensing Lab. in cooperation with Dept. of Agr. Forest Serv.

(NASA Order W-13308)

(NASA-CR-127640; APR-5) Avail: NTIS HC \$6.25 CSCL 02D

Measurements on foliage samples collected from several drought and salt treated plants revealed that leaf thickness decreased with increasing severity of the drought treatment and increased with increasing severity of treatment with NaCl, but remained essentially unaffected by treatment with CaCl₂. Airborne data collected by multispectral scanner indicated that false color images provide selective enhancement of a diseased area. Comparison of simulated and actual aerial color and color IR photography revealed that the color renditions of the MSS simulations agreed closely with those of the actual photography.

Author

N72-28038# Joint Publications Research Service, Arlington, Va. **REPORTS FROM PSYCHOLOGICAL CONGRESSES, USSR** 26 Jun. 1972 80 p refs Transl. into ENGLISH from Vorp. Psikholologii (Moscow), no. 5, Sep.-Oct. 1971 p 150-161 and 165-189

(JPRS-56351) Avail: NTIS HC \$6.00

Articles on engineering psychology research on man-machine systems, problems of personality psychology, and a USSR psychologists' society conference are presented. Author

N72-28039*# Electronic Associates, Inc., Long Branch, N.J. **THE STUDY OF HUMAN VENOUS SYSTEM DYNAMICS USING HYBRID COMPUTER MODELING**

M. F. Snyder and V. C. Rideout (Wis. Univ.) Washington NASA Jul. 1972 33 p refs Prepared jointly with Medical Physics Inst., Utrecht, Holland

(Grant NGR-50-002-083)

(NASA-CR-2084) Avail: NTIS HC \$3.00 CSCL 06P

A computer-based model of the cardiovascular system was created emphasizing effects on the systemic venous system. Certain physiological aspects were emphasized: effects of heart rate, tilting, changes in respiration, and leg muscular contractions. The results from the model showed close correlation with findings previously reported in the literature.

Author

N72-28040*# Battelle-Northwest, Richland, Wash. **THE MEASUREMENT OF RADIATION EXPOSURE OF ASTRONAUTS BY RADIOCHEMICAL TECHNIQUES** Quarterly Research Report, 5 Jul. - 3 Oct. 1971

R. L. Brodzinski 15 Oct. 1971 19 p refs Sponsored by NASA

(Contract AT(45-1)-1830)

(NASA-CR-127563; BNWL-1183-10) Avail: NTIS HC \$3.00 CSCL 06R

The urine specimens collected pre- and postflight from the Apollo 15 mission were analyzed for their radionuclide content. Cosmic radiation dose estimates of 695 and 660 mR are calculated from the observed Na-22 and Na-24 concentrations respectively. The concentrations of Na-22, Na-24, K-40, K-42, Cr-51, Fe-59, and Cs-137 are given. The potassium excretion patterns of high postflight and low preflight levels established for previous missions appears to be reversed for this mission. The concentrations of 23 major, minor, and trace elements in the fecal samples from the Apollo 14 astronauts are reported. Most

elemental excretion rates are comparable to rates reported for earlier missions. The major exception is potassium where loss rates are the lowest ever observed. This coincides with the anomalously low excretion of potassium in postflight urine specimens. Apparent mass balance of calcium and iron continues as in the Apollo 12 and 13 missions.

Author

N72-28041*# Office of Naval Research, Washington, D.C. Ocean Science and Technology Div.

PROJECT TEKITE 1: A MULTIAGENCY 60-DAY SATURATED DIVE

D. C. Pauli, ed. and Cole H. A., ed. 16 Jan. 1970 413 p refs Sponsored in part by NASA, Dept. of Interior, and Gen. Elec.

(NASA-CR-127689; ONR-DR-153) Avail: NTIS; SOD \$3.00 CSCL 06S

The history, organization, and accomplishments of Project Tektite are presented. The project demonstrated that it is possible for men to live and work successfully at underwater depths of 49 feet. The biomedical responses of the aquanauts to the 60 day dive are described. The behavioral and psychological responses to each other, the work, and the isolated environment are reported. The experiments conducted in the fields of marine science, psychological sciences, and biomedical sciences are discussed.

Author

N72-28042*# National Aeronautics and Space Administration, Washington, D.C.

TESTS OF CHEMICAL COLD STERILIZATION OF SOME NUTRIENT MEDIA

K. Luehrs Jul. 1972 4 p Transl. into ENGLISH from Mykosen (Berlin), v. 14, no. 4, 1971 p 195-196

(NASA-TT-F-14412) Avail: NTIS HC \$3.00 CSCL 06M

An attempt was made to cold-sterilize some nutrient media with pyro-carbonic diethylester in the sense that the medium was to be freed of all germs capable of propagation. Satisfactory results were obtained.

Author

N72-28043*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

MATHEMATICAL MODELS OF THERMOREGULATION AND HEAT TRANSFER IN MAMMALS. A COMPENDIUM OF RESEARCH

Avraham Shitzer Jul. 1972 75 p refs

(NASA-TM-X-62172) Avail: NTIS HC \$5.75 CSCL 06C

An annotated compendium on mathematical modeling of mammal thermoregulation systems is presented. Author abstracts, tables containing the more used mathematical models, solutions to these models, and each thermoregulation mechanism considered are included.

E.H.W.

N72-28044# Joint Publications Research Service, Arlington, Va. **CURRENT PROBLEMS IN SPACE BIOLOGY AND MEDICINE**

14 Jul. 1972 162 p Transl. into ENGLISH of the book "Aktualnyye Voprosy Kosmicheskoy Biologii i Meditsiny" Moscow, 1971

(JPRS-56499) Avail: NTIS HC \$10.25

This collection of articles is devoted to current research conducted in space biology and medicine using cosmonauts on the Soyuz spaceship and animal subjects as well as plant life.

Author

N72-28045*# Texas Univ., Houston. School of Public Health. **[CULEX QUINQUEFASCIATUS BREEDING SITES]** Quarterly Report, 3 Apr. - 4 Jul. 1972

4 Jul. 1972 25 p

(Contract NAS9-12696)

(NASA-CR-115708: QR-1) Avail: NTIS HC \$3.25 CSCL 06C

The development of techniques, equipment, and methods for implementing ground truth data on *Culex quinquefasciatus* breeding sites are outlined. E.H.W.

N72-28046*# Scientific Translation Service, Santa Barbara, Calif.

STRUCTURE OF THE YEAST CELL ENVELOPE

Tadashi Hirano Washington NASA Jun. 1972 20 p refs
Transl. into ENGLISH from Saibo (Japan), v. 3, no. 9, 1971 p 15-21

(Contract NASw-2035)

(NASA-TT-F-14308) Avail: NTIS HC \$3.00 CSCL 06M

The structures of cell walls and plasma membranes are studied, by the freeze-etching method. A diagram of the cell envelope proposed is presented. Author

N72-28047*# Connecticut Univ., Storrs. Dept. of Pathobiology.
**STUDIES OF EFFECTS OF CLOSED MICROBIAL ECOLOGY.
REPORT OF 180-DAY TEST PERIOD**

Alan J. Kenyon 15 May 1972 114 p refs

(Contract NAS9-10844)

(NASA-CR-115678) Avail: NTIS HC \$7.75 CSCL 06M

Experiments were performed to determine the influence closed microbial ecologies have on modification or simplification of natural intestinal flora of ferrets in a closed environmental system. On the basis of previous tests in which certain species (*Salmonella* and *Bacteroides*) were decreased at 90 days of enclosure, a second trial was constructed for 180-day tests. In this trial there was little difference in the 8 major classes of intestinal flora between animals in the Open and Closed environmental groups except for the level of *Lactobacillus*. It is of extreme importance to note that when both Open and Closed groups contracted hemorrhagic gastritis, the interrelationship of this agent with other intestinal flora produced a more profound effect on animals from the Closed Group, particularly with reference to *Lactobacillus* levels. Author

N72-28048*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

MICROBIAL BURDEN PREDICTION MODEL FOR UNMANNED PLANETARY SPACECRAFT Final Report

A. R. Hoffman and D. A. Winterburn 30 Jun. 1972 83 p refs
(Contract NAS7-100)

(NASA-CR-127467; JPL-900-566) Avail: NTIS HC \$6.25 CSCL 06M

The technical development of a computer program for predicting microbial burden on unmanned planetary spacecraft is outlined. The discussion includes the derivation of the basic analytical equations, the selection of a method for handling several random variables, the macrologic of the computer programs and the validation and verification of the model. The prediction model was developed to (1) supplement the biological assays of a spacecraft by simulating the microbial accretion during periods when assays are not taken; (2) minimize the necessity for a large number of microbiological assays; and (3) predict the microbial loading on a lander immediately prior to sterilization and other non-lander equipment prior to launch. It is shown that these purposes not only were achieved but also that the prediction results compare favorably to the estimates derived from the direct assays. The computer program can be applied not only as a prediction instrument but also as a management and control tool. The basic logic of the model is shown to have possible applicability to other sequential flow processes, such as food processing. Author

N72-28049*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

LABORATORY VERIFICATION OPTICAL SIGNAL COUPLING. IMBLMS PHASE B.4, APPENDIX C, SECTION 12

21 Dec. 1970 18 p

(Contract NAS9-10742)

(NASA-CR-115719; LMSC-A980463-App-C-Sec-12) Avail: NTIS HC \$3.00 CSCL 20A

The design of optical couplers is described for use in the IMBLMS hardware mode. One coupler transmits data from the bio-belt to the central data system and the other coupler transmits audio frequencies in the opposite direction, from the central data system to the bio-belt. The objective is to isolate the ground system at the body worn bio-belt electronics and the main ground at the central data system, or biomedical and behavioral station. The safety of the subject wearing the bio-belt measuring electronics is the purpose in isolating the wearer from the main system ground. Author

N72-28050*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

LABORATORY VERIFICATION RESPIRATORY MEASUREMENTS. IMBLMS PHASE B.4, APPENDIX C, SECTION 13 Final Report

11 Dec. 1970 23 p

(Contract NAS9-10742)

(NASA-CR-115718; LMSC-A980463-App-C-Sec-13) Avail: NTIS HC \$3.25 CSCL 06P

The B-4 IMBLMS preliminary design of the respiratory measurement element includes certain techniques and apparatus which are quite different from those included in the B-3 version previously delivered to NASA-MSC. A working model was constructed in the laboratory to prove the feasibility of certain key features. The most critical of these is the capability of switching sample gases into the mass spectrometer from two different sources during a single breath cycle. Results proved the feasibility of all of the concepts which were tested, and certain refinements and improvements were included, as well. Author

N72-28051*# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

CONTINUOUS ANIMAL EXPOSURE TO DICHLOROMETHANE

J. D. MacEwen, E. H. Vernot, and C. C. Haun May 1972 31 p refs

(NASA Order T-80498; Contract F33615-70-C-1046)

(NASA-CR-127698; AMRL-TR-72-28; W-71005) Avail: NTIS HC \$3.75 CSCL 06C

Continuous exposures of dogs, monkeys, rats and mice to 5000 ppm and 1000 ppm of dichloromethane vapor (CH_2Cl_2) produced severe toxic effects on dogs, rats and mice. Dogs died after 3 weeks exposure to 1000 ppm and after 6 weeks exposure to 5000 ppm. Thirty percent of the mice also succumbed during four weeks exposure to 5000 ppm CH_2Cl_2 . Although rats survived 14 weeks exposure to 5000 ppm, they experienced subnormal weight gains. Significant gross and histopathological hepatic lesions were noted in all 3 species at death or experimental termination in 14 weeks. In addition, rats showed abnormal kidney histopathology. Fat stains disclosed mild fatty increase in monkey livers after 14 weeks exposure to 1000 ppm CH_2Cl_2 . Author

N72-28052# Lovelace Foundation for Medical Education and Research, Albuquerque, N.Mex.

THE EFFECTS OF EXHAUSTIVE EXERCISE ON RATS AT VARIOUS TIMES FOLLOWING BLAST EXPOSURE

John T. Yelverton, John F. Viney, Ben Jojola, III, and Robert K. Jones Washington Defense Nucl. Agency 1 Apr. 1971 34 p refs

(Contract DA-49-146-XZ-359)

(AD-731395; DASA-2707) Avail: NTIS HC \$3.75 CSCL 06/3

A series of four swim experiments using a 20 C water bath was conducted with female, albino rats, Sprague Dawley strain. The purpose of the study was to: (1) investigate the effects of exhaustive exercise on rats at various times after exposure to airblast, (2) determine a time when exercise ceases to influence the mortality of blast-injured animals, and (3) estimate the recovery time required after blast trauma before maximum or near-maximal exercise capability is restored. It was found that rats which were forced to swim to exhaustion as late as 1 hour following exposure exhibited a fourfold increase in lethality over nonexercised rats exposed to the same blast levels, and that exercise continued to exert an influence on blast lethality at 4 hours following exposure. However, the added stress of swimming did not increase lethality at 24 hours or 7 days. In addition, a near-normal swim performance was apparent at 7 days after traumatization. Author

N72-28053*# Scientific Translation Service, Santa Barbara, Calif.

ENDOCRINOLOGY: THE EFFECT OF AGE ON HYPOCALCEMIA AND HYPOPHOSPHATEMIA

G. Milhaud, A. Perault-Staub, and M. S. Moukhtar Washington NASA Jul. 1972 8 p refs Transl. into ENGLISH from Compt. Rend., Ac-Ad. Sci., Ser. D (Paris), v. 264, 4 Jan. 1967, p 110-113

(Contract NASw-2035)

(NASA-TT-F-14358) Avail: NTIS HC \$3.00 CSCL 06P

The injection of thyrocalcitonine (TCT) provokes considerable hypocalcemia and hypophosphatemia in growing rats. These effects are linked to the intensity of bone catabolism and are much weaker in adult animals. Author

N72-28054*# Scientific Translation Service, Santa Barbara, Calif.

PHYSIOLOGY: THE EFFECT OF THYROCALCITONINE ON THE RENAL EXCRETION OF SODIUM AND CHLORIDES IN NORMAL MAN

R. Ardailou, G. Milhaud, F. Rousselet, P. Vuagnat, and G. Richet Washington NASA Jul. 1972 7 p refs Transl. into ENGLISH from Compt. Rend., Ser. D (Paris), v. 264, 1967 p 3037-3040 (Contract NASw-2035)

(NASA-TT-F-14356) Avail: NTIS HC \$3.00 CSCL 06P

A partially purified thyrocalcitonine preparation provokes increased urinary sodium and chloride excretion in man. This phenomenon is related to the diminished tubular reabsorption of these two ions, independent of endogenous aldosterone or parathormone. Statistical analysis demonstrates that the increased urine sodium level is independent of the urine calcium increase. Author

N72-28055*# Scientific Translation Service, Santa Barbara, Calif.

EVOLUTION OF THE ENDOGENOUS METABOLISM OF BAKER'S YEAST (SACCHAROMYCES CEREVISIAE) AS A FUNCTION OF THE NATURE OF THE OXIDIZED EXOGENOUS SUBSTRATE (ACETATE, ETHANOL OR GLUCOSE)

Michele Iscaki Washington NASA Jul. 1972 8 p refs Transl. into ENGLISH from C. R. Soc. Biol. (Paris), v. 165, 1971 p 804-807

(Contract NASw-2035)

(NASA-TT-F-14359) Avail: NTIS HC \$3.00 CSCL 06M

The oxidation of increased concentrations of acetate and ethanol on the endogenous metabolism of yeast is studied. These results are compared with those obtained in the presence of glucose. Author

N72-28056*# Scientific Translation Service, Santa Barbara, Calif.

FACTORS THAT MODIFY THE BIOSYNTHESIS OF SATURATED FATTY ACIDS IN THE ENDOPLASMIC RETICULUM

Rodolfo R. Brenner, Angel Catala, and Sarah Actic Dato Washington NASA Jul. 1972 12 p refs Transl. into ENGLISH from Acta Cient. Venezolana (Caracas), v. 22, suppl. 2, 1971 p 143-146

(Contract NASw-2035)

(NASA-TT-F-14357) Avail: NTIS HC \$3.00 CSCL 06P

The effect of different factors upon fatty acid desaturation in the endoplasmic reticulum was studied and compared. The factors that modify the fatty acid desaturation are: competition among different fatty acids, competition between desaturation and transacylation of lipids, ATP, fasting, carbohydrates and proteins in the diet, diabetes and insulin. Besides, it was also found that the desaturation of fatty acids follows a circadian rhythm. Author

N72-28057*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

SURVIVAL OF BACTERIAL ISOLATES EXPOSED TO SIMULATED JOVIAN TRAPPED RADIATION BELT ELECTRONS AND SOLAR WIND PROTONS

D. M. Taylor, C. A. Hagen (Bionetics Corp., Pasadena, Calif.), G. M. Renninger (Bionetics Corp., Pasadena, Calif.), G. J. Simko (Bionetics Corp., Pasadena, Calif.), C. D. Smith (Bionetics Corp., Pasadena, Calif.), and J. A. Yelinek (Bionetics Corp., Pasadena, Calif.) 1972 16 p refs Presented at the Joint Open Meeting of the Panel on Planetary Quarantine and Working Group 5, 15th Planetary Meeting of COSPAR, Madrid, 10-24 May 1972 Prepared in cooperation with Bionetics Corp., Pasadena, Calif. (Contract NAS7-100)

(NASA-CR-127568; PQ-7) Avail: NTIS HC \$3.00 CSCL 06M

With missions to Jupiter, the spacecraft will be exposed for extended duration to solar wind radiation and the Jovian trapped radiation belt. This study is designed to determine the effect of these radiation environments on spacecraft bacterial isolates. The information can be used in the probability of contamination analysis for these missions. A bacterial subpopulation from Mariner Mars 1971 spacecraft (nine sporeforming and three nonsporeforming isolates) plus two comparative organisms, *Staphylococcus epidermidis* ATCC 17917 and a strain of *Bacillus subtilis* var. *niger*, were exposed to 2-, 12-, and 25-MeV electrons at different doses with simultaneous exposure to a vacuum of 0.0013 N/sq at 20 and -20 C. The radioresistance of the subpopulation was dependent on the isolate, dose, and energy of electrons. Temperature affected the radioresistance of only the sporeforming isolates. Survival data indicated that spores were reduced approximately 1 log/1500 J/kg, while nonsporeforming isolates (micrococci) were reduced 1.5 to 2 logs/1500 J/kg with the exception of an apparent radioresistant isolate whose resistance approached that of the spores. The subpopulation was found to be less resistant to lower energy than to higher energy electrons. Author

N72-28058*# Minnesota Univ., Minneapolis. School of Public Health.

ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE Semiannual Progress Report

Irving J. Iffug Dec. 1971 84 p

(Grant NGL-24-005-160)

(NASA-CR-127633; SAPR-7) Avail: NTIS HC \$6.25 CSCL 06M

The results of studies to determine the effect of soil particle size on the survival time at 125 C of the microflora associated with these particles are discussed. The data suggest that longer survival times exist for the microflora associated with larger particles. The studies indicate that microorganisms associated with soil are difficult to kill and that organisms associated with large particles are harder to kill than those associated with small particles. Sterilization requirements increase as the level of contamination increases. Soil particles and their accompanying microflora are the most critical contaminants. Author

N72-28059*# Naval Aerospace Medical Research Lab., Pensacola, Fla.

ALTERED SUSCEPTIBILITY TO MOTION SICKNESS AS A FUNCTION OF SUBGRAVITY LEVEL

Earl F. Miller, II and Ashton Graybiel 23 Nov. 1971 20 p refs (NASA Order T-81633; NASA Order L-43518) (NASA-CR-127687; NAMRL-1150) Avail: NTIS HC \$3.00 CSCL 06S

Large interindividual differences among 74 normal subjects in the change in susceptibility to motion sickness with effective lifting of the normal g-load by parabolic flight maneuvers were recorded with high test-retest reliability. Most subjects, who were required to make standardized head movements while seated in a chair rotating at a constant speed, demonstrated either a substantial increase or a decrease in susceptibility, in confirmation of a previous study, while a few appeared to be more or less unaffected by the 1 g to 0 g gravitational change. A similar test procedure conducted with eighteen of the subjects at lunar- and Martian-gravity levels revealed further interindividual differences in susceptibility as a function of g-level. The subjects with gravity-dependent susceptibility revealed: (1) a progressive change in susceptibility as a function of g-load in either the positive or negative direction that was characteristic of the individual, (2) a susceptibility level that appeared to be maintained at the fractional g-load, and (3) immunity to motion sickness at all g-levels tested below the earth standard. The case history as well as ground-based functional and provocative tests of normal subjects proved to be inadequate in predicting susceptibility to motion sickness under subgravity conditions. Author

N72-28060*# Naval Aerospace Medical Research Lab., Pensacola, Fla.

RHESUS MONKEY HEART RATE DURING EXERCISE

John deLorge and John S. Thach, Jr. Apr. 1972 15 p refs (NASA Order L-27432) (NASA-CR-127696) Avail: NTIS HC \$3.00 CSCL 06C

Various schedules of reinforcement and their relation to heart rates of rhesus monkeys during exercise are described. All the reinforcement schedules produced 100 per cent or higher increments in the heart rates of the monkeys during exercise. Resting heart rates were generally much lower than those previously reported, which was attributed to the lack of physical restraint of the monkeys during recording. Author

N72-28061# Joint Publications Research Service, Arlington, Va. **BIOCHEMICAL ASPECTS OF THE BIOLOGICAL EFFECT OF A LOW FREQUENCY PULSED ELECTROMAGNETIC FIELD**

F. A. Kolodub and G. I. Yevtushenko 24 Jul. 1972 9 p refs Transl. into ENGLISH from Gig. Tr. Proj. Zabol. (Moscow), no. 6, 1972 (JPRS-56583) Avail: NTIS HC \$3.00

The effect of a low frequency pulsed electromagnetic field (LFPEF) of varying tension on the carbohydrate energy and nitrogen body metabolism was investigated. The action of the field was found to produce marked disturbances in these types of metabolism in the brain, liver, heart and skeletal muscles. Under the effect of LFPEF macroergic compounds become deficient due to disjunction of the oxidative phosphorylation processes and deranged metabolism of carbohydrates. As regards the nitrogen metabolism the action of LFPEF brings about an intensification of the ammonia formation processes in the absence of correspondingly more vigorous processes of its elimination. A study of enzymatic reactions attended by the formation and elimination of ammonia made it possible to elucidate peculiar features of disorders in the transformation of the nitrogen metabolites in each of the organs studied. Author

N72-28062# Royal Aircraft Establishment, Farnborough (England).

THE CRISIS OF SIGNIFICANCE TESTS IN PSYCHOLOGY

Gernot Kleiter Jun. 1972 32 p refs Transl. into ENGLISH from Jahrb. Psychotherapie und Med. Anthropol., (West Germany), no. 17, 1969 p 144-163

(RAE-Lib-Trans-1649; BR-29646) Avail: NTIS HC \$3.75

The role and limitations of statistical hypothesis-testing in psychology are discussed. In particular, tests of significance level are seen to be capable only of refuting a precisely defined hypothesis; they are no substitutes for insight and creative thought. One should recognize and use subjective judgment (in a Bayesian sense) before commencing investigations, and remain aware that subsequent tests of data are similarly shaped by subjective impressions. Author

N72-28063*# Houston Univ., Tex. Coll. of Optometry. **THE HUMAN, PRIMATE AND RABBIT ULTRAVIOLET ACTION SPECTRA**

Donald Graves Pitts and William Donald Gibbons 31 Mar. 1972 59 p refs Submitted for publication (Contract NAS9-10836)

(NASA-CR-115742) Avail: NTIS HC \$5.00 CSCL 06C

A 5000 watt xenon-mercury high pressure lamp was used to produce a continuous ultraviolet spectrum. Human and animal exposures were made to establish the photokeratitis threshold and abiotic action spectrum. The lower limit of the abiotic action spectrum was 220 nm while the upper limit was 310 nm. The radiant exposure threshold at 270 nm was 0.005 watts/sq cm for the rabbit, 0.004 watts/sq cm for the primate, and 0.004 watts/sq cm for the human. The rabbit curve was bi-peaked with minimums at 220 nm, 240 nm and 270 nm. The primate curve was tri-peaked with minimums at 220 nm, 240 nm and 270 nm. The human data showed a rather shallow curve with a minimum at 270 nm. Formulas and calculations are given to predict minimum exposure times for ocular damage to man in outer space, to establish valid safety criteria, and to establish protective design criteria. Author

N72-28064# Brookhaven National Lab., Upton, N.Y. **COMPARISON OF TECHNIQUES FOR THE TOTAL-BODY NEUTRON ACTIVATION ANALYSIS OF CALCIUM IN MAN** S. H. Cohn, R. G. Fairchild, and K. K. Shukla 1972 22 p refs Presented at Symp. on Dosimetry Tech. Appl. to Agr., Ind., Biol., and Med., Vienna, 17 Apr. 1972

(BNL-16659; Conf-720411-2) Avail: NTIS

The Ca-48 (n1gamma)Ca-49 reaction of partially moderated 14-MeV neutrons was used along with a bi-lateral exposure in three techniques developed for measuring whole-body calcium in man. A uniform thermal neutron distribution through the body and uniform counting sensitivity of a whole-body counter are essential. NSA

N72-28065# Brookhaven National Lab., Upton, N.Y. Medical Research Center.

NEUTRON SOURCES, ENERGY, FLUX DENSITY, AND MODERATION IN TOTAL BODY NEUTRON ACTIVATION ANALYSIS

S. H. Cohn, R. G. Fairchild, and K. K. Shukla 1972 22 p refs Presented at Symp. on Dosimetry Tech. Appl. to Agr., Ind., Biol., and Med., Vienna, 17 Apr. 1972

(BNL-16658; Conf-720411) Avail: NTIS

The factors involved in achieving uniform irradiation of the target element in human subjects and the radiation dose received by the patient, as related to those factors, are considered. The factors include: neutron sources, energy, flux density distribution, and moderators. NSA

N72-28066# Johns Hopkins Univ., Baltimore, Md. Dept. of Biomedical Engineering.

PERIPHERAL CODING OF ACOUSTIC STIMULI Progress Report, 1 Jan. 1971 - 1 Jan. 1972

Murray B. Sachs, R. H. Lewis, and E. D. Young Feb. 1972 31 p refs (AF Proj. 9777)

(AD-738337; AFOSR-72-0564TR) Avail: NTIS CSCL 06/16

Results from measurement of effects of sounds of varying frequency and loudness on the firing rate in auditory nerves correlates well with hearing effects on humans after exposure to loud sounds. Four papers have been prepared and two more are in preparation on the results obtained measuring the nerve responses in the auditory nerve in response to controlled tones. The results have made an advance in understanding how the ear encodes signals for transmission by the auditory nerves to the brain. Author (GRA)

N72-28067# Human Engineering Labs., Aberdeen Proving Ground, Md.

SELECTIVE ATTENTION: A SELECTIVE REVIEW

Andrew A. Monjan and Zoltan Annau Dec. 1971 62 p refs

(AD-738131; HEL-TM-26-71) Avail: NTIS CSCL 05/10

The literature on attention and related topics has increased voluminously in recent years. This review on selective attention deals only with limited aspects of the area. It is in two parts. The first part deals with one aspect of selective attention, as exemplified by the dichotic listening task. Experimental work and theoretical models, published since 1960, are reviewed and some suggestions for future work in this area are included. The second part deals with various neurophysiological mechanisms which have been proposed as involved in the process of selective attention. Various models are reviewed, particularly work published since 1906, with emphasis on data derived from human experiments, in so far as possible. Author (GRA)

N72-28068# Wake Forest Coll., Winston-Salem, N.C. Bowman Gray School of Medicine.

EVALUATION OF CEREBRAL AND SYSTEMIC VASCULAR DYNAMICS IN RESPONSE TO STRESS (2) Final Report

Henry S. Miller Feb. 1972 8 p

(Contract DA-49-193-MD-2794)

(AD-737747) Avail: NTIS CSCL 06/19

The project was instituted in July, 1965 to investigate the vascular dynamics under stress conditions. Transducer techniques for obtaining direct and indirect measurements of the physiological variables under investigation and mathematical techniques for the computer analysis of this data have been developed. A 6 Channel recorder has been modified for 6 Channel electrocardiogram recording at rest and during active exercise. Atrial pacing, treadmill exercise and drug injections have been used as methods of stressing the cardiovascular system. The electrocardiogram, apexcardiogram, carotid pulse waves, phonocardiography and blood pressures have been done before and after exercise. In patients with known coronary artery disease, intra-arterial pressures, electrocardiogram, and clinical evidence of cerebral and coronary insufficiency are recorded during the stress by rapid atrial pacing. GRA

N72-28069# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

PHYSIOLOGICAL AND PERFORMANCE EFFECTS ON THE AIRCREW DURING LOW-ATTITUDE HIGH-SPEED FLIGHT MISSIONS

Henning E. Vongierke Nov. 1971 41 p refs Presented at the AGARD Guidance and Control Panel Meeting on Low-Altitude Flight Control Probl., Brussels, 1-3 Sep. 1970 (AF Proj. 7231)

(AD-737827; AMRL-TR-70-67) Avail: NTIS CSCL 06/19

Operational experience as well as flight and simulator experiments indicate that low altitude high speed flying constitutes a nonspecific stress resulting in adverse physiological responses, cumulative fatigue and potentially detrimental effects on selected performance capabilities. Psychological mission stress and pilot workload are hard to separate from the combination of physical stressors, such as buffeting, noise, and heat. Recent studies on the combined effects of noise and vibration on visual and psychomotor performance will be reviewed. As guidance for the evaluation of operational situations the proposed international standard for the evaluation of vibration environments with respect to health, pilot performance, fatigue, and comfort is reviewed. Research goals of ongoing programs in several countries are directed toward reducing environmental stresses and toward refining guidelines with respect to human psycho-physiological responses to these stressors. Promising new approaches appear to rest in the application of modern control theory to describe man-machine effectiveness under environmental stress. Only such adequate descriptions of the physiological state and operational effectiveness of the man would allow future aircraft and weapons systems to be designed with optimum efficiency and effectiveness. Author (GRA)

N72-28070# Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.

VARGUS PATTERN SYNTHESIS TECHNIQUES AND THEIR APPLICATIONS

Michael Abbamonte and Selby H. Evans Nov. 1971 132 p refs

(Contract DAAD05-68-C-0176; DA Proj. 1T0-61102-B-81-A)

(AD-738174; HEL-TM-21-71) Avail: NTIS CSCL 05/10

This document describes a collection of computer programs developed for use in research on human pattern perception. The overall orientation which guided the development of the VARGUS (Variable Generator of Unfamiliar Stimuli) pattern-generation programs and the historical backgrounds of each category (VARGUS 7, 9 and 10) are related in the first section. The second section provides documentation, sample output and summary for each program and subroutine. GRA

N72-28071# Human Engineering Labs., Aberdeen Proving Ground, Md.

AN ANNOTATED BIBLIOGRAPHY OF THE LITERATURE DEALING WITH THE PHYSIOLOGICAL CORRELATES OF ATTITUDES AND ATTITUDE CHANGE

Nicholas J. Carriero and Edward C. Gehringer Dec. 1971 96 p refs

(AD-739505) Avail: NTIS CSCL 05/10

The bibliography is an annotated collection of 798 references dealing with the physiological correlates of attitudes and attitude change. The major portion of the items are from the period extending from 1949 to 1970. The items are arranged in alphabetical order by author. Author (GRA)

N72-28072# Army Medical Research Lab., Fort Knox, Ky.

ULTRASONIC MEASUREMENTS OF THE LIVING PRIMATE EYE: THE EFFECTS OF TRANSDUCER MANIPULATIONS Interim Report

Gregory W. Lewis 15 Dec. 1971 25 p refs

(DA Proj. 3A0-61102-B-71P)

(AD-738587; USAMRL-957) Avail: NTIS CSCL 06/16

The effects of ultrasonic transducer manipulations on optical component depth and component interface amplitudes in the live primate eye were investigated. Statistical evidence is presented which suggests that as the ultrasound beam traverses the optical components of refraction, increased variability in depth and amplitude measures occur. Angular transducer displacement from the criterion 'standard trace' has a greater effect on depth and amplitude measures than did linear displacement from the

'standard trace'. The most sensitive amplitude measure was that of the front lens. Optical component depth measures were much less sensitive to transducer movement than were component amplitude measures. Author (GRA)

N72-28073# Army Medical Research Lab., Fort Knox, Ky.
MODELS OF HEAT DISSIPATION IN A HOMOGENEOUS SOLID Final Report

Craig R. Heimbach 18 Nov. 1971 20 p refs
 (AD-738589; USAMRL-954) Avail: NTIS CSCL 06/18

Previous theoretical calculations of thermal damage resulting from irradiation have used equations involving the time-temperature history of the material. These models assumed uniform beams of radiation. This report extends the range of models available to include a more realistic application to non-uniform beams. Author (GRA)

N72-28074# Naval Submarine Medical Center, Groton, Conn.
THE TIME COURSE OF ACID BASE BALANCE WHILE ON FBM SUBMARINE PATROL

Alexander S. Peck, Jr. 28 Jul. 1971 12 p refs
 (AD-738809; NSMRL-675; NAVMED-MR011.01-5033-01)
 Avail: NTIS CSCL 06/19

Measurements of arterialized capillary, and venous pH, PCO₂ and PO₂ were taken from 15 healthy male subjects during a control period and during days 2, 9, 17, 42 and 56 of a Polaris submarine patrol. Venous plasma concentrations of sodium, chloride, and potassium were determined from frozen samples. Twenty-four hour urine specimens were collected from four of the men in the study. Daily excretion of sodium, potassium, calcium, and phosphate were determined by analysis of frozen samples. The men were on normal diets with no restrictions or control of calcium intake. Despite prolonged exposure to elevated levels of CO₂ (.72% to .95% with a mean of .85%), no significant respiratory acidosis was documented. Plasma electrolytes were clinically normal and gave no evidence of acidosis during the study and post recovery period. Urinary excretion of calcium, phosphate, sodium, and potassium were within normal limits. The direct on-board measurement of blood gas and pH values shows little physiological change at present operational levels of CO₂. Author (GRA)

N72-28075# Naval Air Development Center, Johnsville, Pa.
 Crew Systems Dept.

ELECTRORETINOGRAPHIC EVALUATION OF THE BUNSEN-ROSCOE LAW FOR THE HUMAN EYE AT HIGH ENERGY LEVELS Interim Report

Robert A. Rosenblum 7 Jul. 1971 20 p refs
 (MF12524004)

(AD-738803; NADC-CS-7101) Avail: NTIS CSCL 06/16

The amplitude of the a-wave of the human electroretinogram is shown to obey the intensity-time relation of the Bunsen-Roscoe Law at very suprathreshold energy levels. This implies that retinal receptor cells are capable of temporal light integration at these energies. Failure to demonstrate the photochemically predicted intensity-time reciprocity failure may represent insufficient flash stimulus energy. The latency of the b-wave response is shown to be dependent on flash duration at constant energy, increasing as duration increases. Author (GRA)

N72-28076# Naval Air Development Center, Johnsville, Pa.
 Crew Systems Dept.

INCREMENT THRESHOLDS FOR TWO NONIDENTICAL FLASHES Interim Report

Robert M. Herrick and Charles J. Theisen, Jr. 22 Nov. 1971 59 p refs

(MF12524004)

(AD-739327; NADC-CS-7120) Avail: NTIS CSCL 05/10

Two flashes of 1 degree visual angle and 0.389 mJ were superimposed upon a steady 1.19 mJ background of the same size seen foveally. The second flash followed the first after delays ranging from 0 to 60 ms. The duration of the first flash was varied from 0 to 4.8 ms, and, for each duration of the first flash, the threshold duration of the second flash was determined. (When seen, the two flashes appeared as one.) At all delays below 25 ms, the threshold energy of the two flashes combined was constant, regardless of the duration of the first flash. At each delay between 25 and 50 ms, at short durations of the first flash, the threshold duration of the second flash was the same as that required when no first flash was presented. However, at longer durations of the first flash, the threshold average luminance provided by the two flashes during the total display time was constant. At the delay that required the maximum energy for threshold, 55 ms, for every duration of the first flash, the duration of the second flash was greater than that required when no first flash was presented. These findings, and others, are incorporated in a simple model. Author (GRA)

N72-28077# Tulane Univ., New Orleans, La. Biomechanics Lab.

A CONTINUUM MODEL OF THE PRIMATE BODY RESPONSE TO IMPACT Final Report, 1 Jun. 1970 - 31 Aug. 1971

Y. King Liu, Stephen C. Cowin, D. U. VonRosenberg, and Kenneth A. Adams Jan. 1972 100 p refs

(Contract F33615-70-C-1565; AF Proj. 7231)

(AD-739249; AMRL-TR-71-99) Avail: NTIS CSCL 06/19

A continuous configuration model of the spine under axial dynamic impact is derived from first principles. The model consists of an initially curved beam-column subjected to eccentric inertial loading. As long as the formulation remains tractable, the assumptions of large deflections and finite strains are retained. Otherwise, the results are specialized to large deflections but small strains and then to small deflections and strains. The emphasis of this derivation is on the basic assumptions leading to the partial differential equations of motions. A comparison with the variational method of formulation is also given. Some previous investigations are shown to be special cases of the present model. Numerical analysis and results using the finite-difference technique are given for three special cases of the model. Feasibility studies were conducted to determine the extent and degree of detail of the biomechanical data needed to implement the model. These studies on the means of obtaining the inertial property distribution of the human trunk, the material property distribution and the failure criterion of the intervertebral joints, showed conclusively that such data indeed can be found. However, before a regression analysis can be made to yield useful input data, a fairly large experimental effort is needed. Author (GRA)

N72-28078# School of Aerospace Medicine, Brooks AFB, Tex.
CEREBRAL CORTEX POTENTIALS EVOKED IN MAN BY PERCEIVED AND NOT PERCEIVED ACOUSTIC STIMULI

E. A. Konstandov and G. I. Dyachkova 1972 14 p refs Transl. into ENGLISH from Neurophysiology (USSR), v. 3, 1971

(AD-739270; SAM-TT-R-1124-0372) Avail: NTIS CSCL 06/16

With the aid of the computer, average evoked potentials (AEP) to short acoustic subliminal stimuli (3-10 db below the threshold audibility), liminal intensity and supraliminal intensity (10-60 db above the threshold) were recorded from the vertex and the occipital region of the skull (healthy subjects). The dynamics of the AEP changes have been demonstrated with an increase in sound intensity from subliminal to supraliminal (60 db) values. Time and amplitude parameters of AEP from perceived and not perceived acoustic stimuli are positively distinguishable from each other. A long-latent, low-amplitude, slow positive wave is the most constant, and in many cases the only component of AEP from a not perceived stimulus. Author (GRA)

N72-28079# National Academy of Sciences-National Research Council, Washington, D.C. Committee on Hearing, Bioacoustics, and Biomechanics.

SUSTAINED LINEAR ACCELERATION

James P. Henry, Randall M. Chambers, Otto H. Gauer, Ernest P. McCutcheon, and Laurence R. Young Mar. 1972 24 p Presented at the meeting of the Working Group 67, Cocoa Beach, Fla., 1 Apr. 1971 (Contract N00014-67-A-0244-0211; NR Proj. 140-113) (AD-738478) Avail: NTIS CSCL 06/19

The report concerns modern and future fighter aircraft with maneuvering capabilities that now are beginning to exceed the G force limitations of man, particularly with regard to such effects on man's pulmonary, cardiovascular, and labyrinthine systems. Protective mechanisms are discussed that have potential for exceeding man's unprotected tolerance; research at many laboratories is discussed. The report considers that 9 G 30-sec duration acceleration is likely to be tolerable and that the solution will probably involve a compromise between posture, straining, pilot selection, and anti-G suits rather than the use of any single technique exclusively. Twelve fruitful research areas are outlined for future laboratory effort. Author (GRA)

N72-28080# New York Univ., N.Y. Dept. of Industrial Engineering and Operations Research.

EVOKED CORTICAL POTENTIALS AND INFORMATION PROCESSING Annual Summary Report, 1 Apr. 1971 - 31 Mar. 1972

John L. Andreassi and Mark S. Mayzner 31 Mar. 1972 78 p refs (Contract N00014-67-A-0467-0009) (AD-738964; Rept-O-5511-356-3; ASR-3) Avail: NTIS CSCL 06/16

The report summarizes the work performed and data collected in the Psychophysiology section of the Human Factors Laboratory, New York University, from 1 April 1971 through 31 March 1972. Six experiments were conducted. The first study was concerned with visual evoked potentials (VEPs) and detection performance under conditions of four-digit overprinting. In the second experiment overprinting was studied again in a situation in which the third stimulus in the digit string was now of higher luminance than the others. Experiment III studied visual and auditory cortical evoked potentials under conditions of single and bimodal stimulation. The fourth experiment was concerned with the question of whether increasingly intense auditory stimuli would produce evoked responses in the visual area. Experiments V and VI were conducted to study the effects of geometric form upon the VEP. In experiment V the stimuli were simple lines oriented three different planes and in experiment VI VEPs to two different geometric forms (square and triangle) were studied. Author (GRA)

N72-28081# Memphis State Univ., Tenn. Dept. of Psychology. **CONVENTIONAL AND HIGH FREQUENCY HEARING OF NAVAL AIRCREWMEN AS A FUNCTION OF NOISE EXPOSURE Technical Report, May 1971 - Mar. 1972**

John L. Fletcher 1 Apr. 1972 13 p refs (Contract N00014-71-C-0354) (AD-739368; HRL/1) Avail: NTIS CSCL 06/19

Conventional and high frequency audiograms for US Navy prop, jet, and rotary wing pilots were obtained and plotted as a function of amount of flight time logged. Lack of sufficient audiograms of prop and rotary pilots restricts discussion of the relative hazard to hearing of prop, rotary, and jet flight. However, for jet aircrewmembers, losses appear to begin at the higher frequencies i.e., above 6 KHz, and erode with cumulative flight time down to the lower frequencies. Percent of persons detecting the high frequency signals is a more precise index of the progression of hearing loss than is mean hearing level, primarily because of an artifact in scoring audiograms. Data collection of aircrew candidates pre-training, during training, and post-primary hearing are concurrently being collected by US Navy Aerospace Medical Research Institute (NAMI) personnel at Pensacola NAS. Author (GRA)

N72-28082# Naval Medical Research Inst., Bethesda, Md. **EFFECTS OF BREATHING AIR AND HELIUM-OXYGEN AT SEVERAL DEPTHS ON RESPONSE RATES IN MULTIPLE SCHEDULES Medical Research Progress Report**

John R. Thomas, J. Michael Walsh, and Arthur J. Bachrach 30 Dec. 1971 29 p refs (AD-739690; NAVMED-MF12.524.004-7007D-1) Avail: NTIS CSCL 06/19

Albino rats, trained on a multiple fixed-ratio (FR), differential reinforcement of low rate (DRL) schedule for food reinforcement were repeatedly exposed to increased pressure (equivalent to 100, 200, and 300 feet of sea water) breathing compressed air or an 80% helium-20% oxygen mixture (Heliox). Response rates on the two schedules were less disrupted when the heliox mixture was used, although decrements in performance were still observed. Repeated exposure to the same depths produced some behavioral adaptation to pressure effects. Differential rate changes on the two schedules under hyperbaric conditions were observed as a function of schedule contingencies. Author (GRA)

N72-28083# Ocean Systems, Inc., Tarrytown, N.Y. Research and Development Dept.

MECHANISM AND DETECTION OF DECOMPRESSION SICKNESS

Mitchell R. Powell 15 Dec. 1971 70 p refs (Contract N00014-69-C-0346)

(AD-739700; UCRI-673) Avail: NTIS CSCL 06/19

The report describes investigations of the use of ultrasound techniques for the study of mechanisms and detection of decompression sickness. The theoretical and experimental basis of through-transmission ultrasound detection of bubbles in a biological system is discussed and compared to Doppler, pulsed-echo, and acoustic-optical imaging techniques. The course of development of decompression sickness symptoms and of visible bubbles in the circulatory system was compared to ultrasonic signal attenuation measurements for similar decompression conditions. Parameters of ultrasound signal attenuations--time to attain an effect, rate of change to maximum effect, magnitude of maximum effect, and time to recover the original signal--paralleled the manifestation of corresponding parameters of decompression sickness symptoms. Visible intravascular bubbles, primarily in the venous system, were found in animals exhibiting a range of decompression symptoms from mild or none to severe or death but were seldom seen after about one hour past decompression. Arterial bubbles on the other hand, were often seen in animals which died from decompression and only occasionally in animals which survived. Author (GRA)

N72-28084# Indiana Univ., Bloomington. **PHYSIOLOGICAL ADJUSTMENTS OF MEN TO WORK AND HEAT Final Technical Report, Jul. 1963 - Jun. 1971**

Sid Robinson 18 Mar. 1972 84 p refs (Contract DA-49-193-MD-2449) (AD-739838) Avail: NTIS CSCL 06/19

Studies of temperature regulatory adjustments of man in relation to variations in the distribution of heat in the body, i.e., the vertical and longitudinal temperature gradients in the limbs, the core and surface temperature changes of the trunk, which occur following abrupt changes in the environmental temperature and/or the energy metabolism activity of the subject. The levels of response under various steady state conditions were also evaluated. Author (GRA)

N72-28085# Office of Naval Research, London (England). **SYMPOSIUM ON THE EFFECTS OF PRESSURE ON ORGANISMS**

Ralph R. Sonnenschein 22 Feb. 1972 12 p refs Conf. held at Bangor, Wales, 6-10 Sep. 1971

(AD-740094; ONRL-C-5-72) Avail: NTIS CSCL 06/19

At the Symposium on the Effects of Pressure on Organisms, held in Bangor, Wales on 6-10 September 1971, effects of high pressure on physicochemical systems and on a wide variety of plant and animal forms were discussed as well as anatomical and physiological adaptations of living forms to pressure and submersion. Author (GRA)

N72-28086* + Beckman Instruments, Inc., Fullerton, Calif. Advanced Technology Operations.
WHITE BLOOD CELL COUNTING SYSTEM Final Report
 15 Jul. 1972 19 p
 (Contract NAS9-12371)
 (NASA-CR-115706; FR-1089-101) Avail: NTIS HC \$3.00 CSCL 06B

The design, fabrication, and tests of a prototype white blood cell counting system for use in the Skylab IMSS are presented. The counting system consists of a sample collection subsystem, sample dilution and fluid containment subsystem, and a cell counter. Preliminary test results show the sample collection and the dilution subsystems are functional and fulfill design goals. Results for the fluid containment subsystem show the handling bags cause counting errors due to: (1) adsorption of cells to the walls of the container, and (2) inadequate cleaning of the plastic bag material before fabrication. It was recommended that another bag material be selected. Author

N72-28087* # General Dynamics/Convair, San Diego, Calif.
LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 1: MANAGEMENT SUMMARY
 Mar. 1972 36 p
 (Contract NAS8-26468)
 (NASA-CR-123738; GDC-DBD72-002-Vol-1) Avail: NTIS HC \$4.00 CSCL 06B

The objectives of a study program to determine the life sciences payloads required for conducting biomedical experiments during space missions are presented. The objectives are defined as: (1) to identify the research functions which must be performed aboard life sciences spacecraft laboratories and the equipment needed to support these functions and (2) to develop layouts and preliminary conceptual designs of several potential baseline payloads for the accomplishment of life research in space. Payload configurations and subsystems are described and illustrated. Tables of data are included to identify the material requirements for the space missions. Author

N72-28088* # General Dynamics/Convair, San Diego, Calif.
LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 2: REQUIREMENTS AND DESIGN STUDIES
 Mar. 1972 239 p refs
 (Contract NAS8-26468)
 (NASA-CR-123739; GDC-DBD72-002-Vol-2) Avail: NTIS HC \$14.00 CSCL 06B

N72-28089* # General Dynamics/Convair, San Diego, Calif.
LIFE SCIENCES PAYLOAD DEFINITION AND INTEGRATION STUDY. VOLUME 3: APPENDICES
 Mar. 1972 243 p
 (Contract NAS8-26468)
 (NASA-CR-123737; GDC-DBD72-002-Vol-3) Avail: NTIS HC \$14.25 CSCL 06B

Detail design information concerning payloads for biomedical research projects conducted during space missions is presented. Subjects discussed are: (1) equipment modules and equipment

item lists, (2) weight and volume breakdown by payload and equipment units, (3) longitudinal floor arrangement configuration, and (4) nonbaseline second generation layouts. Author

N72-28090* # Bell Aerospace Co., Buffalo, N.Y.
TELEOPERATOR TECHNOLOGY AND SYSTEM DEVELOPMENT, VOLUME 1 Final Report, 1 Mar. 1971 - 28 Feb. 1972
 Apr. 1972 205 p
 (Contract NAS8-27021)
 (NASA-CR-123741; Rept-8586-950001A-Vol-1) Avail: NTIS HC \$12.25 CSCL 05H

A two phase approach was undertaken to: (1) evaluate the performance of a general-purpose anthropomorphic manipulator with various controllers and display arrangements, (2) identify basic technical limitations of existing teleoperator designs, and associated controls and displays, and (3) identify, through experimentation, the effects that controls and displays have on the performance of an anthropomorphic manipulator. In Phase 1 the NASA-furnished manipulators, controls and displays were integrated with the remote maneuvering unit; in Phase 2 experiments were defined and performed to assess the utility of teleoperators for 6 typical space inspection, maintenance and repair tasks. Author

N72-28091* # URS/Matrix Co., Huntsville, Ala. Man Systems Div.
DEVELOPMENT OF FLIGHT EXPERIMENT TASK REQUIREMENTS. VOLUME 1: SUMMARY Final Report
 G. Richard Hatterick 1 Jun. 1972 31 p refs 2 Vol.
 (Contract NASw-2192)
 (NASA-CR-127468; PRL-189-Vol-1) Avail: NTIS HC \$3.75 CSCL 05H

A study was conducted to develop the means to identify skills required of scientist passengers on advanced missions related to the space shuttle and RAM programs. The scope of the study was defined to include only the activities of on-orbit personnel which are directly related to, or required by, on-orbit experimentation and scientific investigations conducted on or supported by the shuttle orbiter. A program summary is presented which provides a description of the methodology developed, an overview of the activities performed during the study, and the results obtained through application of the methodology. Author

N72-28092* # URS/Matrix Co., Huntsville, Ala. Man Systems Div.
DEVELOPMENT OF FLIGHT EXPERIMENT TASK REQUIREMENTS. VOLUME 2: TECHNICAL REPORT. PART 1: PROGRAM REPORT AND APPENDICES A-G Final Report
 G. Richard Hatterick 1 Jun. 1972 194 p 2 Vol.
 (Contract NASw-2192)
 (NASA-CR-127469; PRL-189-Vol-2-Pt-1) Avail: NTIS HC \$11.75 CSCL 05H

Activities are documented of the study to determine skills required of on-orbit crew personnel of the space shuttle. The material is presented in four sections that include: (1) methodology for identifying flight experiment task-skill requirements, (2) task-skill analysis of selected flight experiments, (3) study results and conclusions, and (4) new technology. D.L.G.

N72-28093* # URS/Matrix Co., Huntsville, Ala. Man Systems Div.
DEVELOPMENT OF FLIGHT EXPERIMENT TASK REQUIREMENTS. VOLUME 2: TECHNICAL REPORT. PART 2:

APPENDIX H: TASKS-SKILLS DATA SERIES Final Report

G. Richard Hatterick 1 Jun. 1972 992 p 2 Vol.
(Contract NASw-2192)
(NASA-CR-127470; PRL-189-Vol-2-Pt-2) Avail: NTIS HC \$51.75 CSCL 05H

The data sheets presented contain the results of the task analysis portion of the study to identify skill requirements of space shuttle crew personnel. A comprehensive data base is provided of crew functions, operating environments, task dependencies, and task-skills applicable to a representative cross section of earth orbital research experiments. D.L.G.

N72-28094*# Cyberfacts, Inc., Sudbury, Mass. DEVELOPMENT OF A MODEL OF MACHINE HAND EYE COORDINATION AND PROGRAM SPECIFICATIONS FOR A TOPOLOGICAL MACHINE VISION SYSTEM Final Report

30 Jun. 1972 124 p refs
(Contract NASw-2243)
(NASA-CR-127566) Avail: NTIS HC \$8.25 CSCL 05H

A unified approach to computer vision and manipulation is developed which is called choreographic vision. In the model, objects to be viewed by a projected robot in the Viking missions to Mars are seen as objects to be manipulated within choreographic contexts controlled by a multimoded remote, supervisory control system on Earth. A new theory of context relations is introduced as a basis for choreographic programming languages. A topological vision model is developed for recognizing objects by shape and contour. This model is integrated with a projected vision system consisting of a multiaperture image dissector TV camera and a ranging laser system. System program specifications integrate eye-hand coordination and topological vision functions and an aerospace multiprocessor implementation is described. Author

N72-28095*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

ZERO-GRAVITY OPEN-TYPE URINE RECEPTACLE
Anthony S. Giralda Feb. 1972 24 p refs Presented at Conf. on Body Waste Systems for Spacecraft, Hampton, Va., 17 May 1971
(NASA-TM-X-58085; MSC-05813) Avail: NTIS HC \$3.25 CSCL 06I

The development of the zero-gravity open-type urine receptacle used in the Apollo command module is described. This type receptacle eliminates the need for a cuff-type urine collector or for the penis to circumferentially contact the receptacle in order to urinate. This device may be used in a gravity environment, varying from zero gravity to earth gravity, such as may be experienced in a space station or space base. Author

N72-28096# Nauka Press, Moscow (USSR). BIONICS: BIBLIOGRAPHIC INDEX OF THE DOMESTIC AND FOREIGN LITERATURE, 1958-1968

T. N. Anisimova 1971 168 p refs In RUSSIAN
Avail: NTIS HC \$10.50

A bibliography is presented on the following aspects of bionics: general bionics and technical modeling of biological systems; (2) receptor mechanisms; (3) orientation, navigation, and location of animals; (4) effects of physical poles and radiation on biological objects; (5) behavior and control of behavior in animals; (6) bionic problems of control and regulation; (7) problems of constructing complex biological-technical systems; (8) bionic problems in pattern recognition; (9) neurobionics; and (10) bionic aspects of cybernetics and mathematical biology. Transl. by K.P.D.

N72-28097*# McDonnell-Douglas Co., St. Louis, Mo. A POTABLE WATER DISPENSER Patent Application
Herbert R. Cunningham, inventor (to NASA) Filed 28 Jun. 1972 27 p Sponsored by NASA
(NASA-Case-MFS-21115-1; US-Patent-Appl-SN-266930) Avail: NTIS HC \$3.00 CSCL 06I

A mechanism for dispensing precisely measured charges of potable water into reconstitution bags is described. The dispenser includes a tubular body with an axially reciprocable piston. The piston is spring-biased toward an end wall forming a chamber intake port, and ejection port. The volume of the chamber is controlled by the position of the head of the piston. The extent to which the piston is displaced for expanding the chamber is controlled by the position of the shaft. Delivery of potable water to and from the chamber is controlled by a rotary valve, while final dispensing of water is controlled by a linear valve which operates in relation to the rotary valve. NASA

N72-28098*# McDonnell-Douglas Co., St. Louis, Mo. A FLUID DISPENSER Patent Application

Thomas A. Cook and Hans Scheibe, inventors (to NASA) Filed 28 Jun. 1972 22 p Sponsored by NASA
(NASA-Case-MFS-21163-1; US-Patent-Appl-SN-266925) Avail: NTIS HC \$3.00 CSCL 06I

A cyclically operable fluid dispenser particularly suited for use in dispensing precisely measured charges of potable water aboard spacecraft is disclosed. The dispenser is characterized by a sealed housing adapted to be held within a crewman's palm and coupled with a pressurized source of potable water, a dispensing jet projected from the housing and configured to be received within a crewman's lips, an expansible measuring chamber for measuring charges of drinking water received from the source, and a dispenser actuator including a lever extended from the housing to be digitated for initiating operational cycles. NASA

N72-28099# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

METHODOLOGY IN THE MEASUREMENT OF COMPLEX HUMAN PERFORMANCE: TWO-DIMENSIONAL COMPENSATORY TRACKING
Alan E. Jennings, W. Dean Chiles, and Georgetta West May 1972 9 p refs
(FAA-AM-72-21) Avail: NTIS HC \$3.00

Nineteen subjects were tested on two successive days on a complex performance device designed to measure functions of relevance to aircrew performance. Data included measures of monitoring, information processing, pattern discrimination, and group problem solving. The effects of a perceptual motor tracking task were evaluated by measuring performance with and without concurrent tracking during five different task combinations and in a tracking alone condition. The tracking task was shown to be reliable both when performed by itself and when performed concurrently with other tasks. The tracking task was also shown to be sensitive to work load effects from the other tasks and to impose a significant effect on some of the other tasks. The findings also suggest that a composite score based on all concurrently performed tasks may have unique value and sensitivity under some conditions. Author

N72-28100# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

MULTIPLE TASK PERFORMANCE AS A PREDICTOR OF THE POTENTIAL OF AIR TRAFFIC CONTROLLER TRAINEES
W. Dean Chiles, Alan E. Jennings, Georgetta West, and William T. Abernathy Jan. 1972 32 p refs
(FAA-AM-72-5) Avail: NTIS HC \$3.75

Two hundred and twenty-nine air traffic controller trainees were tested on the CAMI multiple task performance battery. The battery provides objective measures of monitoring, arithmetical skills, visual discrimination, and group problem solving. The criterion of trainee potential was based on ratings from FAA Academy instructors in courses being attended by the trainees. Five studies were conducted, the first one (N = 19) being in the nature of a pilot study for checking out procedures. The second study (N = 60) yielded a validity coefficient of .54. The third study (N = 31) yielded a coefficient of .53. The fourth study (N = 30) found no predictive power for the MTPB. The fifth study (N = 89) produced a coefficient of .24 for one method of computing the performance index and .46 for a second method. For each study, the coefficient is based on one hour of testing with about 50 minutes of preceding instruction and practice. It is concluded that the MTPB-approach to selection offers promise as a screening device for air traffic control specialist applicants, but further research is required to establish this as a fact and to determine its utility in terms of cost effectiveness. Author

N72-28101*# Advanced Rocket Technology, Irvine, Calif.
EVALUATION OF ADVANCED COMPONENT CONCEPTS FOR AN INTEGRATED ENVIRONMENTAL CONTROL/LIFE SUPPORT, RESISTOJET CONTROL SYSTEM

Carl R. Halbach, Paul D. Arthur, and Russell J. Page Jun. 1972 78 p refs

(Contract NAS1-10767)

(NASA-CR-112104) Avail: NTIS HC \$6.00 CSCL 06K

Flow restricting devices were studied for their suitability as liquid water propellant flow limiters for the biowaste resistojet. Flow limiting during the start-up transient is required to prevent thruster instabilities and icing which could result in heater failure in the electrical resistance heated thruster (resistojet). The study was directed toward simple devices which would function passively (i.e., without power except from the propellant flow itself), and would offer high reliability and simplicity. In addition to the flow limiting devices, a thermal pumping system was studied to determine whether CO₂, desorbed from molecular sieves could be pumped thermally in a space station application. The thermal pump is considered a possible replacement for mechanical pumps. It involves a cyclic, constant volume cryopumping system which employs space radiators to achieve the cryotemperatures. The frozen CO₂ would be vaporized periodically, using a waste heat loop, to attain sufficient pressure to transfer a large portion of the trapped CO₂ to storage tanks. Author

N72-28102# Joint Publications Research Service, Arlington, Va.
SPACE MEDICINE: REPORTS ON ARTIFICIAL GRAVITATION AND SPACE SUITS

25 Jul. 1972 17 p ref Transl. into ENGLISH from *Aviats. i Kosmonavt.* (Moscow), no. 4, 1972 p 24-25 and 32-33 plus back cover

(JPRS-56598) Avail: NTIS HC \$3.00

A report on the ways and means of maintaining the health and workability of man on long voyages in space is given. Specific reference is made to the physiological problems of artificial gravity and experiments conducted with mice and rats. The second part of the report describes the space suit used by astronauts and the various life support systems it contains.

N72-28103 Joint Publications Research Service, Arlington, Va.
ARTIFICIAL GRAVITATION AND PHYSIOLOGY

Ye. Yuganov *In its Space Med.: Repts. on Artificial Gravitation and Space Suits* 25 Jul. 1972 p 1-5 ref

Methods designed to help astronauts adjust to weightlessness conditions and the effects of these conditions on physiological processes are discussed. Particular attention was given to creating artificial gravity environments onboard the space ship. Also examined were the minimal amount of acceleration needed to create a relatively effective gravitational environment, the vehicle spin rate that can be safely tolerated by man, and the potentialities of life and activity in systems rotating for prolonged periods. It was suggested that the optimum level of prolonged rotation for man is 10 deg/sec, and the artificial gravity needed to preserve physiological processes and life potentialities range between .28 and .31 G of normal gravity. E.H.W.

N72-28104 Joint Publications Research Service, Arlington, Va.
SPACE SUIT OF AN ASTRONAUT

In its Space Med.: Repts. on Artificial Gravitation and Space Suits 25 Jul. 1972 p 6-14

A description is given of the space suit worn by astronauts during EVA. The portable life support systems, protective qualities of the suit, and the safety features built into the suit in case of failures are given. E.H.W.

N72-28105# System Development Corp., Santa Monica, Calif.
HUMAN FACTORS IN THE DEVELOPMENT OF AIR TRAFFIC CONTROL AUTOMATION

John M. Daily 1 Apr. 1971 21 p Sponsored by FAA

Avail: NTIS HC \$3.25

The importance of integrating personnel or human factor considerations into the process of developing automated air traffic control systems is discussed. It is shown that fundamental to effective system development is a well conceived system engineering plan that contains the human factor aspects of the system. Author

N72-28106# Education and Public Affairs, Washington, D.C.
SELECTION OF AIR TRAFFIC CONTROLLERS FOR FEDERAL AVIATION ADMINISTRATION Final Report

Ann M. Milne and Joseph G. Colmen Jan. 1972 153 p refs

(Contract DOT-FA70WA-2371)

Avail: NTIS HC \$9.75

Experiments related to the capacity of tests to predict the quality of job performance of a journeyman air traffic controller produced mixed results. The Civil Service Commission paper-pencil test battery was at best marginal in predicting job performance of journeymen, in spite of the fact that the range of scores obtained by journeymen was broader in general than that obtained by new appointees. Psychomotor tests, on the other hand, displayed consistently significant correlations with supervisory ratings. A combination of a common battery of paper pencil and psychomotor tests increased accuracy of assignments from 25% to 58%. Analyses dealing with classification in terms of capacity to operate in high or low density facilities revealed large potential operational gains with accuracy levels as high as 75% to 80%. Classification of applicants in terms of density for the two options requires the administration of two additional psychomotor tests beyond those needed for option placement. Author

N72-28107# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario), Behavioral Sciences Div.

HUMAN ENGINEERING ASSESSMENT OF VFR CABS

L. G. Innes Feb. 1972 15 p refs

(DCIEM-832) Avail: NTIS HC \$3.00

The predicted substantial increase in student pilot flying at two CF training bases over the next few years is expected to

increase the demands of the VFR controller's task to an unacceptable extent. A human engineering survey of VFR tower cabs on two CF flying training bases was conducted to produce recommendations for interim, low cost modifications which would help in reducing controller workload. Proposals for modifications in equipment, environment and procedures are detailed. Author

N72-28108*# Chemtrac, Inc., Rosemont, Ill.
POTABLE WATER BACTERICIDE AGENT DEVELOPMENT
Final Report, Jun. - Dec. 1971
 T. L. Hurley and R. A. Bambenek Jul. 1972 104 p refs
 (Contract NAS9-12104)
 (NASA-CR-115595; Rept-3097) Avail: NTIS HC \$7.25 CSCL 06K

The results are summarized of the work performed for the development and evaluation of a bactericide agent/system concept capable of being used in the space shuttle potable water system. The concept selected for evaluation doses fuel cell water with silver ions before the water is stored and used, by passing this water through columns packed with silver chloride and silver bromide particles, respectively. Four simulated space shuttle potable water system tests, each of seven days duration, were performed to demonstrate that this concept is capable of delivering sterile water even though $3 +$ or $- 1 \times 10$ to the 9th power Type IIIa or Pseudomonas aeruginosa bacteria, two types which have been found in the Apollo potable water system, are purposely injected into the system each day. This result, coupled with the fact that silver ions do not have to be periodically added to the stored water, indicates that this concept is superior to the chlorine and iodine techniques used on Apollo. Author

N72-28109# Royal Aircraft Establishment, Farnborough (England).
REPRESENTATION BY MODELS OF THE BIOMECHANICAL SYSTEM MAN-OPERATOR UNDER THE ACTION OF RANDOM VIBRATIONS
 B. A. Potemkin and K. V. Frolov Jun. 1972 9 p refs Transl. into ENGLISH from DAN (SSSR), v. 197, no. 6. 1971 p 1284-1287
 (RAE-Lib-Trans-1651; BR-29553) Avail: NTIS HC \$3.00

In an attempt to determine the place and effect of man in an operator-machine system, tests have been carried out to determine the dynamic characteristics of the human body. Values of the transmission function across the body were calculated, using the autocorrelations and spectral densities of the output and input vibration functions. Representative random oscillations were used and the subjects tested for three postures. Results are given for the characteristic components of the models used for the three postures. Author

N72-28110# Konigsberg Instruments, Inc., Pasadena, Calif.
PROGRAM TO DEVELOP IMPROVED IMPLANTABLE PRESSURE TRANSDUCERS Annual Report, 28 Jun. 1969 - 27 Jun. 1971
 Eph. Konigsberg 15 Feb. 1972 129 p
 (Contract PHS-69-2241)
 (PB-207712; NIH-69-2241-1) Avail: NTIS HC \$3.00 CSCL 06B

Improved implantable pressure transducers suitable for both arterial and venous applications have been developed and extensively tested. A gage version of these instruments has also been designed and fabricated. An implantable differential pressure transducer has been designed, and first prototypes tested. A component improvement program for the above devices, including metals, gages, wires, cables and connectors has resulted in greater reliability in usage. Software and test protocols for bench and in vivo calibrations were developed. Author (GRA)

N72-28111# Bunker-Ramo Corp., Westlake Village, Calif. Human Factors Dept.

RELATIONSHIP BETWEEN SYSTEM DESIGN, TECHNICIAN TRAINING AND MAINTENANCE JOB PERFORMANCE ON TWO AUTOPILOT SUBSYSTEMS

David Meister, Dorothy L. Finley, and Ernest A. Thompson Sep. 1971 184 p refs

(Contract F33615-69-C-1320; AF Proj. 1124)
 (AD-739591; AFHRL-TR-70-20) Avail: NTIS CSCL 05/5

The purpose of the study was to investigate the relationship between system design and training variables and performance of technicians. Over a five month period technicians at two SAC bases were observed in troubleshooting the MF-1 and A42G autopilots. Following each maintenance incident the technician was interviewed. At the conclusion of the study maintenance supervisors ranked and rated all technicians in terms of skill level. Data collectors also rated the major design characteristics of the equipments maintained. These ratings were correlated with indices of technician performance and subjected to multiple regression analysis. Those factors contributing a significant amount to performance were extracted. A subjective report test battery was also developed to determine whether subjects could predict their own performance. Author (GRA)

N72-28112# General Electric Co., Schenectady, N.Y. Specialty Materials Handling Products Operation.

HARDIMAN 1 PROTOTYPE FOR MACHINE AUGMENTATION OF HUMAN STRENGTH AND ENDURANCE Final Report, May - Aug. 1971

B. R. Fick and John B. Makinson 30 Aug. 1971 29 p refs
 Sponsored jointly with Army Mobility Equipment R and D Center (Contract N00014-66-C-0051; NR Proj. 196-049)
 (AD-739735) Avail: NTIS CSCL 06/2

The state-of-the-art in bilateral manipulator type man-augmentation systems was dramatically advanced. At the inception of this program, such systems typically handled a maximum of approximately 100 lbs., were large and heavy in relation to their payloads and were generally suited only for remote operation. By contrast, the Hardiman I prototype, consisting of thirty powered joints, can lift itself plus loads equal to its own weight of 1500 lbs. It is packaged to be worn by a man and mimic his motions, maintaining the man's dexterity and feel of the task being performed. In addition to the obvious mechanical design constraints of packaging such a system, it was necessary to achieve substantial technical breakthroughs in the design and analysis of high-load bilateral servo systems. The control technology advances achieved on this program have been instrumental in the development of new concepts in handling ordnance and general cargo for military applications. Author (GRA)

N72-28113# School of Aerospace Medicine, Brooks AFB, Tex.
COMPARISON OF SERIAL AUDIOGRAMS AS MEASURED BY THREE THRESHOLD PROCEDURES Final Report, Feb - Oct. 1971

Roy Danford, Jr. and Vernon C. Bragg Feb. 1972 15 p refs
 (AF Proj. 7755)

(AD-739896; SAM-TR-72-6) Avail: NTIS CSCL 06/2

Seven subjects with normal hearing were tested by three audiometric procedures: manual, Bekesy type, and pulse count. Six frequencies were tested for each ear on five different days. The mean thresholds measured by these technics were compared. No clinically significant differences were found between threshold measures made by any of the three procedures. Author (GRA)

N72-28114# Human Engineering Labs., Aberdeen Proving Ground, Md.

OPERATION ON THE MOVE: A FEASIBILITY STUDY

R. Bruce McCommons Jan. 1972 30 p
(AD-738133; HEL-TM-2-72) Avail: NTIS CSCL 05/10

The investigation was conducted to determine the feasibility of having personnel operate command and control system equipment on the move. Subjects were required to do a variety of psychomotor tasks inside a truck-mounted shelter while the vehicle traversed road courses of varying severity. The report discusses how well the subjects performed the required tasks and how that performance might be enhanced. Author (GRA)

N72-28115# Texas Technological Univ., Lubbock.
PERFORMANCE OF REAL AND NOMINAL CREWS UNDER TRANSFER CONDITIONS: TWO EXPERIMENTS
Clay George and Duane Miller Mar. 1972 16 p refs
Submitted for publication
(Contract DAAD05-69-C-0102; Proj. Themis)
(AD-738176) Avail: NTIS CSCL 05/10

Two experiments were reported concerning transfer facilitation and interference derived from reversal of initial task requirements. Comparisons were made between individuals and two-man crews. Results from Experiment 1 revealed that those receiving an interpolated work session performed reliably better than those receiving a rest pause. Two-man crews also performed at a faster rate than did individuals. Results from Experiment 2 confirmed the crew versus individual performance differences, with an additional finding that crews adapted more adequately to rapidly changing response requirements. Author (GRA)

N72-28116# Applied Psychological Services, Wayne, Pa. Science Center.
PREDICTION OF HUMAN RELIABILITY. PART 1: DEVELOPMENT AND TEST OF A HUMAN RELIABILITY PREDICTIVE TECHNIQUE FOR APPLICATION IN ELECTRONIC MAINTAINABILITY PREDICTION
Arthur I. Siegel and Philip J. Federman 10 Nov. 1971 102 p refs
(Contract N62269-71-C-0014)
(AD-738572; Rept-7172-2-Pt-1) Avail: NTIS CSCL 05/9

Solution to the problem of estimating the probability that a given electronic malfunction will be corrected within a given time is addressed through compatible, complementary techniques. One technique compounds fleet derived job factor success probability data to yield a probability of malfunction correction success. The complementary technique, based on computer simulation methods, yields the anticipated time for malfunction correction. The two techniques were applied to two different operational Navy systems. The results are presented and discussed in the context of technique reliability, utility, discriminating power, and reasonableness of obtained results. GRA

N72-28117# Air Force Human Resources Lab., Williams AFB, Ariz. Flying Training Div.
AN INSTRUCTION MANUAL FOR USING PERFORMANCE RECORD SHEETS DESIGNED FOR PRIMARY PILOT TRAINING
James F. Smith and Ralph E. Flexman (Ill. Univ.) Mar. 1972 96 p ref
(AD-739190; AFHRL/FT-TR-72-11) Avail: NTIS CSCL 05/9

The report provides a description of all steps required to develop daily performance record sheets (PRS); provides examples of PRSs which were used successfully; describes instructor training necessary to insure satisfactory results; and highlights restrictions or limitation to the use of this technique.

Author (GRA)

N72-28118# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ON THE COMPLEX ORGANIZATION OF NEW WORK IN

THE AERO ENGINEERING SERVICE (AES) OF THE AIR FORCE/AIR DEFENSE

H. Jaretzki 11 Dec. 1971 13 p Transl. into ENGLISH from Militaertechnik (East Ger.), no. 1, 1970 p 32-33
(AF Proj. 1368)
(AD-739217; FTD-HT-23-853-71) Avail: NTIS CSCL 05/9

The report states the necessity for leadership in the new innovations in the aviation engineering service of the Air Force/Air Defense Service. In addition, this concept is dealt with in considerable detail and particularly in the mass production of leaders, technical procedures in servicing and maintaining aircraft operational readiness, working conditions and materials, the analytical processes and the qualification of engineering technical personnel. In conclusion, the advantages that the application of this concept presents are briefly outlined.

Author (GRA)

N72-28119# South Carolina Univ., Columbia. Coll. of Engineering.
BEHAVIOR OF MECHANICAL MODEL OF SYSTEMIC CIRCUIT OF CARDIOVASCULAR SYSTEM
W. H. Hoppmann, II Aug. 1971 27 p refs
(Contract DAAD05-70-C-0385)
(AD-738583) Avail: NTIS CSCL 06/2

A simplified physical model of the systemic circuit of the human cardiovascular system was previously designed and constructed for the purpose of studying certain mechanical aspects of fluid flow in such systems. With the model an extensive investigation of several aspects has now been made. It consists essentially of experimental studies of the effect of variation of rigidity of the tubes, of the effect of bleeding on performance, and the effect of the variation of frequency of drive on systemic behavior. A preliminary report was previously made on the first two subjects. For these, a significant addition is described in the present report. Also, important findings concerning frequency effects are given in some detail. Author (GRA)

N72-28120# Air Force Academy, Colo.
FOUR IN-DEPTH STUDIES OF A FLIGHT TRAINING SKILL: TRIAL AND ERROR VERSUS PROMPTED LEARNING EVALUATED ON EFFICIENCY, TRANSFER AND STRESS
Dirk C. Prather, Gene A. Berry, and Gerald L. Jones Dec. 1971 38 p refs
(AD-739614; USAFA-RR-71-11) Avail: NTIS CSCL 05/9

The following experiments provide an in-depth study of prompting versus trial-and-error (T and E) learning of a perceptual skill similar to that experienced by fighter pilots, which was a simulation of strafing-range estimation. The studies were concerned with which training method will require the least number of trials to learn a given task, which will most facilitate transfer of the learned task to new stimulus situations, which will yield the best performance under stress both on the training task and on the transfer task, and can resistance to stress be learned during training. The learning curves of both groups reflect little differences between training methods in learning the skill to asymptote. T and E was the superior training method on transfer (p-.05) and under stress (p-.01). Performance curves indicated that resistance to stress can be learned in the training environment (p-.05). The results were interpreted as evidence that the trainee should be allowed to make some errors during training and develop his own intrinsic cues through trial-and-error learning. The indiscriminate use of prompting methods is open to question. Author (GRA)

N72-28121# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
AN INVESTIGATION OF ALTERNATIVE METHODS OF VISUAL CUING M.S. Thesis

Michael E. Harvey 1971 28 p refs Supported by Army (AD-739583) Avail: NTIS CSCL 05/10

An investigation of the effects of three methods of visual cuing on human performance are presented. Specifically this study attempts to determine which of the three cuing techniques, conventional, color, or spatial, when applied to a visual control panel has the greatest effect on reducing operator reaction time. The results of the study should be of primary interest in the basic design of control panels. However, the results may be of value in improving maintainability characteristics of complex systems monitored by large control panels. Statistical results as well as practical considerations indicate that conventional cuing techniques should be used for displays of limited size with no primary loading task. Finally, extensions to the present research are suggested which could add depth and thoroughness to the solution of the problem. Author (GRA)

N72-28122# Human Resources Research Organization, Alexandria, Va.

COMPARISON AND EVALUATION OF PRINTED PROGRAMS FOR AIRCRAFT RECOGNITION

Elmo E. Miller and Arthur C. Vicory Oct. 1971 37 p refs (Contract DAHC19-70-C-0012; DA Proj. 2Q0-62107-A-712) (AD-739521; HUMRRO-TR-71-22) Avail: NTIS CSCL 05/9

Several printed prototype programs for training visual aircraft recognition were developed and compared experimentally. One program produced an average score of 95% on a printed recognition test (the next closest group test had more than twice as many errors). The program also tended to take the least time to administer (about 15 minutes per aircraft). The training was in three phases: Study of Multi-Image Cards (each showing several views of one aircraft, listing distinctive features); Study of Paired Comparison cards (each showing two or three aircraft that are likely to be confused); Study of flash Cards (each showing one view of one aircraft--10 different cards for each aircraft). After each phase, tests with printed imagery were administered. The program should be feasible and effective for routine training. Author (GRA)

N72-28123# Human Resources Research Organization, Alexandria, Va.

STUDIES OF AIRCRAFT RECOGNITION TRAINING

Paul G. Whitmore, William C. Rankin, Robert D. Baldwin, and Sandra Garcia Feb. 1972 51 p (Contract DAHC19-70-C-0012; DA Proj. 2Q0-62107-A-712) (AD-739923; HUMRRO-TR-72-5) Avail: NTIS CSCL 05/9

The research dealt with three problem areas: selection of the minimum number of views of each aircraft required for effective recognition training, determination of an appropriate exposure duration for test images, and determination of the relative emphasis needed on friendly and hostile aircraft to produce adequate identification performance. The uniformity of performance on a posttraining test was a function of the number and distribution of the views used in training and the similarity level of the aircraft. Differences in duration from one to five seconds were critical only for the most highly similar aircraft. Both friendly and hostile aircraft need to be given equal training emphasis. Author (GRA)

N72-28956* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. **MINIATURE BIOTELEMETER GIVES MULTICHANNEL WIDEBAND BIOMEDICAL DATA**

J. B. Carraway In its JPL Quarterly Tech. Rev., Vol. 2, No. 1 Apr. 1972 p 152-166 CSCL 06B

A miniature biotelemeter was developed for sensing and transmitting multiple channels of biomedical data over a radio link. The design of this miniature, 10-channel, wideband (5 kHz/channel), pulse amplitude modulation/ frequency modulation

biotelemeter takes advantage of modern device technology (e.g., integrated circuit operational amplifiers, complementary symmetry/metal oxide semiconductor logic, and solid state switches) and hybrid packaging techniques. The telemeter is being used to monitor 10 channels of neuron firings from specific regions of the brain in rats implanted with chronic electrodes. Design, fabrication, and testing of an engineering model biotelemeter are described. Author

N72-29049*# Bryn Mawr Coll., Pa. **STIMULUS CONTROL IN PIGEONS AFTER EXTENDED DISCRIMINATIVE TRAINING**

Matthew Yarczower [1972] 15 p refs (Grant NGR-39-018-002)

(NASA-CR-127772) Avail: NTIS HC \$3.00 CSCL 06C

The effects of amount of training on conditioned inhibition and on the degree of stimulus control were studied using pigeons. The ability of an S- associated with non-reinforcement of suppress positive reinforced behavior was acquired very rapidly during discriminative training. Increased S+, S- training appeared to weaken this conditioned inhibitory effect while at the same time more S+ training apparently increased the amount of external inhibition (non-conditioned inhibition) of positively reinforced behavior by a novel stimulus. Behavioral contrast and incremental generalization gradients along the S- dimension (inhibitory dimensional control) were absent at all stages of training. Behavioral contrast and inhibitory dimensional control are therefore not necessary concomitants of conditioned inhibition by an S-. A new method of assessing the suppressive effects of stimuli during generalization tests was described. Author

N72-29050*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

A PRELIMINARY INVESTIGATION OF THE ENVIRONMENTAL CONTROL AND LIFE SUPPORT SUBSYSTEMS (EC/LSS) FOR ANIMAL AND PLANT EXPERIMENT PAYLOADS

Hubert B. Wells 15 May 1972 69 p refs (NASA-TM-X-64678) Avail: NTIS HC \$5.50 CSCL 06F

A preliminary study of the environmental control and life support subsystems (EC/LSS) necessary for an earth orbital spacecraft to conduct biological experiments is presented. The primary spacecraft models available for conducting these biological experiments are the space shuttle and modular space station. The experiments would be housed in a separate module that would be contained in either the shuttle payload bay or attached to the modular space station. This module would be manned only for experiment-related tasks, and would contain a separate EC/LSS for the crew and animals. Metabolic data were tabulated on various animals that are considered useful for a typical experiment program. The minimum payload for the 30-day space shuttle module was found to require about the equivalent of a one-man EC/LSS; however, the selected two-man shuttle assemblies will give a growth and contingency factor of about 50 percent. The maximum payloads for the space station mission will require at least a seven-man EC/LSS for the laboratory colony and a nine-man EC/LSS for the centrifuge colony. There is practically no room for growth or contingencies in these areas. Author

N72-29051# Joint Publications Research Service, Arlington, Va. **SPACE BIOLOGY AND MEDICINE, VOLUME 6, NO. 3, 1972**

3 Aug. 1972 143 p refs Transl. into ENGLISH of Kosm. Biol. Med. (USSR), v. 6, no. 3, May-Jun. 1972 p 3-90 (JPRS-56675) Avail: NTIS HC \$9.25

Medical and biological research is reported on physiological and psychological aspects of manned space flight. Studies are aimed at guaranteeing safety on long flights and reliability of the human component in the man-spaceship system.

N72-29052 Joint Publications Research Service, Arlington, Va.
MATHEMATICAL MODEL OF A TWO-COMPONENT ALGAL-BACTERIAL BIOGENOSIS
 N. S. Abrosov and B. G. Kovrov *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 1-11 refs

A mathematical model of an algal-bacterial biocenosis developing as a result of nonsterile *Chlorella* cultivation is reported. The model takes into account living and dead *Chlorella* cells and concomitant microorganisms, carbon dioxide, mineral components, oxygen, organic substances, light energy and the basic processes involved in transformation of these components. The model is based on the description of an object by means of systems with limiting factors (L-systems). The model makes it possible to trace changes of all important components in the biocenosis, to define the parameters that cannot be readily measured experimentally, and to ascertain the principal regularities in development of the investigated biocenosis. Author

N72-29053 Joint Publications Research Service, Arlington, Va.
STATUS OF CALCIUM METABOLISM IN THE CALCIFIED TISSUES OF RATS DURING PROLONGED HYPODYNAMIA AND THYREOCALCITONIN ADMINISTRATION
 A. I. Volozhin, P. V. Vasilyev, N. N. Uglova, and V. Ye. Potkin *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 12-19 refs

The influence of 5-, 10-, 20-, 40- and 60-day hypodynamia and thyreocalcitonin administration on the resorption rate of Ca-45 given 70 days before the exposure was investigated in experiments on 180 albino rats. In comparison with the controls the hypolinetic exposure decreased the increment in the weight of skeletal bones to a considerable extent. Daily injections of 5 micrograms of thyreocalcitonin in combination with polyvinyl pyrrolidone to nonrestrained rats also caused a decrease in the Ca-45 level in their calcified tissues. Injections of the drug to restrained animals exerted an opposite effect: the renovation rate of the nonreadily exchangeable fraction increased in comparison with that in animals exposed to hypodynamia alone. The drug exerted an insignificant effect on the growth rate of skeletal bones in restrained rats.

N72-29054 Joint Publications Research Service, Arlington, Va.
EFFECT OF HYPOXIA ON THE SKELETAL MUSCLES OF RATS DURING HYPOKINESIA
 V. V. Portugalov, Ye. I. Ilina-Kakuyeva, and V. I. Starostin *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 20-23 refs

Experimental rats were exposed simultaneously to 14- and 30-day hypokinesia and hypoxia of 405.09 mm Hg. It was demonstrated that hypoxia did not prevent their development of morphologic and metabolic changes which can be observed during hypokinesia. Author

N72-29055 Joint Publications Research Service, Arlington, Va.
TOXICOLOGICAL EVALUATION OF SOME SYNTHETIC MATERIALS USED IN SEALED ENCLOSURES
 G. I. Solomin, G. M. Gorban, and V. A. Shchirskaya *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 24-29 refs

Three polymers used extensively in sealed enclosures were subjected to a toxicological evaluation. When exposed to a temperature of 80-85 deg they released products at concentrations which caused functional changes in white rats and white mice which inhaled them for two hours. From the toxicological point of view the most important changes were induced by AK-20-A nitroglue, which therefore cannot be recommended for further use in these environments. The other two materials released no substances which were harmful and can be employed in the interiors of small sealed rooms. Author

N72-29056 Joint Publications Research Service, Arlington, Va.
SANITARY-HYGIENIC EVALUATION OF THE EXTRACTION METHOD FOR REGENERATING WATER FROM A CONDENSATE OF ATMOSPHERIC MOISTURE
 Yu. Ye. Sinyak, L. A. Kuznetsova, M. I. Shikina, A. G. Filchakov, and V. V. Krasnoshchekov *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 30-34 refs

Water regenerated from an atmospheric condensate by extraction with higher amines and alkyl phosphonic acids was subjected to sanitary-hygienic and biomedical evaluations. After additional sorption purification water regenerated in this way contained no toxic impurities, thus completely satisfying the sanitary-hygienic requirements. Author

N72-29057 Joint Publications Research Service, Arlington, Va.
SOME METHODS FOR TRANSPORTING LIQUID WASTES OF THE VITAL FUNCTIONS OF A CREW AND SANITARY-WASTE WATER DURING SPACE FLIGHTS
 V. P. Yefimov and V. A. Frolov *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 35-39 refs

Different procedures for the transport of liquid wastes and waste water during weightlessness are discussed. A diagram of liquid transport in the waste management system of the Vostok and Voskhod spacecraft is described. A brief analysis of the operation of American waste management systems makes it possible to evaluate their possible application in long term space flights. Diagrams of gas-fluid separators which operate on capillary forces for transporting the fluid and separating it from the gaseous phase are included. Author

N72-29058 Joint Publications Research Service, Arlington, Va.
EFFECT OF A HYPEROXIC ATMOSPHERE ON RAT TOLERANCE TO ACUTE CARBON MONOXIDE EXPOSURE
 B. I. Abidin, V. I. Belkin, A. N. Malkuta, and G. D. Yukhnovskiy *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 40-42 refs

It is demonstrated that the 30-day exposure of white male rats to a hyperoxic atmosphere (45 percent O₂) at normal barometric pressure caused a delay in their body weight increment and a decrease in their oxygen consumption. This exposure exerts no real influence on animal tolerance of acute exposure to carbon monoxide. Author

N72-29059 Joint Publications Research Service, Arlington, Va.
EFFECT OF PROLONGED GAMMA IRRADIATION ON THE FUNCTIONAL ACTIVITY OF LEUKOCYTES
 E. S. Zubenkova *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 43-48 refs

The functional activities of blood and bone marrow cells of 30 dogs exposed for three years to gamma irradiation in different doses (0.06, 0.2 and 0.4 rad per day) are presented. Functional activity was evaluated by measuring the osmotic resistance of leukocytes and by determining the viability of granulocytes during supravital staining. In irradiated animals the osmotic resistance of leukocytes decreased and the changes were detected a year after onset of the exposure. Specific investigations revealed that the dropoff in functional activity of cells occurred in the bone marrow. Author

N72-29060 Joint Publications Research Service, Arlington, Va.
LABYRINTHAL REACTIONS OF DOGS DURING PROLONGED CHRONIC IRRADIATION
 P. I. Kumets *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 49-54 refs

A study of the functional state of the vestibular analyzer in dogs during a three-year chronic irradiation (a total dosage of 188.5 rad per year) revealed phasic and transient changes in the excitability and reactivity of the cupular-endolymphatic system.

Author

N72-29061 Joint Publications Research Service, Arlington, Va.
NORMAL AUTOANTIBODIES AS A PROTECTIVE ANTIRADIATION FACTOR

N. N. Klomparskaya *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 55-63 refs

Experiments carried out on 1,410 white common female mice exposed to Co-60 gamma irradiation Cs gamma irradiation and X-irradiation to provide a total uniform dose of 900 R have demonstrated that the lower the dose rate, the higher is the content of normal antibodies in the blood and organs of the animals during the first 30 minutes after the exposure. Irradiation with a dose of 900 R, imparted in two portions with a one hour interval, also increases the occurrence of normal autoantibodies in the blood. Accordingly, there is a linear correlation between the dose rate, the severity of the damage and intensity of the autoimmune process during the peak of radiation sickness. Mobilization of normal autoantibodies in an organism irradiated with low dose rates exerts a protective effect and increases its radioresistance.

Author

N72-29062 Joint Publications Research Service, Arlington, Va.
INCORPORATION OF METHIONINE-S-35 INTO THE PROTEINS OF DIGESTIVE SYSTEM ORGANS OF RABBITS EXPOSED TO IRRADIATION AND VIBRATION

A. V. Krillicheva, R. I. Yuy, V. I. Denisov, and L. S. Prikhodko *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 64-68 refs

Protein metabolism changes in the digestive system organs of month-old rabbits in response to irradiation, acceleration, and vibration transpires in the following principle forms: (1) a predominance, at early times after exposure, of the effects of irradiation and vibration, exerting an independent reciprocal influence, and at later times, the acceleration effect; (2) absence of significant effects at early times after exposure, whereas at later times the appearance of all the principle effects and the effect of second order interaction is observed; and (3) absence of significant effects at early times after exposure, and later appearance of the acceleration effect and also the effects of interaction between irradiation and vibration.

Author

N72-29063 Joint Publications Research Service, Arlington, Va.
THE PROBLEM OF ARTIFICIAL GRAVITATION FROM THE VIEWPOINT OF EXPERIMENTAL PHYSIOLOGY

Ye. M. Yuganov and M. D. Yemalyanov *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 69-74 refs

On the basis of experimental investigations on small laboratory animals during flights along Keplerian trajectories it was concluded that an acceleration of 0.3 g is the minimum effective value required to generate artificial gravity on space missions. Vestibular reactions, motor activity and the biopotentials of skeletal muscles of small laboratory animals were used as criteria. A study of adaptive processes of man long exposed to rotation helped in establishing the threshold parameters with respect to the use of artificial gravity.

Author

N72-29064 Joint Publications Research Service, Arlington, Va.
MAN'S TOLERANCE TO ACCELERATIONS AFTER PROLONGED EXPOSURE TO CONDITIONS SIMULATING

WEIGHTLESSNESS

A. S. Barer, Ye. I. Sorokina, and K. I. Murakhovskiy *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 75-80 refs

Data on how men can tolerate long applied transverse accelerations (65 to 78 deg) after prolonged exposure to simulated weightlessness were derived semiempirically. The results are summarized in a graph on which accelerations are plotted as a function of exposure duration. It is assumed that following prolonged exposure to weightlessness (seven-60 days) space pilots will tolerate a 1 g effect worse than re-entry decelerations.

Author

N72-29065 Joint Publications Research Service, Arlington, Va.
EFFECT OF PSYCHOTROPIC SUBSTANCES ON MAN'S TOLERANCE TO ACCELERATIONS

P. V. Vasilyev, V. Ye. Belay, R. A. Vartbaronov, and G. D. Glod *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 81-90 refs

The influence of psychotropic substances (stimulants and tranquilizers) on human tolerance to accelerations was studied on five volunteers in 25 experimental runs. The effectiveness of these drugs was evaluated with respect to hemodynamics and performance in comparison with the control experiments. The administration of a combination of stimulants (centedrin 0.01 + securinin 0.002) reduced the adverse effect of accelerations: hemodynamic indices changed to a lesser degree, compensation of intracranial and retinal circulation improved, and work capacity decreased to a lesser degree. Administration of a tranquilizer did not affect the level of acceleration-induced hemodynamic shifts, although there was a decrease in the unfavorable stress effect on performance of the test subjects.

Author

N72-29066 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF HEMODYNAMICS WITH EXPOSURE TO DECOMPRESSION AND ACCELERATIONS

P. M. Suvorov, V. G. Voloshin, L. N. Dyachenko, and V. F. Krivets *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 91-98 refs

Compared is the hemodynamic state of man exposed to lower body negative pressure of -50 and -70 mm Hg and +G sub z accelerations of 3 to 7 g for 30 sec. In addition to certain similarities in the hemodynamic changes induced by LBNP and accelerations, the studies demonstrated definite significant differences. During LBNP there was no gradient of arterial pressure between trunk and head vessels. The elevation level of arterial tone was about twice as low during LBNP than during an exposure to accelerations. Application of LBNP, especially of -70 mm Hg, induced not only a type of vascular decompression, but also cardiac and cardiovascular types involving a heart rate decrease.

Author

N72-29067 Joint Publications Research Service, Arlington, Va.
CHANGE IN THE FUNCTIONAL STATE OF ANALYZERS OF FLIGHT CREWS DURING PROLONGED FLIGHTS

E. V. Bondarev, V. A. Yegorov, and O. F. Zakharova *In its Space Biol. and Med.*, Vol. 6, No. 3, 1972 3 Aug. 1972 p 99-102

During prolonged flights the functional states of analyzers of airline crew members undergo changes under the influence of adverse factors that to a certain degree are similar to spaceflight factors. The rate of information processing and the carrying capacity based on the speed and accuracy of responses to signals (acoustic and optical stimuli) decline most significantly. The responses to vibrotactile signals remain virtually unchanged. The degree of the decrease in these indices depends greatly on crew activity.

Author

N72-29068 Joint Publications Research Service, Arlington, Va.
**PSYCHOLOGICAL PRINCIPLES OF ACTIVE REST DURING
 PROLONGED SPACE FLIGHTS**

G. M. Zarakovskiy and S. L. Rysakova *In its* Space Biol. and Med., Vol. 6, No. 3, 1972 3 Aug. 1972 p 103-108 refs

Several hypotheses concerning the psychophysiological laws which underlie active rest are discussed. This type of rest is regarded as a manifestation of antihomoeostatic tendencies which are specific for the human psychic sphere. The positive emotional effect of active rest is dependent on formal-information characteristics and the correspondence of their content to the interests of the particular individual. It has been postulated that with an increase in flight duration the importance of the first component will increase. This hypothesis was confirmed in a 70-day experiment simulating space flight with the use of such means of active rest as musical productions and motion picture films.
 Author

N72-29069 Joint Publications Research Service, Arlington, Va.
**MORPHOLOGICAL-FUNCTIONAL CHANGES IN THE
 ENDOCRINAL SYSTEM ACCOMPANYING OXYGEN
 STARVATION**

In its Space Biol. and Med., Vol. 6, No. 3, 1972 3 Aug. 1972 p 109-120 refs

Data on the influence of oxygen starvation on the structure and functioning of a number of endocrinal organs are discussed. The state of oxygen starvation in animals is accompanied by morphological and functional shifts on the part of the endocrinal system. Under these conditions the functional activity of the suprarenals is increased, whereas the activity of the thyroid gland and testes is reduced. It is postulated that the reasons for this selectivity in impairments in functioning of individual peripheral endocrinal organs during hypoxia are morphological-functional changes in the central nervous system and nuclear formations of the hypothalamic region.
 Author

N72-29070 Joint Publications Research Service, Arlington, Va.
**FUNCTIONAL RELIABILITY OF THE BIOLOGICAL LINK IN
 A LIFE SUPPORT SYSTEM**

I. A. Shvytov *In its* Space Biol. and Med., Vol. 6, No. 3, 1972 3 Aug. 1972 p 121-128 refs

The problems involved in reliability of functioning of the biological component in a life support system are discussed. The case of using a microbial population cultivated in a chemostat as such a component is described. The duration of reliability of this system is ascertained and the formulas to be used in calculating the upper and lower limits of its reliability are given.
 Author

N72-29071 Joint Publications Research Service, Arlington, Va.
**METHOD FOR COMPUTING SOME PARAMETERS FOR
 THE ENVIRONMENTAL CONTROL SYSTEM OF A
 SPACESUIT**

I. P. Abramov *In its* Space Biol. and Med., Vol. 6, No. 3, 1972 3 Aug. 1972 p 129-136 refs

A procedure for selecting the optimum atmospheric parameters for a spacesuit before extravehicular operations is given. A method for calculating oxygen consumption to ensure the required atmosphere is described. When determining the parameters it is necessary to know the initial and final oxygen contents in the spacesuit, as well as the oxygen free volume and absolute pressure during ventilation. The nomogram to be used in calculating the specifications for the atmosphere replacement system and the reliability of the full pressure suit is presented.
 Author

N72-29073* National Aeronautics and Space Administration, Washington, D.C.

US-USSR SPACE BIOLOGY REPORT

Richard Friedman 1 Aug. 1972 4 p
 (NASA-News-Release-72-157) Avail: NASA Scientific and Technical Information Facility, P. O. Box 33, College Park, Md. 20740 CSCL 06B

The recommendations of the Joint Working Group on Space Biology and Medicine are reported. The exchange of information for the U.S. included the pre- and postflight medical requirements and flight crew health stabilization program for Apollo 16. The U.S.S.R. presentations detailed the medical findings of the Soyuz/Salyut mission, including the postflight autopsy results. The causes of death of the cosmonauts were the occurrence of hypoxia and gaseous embolism. A significant development resulting from the meeting was the agreement that the Joint Working Group strive toward the development of common pre- and postflight medical examination procedures for flight crews for direct comparison of U.S. and U.S.S.R. data.
 F.O.S

N72-29074# Civil Aeromedical Inst., Oklahoma City, Okla.
**HIGH TEMPERATURE AND PERFORMANCE IN A FLIGHT
 TASK SIMULATOR**

P. F. Iampietro, C. E. Melton, Jr., E. A. Higgins, J. A. Vaughan, S. M. Hoffmann, G. E. Funkhouser, and J. T. Saldivar May 1972 15 p refs

(FAA-AM-72-17) Avail: NTIS HC \$3.00

The effects of high cockpit temperature on physiological responses and performance were determined on pilots in a general aviation simulator. The pilots (all instrument rated) flew an instrument flight while exposed to each of three cockpit temperatures: (1) 25.0 C (77 F), (2) 43.3 C (110 F), (3) 60.0 C (140 F). Each flight lasted about 50 minutes. Performance was scored as the deviations in heading from the predetermined flight path. Deviations were scored for seven segments of the flight. Physiological parameters recorded were: heart rate, deep body temperature, skin temperature and urine output and sweat loss. There were significant decrements in performance in three segments of the flight. Performance at 43 C was degraded over performance at 25 C during the 1st segment of flight. Performance at 43 and 60 C was degraded over performance at 25 C during Turn 1. Performance at 60 C was worse than performance at 25 and 43 C during the ILS segment. Results are discussed in terms of the complexity of the flight segment being flown.
 Author

N72-29075* Department of Health, Education, and Welfare, Phoenix, Ariz. Environmental Microbiology Section.

**SERVICES PROVIDED IN SUPPORT OF THE PLANETARY
 QUARANTINE REQUIREMENTS**

Martin S. Favero Jun. 1972 23 p

(NASA Order W-13062)

(NASA-CR-127768; Rept-38) Avail: NTIS HC \$3.25 CSCL 06M

Tests were conducted to determine the dry heat resistance at 125 C of a naturally occurring bacterial spore population in a mixture of sieved vacuum cleaner dusts from Cape Kennedy. The dust was aerosolized in a special chamber and was allowed to settle on 32 Teflon ribbons to provide approximately 500,000 spores per ribbon.
 Author

N72-29076# Central Inst. for the Deaf, St. Louis, Mo.
**ELECTROPHYSIOLOGICAL CORRELATES OF BEHAVIORAL
 TEMPORARY THRESHOLD SHIFTS IN CHINCHILLA**

Luis D. Benitez, Donald H. Eldredge, and Jerry W. Templer 1 Feb. 1972 27 p refs

(Contract Nonr-4327(00); NR Proj. 140-170)

(AD-740227) Avail: NTIS CSCL 06/19

A previous test exposed chinchillas for seven days to an octave band of noise centered at 500 Hz and at 95 db SPL to produce temporary shifts of behavioral auditory thresholds which required 4-7 days to recover to normal. In the present study physiological potentials were measured about 5, 24, and 48 hours after exposures to the same noise for 2 or 3 days. Cochlear microphonic responses and dc endocochlear potentials were measured in each of the three cochlear turns. Input-output functions for whole-nerve action potential responses to clicks and visual detection levels for early averaged evoked responses arising in the brain stem were also measured. GRA

N72-29077# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

TWO BIODYNAMIC MODELS USED TO DETERMINE OPTIMUM ENERGY ABSORBER CHARACTERISTICS

Richard W. Carr Dec. 1971 22 p refs Presented at Symp. on Biodynamics Models and their Appl., Dayton, Ohio 26-28 Oct. 1970

(AF Proj. 7231)

(AD-740447; AMRL-TR-71-29-Paper-10) Avail: NTIS CSCL 01/2

Energy absorbers are generally designed to generate a constant force over their stroke length since constant force or square wave devices are the most efficient. The document is concerned with the question of whether this type of energy absorber is suitable for protecting a seated man from high level accelerations such as those present in potentially survivable airplane crashes. The question was approached by using two biodynamic models of the seated human. One was used to determine human dynamic response to impact accelerations, for which the equations of motion of the system were determined. A computer program was used to solve for the seat acceleration which was then used as an input to a second biodynamic model.

GRA

N72-29078# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

HUMAN OPERATOR PERFORMANCE IN HYPOXIC STRESS

Clyde R. Replogle, Frank M. Holden, Robert E. Gold, Linton L. Kulak, F. Jonas, and George Potor, Jr. Dec. 1971 17 p refs Presented at Symp. on Biodynamics Models and their Appl., Dayton, Ohio, 26-28 Oct. 1971

(AF Proj. 7231)

(AD-740468; AMRL-TR-71-29-Paper-31) Avail: NTIS CSCL 06/19

The experiment was designed to assess the value of several different tracking tasks in quantitatively measuring the effects of hypoxia on human operator performance. Each subject was required to perform three tracking tasks. One was an adaptive first order unstable task. The second represented stable third order longitudinal airframe dynamics. The last was a two axis combination of the first two, with the stable task represented by the vertical display axis and the unstable task on the horizontal axis. A two by two analysis of variance was employed to provide estimates of the reliability of the measurements. The results indicate that the adaptive unstable task is significantly sensitive to hypoxic stress, whereas to identify similar changes in the stable task requires frequency domain analysis. There is some indication that the unstable task may be sensitive to 12,000 ft simulated hypoxia after only 2 minutes of exposure.

Author (GRA)

N72-29079# Arizona Univ., Tucson. Dept. of Chemistry. **MOLECULAR AND ELECTRONIC MECHANISMS OF BIOLOGICAL ENERGY CONVERSION PROCESSES** Final Report, 20 Sep. 1967 - 1 Feb. 1971

Gordon Tollin 1 May 1971 87 p refs

(Contract F19628-68-C-0027)

(AD-735272; AFCL-71-0343) Avail: NTIS CSCL 06/1

The chemistry and enzymology of flavin was studied by examining molecular complex formation with phenols and indoles and the binding of flavin analogs to apoprotein. Spectroscopic, kinetic, and thermodynamic approaches were used. Considerable insight was obtained into the role of environmental factors in modifying the chemical and physical properties of the flavin molecule. Chlorophyll one-electron photochemistry in solution was investigated using optical, ESR and flash photolysis techniques. Evidence was obtained for a chlorophyll-photosensitized one-electron transfer from solvent (alcohols, pyridine) to quinone leading to the formation of a chlorophyll-semiquinone complex stabilized via coordination with the central magnesium ion. Dissociation of this complex is followed by disproportionation of the semiquinone radicals. Author

N72-29080 Illinois Univ., Urbana. Aviation Research Lab. **STUDIES IN PILOT TRAINING: THE ANATOMY OF TRANSFER** Aviation Research Monographs, volume 2, no. 1, Jun. 1972

Ralph E. Flexman, Stanley N. Roscoe, Alexander C. Williams, Jr., and Beverly H. Williges Jun. 1972 93 p refs

(LC-77-171977) Copyright. Avail: Issuing Activity

Data relevant to the specific mechanism of transfer of training from ground based simulators to piloting an aircraft are given. Two experiments, contact flight and instrument flight, were used to measure the percent of transfer and transfer effectiveness. E.H.W.

N72-29081*# Research Triangle Inst., Durham, N.C. **[BIOMEDICAL RESEARCH AND AEROSPACE TECHNOLOGY APPLICATIONS]**

31 Dec. 1971 167 p refs

(Contracts NASw-1950; NASw-2273)

(NASA-CR-127792) Avail: NTIS HC \$10.50 CSCL 06K

The accomplishments and activities of an Applications Team for biomedical subjects are presented. The team attempts to couple the technological problems and requirements in medicine with the relevant aerospace technology and, in particular, NASA-generated technology. The team actively engages in identifying these problems through direct contact with medical staffs or problem originators. The identification and specification of medical problems is followed by a search for technology which may be relevant to solutions to these problems. Author

N72-29082*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

APOLLO 13 LiOH CANISTER BREAKTHROUGH TEST

J. C. LeBlanc 15 Jul. 1970 338 p

(Proj. Apollo)

(NASA-TM-X-68571; MSC-01343; CSD-A-1070) Avail: NTIS HC \$19.00 CSCL 06K

The Apollo 13 lithium hydroxide canister test was conducted to evaluate emergency measures designed to enable the Apollo 13 crew to use command module lithium hydroxide canisters in the lunar module. The test verified the effectiveness of the emergency system and established that the canisters in the command module would provide ample carbon dioxide removal for the return of the Apollo 13 crew. The time interval between canister changes on the flight was also determined in the test. This reduced power demand on the lunar module by eliminating the need for telemetry in determining canister replacement times. Details of the canister modifications were relayed to the flight crew and a replica of the test system was assembled in the flight vehicle. Graphs of the parameters which were measured during the simulation are presented. Author

N72-29083*# Westinghouse Electric Corp., Pittsburgh, Pa.
CONCEPTUAL DESIGN STUDY OF A SIX-MAN SOLID ELECTROLYTE SYSTEM FOR OXYGEN RECLAMATION

J. P. Morris, C. K. Wu, L. Elikan, N. J. Bifano, and R. R. Holman
 [1972] 89 p refs

(Contract NAS1-8896)

(NASA-CR-112063) Avail: NTIS HC \$6.50 CSCL 06K

A six-man solid electrolyte oxygen regeneration system (SEORS) that will produce 12.5 lbs/day of oxygen has been designed. The SEORS will simultaneously electrolyze both carbon dioxide and water vapor and be suitable for coupling with a carbon dioxide concentration system of either molecular sieve, solid amine or hydrogen depolarized electrochemical type. The total system will occupy approximately 19 cu ft (34.5 in. x .26 in. x 36 in. high) and will weigh approximately 500 pounds. It is estimated that the total electrical power required will be 1783 watts. The system consists of three major components; electrolyzer, hydrogen diffuser, and carbon deposition reactor. There are 108 electrolysis stacks of 12 cells each in the electrolyzer. Only 2/3 of the 108 stacks will be operated at a time; the remainder will be held in reserve. The design calls for 96 palladium membranes for hydrogen removal to give 60 percent redundancy. Four carbon deposition reactors are employed. The iron catalyst tube in each reactor weighs 7.1 lb and 100 percent redundancy is allowed. Author

N72-29084*# Michigan Univ., Ann Arbor. Engineering Human Performance Lab.

HUMAN STRENGTH SIMULATIONS FOR ONE AND TWO-HANDED TASKS IN ZERO GRAVITY

Apr. 1972 155 p refs

(Contract NAS9-10973)

(NASA-CR-115744) Avail: NTIS HC \$9.75 CSCL 06S

A description is given of a three dimensional hand force capability model for the seated operator and a biomechanical model for analysis of symmetric sagittal plane activities. The models are used to simulate and study human strengths for one and two handed tasks in zero gravity. Specific conditions considered include: (1) one hand active, (2) both hands active but with different force directions on each, (3) body bracing situations provided by portable foot restraint when standing and lap belt when seated, (4) static or slow movement tasks with maximum length of 4 seconds and a minimum rest of 5 minutes between exertions, and (5) wide range of hand positions relative to either the feet or bisection of a line connecting the hip centers. Simulations were also made for shirt sleeved individuals and for the male population strengths with anthropometry matching that of astronauts. Author

N72-29085*# Baylor Univ., Houston, Tex.
RESEARCH PROGRAM FOR EXPERIMENT M133 Final Report

James D. Frost, Jr. 31 May 1972 56 p refs

(Contract NAS9-11855)

(NASA-CR-115745) Avail: NTIS HC \$5.00 CSCL 06B

The development of the automatic data-acquisition and sleep-analysis system is reported. The purpose was consultation and evaluation in the transition of the Skylab M133 Sleep-Monitoring Experiment equipment from prototype of flight status; review of problems associated with acquisition and on-line display of data in near-real time via spacecraft telemetry; and development of laboratory facilities and design of equipment to assure reliable playback and analysis of analog data. The existing prototype system modified, and the changes improve the performance of the analysis circuitry and increase its reliability. These modifications are useful for pre- and postflight analysis, but are not now proposed for the inflight system. There were improvements in the EEG recording cap, some of which will be incorporated into the flight hardware. Author

N72-29086*# Stanford Research Inst., Menlo Park, Calif.
PERCEIVED NOISINESS UNDER ANECHOIC, SEMI-REVERBERANT AND EARPHONE LISTENING CONDITIONS

Frank R. Clarke and Karl D. Kryter Washington NASA Aug. 1972 30 p refs

(Contract NAS1-10017)

(NASA-CR-2108) Avail: NTIS HC \$3.00 CSCL 06S

Magnitude estimates by each of 31 listeners were obtained for a variety of noise sources under three methods of stimuli presentation: loudspeaker presentation in an anechoic chamber, loudspeaker presentation in a normal semi-reverberant room, and earphone presentation. Comparability of ratings obtained in these environments were evaluated with respect to predictability of ratings from physical measures, reliability of ratings, and to the scale values assigned to various noise stimuli. Acoustic environment was found to have little effect upon physical predictive measures and ratings of perceived noisiness were little affected by the acoustic environment in which they were obtained. The need for further study of possible differing interactions between judged noisiness of steady state sound and the methods of magnitude estimation and paired comparisons is indicated by the finding that in these tests the subjects, though instructed otherwise, apparently judged the maximum rather than the effective magnitude of steady-state noises. Author

N72-29087*# Stanford Research Inst., Menlo Park, Calif.
THE METHODS OF PAIRED COMPARISONS AND MAGNITUDE ESTIMATION IN JUDGING THE NOISINESS OF AIRCRAFT

Frank R. Clarke and Karl D. Kryter Washington NASA Aug. 1972 40 p refs

(Contract NAS1-10017)

(NASA-CR-2107) Avail: NTIS HC \$3.00 CSCL 20A

The point of subjective equality in regard to perceived noisiness for each of 14 pairs of aircraft noises was obtained using both magnitude estimation technique and the method of paired comparisons. Both methods gave approximately the same estimates of the points of subjective equality for the noise pairs, and both showed similar correspondence to predictive physical measures. Nevertheless, the two methods appear to have greater face validity to the listeners. However, the magnitude estimation technique appears to be more efficient; for a given level of reliability it requires approximately 50% of the testing time required by the paired comparison method. The functions relating physical intensity to the estimated magnitude of subjective noisiness had slopes ranging from about .61 to .29 for the aircraft noises employed in this study, indicating a required change of about 5 to 10 db for a doubling in subjective magnitude. Some physical units of noise measurement were found to be very predictive (standard errors of estimate as low as 1.9 db) of the subjective judgements of noisiness. Author

N72-29088# Civil Aeromedical Inst., Oklahoma City, Okla.
A PROPOSED NEW TEST FOR APTITUDE SCREENING OF AIR TRAFFIC CONTROLLER APPLICANTS

Bart B. Cobb and John J. Mathews May 1972 30 p refs

(FAA-AM-72-18) Avail: NTIS \$3.50

The development and experimental validation of a novel aptitude test, referred to as Directional Headings (or DHT), for the selection of air traffic control specialist (ATCS) trainees are discussed. The test requires the subject to rapidly interpret letters, symbols, and degrees in order to determine: directional headings, the exact opposites of headings, and opposites of headings under conditions of aural distraction. The DHT was administered on an experimental basis to several hundred men as they entered basic ATCS training at the FAA Academy. Test subjects were pre-screened. Despite pre-screening, the DHT scores correlated .41 with an overall measure of training performance. Moreover, over 44 per cent of the 115 examinees who failed the training course scored no higher than 29 on the DHT whereas over 85 per cent of the graduates scored 30 or higher. Author

N72-29089# Lockheed Missiles and Space Co., Palo Alto, Calif.
THE SOYUZ LIFE SUPPORT SYSTEM
 [1972] 3 p Transl. into ENGLISH from Aviat. i Kosmonavt. (Moscow), no. 6, 1972 p 46-47
 Avail: NTIS HC \$3.00; National Translation Center, John Crerar Library, Chicago, Ill. 60616

The Soyuz life support systems are described as well as principles for operating each system. E.H.W.

N72-29090# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Electron Physics.
ON THE OPTIMAL CHOICE OF SCATTERING FOILS FOR ELECTRON THERAPY
 Anders Brahme Jun. 1972 31 p refs Submitted for publication
 (TRITA-EPP-72-17) Avail: NTIS HC \$3.75

The choice of scattering material for use in high energy electron therapy has been studied quantitatively from a theoretical point of view. The influence of the scattering material on the average energy loss, the most probable energy loss, the straggling and the bremsstrahlung contamination of a primary electron beam has been calculated for a given mean square angle of scattering. The influence of the different forms of degradations on the depth dose distributions is discussed and the wide range of possibilities for obtaining flattened electron beams is briefly reviewed. Author (ESRO)

N72-29091# Royal Aircraft Establishment, Farnborough (England). Engineering Physics Dept.
THE DYNAMIC BEHAVIOUR OF CRASH HELMETS
 J. M. Rayne London Aeron. Res. Council 1972 73 p refs
 Supersedes RAE-TR-69160; ARC-31726
 (ARC-CP-1202; RAE-TR-69160; ARC-31726) Avail: NTIS HC \$5.75; HMSO £ 1.20; PHI \$4.90

Work on the protection of the head in crashes is summarized. In general, two problems are seen to exist; the prevention of skull fracture and the prevention of concussion. The skull can be protected within quite wide limits by spreading the load, but little can be done directly by helmets of practicable size to prevent concussion. The likelihood of brain injury can be reduced slightly by designing helmets with low elasticity and a tendency to deflect blows. Kinetic energy and the peak force transmitted to the head are often regarded as the sole criteria needed to define a blow, but it is shown that the coefficient of restitution and stopping distance are also important parameters. Account should be taken of the effect of the ratio of the colliding masses and the effect of varying momentum when comparing test results from various rigs. A simple calibration device using a shaped plasticine test-piece is put forward to compare the behaviour of different test machines under given conditions. The effect of varying different parameters is illustrated by experiments on two test rigs and tests on existing service helmets are reported. Author (ESRO)

N72-29092# Royal Aircraft Establishment, Farnborough (England).
A LABORATORY COMPARISON OF THREE METHODS OF PERSONAL CONDITIONING
 J. R. Allan, M. F. Allnutt, M. A. Beeny, R. de G. Hanson, J. Morrison, R. W. J. Needham, D. G. Robertson, and B. C. Short London Aeron. Res. Council 1972 39 p refs Supersedes RAE-TR-70212; seen71-30127 ARC-32961 Prepared jointly with Roy. Air Force Inst. of Aviation Med.
 (ARC-CP-1210; RAE-TR-70212; ARC-32961) Avail: NTIS HC \$4.00; HMSO: 65p; PHI: 2.65

Twelve subjects were used to obtain comparative data between a water cooled, a convective air cooled, and a reverse flow air cooled personal conditioning system during laboratory simulations of a typical operational sortie in a hot climate. The results generally favored the water cooled system on physiological, behavioral and subjective grounds. Author (ESRO)

N72-29093# Army Edgewood Arsenal, Md.
EVALUATION OF A POWER-ASSISTED BREATHING DEVICE. PART 1: AIRFLOW CHARACTERISTICS. PART 2: SUBJECTIVE PREFERENCE FOR AIRFLOWS OVER THE FACE Technical Report, Mar. - Apr. 1971
 E. G. Cummings, W. V. Blevins, and C. R. Bulette Apr. 1972 20 p refs
 (DA Proj. 1W6-62710-A-D25)
 (AD-740643; EA-TR-4639) Avail: NTIS CSCL 06/17

The power-assisted breathing device was conceived to reduce gas mask resistance. This device consisted of a battery-operated blower attached to the inspiratory ports of the M17A1 mask, which was designed for continuous operation during wear. It supplied a flow of air through filters at 56 liters/min; this flow varies during wear with the phase of breathing. Subjective preferences for airflows over the face were tested from 75 to 250 liters/min for design information. Subjective opinions are discussed. Author (GRA)

N72-29094# Naval Training Device Center, Orlando, Fla.
EYE MOVEMENT RESEARCH PROGRAM: VISUAL TRAINING Annual Report
 Stephen Jordan and Urbano Manfredi Mar. 1972 51 p refs
 (AD-741246; NAVTRADEVCCEN-IH-202; AR-2) Avail: NTIS CSCL 05/5

In a series of experiments, significant improvements were found in ocular pursuit tracking with practice. These improvements, which held for various directions of tracking, endured beyond the training period. Also, the effect of ocular pursuit training on subsequent performance in a variety of visualmotor tasks was studied. In two transfer of training experiments, a high degree of positive transfer was found in the first but not in the second study. Author (GRA)

N72-29095# Sperry Rand Corp., Great Neck, N.Y. Gyroscope Div.
VISUAL REQUIREMENTS STUDY FOR HEAD-UP DISPLAYS Final Report
 T. Gold and R. F. Perry Mar. 1972 65 p refs
 (Contract N00014-68-C-0465; NR Proj. 213-068)
 (AD-741218; JANAIR-700407) Avail: NTIS CSCL 05/5

An experimental study was conducted to determine the binocular disparity tolerances for pilots viewing dynamic head-up display images against a moving real world background. An existing head-up display simulator, which could generate images with controlled disparities for each eye, was modified to incorporate a background of projected motion pictures taken in flight at low altitudes. Six pilots served as test subjects, three from the Army Aviation School and three from the Naval Air Test Center. The results indicate maximum disparity levels for sustained comfortable viewing of 1.0 milliradian for vertical and convergent horizontal disparities, and 2.5 milliradians for divergent horizontal disparities. These results are the same as those obtained with the display viewed against a static real world background in a preceding study involving a different group of subjects. Author (GRA)

N72-29096# Atlantic Research Corp., Alexandria, Va. Kinetics and Combustion Group.
HABITABLE ATMOSPHERES WHICH DO NOT SUPPORT

COMBUSTION Final Technical Report

Edward T. McHale 15 Mar. 1972 155 p refs
(Contract DAHC19-71-C-0026; DA Proj. 200-61102-B-13-B;
DA Proj. 2N0-611-02-B-71-D)
(AD-741808) Avail: NTIS CSCL 13/12

It is believed that atmospheres can be developed which will not support combustion of ordinary materials such as paper, plastics, solvents, etc., and in which humans will be able to live and function normally for extended periods of time. Such atmospheres would contain relatively small amounts (10-20%) of certain fully-fluorinated agents (CF₄, C₂F₆, or C₃F₈) added to air. The presence of the agents would completely suppress the burning of materials, but because they are physiologically inert and present in small concentration, they would not appreciably affect the life support process. The objective of the present study was to evaluate the validity of this concept. The toxicity tests included acute and ten-day inhalation studies on rats and guinea pigs and cardiac sensitization tests on dogs (with CF₄).

Author (GRA)

**N72-29097# School of Aerospace Medicine, Brooks AFB, Tex.
DEVELOPMENT OF A SOLID-STATE IMPEDANCE
PLETHYSMOGRAPH FOR RESEARCH IN A SPACE
ENVIRONMENT Technical Report, Apr. - Jul. 1970**

John W. Yates Dec. 1971 35 p refs
(AF Proj. 6320)

(AD-740866; SAM-TR-71-49) Avail: NTIS CSCL 06/2

A new solid-state impedance plethysmograph utilizing a constant current source was designed, built, and tested. The report presents the design philosophy, the circuitry, the final configuration of the device, and the technics for its proper alignment. The circuit detects a 1% impedance change centered on basal body impedance levels between 100 ohms and 15 kilohms. Although normally operated at 100 kHz, the circuit will operate at various frequencies, and it will accommodate either the bipolar or tetrapolar electrode configuration. Circuit performance was confirmed by taking thoracic impedance measurements on a human subject.

Author (GRA)

**N72-29098# Cornell Univ., Ithaca, N.Y.
PERFORMANCE OF AN AUDIO PERCEPTRON Ph.D.
Thesis**

Mark Gordon Scattergood Jun. 1971 116 p refs
(Contract Nonr(G)00003-71; NR Proj. 371-961)
(AD-740125) Avail: NTIS CSCL 06/4

Perceptrons are a class of simple adaptive pattern-recognition devices built of crude model neurons. In the work a perceptron is used to recognize patterns generated by an audio preprocessor. The preprocessor is modeled on the cochlea and cochlear ganglion of the cat with the assumption that these systems are similar to those in humans. Nonsense syllables are used as input to the preprocessor and the perceptron is taught to dichotomize the syllables through a negative-reinforcement training procedure. The perceptron is tested for its ability to learn various dichotomies as a function of the complexity of the dichotomy and as a function of the number of different voices used. It is further tested for its ability to generalize from one set of speakers to another.

Author (GRA)

**N72-29099# Aerospace Medical Research Labs., Wright-
Patterson AFB, Ohio.
INTERFACING MAN-MACHINE CONTROL PERFORMANCE
IN A BIODYNAMIC ENVIRONMENT**

Henry R. Jex Dec. 1971 23 p refs Presented at the Symp.
on Biodyn. Models and their Appl., Dayton, Ohio, 26-28 Oct.
1971
(AF Proj. 7231)

(AD-740467; AMRL-TR-71-29-Paper-30) Avail: NTIS CSCL
05/8

The purpose of this presentation is to review the state of the art in interfacing man-machine control performance in a biodynamic environment. It is given in three parts: (1) a review of the models which are appropriate for manual control performance and the added elements necessary to deal with biodynamic interfaces, (2) some simplified relationships relating the parameters of the models to the resulting man-machine performance, and (3) a review of some biodynamic interface pilot/vehicle problems which have occurred, been solved, or need to be solved.

Author (GRA)

**N72-29100# Aerospace Medical Research Labs., Wright-
Patterson AFB, Ohio.**

**DYNAMIC SIMULATION TECHNIQUES FOR THE DESIGN
OF ESCAPE SYSTEMS: CURRENT APPLICATIONS AND
FUTURE AIR FORCE REQUIREMENTS**

James W. Brinkley and John T. Shaffer Dec. 1971 34 p refs
Presented at Symp. on Biodynamics Models and their Appl.,
Dayton, Ohio, 26-28 Oct. 1970
(AF Proj. 7231)

(AD-740439; AMRL-TR-71-29-Paper-2) Avail: NTIS CSCL
13/12

Research in biodynamics has made very significant contributions to the fulfillment of Air Force operational requirements in the area of emergency escape system design in certain select aspects. The development of dynamic models to describe the response of the human to given environments has provided the aircraft designer with a powerful design and evaluation tool expressed in his own engineering language. Multiple degree-of-freedom models currently used to study the performance of escape systems and the effects of the design of their subsystems can be modified to incorporate the biodynamic model to assess the influence of escape system model outputs on the human. The parameters of escape system components may thereby be varied analytically to study their effect on human response and, conversely, the analysis can also show the influence of human body dynamics upon the performance of the escape system.

GRA

**N72-29101# Aerospace Medical Research Labs., Wright-
Patterson AFB, Ohio.**

**SOME ASPECTS OF BIODYNAMIC MODELLING FOR
AIRCRAFT ESCAPE SYSTEMS**

Peter R. Payne Dec. 1971 104 p refs Presented at Symp. on
Biodynamics Models and their Appl., Dayton, Ohio, 26-28 Oct.
1970

(AF Proj. 7231)

(AD-740446; AMRL-TR-71-29-Paper-9) Avail: NTIS CSCL
06/7

In today's high-speed aircraft there is little possibility of escape unless an ejection seat or capsule is employed, and future flight envelopes are extending to the point where even an escape seat may be inadequate, partly because of the injuries caused by wind blast, and partly because the amount of vertical acceleration required to clear the aircraft structure (usually the fin) may be so great that the seat occupant will be seriously injured by the escape system itself. A biodynamic model of the human body is presented in order to study the tolerances to aircraft ejection.

GRA

**N72-29322* National Aeronautics and Space Administration,
Manned Spacecraft Center, Houston, Tex.**

PUBLIC HEALTH APPLICATIONS OF REMOTE SENSING

Charles E. Fuller *In its* 4th Ann. Earth Resources Program Rev.,
Vol. 1 21 Jan. 1972 20 p Original contains color
illustrations

CSCL 06C
Remote infrared and multispectral photography were used
to identify coastal salt water-fresh water interfaces conducive to

N72-29408

encephalitis vector mosquito breeding in Florida, and to determine the environmental conditions that caused an explosive outbreak of anthrax in Louisiana. Multiband photographic inventories were obtained by simultaneously processing three photographic negatives of the same view which record different wavelength portions of the same light. The process enhances differentiation of vegetative communities and sharply delineates edge effects by assigning false colors to differentiate subtle density differences.

G.G.

N72-29408* California Univ., Berkeley. Forestry Remote Sensing Lab.

DEVELOPMENT OF ANALYSIS TECHNIQUES FOR REMOTE SENSING OF VEGETATION RESOURCES

William C. Draeger *In* NASA. Manned Spacecraft Center 4th Ann. Earth Resources Program Review, Vol. 5 21 Jan. 1972
13 p Original contains color illustrations

CSCL 02C

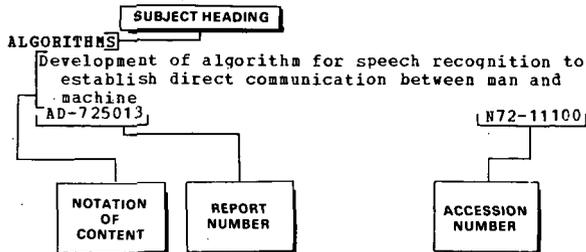
Various data handling and analysis techniques are summarized for evaluation of ERTS-A and supporting high flight imagery. These evaluations are concerned with remote sensors applied to wildland and agricultural vegetation resource inventory problems. Monitoring California's annual grassland, automatic texture analysis, agricultural ground data collection techniques, and spectral measurements are included.

J.A.M.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl.108) NOVEMBER 1972

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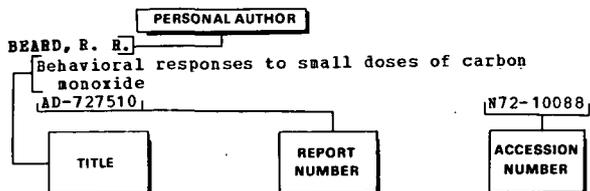
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