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Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011 (201)
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National Aeronautics and Space Administration

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

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NASA SP-7011(201)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 201)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1979 in

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

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 191 reports, articles and other documents announced during December 1979 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1979 Supplements.

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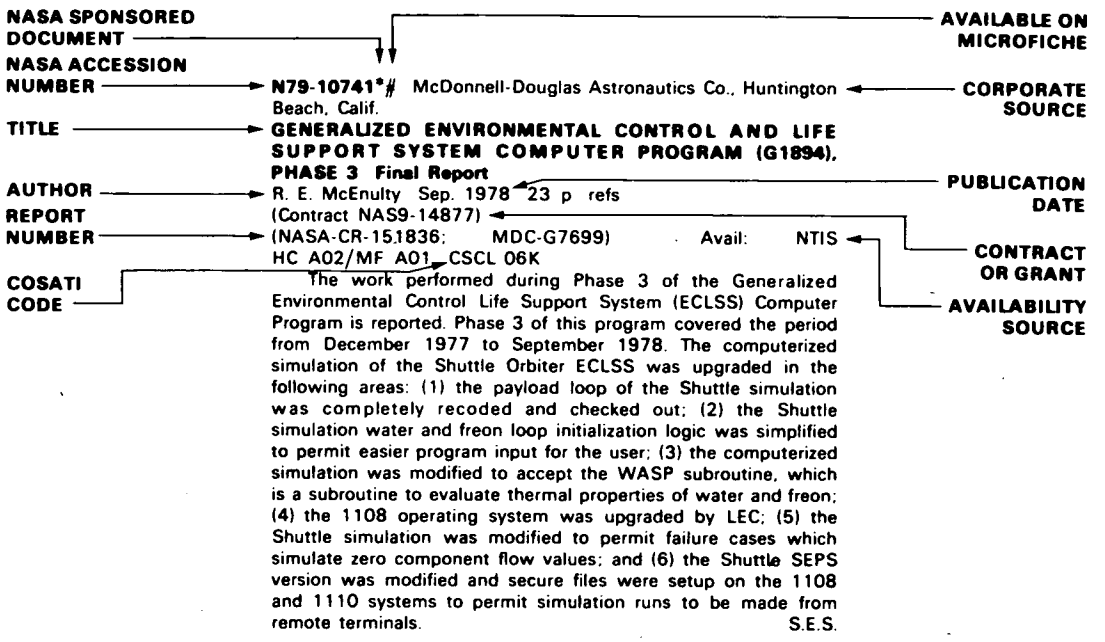

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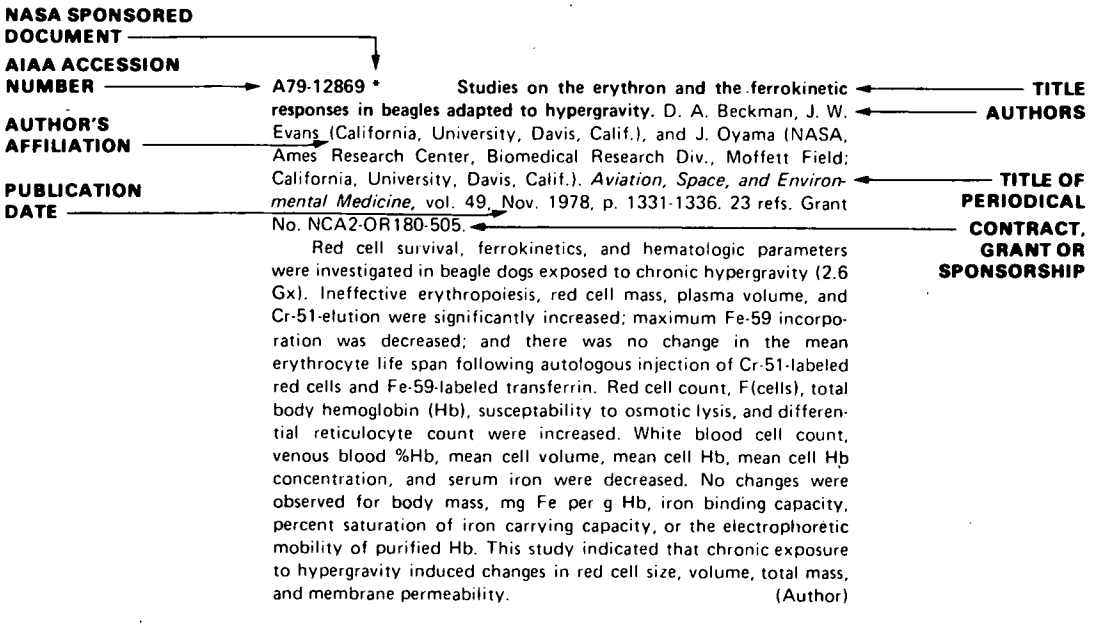

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 201)

JANUARY 1980

IAA ENTRIES

A79-51026 **Noninvasive cardiovascular measurements.** Edited by H. A. Miller, E. V. Schmidt, and D. C. Harrison (Stanford University, Stanford, Calif.). Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers (SPIE Proceedings. Volume 167), 1978. 232 p.

A collection of papers is presented regarding recent advances of prime importance in noninvasive cardiovascular measurement techniques. Five problem areas are discussed: (1) quantitative radiography; (2) computerized and contrast angiography (nuclear and computerized tomographic imaging, intravenous contrast angiography); (3) noninvasive blood pressure measurement and monitoring; (4) ultrasonography (echocardiography, blood flow); and (5) magnetocardiography. The authors of each section in this book review the most important advances in their fields, and project those new areas which are most promising for continued research. S.D.

A79-51027 * **Aerospace highlights and potential medical applications.** C. A. Syvertson (NASA, Ames Research Center, Moffett Field, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 1-10.

An attempt is made to provide an overview of activities going on in NASA from aeronautics to manned space flight, to exploration of other planets. Some of the spin-offs of NASA research related to the medical profession are described. The discussion focuses on the Space Shuttle, the unmanned spacecraft Seasat program, the exploration of other planets in the solar system, a water-cooled helmet, and some breakthroughs in medical diagnostic instrumentation. S.D.

A79-51028 **Computer quantitation of angiocardiographic images.** P. H. Heintzen, R. Brennecke, and J. H. Buersch (Kiel, Neue Universität, Kiel, West Germany). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 17-20. 10 refs.

A new technique for computerized videoangiocardiography is described which minimizes the disadvantages of contrast material and provides maximum structural and/or functional information from angiocardiograms for a given amount of contrast regardless of the site and mode of injection. This improvement is achieved by summing up instantaneous contrast angiocardiographic pictures in a continuous or heart-phase-related mode, and subtracting the corresponding nonspecific background obtained from X-ray pictures taken in real time prior to or following contrast injection. Digital filtering and histogram modification techniques are used to enhance the contrast and reduce the 'noise'. Typical results are presented. S.D.

A79-51029 **Clinical usefulness of radiopaque markers in left ventricular function.** G. T. Meester, P. W. Serruys, P. G. Hugenholtz (Rotterdam, Erasmus Universiteit, Rotterdam, Netherlands), and R. W. Brower (Interuniversitary Cardiological Institute, Amsterdam, Netherlands). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 21-26. 28 refs.

When coronary blood flow is restored after a successful coronary bypass surgery, improvement of local wall motion can be expected. However, this result is not clearly present in the available present-day extensive and somewhat conflicting literature. This is partly due to extraneous factors such as peri-operative infarctions, graft closure, the effect of concomitant medical treatment, and the methodology involved. The paper reviews some of these factors and discusses alternative approaches. Attention is given to an approach suitable for the quantitation of local wall motion through the use of implanted epicardial radiopaque markers. Relevant experimental results are presented. Also discussed is the automatic detection of ventricular contours in angiocardiograms. S.D.

A79-51030 * **Computer quantitation of coronary angiograms.** D. C. Ledbetter, R. H. Selzer (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), R. M. Gordon (Informatics, Inc., Palo Alto, Calif.), D. H. Blankenhorn (Southern California, University, Los Angeles, Calif.), and M. E. Sanmarco (Rancho Los Amigos Hospital, Downey, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 27-36. 5 refs.

A computer technique is being developed at the Jet Propulsion Laboratory to automate the measurement of coronary stenosis. A Vanguard 35mm film transport is optically coupled to a Spatial Data System vidicon/digitizer which in turn is controlled by a DEC PDP 11/55 computer. Programs have been developed to track the edges of the arterial shadow, to locate normal and atherosclerotic vessel sections and to measure percent stenosis. Multiple frame analysis techniques are being investigated that involve on the one hand, averaging stenosis measurements from adjacent frames, and on the other hand, averaging adjacent frame images directly and then measuring stenosis from the averaged image. For the latter case, geometric transformations are used to force registration of vessel images whose spatial orientation changes. (Author)

A79-51031 **Computerized positron emission tomography /PET/ for the assessment of myocardial integrity.** M. M. Ter-Pogossian (Washington University, St. Louis, Mo.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 43-48. 14 refs.

Myocardial integrity is an important parameter in the diagnosis, therapy, and general understanding of cardiac disease. The paper describes the operating principles and capabilities of a new noninvasive technique, called the computerized positron emission tomography (PET), for the in vivo assessment of myocardial integrity.

This technique, a nuclear medicine imaging procedure, yields transverse tomographic images of the heart, which reflect the distribution of a previously administered positron-emitting radionuclide.The images are produced with a very high spatial resolution as compared to more conventional nuclear medicine procedures, and they provide highly quantitative information on the distribution of the radionuclide. The combined use of PET and cyclotron-produced short-lived positron-emitting radionuclides permits the in vivo regional noninvasive assessment of myocardial metabolism, which is perhaps the most important parameter of myocardial integrity. S.D.

A79-51032 Current status of cardiovascular imaging by transmission computed tomography. W. R. Brody (Stanford University, Stanford, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 49-55. 20 refs. Research supported by the Santa Clara County Heart Association.

Although the technological advances in transmission computed tomography (CT) have been dramatic, cardiovascular applications of CT are currently limited by inadequate temporal resolution to resolve moving structures (e.g., the myocardium), difficulties in timing the scan exposure to coincide with maximum contrast enhancement of vascular structures and cardiac chambers, and limited field of view perpendicular to the axial plane. The modes of cardiac CT operation are reviewed: static (single scan), dynamic (multiple scans in rapid succession), gated and rapid (scans less than 500 msec). Modest improvements in gated and dynamic scanning are expected with existing technology and optimization of reconstruction algorithms. Future advances in CT technology should be directed toward the development of rapid scanning systems for imaging the myocardium and toward higher resolution scanners for imaging vascular structures. (Author)

A79-51033 The development of a digital video subtraction system for intravenous angiography. T. W. Ovitt, M. P. Capp, H. D. Fisher, M. M. Frost, S. Nudelman, H. Roehrig (Arizona, University, Tucson, Ariz.), and J. L. Lebel (Arizona, University, Tucson, Ariz.; Colorado State University, Fort Collins, Colo.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 61-65.

A system is under development for a relatively noninvasive technique for the assessment of atherosclerosis. The principle of this method is digital video X-ray subtraction for the visualization of arterial structures after the intravenous injection of contrast media. The prototype unit for the development of video subtraction techniques has been assembled and preliminary testing has started. Results so far in dogs have shown good visualization of the heart, carotid arteries and renal arteries. (Author)

A79-51034 * Iodine imaging using spectral analysis. A. Macovski (Stanford University, Stanford, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 67-75. 7 refs. NSF Grant No. ENG-76-05529; Contract No. NAS5-23522.

Existing radiographic imaging systems provide images which represent an integration or averaging over the energy spectrum. In order to provide noninvasive angiography it is necessary to image the relatively small amounts of iodine which are available following an intravenous administration. This is accomplished by making use of the special spectral characteristics of iodine. Two methods will be presented. One involves a special grating for encoding the iodine information in the form of a fine line pattern. This is subsequently decoded to provide images of iodinated structures which are otherwise almost invisible. The second method utilizes a scanned X-ray beam which is rapidly switched in the high energy region. In this region, iodine experiences significant variations in the attenuation coefficient while bone and soft tissue do not. An efficient and accurate X-ray detector can be used with scanned X-ray beams. This provides a high degree of sensitivity enabling the visualization of small vessels containing relatively dilute iodine. (Author)

A79-51035 Real-time computerized fluoroscopic cardiac imaging. R. A. Kruger, C. A. Mistretta, T. L. Houk, S. J. Riederer, C. G. Shaw, D. L. Ergun, D. Carbone, W. Kubal, A. Crummy, and W. Zwiebel (Wisconsin, University, Madison, Wis.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 77-82. 7 refs.

A computerized fluoroscopy system employing several time and energy subtraction algorithms has permitted good visualization of the cardiovascular system using peripheral intravenous iodine injections of about 1 cm cu/kg. Image contrast improvements of 8-16 over conventional fluoroscopy are common. Several canine and human imaging studies are described including visualization of myocardial infarctions as regions of anomalous image grey shade. The system employs a standard image intensified fluoroscopy system and a specially constructed real-time image processor. Quasi-monoenergetic X-ray beams formed by filtration deliver typical doses of 400 mR/sec in adult human cardiac exams. (Author)

A79-51036 A study of noninvasive blood pressure measurement techniques. C. S. Weaver, J. S. Eckerley, P. M. Newgard, C. T. Warnke (SRI International, Menlo Park, Calif.), J. B. Angell, S. C. Terry, and J. Robinson (Stanford University, Stanford, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 89-105. 10 refs. Grant No. NIH-HL-17604.

Some results of a study of techniques for the noninvasive and ambulatory measurement of blood pressure are presented. A method for computer processing ambulatory or stress test data to determine blood pressure is described. It appears that good accuracies can be obtained with ambulatory patients during normal ranges of physical activities and perhaps during treadmill tests. The development and testing of a new transducer for the noninvasive beat-by-beat measurement of blood pressure is described. The transducer outputs are similar to intra-arterial waveforms that are obtained by catheter, and it is expected that the transducer will be used in the operating room, the ICU, and the CCU. (Author)

A79-51037 Analyses for noninvasive monitoring of arterial blood pressure by /I/ phono cuff-sphygmomanometry, for discrete measurements and /II/ arterial ultrasonic imaging, for continuous measurements. D. N. Ghista (Michigan Technological University, Houghton, Mich.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 107-120. 7 refs.

A79-51038 A new noninvasive technique for cardiac pressure measurement. II - Scattering from encapsulated bubbles. D. Z. Anderson, M. O. Scully, and W. C. Speed (Arizona, University, Tucson, Ariz.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 121-127.

A recent paper by Fairbank and Scully (1977) has reported a new technique for noninvasive measurement of cardiac pressure by using tiny air bubbles. The present paper investigates experimentally the utility of pressure-sensitive coated (Dow and Sephadex) spheres to the problem of remote pressure sensing. The experiments are performed in both the low bubble density (single scattering) and high density (multiple scattering) limits using both Dow and Sephadex spheres. The experiments described demonstrate the pressure sensitivity of the amplitude and frequency responses for both types of spheres. The viability of this encapsulated-bubble scheme as applied to remote cardiac pressure measurements is demonstrated. S.D.

A79-51039 * Signal processing in ultrasound. D. H. Le Croissette (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and P. M. Gammell (Southern California, University, Los Angeles, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 135-141. 7 refs. Contract No. NAS7-100.

Signal is the term used to denote the characteristic in the time or frequency domain of the probing energy of the system. Processing of this signal in diagnostic ultrasound occurs as the signal travels through the ultrasonic and electrical sections of the apparatus. The paper discusses current signal processing methods, postreception processing, display devices, real-time imaging, and quantitative measurements in noninvasive cardiology. The possibility of using deconvolution in a single transducer system is examined, and some future developments using digital techniques are outlined. S.D.

A79-51040 Clinical applications of new echocardiographic techniques. R. L. Popp (Stanford University, Stanford, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 143-150. 20 refs.

The paper reviews the method of two-dimensional echocardiographic imaging for clinical purposes, and attempts to differentiate those proven applications from the ones considered to need further definition and investigation. Capabilities of M-mode and two-dimensional echocardiography are compared. The two-dimensional echocardiographic system provides both M-mode information and two-dimensional display. This technique has been shown to be accurate for quantitation of the size of cardiac valves, segmental left ventricular wall motion abnormalities, complex congenital heart malformations, and the presence of intracardiac masses and of pericardial fluid surrounding the heart. In particular, the technique is suitable for identifying the orientation and location of myocardial segments to be sampled for tissue signature analysis for noninvasive characterization of the histology of the heart. S.D.

A79-51041 Cardiac blood flow measurement - A component of the comprehensive cardiac examination. D. W. Baker (Washington, University, Seattle, Wash.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 155-159. 15 refs. Grant No. NIH-HL-07293.

The resolution and sensitivity of ultrasonic techniques provide the potential for many types of cardiac blood flow detection and analysis. The paper discusses the need for the clinical flow measurements, specific measurements, instrumentation factors in quantitation, a systems approach to flow measurement, and data displays. A real-time computer-based ultrasound system with specialized display is under development. The availability of advanced, large-scale, digital integrated circuits and large memories makes it relatively inexpensive to collect, process, and display the large bodies of data required to utilize more blood-flow information in the diagnostic process. S.D.

A79-51042 Quantitative flow estimation with transcutaneous Doppler ultrasound. C. F. Hottinger, L. Gerzberg, J. D. Meindl, W. R. Brody, T. S. Nelsen (Stanford University, Stanford, Calif.), and W. C. Haase. In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 161-168. 17 refs. Grant No. NIH-NIGMS-17940.

The paper outlines an approach known as the attenuation-compensated volume flow meter (ACVF), which avoids the need for direct calculations of the vessel size, and assures measurement of flow normal to a sample surface using pulsed Doppler ultrasound. The transducer configuration and block diagram of the ACVF are schematically presented and described. The approach allows estimation of volume flow without precise determination of the Doppler angle, vessel size, or details of the velocity profile. The approach thus overcomes several of the major obstacles hindering transcutaneous quantitation of blood flow. This simplification arises through the close correspondence of the measurement method to the formal definition of flow. S.D.

A79-51043 * Biomagnetic instrumentation and measurement. E. J. Iufer (NASA, Ames Research Center, Moffett Field, Calif.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 175-180. 16 refs.

The instruments and techniques of biomagnetic measurement have progressed greatly in the past 15 years and are now of a quality appropriate to clinical applications. The paper reports on recent developments in the design and application of SQUID (Superconducting Quantum Interference Device) magnetometers to biomagnetic measurement. The discussion covers biomagnetic field levels, magnetocardiography, magnetic susceptibility plethysmography, ambient noise and sensor types, principles of operation of a SQUID magnetometer, and laboratory techniques. Of the many promising applications of noninvasive biomagnetic measurement, magnetocardiography is the most advanced and the most likely to find clinical application in the near future. S.D.

A79-51044 Clinical magnetocardiography. J. P. Wikswo, Jr. (Vanderbilt University, Nashville, Tenn.). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 181-193. 40 refs.

The paper outlines the theoretical basis of magnetocardiography (MCG) to elucidate the basic differences between the ECG and MCG. MCG instrumentation and various methods of recording, displaying and analyzing the MCG are described. The current clinical experience with MCG is discussed, and the rationale for the various clinical applications is summarized. There are currently four areas where MCG might prove clinically useful: (1) to complement ECG diagnosis, (2) to screen large numbers of people for cardiac electrical abnormalities, (3) to measure noninvasively the electrical activity of the Bundle of His, and (4) to detect infarct-related injury currents. The identification of those areas where magnetocardiography offers the most promise as a clinical tool is under way. S.D.

A79-51045 Non-invasive information on the P-R segment of the cardiac cycle - An assessment of the clinical potential of the electric and magnetic methods. D. Farrell, J. Tripp, and R. Norgren (Case Western Reserve University, Cleveland, Ohio). In: Noninvasive cardiovascular measurements. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1978, p. 195-200. 29 refs. Research supported by the American Heart Association; NSF Grant No. ENG-77-15952-A01.

A79-51084 # Automatic audiometry in the practice of flight-personnel examination (Avtomaticheskaia audiometriia v praktike obsledovaniia letnogo sostava). O. A. Nakapkin. *Voenno-Meditsinskii Zhurnal,* June 1979, p. 49-50. In Russian.

A79-51098 * # Advanced transport operation effects on pilot scan patterns. R. L. Harris, Sr. and R. W. Mixon (NASA, Langley Research Center, Hampton, Va.). *Human Factors Society, Annual Meeting, Boston, Mass., Oct. 30-Nov. 1, 1979, Paper.* 6 p. 11 refs.

Long straight-in and close-in, curved, descending instrument approaches were made in NASA's fixed-base Terminal Configured Vehicle simulator. The pilot either manually controlled the simulator or monitored the automatic system control of the simulated aircraft during the approach. Tests were performed with or without the display of traffic. The results indicate that the pilots' use of the Electronic Horizontal Situation Indicator (EHSI) increased appreciably for the close-in, curved, descending approach compared to the conventional straight-in approach. When operating as a monitor of the autopilot system, the pilot scanned around more with less attention devoted to the Electronic Attitude Direction Indicator (EADI). The pilots preferred the manual mode because it kept them in the control loop. The addition of displayed traffic to the EHSI increased the pilots' use of the EHSI with a corresponding reduction in his use of the EADI. Also, the pilot's pupil diameter increased during the landing flare indicating a higher stress level even though the tests were conducted in a fixed-base simulator. (Author)

A79-51111 **Effect of hypoxia on mechanical properties of hyperthyroid cat papillary muscle.** I. Palacios, K. Sagar, and W. J. Powell, Jr. (Massachusetts General Hospital; Harvard University, Boston, Mass.). *American Journal of Physiology*, vol. 237, Sept. 1979, p. H293-H298. 31 refs. Research supported by the Universidad Central de Venezuela; Grants No. PHS-HL-06664; No. PHS-5P50-HL-17665; No. PHS-HL-07028.

A79-51112 **Application of an isolated heart model to investigate blood-oxygen delivery.** P. W. Rand, C. V. Nelson, E. H. Lacombe, N. D. Barker, and L. A. Pirone (Maine Medical Center, Portland, Me.). *American Journal of Physiology*, vol. 237, Sept. 1979, p. H348-H352. 13 refs. Research supported by the John A. Hartford Foundation.

Application of a blood-perfused isolated rabbit heart model providing metabolic, functional, and vectorcardiographic measurements is presented. The model avoided compensatory hemodynamic responses which limited interpretation of hemoglobin-oxygen affinity modifications, and fixed-flow perfusions of unchanged or affinity-modified red blood cell suspensions were performed to assess the benefits of high affinity during hypoxic hypoxia and of low affinity during posthypoxic recovery. High myocardial oxygen consumption (MVo2) was associated with high-affinity blood during mild hypoxia and low-affinity blood during posthypoxic recovery. Ventricular function, vectorcardiographic patterns, and lactate levels were affected by hypoxia and ischemia, but not by level of affinity, and the relevance of these observations to the therapeutic potential of hemoglobin-oxygen affinity modification is discussed. A.T.

A79-51113 # **The effect of normobaric hyperoxia on brain and liver tissue respiration in albino rats with different resistances to hypoxia (Vliianie normobaricheskoi giperoksii na tkanevoe dykhanie mosga i pecheni belykh krys s razlichnoi ustoichivost'iu k gipoksii).** A. I. Nazarenko and T. N. Govorukha (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 25, July-Aug. 1979, p. 339-342. 18 refs. In Russian.

A79-51114 # **Lung oxygen diffusibility and permeability in dogs of various ages under normal conditions and in cases of acute hypoxic hypoxia (Diffuzionnaia sposobnost' i pronitsaemost' legkikh dlia kisloroda u sobak raznogo vozrasta v norme i pri ostroi gipoksicheskoi gipoksii).** V. P. Pozharov, E. V. Rozova, and M. M. Seredenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 25, July-Aug. 1979, p. 364-370. 19 refs. In Russian.

A79-51115 # **The effect of the reduction of inspired gas density on external respiration (O vliianii snizheniia plotnosti vdykhaemoi gazovoi smesi na vneshnee dykhanie).** E. V. Rozova and M. M. Seredenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 25, July-Aug. 1979, p. 445-447. 14 refs. In Russian.

The effects of gas mixtures of various densities and normal and elevated oxygen concentrations on external respiration and gas exchange in humans is investigated. Subjects breathed atmospheric air as well as 21% O2-79% He, 40% O2-60% N2 and 40% O2-60% He mixtures for 15 min and ventilatory and gas exchange responses were monitored. Breathing of the normoxic oxygen-helium mixture is found to lead to a decrease in respiratory volume and the ratio between alveolar ventilation and respiratory volume relative to air breathing, indicating a decrease in the ability of the respiratory system to supply oxygen. An increase in the dead volume and decreases in oxygen consumption, carbon dioxide evolution and arterial oxygen pressure are also noted. The inhalation of hyperoxic oxygen-helium mixtures is found to lead to decreases in the alveolar ventilation/respiratory volume ratio and CO2 evolution, and a less marked increase in oxygen consumption as compared with the effects of a hyperoxic oxygen-nitrogen mixture. A.L.W.

A79-51116 # **The effect of microwave fields on muscle oxygen pressure and temperature in animals previously adapted to hypoxia (Vliianie energii SVCh polia na napriazhenie kisloroda i temperaturu v myshechnoi tkani zhivotnykh, predvaritel'no adaptirovannykh k gipoksii).** U. N. Degtiar' (Kievskii Institut Obshchei i Kommunal'noi Gigieny, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 25, July-Aug. 1979, p. 448-450. 5 refs. In Russian.

A79-51117 # **The physiological role of surface-active substances in the lung (Fiziologicheskaia rol' poverkhnostnoaktivnykh veshchestv legkogo).** V. A. Berezovskii and V. Iu. Gorchakov (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 25, July-Aug. 1979, p. 456-465. 98 refs. In Russian.

Current understandings of the role of lung surfactants in respiratory physiology are reviewed. The functions of lung surfactants in maintaining the elasticity of the lung, lowering gas-liquid interfacial tensions, stabilizing alveolus dimensions and regulating gas exchange are discussed and the structure of surfactant layers is outlined. Means of sampling and purifying surfactants are presented, and the role of surfactants in lung pathology is considered. Attention is also given to the effects of hypoxia and hyperoxia on the synthesis, reabsorption and surface activity of lung surfactants. A.L.W.

A79-51118 # **Possibilities and perspectives of tetrapolar transthoracic impedance rheophethysmography in noninvasive studies of hemo- and cardiodynamics (Vozmozhnosti i perspektivy metoda tetrapoliarnoi transtorakal'noi impendansnoi reopletizmographii dlia neinvazivnogo issledovaniia gemo- i kardiodinamiki).** M. I. Gurevich, A. I. Solov'ev, and L. B. Doloman (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal* (Kiev), vol. 25, July-Aug. 1979, p. 465-471. 36 refs. In Russian.

A79-51174 **The visual cortex of normal and deprived monkeys.** D. H. Hubel (Harvard University, Boston, Mass.). *American Scientist*, vol. 67, Sept.-Oct. 1979, p. 532-543. 26 refs.

The paper reviews studies on the part of the brain that is concerned with vision. Attention is focused on the visual cortex of monkeys with normal vision and those deprived of the use of one or both eyes. The discussion covers the striate cortex and its functions; functional architecture; geometry of ocular dominance columns; physiological effects of visual deprivation; timing of deprivation effects; effects of closure on critical architecture; dominance columns in newborn monkeys; and some comments on normal and abnormal brains. The results described involve the visual pathway only, and probably a relatively peripheral part of it. They provide insight into some of the functions of the brain. S.D.

A79-51327 # **Reciprocal interaction between the photopic and scotopic systems of the visual analyzer in man (O retsiproknom vzaimodeistvii mezhdu fotopicheskoi i skotopicheskoi sistemami zritel'nogo analizatora cheloveka).** V. A. Il'ianok (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). In: Sensory perception systems (Sensornye sistemy). Leningrad, Izdatel'stvo Nauka, 1979, p. 40-53. 90 refs. In Russian.

A review is presented of available literature on the reciprocal interaction between the rod and cone systems of the visual analyzer in man. A description is given of this interaction in the electrical activity of different areas of the cerebral cortex during the redistribution of brightness in the field of vision. Mechanisms responsible for the occurrence of inhibitory processes, their dependence on the various parameters of light stimuli, and the role of these processes in regulating the functions of all visual-analyzer levels are examined. Practical recommendations are made as to the optimization of the brightness distribution in the field of vision. S.D.

A79-51328 # **Effect of adaptation level on certain visual functions in man (Vliianie urovnia adaptatsii na nekotorye zritel'nye funktsii cheloveka).** V. M. Kamenkovich (Akademiia Nauk SSSR,

Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). In: Sensory perception systems (Sensornye sistemy). Leningrad, Izdatel'stvo Nauka, 1979, p. 53-61. 50 refs. In Russian.

The paper presents a review of literature data on the effect of adaptation level on simple visual functions, viz., visual acuity and contrast sensitivity. Also presented are results of investigations into the adaptive changes in the threshold time for recognition of simple and complex visual images under conditions of varying and constant contrast. S.D.

A79-51698 * Minute tubular forms in soil. L. E. Casida, Jr. and K.-C. Liu (Pennsylvania State University, University Park, Pa.). *Canadian Journal of Microbiology*, vol. 25, no. 6, 1979, p. 722-729. 16 refs. Grant No. NGR-39-009-180.

Large numbers of long, straight, flattened structures were observed during an electron-microscope study of bacteriophage in aqueous extracts. These structures were called tubules and ranged in width from 10 to 50 nm. Materials and methods were discussed relative to extraction of tubules from soil, electron microscopy, quantitation of tubules in filtrate suspension, tests performed on tubules, plaque formation, and nutrient amendments. It is found that all of the tubules recovered from soil are broken at one or both ends. They are present in surface soils but not in a subsurface sample. Their numbers decrease during bacterial multiplication in soil or broth-containing soil. The tubules appear to be composed of protein that could be disintegrated to liberate nonprotein fibers. A possible clue to the nature of the tubules is their apparent relation to soil bacteria. S.D.

A79-51701 * Attachment to autoclaved soil of bacterial cells from pure cultures of soil isolates. D. L. Balkwill and L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Applied and Environmental Microbiology*, vol. 37, May 1979, p. 1031-1037. 32 refs. Grant No. NGR-39-009-180.

A study to determine whether the firmness of microbial attachment that occurred for the overall bacterial population in natural unaltered soil could be duplicated for selected bacterial soil isolates introduced into autoclaved soil is presented. Pure cultures of Arthrobacter globiformis and four fresh isolates were incubated individually in autoclaved soil in the presence and absence of glucose. The attachment attained by the soil isolates duplicated that of the overall bacterial population that resides in unaltered, unamended soil. Electron microscopy indicated that all attached cells produced extracellular polysaccharide slimes in the autoclaved soil, and that these materials appeared to connect the cells to surrounding soil debris. The actual role of polysaccharides in attachment was not clear, however, because at least one of these organisms possessed extracellular slime during the period when it had not yet attached to the soil. A.T.

A79-52022 Frequency and amplitude analysis of the EMG during exercise on the bicycle ergometer. J. S. Petrofsky (St. Louis University, St. Louis, Mo.). *European Journal of Applied Physiology*, vol. 41, no. 1, 1979, p. 1-15. 38 refs. U.S. Department of Health, Education, and Welfare Contract No. HSM-099-71-21; Grant No. AF-AFOSR-72-2362.

Experiments were conducted in which the amplitude and frequency of the EMG were recorded from the quadricepts muscle in three male subjects during work on a bicycle ergometer. The objective was to examine the relationship of the center frequency and rms amplitude to the oxygen cost and fatigue in muscle during dynamic exercise. The results indicate that the EMG is a complex waveform, being influenced not only by fatigue, but to even a larger extent in many cases, by the temperature of the exercising muscles. Although muscular fatigue caused an increase in the rms amplitude and a decrease in the center frequency, the increase in muscle temperature opposed these changes by reducing the rms amplitude and increasing the center frequency. S.D.

A79-52023 Plasma aldosterone, renin activity, and cortisol responses to heat exposure in sodium depleted and repleted subjects. M. Follenius, G. Brandenberger, B. Reinhardt, and M. Simeoni (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France). *European Journal of Applied Physiology*, vol. 41, no. 1, 1979, p. 41-50. 27 refs.

A79-52024 Time course of O2-pulse during various tests of aerobic power. R. A. Wiswell and H. A. de Vries (Southern California, University, Los Angeles, Calif.). *European Journal of Applied Physiology*, vol. 41, no. 4, 1979, p. 221-231. 17 refs.

An experimental study was conducted to (1) test the hypothesis proposed by Balke (1954) that O2-pulse typically reaches a maximum before V(O2) max by observing the time course of O2-pulse throughout maximal exercise stress; (2) compare bicycle ergometer and treadmill exercise with respect to the elicited O2-pulse time course as well as to the V(O2)max and HR; (3) discern those physiologic variables which might predispose an individual to reach a peak O2-pulse at submaximal work load if this phenomenon is not universal; and (4) evaluate the use of O2-pulse at submaximal levels of exercise to predict V(O2)max. The results show that the use of maximal O2-pulse rather than V(O2)max offers no significant advantage. O2-pulse during submaximal exercise appears to provide a good indication of cardiorespiratory fitness. S.D.

A79-52025 Electrophysiological correlates of local muscular fatigue effects upon human visual reaction time. G. A. Wood (Western Australia, University, Nedlands, Australia). *European Journal of Applied Physiology*, vol. 41, no. 4, 1979, p. 247-257. 18 refs.

A79-52055 Manual landings in Category 3 conditions. A. D. Brown and D. J. Gurney (Royal Aircraft Establishment, Bedford, Hants., England). *Aeronautical Journal*, vol. 83, Aug. 1979, p. 296-305. 9 refs.

Two aircraft were used for flight trials in accordance with the program involving flying in Category 3 fog conditions. The pilot techniques used and the problems encountered in manual landing are discussed. The trial progressed from simulation studies and aircraft performance measurements to actual flight trials in fog. At the start of the program, while experience was being gained, weather minima were imposed based partly on earlier trial results and partly on an improved knowledge of fog characteristics. As data were obtained and crew procedures refined, the minima were progressively reduced so that the limiting visual conditions for manual landings could be established. V.T.

A79-52276 Pilot performance during simulated approaches and landings made with various computer-generated visual glidepath indicators. M. F. Lewis and H. W. Mertens (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 50, Oct. 1979, p. 991-1002. 16 refs.

The paper presents the effectiveness of four different visual glidepath indicator systems, in terms of pilot performance, under conditions where the stimulus environment is severely reduced. These are the 2-bar, 3-bar, T-bar visual approach slope indicators (VASI) and the precision approach path indicator (PAPI) systems which have involved subjective pilot assessments rather than performance measures. 24 pilots were selected for testing, with at least a 20/30 acuity between 30 and 40 inches, employing an aircraft simulator that was connected to an analog-to-digital converter. The tests were simulated with downwind and upwind light bars for the 2-bar system, while a third was added upwind of the second for the 3-bar system. The T-bar employed a partially nonvisible wingbar, where the upwind position lights increased with deviation above the optimum glidepath to form an inverted T. It was determined that with varying approaches and landing systems, discrepancies in landing consistency did occur. C.F.W.

A79-52277 Effect of fiber and dye degradation products /FDP/ on burn wound healing. F. S. Knox, III, T. L. Wachtel, G. R. Mc-Cahan, Jr., and S. C. Knapp (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1007-1015. 12 refs.

Upon exposure to the thermal environment of an aircraft fire, many fire retardant fabrics off-gas fiber and dye degradation products (FDP). Condensation of these products on human skin raises questions concerning possible deleterious effects on burn wound healing. A porcine bioassay was used to study the physiological effects of FDP. Selected areas of living skin, protected by dyed aromatic polyamides and polybenzimidazole fabrics, were exposed to a thermal source adjusted to simulate a postcrash JP-4 fuel fire. Burn sites contaminated with FDP were evaluated by clinical observation and histological techniques. Healing of the burn wound was followed by recording time to begin epithelialization, time to closure of an open wound, and the amount and type of cicatrix formation. The experiment showed that each fabric has unique off-gasing products. The greatest amount of FDP was deposited on the skin when the skin was covered by a single layer of shell fabric separated by a 6.35-mm air gap. The presence of an intervening cotton T-shirt decreased the amount of FDP deposited on the skin. No evidence is found that FDP caused alterations in wound healing. (Author)

A79-52278 Bimodal relationship of human tremor and shivering on introduction to cold exposure. M. F. Schneider and J. D. Brooke (Guelph, University, Guelph, Ontario, Canada). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1016-1019. 18 refs. Research supported by the National Research Council of Canada and World Sugar Research Organization.

A79-52279 Comparison of physiological effects of head-down tilting and immersion on the human body. E. B. Shulzhenko, V. E. Panfilov, K. I. Gogolev, and E. A. Aleksandrova (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1020-1022.

The effects on water balance and blood composition of two procedures used to simulate an acute stage of weightlessness adaptation, head-down tilting and water immersion, are compared. Healthy male subjects were exposed to seven days of either head-down tilting at 6 deg or support-free, dry immersion in water, and water consumption, diuresis, hematocrit, total blood protein and blood protein fractions were monitored. More pronounced changes in water balance, hematocrit, plasma volume and blood protein, albumin and globulin contents observed during immersion indicate that immersion produces a greater effect on the human body, to which it takes longer to adapt and which more closely reproduces the effects of weightlessness adaptation. A.L.W.

A79-52280 Bioassay of thermal protection afforded by candidate flight suit fabrics. F. S. Knox, III, T. L. Wachtel, and G. R. McCahan, Jr. (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1023-1030. 25 refs.

Four thermally protective flight suit fabrics designed to protect the aviator from the thermal environment of a post-crash fire were tested by porcine bioassay to determine their mitigating effects on skin burning. A JP-4 fueled furnace with a mean heat flux of 3.07 cal/sq cm per sec was used as a heat source to study the protective properties of 4.8-oz. twill weave Nomex aramide, 4.5-oz. stabilized twill weave polybenzimidazole, 4.8-oz. plain weave experimental high-temperature polymer (HT4) and 4.8-oz. plain weave Nomex aramide on a porcine model of human skin. Results of statistical analyses of clinical and microscopic data indicate that all fabrics tested provide essentially the same degree of thermal protection, although HT4 is slightly better in attenuating heat flux. When used with a cotton T-shirt or an air gap, however, protection was improved for all fabrics and in all configurations. It is suggested that the improvement of flight suits can be achieved by the redesign of current uniforms and fabrics to include multiple layers. A.L.W.

A79-52281 Similarity in the number of lifespan heartbeats among non-hibernating homeothermic animals. S. D. Livingstone and L. A. Kuehn (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1037-1039.

A79-52282 Cold water survival suits for aircrew. G. R. White (Department of Defence, Aeronautical Research Laboratories, Melbourne, Australia) and N. J. Roth (Royal Australian Air Force, Institute of Aviation Medicine, Point Cook, Australia). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1040-1045. 11 refs.

Laboratory and sea trials were used to compare the effectiveness of three aircrew exposure garments - the British Mark 10, the United States CWU 21/P, and the Canadian U.VIC. Thermofloat jacket. The first two are waterproof coveralls, whereas the third is a neoprene-lined jacket designed on the basis of the 'wet suit' concept. Rectal and skin temperatures, electrocardiograms and other variables were measured while subjects, wearing the suits, were immersed in water at temperatures of 70 C and 10.5 C. The three garments were found to be similar in the degree of thermal protection provided, but the Thermofloat jacket appeared superior in other ways and has the greater potential for development. A previously unreported observation was a marked reduction in core cooling rate after the expected linear fall in core temperature. This has possible implications in the conduct of research in this field. (Author)

A79-52283 Passive resistive torques about long bone axes of major human joints. A. E. Engin (Ohio State University, Columbus, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1052-1057. 11 refs. USAF-supported research.

Multisegmented total-human-body models play an important role in studies such as vehicle crash victim simulation, pilot ejection and flailing. Proper biomechanical description of the major articulating joints of these mathematical models require passive resistive torque data for the rotational motions of the body segments about their long bone axes. The paper presents a research program which was developed to collect such data at the shoulder, hip, knee, elbow, and ankle joints. The research was conducted, with some obvious limitations, on live human subjects by means of specially designed experimental apparatus. The numerical results are presented for three subjects for the passive resistive torques about the long bone axes of the major articulating joints. It is concluded that the maximum tolerable passive resistive torques associated with the long bones of the lower extremities are more than twice the ones associated with the long bones of the upper extremities. (Author)

A79-52284 Ultrastructural development of the vestibular system under conditions of simulated weightlessness. J. Neubert (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany). *Aviation, Space, and Environmental Medicine,* vol. 50, Oct. 1979, p. 1058-1061. 12 refs.

Electronmicroscopy was used to track the development of the gravity system of frog embryos and larvae which have bred for 5, 7, and 10 d after egg fertilization under conditions of simulated weightlessness on the fast-running horizontal clinostat. Although no differences in the morphologic structure of the organ between test and control animals could be found up to 7 d of development, there is a significant accumulation of vacuoles in sensory epithelia of frog larvae developing for 10 d (stage 17) in simulated zero G. (Author)

A79-52285 Medical barofunction testing of aviators with otorhinolaryngologic disease. J. C. Emery, D. E. Furry, E. J. Sacks (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.), A. S. Kapadia, and M. H. Smolensky (Texas,

University, Houston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 50, Oct. 1979, p. 1062-1066. 19 refs.

Forty aviators with otorhinolaryngologic pathology, previously considered physically disqualified for flight status, were tested in the hypobaric chamber to evaluate tolerance to rapid barometric pressure changes. Testing consisted of three sequential trials in the low-pressure chamber (LPC) at rates of 1,524 m/min ascent and descent. The first trial was to 1,524 m, the second to 3,048 m, and the third to 5,486 m. Failure consisted of any symptoms (pain) or physical findings of barotrauma (aerosinusities or aerootitis media). Results revealed a 22.5% failure rate. The findings indicate this type of 'Medical Barofunction Test' is a practical adjunct to the clinical evaluation of the aviator. The profile is safe and free from serious dysbaric episodes experienced above 7,620 m. Follow-up studies revealed the incidence of false negatives to be only 8% by the LPC test. The findings are not significantly different from the medical disqualification rate of a normal student aviator comparison group. (Author)

A79-52286 Technique for simulating G-induced tunnel vision. J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 50, Oct. 1979, p. 1076.

A simple technique is described which helps subjects gain an understanding of the endpoint used to terminate exposure to centrifuge stress during training procedures on the human centrifuge. The technique involves manual induction of increased intraocular pressure which, in turn, causes a decrease in retinal perfusion followed by greyout and tunnel vision. (Author)

A79-52326 The influence of low frequency vibration on pilot performance /as measured in a fixed base simulator/. A. M. Stave (United Technologies Corp., Sikorsky Aircraft Div., Stratford, Conn.). *Ergonomics*, vol. 22, July 1979, p. 823-835. 11 refs. Grant No. DAAJ01-72-C-0634.

The results of a two-year study on the effects of low-frequency vibration on pilot performance are described. Data on the effects of low-frequency vibration are collected while pilots fly a helicopter simulator and accomplish navigation, approach, hover, and slung load handling tasks. Performance is measured in terms of flight path and altitude deviations from desired values. Times required to perform load pick-up and drop-off as well as load placement accuracy are also measured. The simulator used is a fixed base device which makes use of analog and digital computers. It is found that the vibration stimuli used do not degrade performance, which tends to improve with increased stress. It is hypothesized that this trend is due to motivation, i.e., as subjects feel the onset of fatigue they compensate by working harder and thus tend to improve their performance. Poor scores (about 6% of the observations) are attributed to lapses in the pilot's ability to respond to display cues. S.D.

A79-52327 Mechanisms of the effects of vibration frequency, level and duration on continuous manual control performance. C. H. Lewis and M. J. Griffin (Southampton, University, Southampton, England). *Ergonomics*, vol. 22, July 1979, p. 855-890. 28 refs. Research supported by the Ministry of Defence (Procurement Executive).

Three experiments are carried out to assess the effects of vibration frequency, level, and duration on a zero-order pursuit tracking task. It is found that the primary effects of vibration on the performance of a single-axis zero-order pursuit tracking task are increases in tracking error variance, due to vibration-induced control activity and increased operator-generated noise or remnant. The hypothesis proposed by Lewis and Griffin (1976) is supported only for vibration frequencies above 10 Hz. Perceptual and motor sources are suggested for the increased remnant. Prolonged continuous performance of the simple pursuit tracking task during both static and vibration conditions resulted in large increases in response lags and suppression of coherent responses, which are related to diminished levels of arousal. S.D.

A79-52475 # Some neurochemical characteristics of rats after space flight in the Cosmos-936 satellite (Nekotorye neirokhimicheskie kharakteristiki krys posle kosmicheskogo poleta v iskusstvennom sputnike 'Kosmos-936'). O. G. Gazenko, N. N. Demin, A. N. Panov, D. A. Rashevskaia, N. L. Rubinskaia, and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 247, no. 2, 1979, p. 510-512. In Russian.

Results are presented for a biochemical study of samples concerning the cerebellar tissue as well as the frontal, temporal and occipital areas of the cerebral cortex in male Vistar-SPF rats following a 20-day space flight in the Cosmos-936 satellite. A preliminary conclusion is that the observed neurochemical changes in space flight are the result of a passive inhibition of the functional activity of the cerebral cortex (in the presence of stimulus deficiency) rather than the result of stress factors. Twenty-five days after landing, the observed deviations had vanished. S.D.

A79-52539 Orientation relative to the retina determines perceptual organization. B. Gillam and D. McGrath (New York, State University, New York, N.Y.). *Perception and Psychophysics*, vol. 26, no. 3, Sept. 1979, p. 177-181. 12 refs. NSF Grant No. BO43254; Grant No. NIH-30840.

Two experiments are reported which show that perceptual unit formation, as measured by Gillam's method of using common reversals of ambiguous lines as an index of their coherence, depends strongly on the orientation of the configuration. Measurements under conditions of 90 deg head and body tilt show that the critical orientation is retinal, not physical. The results are discussed in relation to other findings and to possible explanations. (Author)

A79-52540 Target redundancy in visual search - Do repetitions of the target within the display impair processing. C. W. Eriksen and B. A. Eriksen (Illinois, University, Urbana, Ill.). *Perception and Psychophysics*, vol. 26, no. 3, Sept. 1979, p. 195-205. 20 refs. Grant No. PHS-MH-01206.

The effects of the repetition of a visual target within a display on input processing are investigated in order to test the predictions of Estes' (1972, 1974) interactive channels model and those of the continuous flow model of Ericksen and Schultz (1979) of visual search. Subjects were asked to discriminate between two sets of visual target stimuli surrounded by noise of different degrees of similarity, spacing and perceptual segregation in a response competition paradigm. Response times measured showed no impairment when noise was identical with the stimulus, thus favoring the continuous flow model and competition among internal recognition responses, rather than the interactive channels model which predicts a longer response time when noise and target stimuli are identical. A second experiment performed to assess any facilitating effect of redundancy by varying the type or spacing of noise stimuli confirms the above results, however, it provides no evidence of facilitation. A.L.W.

A79-52541 Upper-velocity threshold for detection of movement. J. R. Johnstone (Western Australia, University, Nedlands, Australia) and L. A. Riggs (Brown University, Providence, R.I.). *Optics Letters*, vol. 4, Oct. 1979, p. 309, 310.

The maximum velocity with which an object can move and be seen to be moving was measured as a function of its luminance. Object movements greater than 1000 deg/sec can readily be detected as movement. Saccadic eye movements should therefore produce sensations of visual movement. The absence of such sensations indicates that correct evaluation of the resulting visual input requires some other mechanism. (Author)

A79-52691 **Visual motion perception by intelligent systems.** W. Scacchi (California, University, Irvine, Calif.). In: Conference on Pattern Recognition and Image Processing, Chicago, Ill., August 6-8, 1979, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1979, p. 646-652. 44 refs. Research supported by the Hughes Aircraft Co.

The focus of this study is to develop an understanding of the state of the art in visual motion perception by intelligent systems. We examine diverse theoretical and empirical approaches to visual motion analysis, perception, and understanding. We survey the literature applicable to visual motion perception as discussed in scene analysis techniques, hardware-based vision systems, computer animation, artificial intelligence techniques, and human motion perception. We focus primarily on issues of observed object and image sequence description, representation, and perceptual control strategies. We next introduce two concepts in visual motion perception: motion vantage perspective and object motion coherence. We then suggest the emerging trends, problem areas, and alternative directions for research in visual motion perception by intelligent systems. (Author)

A79-52696 * # **Man and machine design for space flight.** A. J. Louviere (NASA, Johnson Space Center, Spacecraft Design Div., Houston, Tex.). *American Association for the Advancement of Science, Annual Meeting, Houston, Tex., Jan. 3-8, 1979, Paper.* 4 p.

The factors involved in creating effective designs for living and working in a weightless environment are discussed. Among the areas covered are special provisions for eating and drinking, a special shower nozzle to remove soap, electric shavers designed for vacuum containment of the clippings, and the need for restraint systems at the crew's workstations. Attention is given to the fact that the crewmen assume a neutral body posture in weightlessness which is an important consideration in designing displays, controls, and windows. It is concluded that the incorporation of the change in body posture and the requirement for restraint into future designs will greatly facilitate the crewman's task in the weightless environment. M.E.P.

A79-52878 **Protection standards for microwave and radiofrequency radiations.** F. Harlen (National Radiological Protection Board, Harwell, Oxon, England) In: Conference on Electromagnetic Compatibility, Guildford, Surrey, England, April 4-7, 1978, Proceedings. London, Institution of Electronic and Radio Engineers, 1978, p. 23-29. 17 refs.

The exposure limit standards for microwave and radiofrequency radiations are examined. The safe number adopted by the U.S. and West European standards is 100 W/sq m. The premise of the safe number is that the principle bioeffects are thermal, but the supportive biological work was concentrated in a limited range of microwave frequencies, so that the differences between Western standards are in the frequency ranges and the formulae for intermittent exposures. Current research shows that the VHF region may contain the most hazardous frequencies, and that people may be working in the near field at these frequencies. The concept of power density then becomes meaningless and it is necessary to consider the separate contributions of the E and H fields. The East European standards are generally more restrictive, and are based on subjective epidemiological studies of people working with microwaves and on behavioral effects in laboratory animals, while the Western approach is based on demonstrable injury. A.T.

A79-52894 **The metabolic demand and oxygen supply of the heart - Physiologic and clinical considerations.** K. T. Webber and J. S. Janicki (Pennsylvania, University, Philadelphia, Pa.). *American Journal of Cardiology,* vol. 44, Oct. 1, 1979, p. 722-729. 36 refs. Grants No. NIH-HL-17441; No. NIH-HL-18749; No. NIH-HL-808805.

A79-52895 **Temporal relation between onset of cell anoxia and ischemic contractile failure.** W. R. Harden, III, C. H. Barlow, M. B. Simson, and A. H. Harken (Pennsylvania, University, Philadelphia, Pa.). *American Journal of Cardiology,* vol. 44, Oct. 1, 1979, p. 741-746. 18 refs. Grant No. NIH-1-R01-HL-22315.

A79-53000 * **Energy transduction in Halobacterium halobium.** J. K. Lanyi (NASA, Ames Research Center, Moffett Field, Calif.). In: Membrane proteins in energy transduction. New York, Marcel Dekker, Inc., 1979, p. 451-483. 147 refs.

The properties and functions of the light-energy-transducing purple membrane of Halobacterium halobium are reviewed. Consideration is given to the protein structure and composition of the membrane and the photochemistry of the protein-retinal complex known as bacteriorhodopsin. The role of bacteriorhodpsin in establishing and maintaining an electrochemical (H(+)) gradient is examined, and interactions of this gradient with Na(+) and K(+) gradients, the light-induced transport of amino acids and the light-induced phosphorylation of ADP are considered. Bacteriorhodopsin and the respiratory chain are discussed as alternative sources of energy for the maintenance of the H(+) gradient. Advantages of the Halobacterium purple membrane system for studies of membrane energetics and the confirmation of the chemiosmotic hypothesis are also noted. A.L.W.

A79-53065 # **Tremometry as a method of evaluating the functional state of the nervous system of a pilot (Tremometriia kak metod otsenki funktsional'nogo sostoianiia nervnoi sistemy letchika).** A. N. Kol'tsov, Iu. A. Kukushkin, V. A. Varfolomeev, and V. Ia. Koliagin. *Voenno-Meditsinskii Zhurnal,* July 1979, p. 50-52. In Russian.

The dynamics of muscle tremors in pilots during various flight phases and in other operators subject to conditions of high physiological and emotional stress are investigated by means of contact and contactless coordinometers. Contact measurements reveal that prior to a flight, tremor frequency is greater in the first 15 sec of a test than in the last 15 sec, while during flight tremor frequencies tend to equalize, indicating that the dominance of the fundamental oscillations can be used as a criterion of fatigue. Measurements made by a contactless coordinometer with a capacitance probe reveal oscillations of 6 to 12 Hz superimposed on a carrier frequency of 0.8 to 3 Hz, which vary inversely in frequency as flight stress increases. Increases in oscillation amplitude are also found to be indicative of fatigue, while the high-frequency oscillations are attributed to levels of physiological and emotional stress. A.L.W.

A79-53066 # **The role of lesser circulation hemodynamic changes in pulmonary gas exchange (Rol' izmenenii gemodinamiki v malom kruge krovoobrashcheniia v legochnom gazoobmene).** E. S. Lebedeva, L. N. Danilov, S. A. Aganezov, and G. M. Laskin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Pul'monologii; I Leningradskii Meditsinskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 65, June 1979, p. 881-886. 20 refs. In Russian.

The influence of changes in the hemodynamics of pulmonary circulation on gas exchange in the lungs is evaluated. Intravenous serotonin injections were administered to healthy dogs in order to increase intravascular pressure and the volume of pulmonary circulation. It is observed that hemodynamic changes are accompanied by increases in circulating pulmonary blood volume, lung diffusivity, arterial oxygen content and arterial oxygen saturation. It is concluded that these hemodynamic factors act to open up latent pulmonary vascular regions and thus more evenly distribute ventilation capabilities, leading to enhanced gas exchange, conceivably in response to pulmonary gas exchange disturbances. A.L.W.

A79-53067 # **A cinematographic technique for investigating some aspects of visual recognition (Kinematograficheskii metod issledovaniia nekotorykh aspektov zritel'nogo opoznaniia).** Iu. I. Levkovich (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 65, July 1979, p. 1075-1078. In Russian.

A79-53068 # **Continuous long-duration recording of the heart rate by means of a noncontact technique (Nepreryvnaia**

dlitel'naia registratsiia chastoty serdechnykh sokrashchenii beskontaktnym metodom). A. I. Belich (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 65, July 1979, p. 1079-1082. 5 refs. In Russian.

A79-53096 A spherical representation of a human body for visualizing movement. N. I. Badler, J. O'Rourke (Pennsylvania, University, Philadelphia, Pa.), and H. Toltzis (Gould, Inc., Cleveland, Ohio). *IEEE, Proceedings,* vol. 67, Oct. 1979, p. 1397-1403. 33 refs. NSF Grants No. ENG-75-10535; No. MCS-76-19464; Contract No. N00014-78-C-0102.

A three-dimensional human body model for displaying body movements on a computer graphics display is described. The surface of the body model is formed from overlapping spheres, yielding a realistically formed and shaded body image on a raster graphics display. An experimental model consisting of 310 spheres is articulated with 19 joints and 20 body segments. The properties of this model include joints which do not deform during movement, simple hidden surface removal, and efficient collision and contact detection. The model may also be placed in a planar polygon environment. Applications in crash simulation and human movement simulation are indicated. (Author)

A79-53163 Nonlinear perception of infrared radiation in the 800-1355 nm range with human eye. V. G. Dmitriev, V. N. Emel'ianov, M. A. Kashintsev, V. V. Kulikov, A. A. Solov'ev, M. F. Stel'makh, and O. B. Cherednichenko. *(Kvantovaia Elektronika* /Moscow/, vol. 6, Apr. 1979, p. 803-810.) *Soviet Journal of Quantum Electronics,* vol. 9, Apr. 1979, p. 475-479. 12 refs. Translation.

The present experimental study of the IR optical susceptibility of the human eye showed that in the 800 to 1355 micron range, IR radiation appears as visible radiation at a wavelength close to the second harmonic. The spectral sensitivity curve for IR radiation is spiky with the envelope maximum located at 1113 microns. The mechanism of nonlinear optical susceptibility to IR radiation appears to be localized in the retina nerves. V.P.

A79-53211 # Role of n-aminobenzoic acid in repairing UV and gamma radiation damage (Rol' n-aminobenzoinoi kisloty v reparatsii povrezhdenii, indutsirovannykh u.-f. i gamma-izlucheniiami). I. A. Rapoport, S. V. Vasil'eva, and L. S. Davnichenko (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 247, no. 1, 1979, p. 231-234. 11 refs. In Russian.

Results are presented of an experimental study of an Escherichia coli strain characterized by the activity of certain enzymatic systems involved in the repairing of DNA damage caused by UV and gamma radiation in the presence of n-aminobenzoic acid, PAB, known as a vitamin (coenzyme). Mutagenic and 'reparagenic' activities are discussed. Particular attention is given to the function of PAB as a damage-repairing agent. S.D.

A79-53285 Development of adaptation to hypodynamics on rat and its readaptability to ambulatory life. H. Saiki, M. Nakaya, M. Sudoh, and M. Abe (Jikei University School of Medicine, Tokyo, Japan). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-76.* 8 p. 5 refs.

This paper examines ease of readaptation of rats to the normal ambulatory life after hypodynamic exposure. A comparison of readaptability was made after 3, 5, and 10 week simulated exposures made by suspension technique expressed as the speed of recovery to the normal K(+) excretion level. Blood pressure, resting metabolic rate, and body weight were measured daily, and the urinary excretion rate of K(+) in the daily total urine was measured continuously. It was concluded that: (1) recovery is more readily accomplished when released from hypokinetic exposure after 10 weeks than after 5 weeks, and after 5 weeks than after 3 weeks exposure; (2) characteristic fluctuations in blood pressure, resting metabolic rate, and body weight occurred corresponding to hypodynamic exposure periods and time after return to normodynamic life; (3) during the 6th to 10th week of hypodynamic exposure two subjects suffered urinary bleeding and ischuria every few days accompanied by abnormal changes of blood pressure, resting metabolic rate, and body weight. A.T.

A79-53286 * Early cardiovascular adaptation to zero gravity simulated by head-down tilt. C. G. Blomqvist, J. V. Nixon, R. L. Johnson, Jr., and J. H. Mitchell (Texas, University, Dallas, Tex.). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-77.* 13 p. 32 refs. Research supported by the Harry S. Moss Heart Fund; Grants No. NsG-9026; No. NIH-HL-06296; No. NIH-5-M01-II-00633.

The early cardiovascular adaptation to zero gravity, simulated by head-down tilt at 5 deg, was studied in a series of 10 normal young men. The validity of the model was confirmed by comparing the results with data from Apollo and Skylab flights. Tilt produced a significant central fluid shift with a transient increase in central venous pressure, later followed by an increase in left ventricular size without changes in cardiac output, arterial pressure, or contractile state. The hemodynamic changes were transient with a nearly complete return to the control state within 6 h. The adaptation included a diuresis and a decrease in blood volume, associated with ADH, renin, and aldosterone inhibition. (Author)

A79-53287 Ultrastructural development of the vestibular system of frog larvae in 0g simulation. J. Neubert (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-78.* 9 p. 10 refs.

The vestibular apparatus of 10 frog larvae exposed to weightlessness simulation till stage 15, 17, and 22 respectively was investigated by electron microscopy. Till stage 15 no significant changes in morphology of the gravity sensory system could be found. A stay under weightlessness simulation till stage 17 and 22 is followed by significant alterations in sensory epithelia and also in the otolith membrane. Large vacuols were concentrated in the region where an otolith membrance covers the hair cells but not in the rim zones of the epithelia with undifferentiated cells. The quantity of otoconia in the otolith membrane of simulated tadpoles seems to be diminished. The results are compared with data from flown experiments and some concordance was noted. (Author)

A79-53288 Male and female characteristics in vestibular testing - A step toward the selection of the best participants for space flight. G. Aust, J. R. Hordinsky, B. Schmelzer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-80.* 13 p. 28 refs.

The responses of male and female test subjects who are motion sickness sensitive and resistant to vestibular tests are compared in order to evaluate sex differences in space flight suitability. Forty-two females and 44 males were subjected to a rotary motion sickness provocation test, a bithermal caloric test, a rotatory intensity damping test, a vestibular-spinal stepping test, pendular and unidirectional eye tracking tests and a test of caloric responsiveness under lower body negative pressure. Significant differences in vestibular nystagmus reaction were observed between males and females, indicating different operative nervous and psychological factors, however greater differences were observed between male and female groups designated motion sickness resistant and motion sickness sensitive on the basis of answers to a questionnaire. It is recommended that space flight selection procedures should seek to identify candidates with potential motion sickness sensitivity by vestibular tests and motion sickness histories. A.L.W.

A79-53289 **Preliminary selection of candidates for space flights.** S. Baranski, Z. Gierowski, and K. Klukowski (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-83.* 6 p. 6 refs.

Physiological and psychological aspects of Polish cosmonaut candidate selection are discussed. The physical training program undergone by groups of potential candidates is outlined and increases in physical fitness attained are illustrated graphically. Tests of tolerance to simulated flight conditions (acceleration, hypoxia, pressure and altitude) as well as cardiorespiratory efficiency, visual acuity, vestibular organ sensitivity, perceptual, intellectual and psychomotor abilities and personality are indicated, and criteria for the selection of the candidates chosen on the basis of the test results are discussed. Advantages of the training program in the evaluation of medical and psychological factors, particularly vestibular and vasomotor responses, are pointed out. A.L.W.

A79-53290 **A new application of LBNP to measure orthostatic tolerance before and after O-G simulation /water immersion/.** J. R. Hordinsky, U. Gebhardt, H. J. Borger, and J. Birk (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-87.* 16 p. 21 refs.

The absolute orthostatic tolerances and orthostatic tolerances after periods of weightlessness simulation of male and female subjects are measured by means of lower body negative pressure (LBNP) tests. Subjects were exposed to increasing levels of LBNP until the onset of syncope or a prescribed set of symptoms as an isolated test, and before and after exposure to six hours of bed rest or water immersion. Mean tolerance times are found not to differ significantly between males and females, to correlate slightly with certain physiological factors, and not to depend on smoking history, exercise history, time of day, type of LBNP endpoint and contraceptive pill usage. Decreases in LBNP tolerance were observed after bed rest and water immersion in males and females. Tolerance levels attained are compatible with those obtained with males in other investigations, and indicate that responses to -50 mm Hg LBNP do not allow the prediction of absolute tolerance levels. A.L.W.

A79-53291 * **Bioinstrumentation for evaluation of workload in payload specialists - Results of ASSESS II.** H. M. Wegmann, R. Herrmann (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany), and C. M. Winget (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-88.* 12 p. 6 refs.

Results of the medical experiment on payload specialist workloads conducted as part of the ASSESS II airborne simulation of Spacelab conditions are reported. Subjects were fitted with temperature probes and ECG, EEG and EOG electrodes, and hormone and electrolyte excretion was monitored in order to evaluate the changes in circadian rhythms, sleep patterns and stress responses brought about by mission schedules over the ten days of the experiment. Internal dissociations of circadian rhythms, sleep disturbances and increased stress levels were observed, especially during the first three days of the experiment, indicating a considerable workload to be imposed upon the payload specialists. An intensive premission simulation is suggested as a means of estimating overall workloads and allowing payload specialist adaptation to mission conditions. The bioinstrumentation which was developed and applied to the airborne laboratory is concluded to be a practical and reliable tool in the assessment of payload specialist workloads. A.L.W.

A79-53293 **Evolution of space suit technology.** W. Elkins (Acurex Corp., Aerospace Systems Div., Mountain View, Calif.). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-92.* 13 p. 10 refs.

The paper defines the evolution of hard/hybrid technology, how it is being utilized in the Shuttle suit, and predictions for its application in future space suit designs. The discussion focuses on soft suit technology, hard suit and hybrid suit development, as well as high-pressure suit development. The Shuttle extravehicular maneuvering unit (EMU) represents a combination of the two distinct technologies. It employs typical soft suit technology in the sewn restraint and bladder layers of the arms, glove, waist, lower torso, legs and boots. The EMU also contains multiple sealed bearing joint elements, a rolling convolute single wall laminate shoulder joint element, hard structure upper torso, rigid torso closure, torso sealed bearing, and modular sizing; these elements are derived from hard/hybrid suit technologies. Certain details of future development of space suit technology are mentioned, including in-orbit resizing of the space suit to fit successive shifts of space workers, and quick in-orbit change out of pressure suit components. S.D.

A79-53294 * **Food and waste management biotechnology for the space shuttle.** R. W. Murray, J. D. Schelkopf, S. R. Hunt (General Electric Co., Philadelphia, Pa.), and R. L. Sauer (NASA, Johnson Space Center, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-93.* 12 p.

Space-crew facilities for preparation, eating, personal hygiene and waste management are contained in one small area of the Shuttle Orbiter Mid-Deck, all the functional systems being interconnected. The paper discusses three major systems: (1) the Galley, which includes the personal hygiene station and food packages; (2) the Waste Collector, which includes provisions for male and female users, urine, feces and emesis collection in both a normal and contigency mode of operation; and (3) Biowaste Monitoring, which includes mass measurement and sampling. The technology improvement continues by assuring that the Orbiter systems have sufficient design flexibility to permit later improvements in operation and in function. S.D.

A79-53295 **Thoughts about man-machine interrelations in space flights applied to Spacelab missions.** P. Stampfl (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Bereich für Projektträgerschaften, Cologne, West Germany). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-95.* 17 p.

The paper discusses certain aspects of man-machine interface as related to manned Spacelab missions. The constraints on the human side and on the hardware side, which determine the man-machine interface, are identified and discussed. Specific rules for the days of launch and landing are given in terms of sleep times and lengths. Kinds of activities to be carried out during Spacelab missions are determined experimentally, where timeline is the sequency of activities during a manned space-flight mission. Valuable recommendations are given to prospective experimenters for successful accomplishment of Spacelab missions. Timeline analysis for Spacelab 1 and available Skylab experience have highlighted the possible role of man in space research activities. S.D.

A79-53296 **Equipment for surgical interventions and childbirth in weightlessness.** H. G. Mutke. *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-97.* 5 p.

A very lightweight, transparent plastic sack is developed which can contain all necessary instruments and free-floating liquids for surgical interventions and animal experiments in future (manned) Space Shuttle missions. This equipment can be attached to the affected crew member or used for experiments in such a way that the area to be treated is closed off from the environment. This operation sack can be inflated with a foot-operated electrical pump so that the experimenter and his assistants can operate within the sack without obstruction through long-sleeved plastic gloves under sterile conditions. Other details are also described. Since operations, experiments and even, for example, childbirths, can only take place when special precautionary measures have been taken to prevent contamination of

the spacecraft by blood or other liquids or secretions, such equipment is indispensable for future Spacelab missions and larger platforms. S.D.

A79-53297 Selection, training, and health care of working specialists for Shuttle/Spacelab and future space station missions. G. L. Murphy (McDonnell Douglas Astronautics Co., Huntington Beach, Calif.) and A. Kubozono (National Space Development Agency of Japan, Office of Space Shuttle Utilization, Tokyo, Japan). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-99.* 25 p. 10 refs. (MDAC-WD-2976)

The purpose of this paper is to describe selection procedures and criteria for Shuttle payload specialists, to relate these procedures and criteria to the clinical selection of working specialists for future space stations, and to provide useful proposals for selection of space station working specialists. The paper describes selection, training, and health care requirements imposed by NASA, processes used in selection of payload specialists for Spacelab 1, and planning by the Japanese for selection of payload specialists for Japanese Shuttle/Spacelab flights, and extrapolates these experiences to the requirements for selection of working specialists for advanced space stations. (Author)

A79-53424 * Considerations associated with the introduction of female crewmembers in spacecraft and space stations. J. W. Brown (NASA, Johnson Space Center, Houston, Tex.). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-A-22.* 18 p. 15 refs.

This paper examines considerations of inclusion of female crewmembers in spacecraft and space stations. The anthropometric and physiological differences between males and females as related to spaceflight such as body dimensions, muscle strength characteristics, body posture, reach, and physiological differences are discussed. Crew provisions including inflight garments, hair style, cosmetics, personal hygiene, waste management, and personal privacy are described. Impacts on hardware design and crew performance, examples of effects on Orbiter systems, data on females and their performance under conditions analogous to spaceflight, and earth-based simulation experience are examined. It is concluded that no major problems have been found which would preclude females from space, and in the future the novelty of mixed crews will significantly decrease. A.T.

A79-53425 Communication problems of international crews. V. Remek (Czechoslovak Academy of Sciences, Czechoslovak Committee Interkosmos, Prague, Czechoslovakia). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-A-23.* 13 p. 18 refs.

Problems in verbal communication with and among members of international space crews are discussed, emphasizing operational experience in the Intercosmos program. The space communication environment is examined, noting the complexity of communication circuits and the need for precision in technical directives. Means of communication optimization are suggested, including increasing the depth and extent of term standardization, and crew training for different levels of communication. Consideration is given to the linguistic arrangements made for the Apollo-Soyuz Test Project, and the problems within the Intercosmos program are distinguished, stressing the importance of a good knowledge of the Russian language. Communication aspects of the Soviet-Czechoslovak mission are considered, and the disturbance to the verbal behavior of the Czech participant in the mission is analyzed. A.L.W.

A79-53426 Psychological training - One of the most important factors of enhancing the safety of space flights. G. T. Beregovoi, I. V. Davydov, N. V. Krylova, and I. B. Solov'eva (Academy of Sciences, Institute of Psychology, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-A-24.* 5 p.

The role of psychological training in enhancing cosmonaut preparedness for normal and emergency spacecraft operations is discussed. The use of such real-life emotiogenic situations as flying an aircraft or parachuting to teach an operator to concentrate on his performance under unusual, stressful situations is explained. Consideration is also given to environmental training courses designed to give cosmonauts confidence in dealing with unexpected landing environments, and the effectiveness of this training approach is illustrated by examples of successfully executed emergency landings in extreme or hazardous environments. A.L.W.

A79-53447 The biomedical implications of extended duration zero-g extravehicular activities. A. H. Bellenkes (Delaware, University, Newark, Del.). *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper 79-ST-06.* 13 p. 24 refs.

The in-orbit construction of large space structures will require the use of lengthy extravehicular activities (EVAs) primarily in the assembly and maintenance phases. There are preliminary estimates that complete construction of, for example, a solar power satellite will require nearly a year, perhaps longer during the initial stages of the SPS program. After presenting a brief historical survey of past EVA programs and procedures, the paper addresses the biomedical variables which may be encountered by astronauts working for very long periods of time in the weightless environment. Furthermore, possible designs for extended duration life support systems are discussed with emphasis placed on the areas of basic biomedical conditioning, in-orbit living facilities, typical EVA workloads, and other related variables. Finally, current and proposed mission designs are discussed in terms of present technologies. (Author)

A79-53486 Physiologicohygienic and ergonomic aspects of Salyut 6 cosmonauts extravehicular activity /EVA/. A. S. Barer, M. I. Vackar, O. G. Gazenko, L. G. Golovkin, V. P. Zinchenko, G. I. Severin, S. N. Filipenkov, and V. V. Chigolev. *International Astronautical Federation, International Astronautical Congress, 30th, Munich, West Germany, Sept. 17-22, 1979, Paper.* 7 p.

Measurements of changes in Salyut 6 cosmonaut physiological parameters and life-support system parameters during two occasions of EVA are reported. Excursions from the Salyut 6 orbital space station were performed for 88 and 125 minutes, with total stay times of 220 and 240 minutes, respectively, in a new semirigid liquid-cooled space suit with an integrated self-contained life support system. Pulse rate and respiratory rate telemetry data were found to be adequate to the work performed during the EVAs, and to be in general related to energy cost levels, which were determined from measurements of body temperature, suit temperature and respiratory functions. Ratios of energy cost levels to heat removal rates indicate that the life support system generally provided sufficient thermal conditioning during all phases of EVA, despite reported short-term sensations of local overcooling or overheating. A.L.W.

A79-53516 Lightweight helmet-mounted eye movement measurement system. J. A. Barnes (U.S. Army, Human Engineering Laboratory, Aberdeen Proving Ground, Md.). In: Electro-Optics/Laser Conference and Exposition, Boston, Mass., September 19-21, 1978, Proceedings. Chicago, Industrial and Scientific Conference Management, Inc., 1978, p. 343-347.

A helmet-mounted optical system has been developed for determining aircrewman's fixation points and paths of eye movement between fixation points. The optical system components are an optical head, a CID video camera, a video recorder, a monitor/receiver, a video transmitter, and a coupling lens. Consideration is given to the design and performance of the system. B.J.

A79-53531 **Theoretical foundations of cardiovascular processes.** Edited by D. N. Ghista (Michigan Technological University, Houghton, Mich.), E. Van Vollenhoven, W.-J. Yang (Michigan, University, Ann Arbor, Mich.), and H. Reul. Basel, S. Karger AG (Advances in Cardiovascular Physics. Volume 1), 1979. 192 p. $58.75.

The theory and governing equations of the electrical and magnetic processes, solid and fluid mechanics, and transport mechanisms of the cardiovascular system are presented. Attention is given to the electrical activity and magnetic field of the heart, thus providing the biophysical basis of electro- and magnetocardiography. The governing equations and models describing the constitutive properties of blood and the vasculature, and blood flow in the cardiovascular system are treated. Equations are presented for the mechanics and thermodynamics of biotransport processes, and heat transfer processes in thermoregulation and circulation measurement are examined. A.L.W.

A79-53532 **Fundamentals of electrical processes in the electrophysiology of the heart.** R. Plonsey (Case Western Reserve University, Cleveland, Ohio). In: Theoretical foundations of cardiovascular processes. Basel, S. Karger AG, 1979, p. 1-28. 22 refs. Grants No. NIH-HL-10417; No. NIH-HL-17931.

This chapter constitutes the biophysical basis for quantitative electrocardiography. It develops the fundamental equations of electricity which are applicable in study of the electrophysiology of the heart. Measurements which reveal some of the character of cardiac electrophysiology are described and the results are discussed. (Author)

A79-53533 **The theory of the magnetocardiogram.** J. H. Tripp (Case Western Reserve University, Cleveland, Ohio). In: Theoretical foundations of cardiovascular processes. Basel, S. Karger AG, 1979, p. 29-46. 38 refs. Grant No. NIH-RR-07113-09.

The formal theory of the magnetic field surrounding the heart is developed by treating the heart as a distributed current dipole source immersed in an inhomogeneous conducting medium. Equations governing the electric potential and the magnetic field are derived, following which a multipole expansion of the magnetic vector potential is used to obtain expressions for the dipole moments. These moments are then compared with the electric and magnetic heart vectors and it is shown how a lead field theory can be developed to yield expressions enabling these heart vectors to be measured directly. Some actual theoretical investigations which have made use of the formalism are then summarized. Finally, consideration is given to the potential practical importance of and future outlook for magnetocardiology. (Author)

A79-53534 **Basic biomechanics equations for cardiovascular flow.** T.-K. Hung (Pittsburgh, University, Pittsburgh, Pa.), G. Bugliarello (New York, Polytechnic Institute; New York, N.Y.), and C. E. Quevedo (Escuela Politécnica Nacional; Universidad Central del Ecuador, Quito, Ecuador). In: Theoretical foundations of cardiovascular processes. Basel, S. Karger AG, 1979, p. 47-101. 32 refs.

The basic equations of mass, momentum and energy transfer for biological flow processes are derived along with the equations of motion of the flexible blood vessel boundaries. For Newtonian fluids, the Navier-Stokes equations are simplified for linear flow processes as well as for one-dimensional analyses. A generalized Bernoulli's theorem is introduced to include the effects of the flexible boundary and of the unsteadiness of flow on energy balance. Electrical analog, hydraulic impedance and Windkessel theory are introduced along with non-linear analysis for flow and pressure pulses. (Author)

A79-53535 **Equations on biotransport mechanisms.** W.-J. Yang (Michigan, University, Ann Arbor, Mich.). In: Theoretical foundations of cardiovascular processes. Basel, S. Karger AG, 1979, p. 102-127. 6 refs.

The paper deals with the principles and laws which govern the transformation of energy and the transfer of energy and matter within a system or between the system and its environment. Important concepts in equilibrium thermodynamics and transport phenomena are outlined. Attention is given to the first and second laws of thermodynamics, free energy and its changes, reaction equilibrium constant, transfer potentials, some laws of physicochemical behavior, transport fluxes and principles of conservation of properties. Basic equations governing the physical, chemical and electrical behavior during material transformation are included. S.D.

A79-53536 **Bio-heat transfer processes, for human thermoregulatory and circulatory characteristics measurements.** U. Dinnar (Technion - Israel Institute of Technology, Haifa, Israel). In: Theoretical foundations of cardiovascular processes. Basel, S. Karger AG, 1979, p. 128-179. 40 refs.

Life is a continuous process of energy exchange between the body and the environment. This exchange of energy is carried out in different forms and its task is to maintain a fairly constant core temperature inside the body. The paper reviews various bioheat transfer processes: metabolism and other internal heat production, evaporation, conduction, convection, radiation and the work produced by the body. These items are discussed separately and then combined to form a gross model of the thermoregulatory system. Also discussed are measurement techniques, based on heat transfer principles, relative to velocity measurements, cardiac output measurement by thermodilution, local thermodilution for single blood vessels, and medical thermography. Further applications are mentioned, including the application of heat transfer in the study of skin burns, heat transfer in cryosurgery, and heat therapy. S.D.

A79-54091 **The retinal resolving power measured by laser interference fringes.** B. Rassow (University Eye Hospital, Hamburg, West Germany). In: European Electro-Optics Conference, 4th, Utrecht, Netherlands, October 10-13, 1978, Proceedings. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1979, p. 154-157.

A small device developed and constructed for daily routine eye measurements in hospital is described. The laser beam of a helium-neon laser is reflected from both surfaces of a glass plate. The two bundles created by this reflection are focused in the nodal plane of the eye examined. Interference fringes in the overlapping area are independent of the optics of the eye. Observing the fringes means that the resolving power of the retina-brain system is sufficient for this frequency. Variation of the line frequency is done by changing the glass plates. Glass plates of different thickness give different distances of the two light points in the pupil of the eye. A small distance corresponds to low and a greater distance to high frequency. V.T.

A79-54251 **Optokinetic reactions in man elicited by localized retinal motion stimuli.** M. F. W. Dubois and H. Collewijn (Rotterdam, Erasmus Universiteit, Rotterdam, Netherlands). *Vision Research*, vol. 19, no. 10, 1979, p. 1105-1115. 25 refs. Research supported by the Foundation for Medical Research.

A79-54252 **Changes in critical duration during dark-adaptation.** S. Montellese, L. T. Sharpe, and J. L. Brown (Rochester, University, Rochester, N.Y.). *Vision Research*, vol. 19, no. 10, 1979, p. 1147-1153. 48 refs. Contract No. N14-76-C-0189; Grant No. NIH-EY-00680.

Critical duration was measured using a 10 min test spot, located 5 deg from the fovea, in the nasal visual field. Subjects (N=2) were pre-adapted to a luminance of 2.3 L (23,000 td) for 10 min. Data were then collected at 250 and 500 msec, 1, 2, 4, 7, and 10 sec of dark-adaptation. For each of these times, stimulus duration ranged from 9.5 to 152 msec and temporal summation capability was calculated from resulting threshold determinations. Within the first 10 sec of dark-adaptation, critical duration increased from 30 to 80 msec, with approx. 75% of the change occurring within the first 2 sec

for both observers. These results show that increases in temporal summation capability contribute to lowering of threshold primarily during the very early stages of dark-adaptation. (Author)

A79-54253 **A comparison of oculomotor and motion parallax cues of egocentric distance.** W. C. Gogel and J. D. Tietz (California, University, Santa Barbara, Calif.). *Vision Research,* vol. 19, no. 10, 1979, p. 1161-1170. 12 refs. NSF Grant No. BNS-77-16620.

Using the head motion procedure, the apparent distance of a point of light in an otherwise dark visual field was measured under conditions in which oculomotor cues (accommodation, convergence) and absolute motion parallax were varied together and separately. It was concluded that absolute motion parallax is almost as effective a cue to distance as are oculomotor cues from monocular observation, but is not as effective as oculomotor cues from binocular observation. Evidence was also presented that the null adjustment method, used in conjunction with the head motion procedure, provides an unbiased measure of apparent distance. (Author)

A79-54254 **Eye torsion in response to a tilted visual stimulus.** D. R. Goodenough, E. Sigman, P. K. Oltman, J. Rosso, and H. Mertz (Educational Testing Service, Princeton, N. J.). *Vision Research,* vol. 19, no. 10, 1979, p. 1177-1179. 12 refs. Grant No. NIH-MH-21989.

The induction of vestibular-controlled eye torsion by a tilted stationary visual stimulus is examined. Torsional eye responses to the rod-and-frame display, in which a vertical rod is viewed inside a frame when both are tilted, both are vertical or the rod is vertical and the frame is tilted (rod and frame illusion), were recorded photographically. Eye orientation is found to follow the tilt of the stimulus, changing on the average by 0.29 deg in response to a stimulus tilt of 28 deg. The discrepancy between the present results and the negative results obtained by Howard and Templeton (1964) is explained by the retinal eccentricity of the present stimulus. It is also concluded that, although eye torsion may contribute to the rod and frame illusion, the magnitude of the torsional response appears to be too small to account entirely for the illusory effects of the tilted frame on rod orientation. A.L.W.

A79-54266 **Evidence for increased intrathoracic fluid volume in man at high altitude.** J. J. Jaeger, J. T. Sylvester, A. Cymerman, J. J. Berberich, J. C. Denniston, and J. T. Maher (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 47, Oct. 1979, p. 670-676. 34 refs.

To determine if subclinical pulmonary edema occurs commonly at high altitude, 25 soldiers participated in two consecutive 72-h field exercises, the first at low altitude (200-875 m) and the second at high altitude (3,000-4,300 m). Various aspects of ventilatory function and pulmonary mechanics were measured at 0, 36, and 72 h of each exercise. Based on physical examination and chest radiographs there was no evidence of pulmonary edema at high altitude. There was, however, an immediate and sustained decrease in vital capacity and transthoracic electrical impedance as well as a clockwise rotation of the transpulmonary pressure-volume curve. In contrast, closing capacity and residual volume did not change immediately upon arrival at high altitude but did increase later during the exposure. These observations are consistent with an abrupt increase in thoracic intravascular fluid volume upon arrival at high altitude followed by a more gradual increase in extravascular fluid volume in the peribronchial spaces of dependent lung regions. (Author)

A79-54267 **Metabolic adrenergic changes during submaximal exercise and in the recovery period in man.** J. M. Pequignot, L. Peyrin, M. H. Mayet, and R. Flandrois (CNRS, Laboratoire de Physiologie; Lyon I, Université, Lyon, France). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 47, Oct. 1979, p. 701-705. 31 refs.

A79-54268 **Influence of skin temperature on sweating and aerobic performance during severe work.** C. T. M. Davies (Medical Research Council, Environmental Physiology Unit, London, England). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 47, Oct. 1979, p. 770-777. 27 refs.

A79-54269 * **Radiographic comparison of human lung shape during normal gravity and weightlessness.** D. B. Michels, P. J. Friedman, and J. B. West (California, University, La Jolla, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 47, Oct. 1979, p. 851-857. 20 refs. Grant No. NGL-05-009-109.

Chest radiographs in five seated normal volunteers at 1 G and 0 G were made with a view toward comparing human lung shape during normal gravity and weightlessness. Lung shape was assessed by measuring lung heights and widths in upper, middle and lower lung regions. No significant differences were found between any of the 1-G and 0-G measurements, although there was a slight tendency for the lung to become shorter and wider at 0 G. The evidence that gravity causes regional differences in ventilation by direct action on the lung is consistent with the theoretical analysis of West and Matthews (1972). S.D.

STAR ENTRIES

N79-32822*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MICROBIOLOGICAL EVALUATION OF THE MOBILE BIOLOGICAL ISOLATOR SYSTEM
Daniel M. Taylor, Frank Morelli, William Neiderheiser, and Wallace M. Tratz 1 Jul. 1979 61 p refs
(Contract NAS7-100)
(NASA-CR-162293; JPL-Pub-79-48) Avail: NTIS HC A04/MF A01 CSCL 06C

Evaluations on critical components of the mobile biological isolation system were performed. High efficiency particulate air filter efficiency and suit integrity were found to withstand repeated ethylene oxide (ETO) sterilizations. The minimum ETO sterilization time required to inactivate all contaminant organisms was established at four hours. Two days of aerating at 120 F was found to dissipate all harmful ETO residuals from the suit. Donning and doffing procedures were clarified and written specifically for isolation rooms. Author

N79-32823# Missouri Univ. - Columbia. Dept. of Veterinary Microbiology.
MECHANISMS OF OXYGEN TOXICITY AT THE CELLULAR LEVEL Annual Status Report, Jan. 1978
Olen R. Brown, Laurie Foudin, Fred Yein, Patti Gilliland, Richard Seither, and Doris Song 1 Jan. 1978 16 p refs
(Contract N00014-76-C-0328; NR Proj. 204-020)
(AD-A070026; Rept-32) Avail: NTIS HC A02/MF A01 CSCL 06/20

Oxygen at elevated pressures is toxic for life forms from microbes to man. Growth is inhibited in Escherichia coli and results primarily from poisoning of specific enzymes in the following biosynthetic pathways branched-chain and aromatic amino acids, NAD-niacin, phosphoribosylpyrosphosphate PRPP and reverse glycolysis. Inhibition of amino acid biosynthesis indirectly stops protein synthesis and induces 'stringency' production of pp-guainine-pp, a powerful inhibitor of metabolic processes which accounts for inhibition in metabolic processes where there is no observed enzymatic poisoning. Inhibitions in the PRPP, NAD-niacin, and reverse glycolysis pathways are significant to bacterial and perhps to human oxygen toxicity where products of the pathways protect. Author (GRA)

N79-32824# Ohio State Univ., Columbus. Dept. of Statistics.
ESTIMATION OF RATE CONSTANTS IN THE MICHAELIS-MENTEN MODEL
J. S. Rustagi and Joanne Yang Mar. 1979 18 p refs
(Contract N00014-78-C-0543)
(AD-A070360; TR-177) Avail: NTIS HC A02/MF A01 CSCL 12/1

Nonlinear models leading to the Michaelis-Menten scheme result from the study compartment systems as well as in other contexts. Using difference equation approach, rate constants are estimated in some simple models. Simulation methods are used to derive the distributions of these estimates. It is shown that the assumptions of normality of errors leads to the normal distribution of the estimated rate constants. Author (GRA)

N79-32825 Pennsylvania Univ., Philadelphia.
OXYGEN DELIVERY IN THE HYPOXIC PERFUSED HEART: RELATION TO FUNCTIONAL AND METABOLIC CHANGES Ph.D. Thesis
Charles Steenbergen 1979 261 p
Avail: Univ. Microfilms Order No. 7919520

It is recognized that the distribution of oxygen delivery is markedly altered by local vascular changes in the absence of any physical impediment to flow, and that local vascular control mechanisms result in decreased coronary perfusion into small areas of tissue. The contribution of these mechanisms to ischemia induced changes in contractility and metabolism is assessed utilizing NADH fluorescence photography. Results indicate (1) during ischemia, there is a parallel decline in effluent pH, intracellular pH, and pressure development; (2) the negative inotropic effect of ischemia is primarily due to acid accumulation despite the presence of relatively nonfunctioning, anoxic cells; and (3) decreased intracellular pH in the aerobic tissue does not substantially diminish high energy phosphate reserves, while in the anoxic tissue, high energy phosphate levels decline rapidly. Dissert. Abstr.

N79-32826# Illinois Univ. at Chicago Circle, Chicago. Dept. of Materials Engineering.
REFINEMENT AND VALIDATION OF A THREE-DIMENSIONAL HEAD-SPIN MODEL Final Report, 1 Jan. 1976 - 31 Dec. 1977
T. Belytschko and E. Privitzer Wright-Patterson AFB, Ohio AMRL Aug. 1978 162 p refs
(Contract F33615-76-C-0506)
(AD-A062502; AMRL-TR-78-7) Avail: NTIS HC A07/MF A01 CSCL 06/16

Four models of varying orders of complexity were developed, ranging from a complex model with 252 degrees of freedom to a vary simplified model with 32 degrees of freedom. Comparisons of the impedance curves of the models with experimentally developed curves show good agreement, both in the magnitudes and locations of peaks. Furthermore, by varying the components of the model it was shown that the primary peaks in the impedance curve in the 5 to 7 Hz range result from a combination of buttock-seat resonance, the flexural response of the spine and visceral resonance. Analogous head-spin models were developed for the chimpanzee, baboon, and rhesus monkey. Impedance curves are presented for these models and show significant differences in character from that of the human spine models. Model studies are presented for ejection loading and for pre-ejection alignment by an inertial reel. The influence of various parameters, such as head position and the restraint system properties, were studied. Author

N79-32827# Department of Energy, Washington, D. C.
METHODS FOR STUDYING AND CRITERIA FOR EVALUATING THE BIOLOGICAL EFFECTS OF ELECTRIC FIELDS OF INDUSTRIAL FREQUENCY
B. M. Savin, M. G. Shandala, K. V. Nikonova, and Yu. A. Morozov 1978 24 p refs Presented at Criteria for Evaluating the Biological Efforts, Paskeut, USSR, 15 May 1978
(CONF-780541-1) Avail: NTIS HC A02/MF A01

Data are reviewed from a number of U.S.S.R. research studies on the biological effects of electric power transmission lines of 1150 Kv and above. Effects on man, plants, animals, and terrestrial ecosystems are reported. Existing health standards in the U.S.S.R. for the exposure of personnel working in electric fields are included. It is concluded that high voltage electric fields have a harmful effect on man and his environment. DOE

N79-32828# Battelle Pacific Northwest Labs., Richland, Wash.
REVIEW OF UNFOLDING METHODS USED IN THE US AND THEIR STANDARDIZATION FOR DOSIMETRY
C. A. Oster [1979] 20 p refs Presented at the 2nd ASTM-EURATOM Symp. on Reactor Dosimetry: Dosimetry Methods for Fuels, Cladding and Structural Mater., Palo Alto, Calif., 3-7 Oct. 1977
(Contract EY-76-C-06-1830)
(BNWL-SA-6503; Conf-771036-17) Avail: NTIS HC A02/MF A01

A summary of the methods used in the U.S. to unfold radiation spectra is given. For discussion purposes, the methods studied are placed in groups, based on the algorithm used for unfolding and/or treatment of data uncertainties. Specific codes from each

group are selected and examined for their role in dosimetry standardization. Finally, the preparation of the ASTM recommended practices and use of benchmark problems in the standardization process are discussed. DOE

N79-32829# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

EFFECTS OF ACUTE NOISE TRAUMATA ON WHOLE-NERVE AND SINGLE-UNIT ACTIVITY

G. F. Smoorenburg and E. vanHeusden 1978 12 p refs Presented at 15th Workshop on Inner Ear Biol., Seefeld, Austria, Sep. 1978

(IZF-1978-23; TDCK-71654) Avail: NTIS HC A02/MF A01

Some preliminary results of a research program on the effects of noise traumata on cochlear functioning are given. Measurements reported include the latency of the whole-nerve (compound) action potential (AP), the selectivity of frequency-tuning curves (e.g. the Q10-values) measured for the AP (with a forward-masking technique) and for single units in the antero-ventral cochlear nucleus, the degree of phase-locking of the action potentials of these units to the stimulus waveform, and the phase of the stimulus waveform to which these potentials are locked. The noise traumata were induced during the experiments. Results show that the AP latency increases after inducement of a noise trauma if the stimulus is presented at the same sound pressure level as before the trauma. An effect of the noise trauma on Q10 values, although small, can be measured. Neither the AP latency data nor the response times calculated from single-unit data suggest that a decrease in the sharpness of tuning found after inducement of noise trauma is accompanied by a decrease of cochlear response times. Author (ESA)

N79-32830# National Technical Information Service, Springfield, Va.

HYPOTHERMIA. A BIBLIOGRAPHY WITH ABSTRACTS Report, 1964 - May 1979

Elizabeth A. Harrison Jun. 1979 246 p Supersedes NTIS/PS-78/0517; NTIS/PS-77/0419; NTIS/PS-76/0398

(NTIS/PS-79/0533/4; NTIS/PS-78/0517; NTIS/PS-77/0419; NTIS/PS-76/0398) Avail: NTIS HC $28.00/MF $28.00 CSCL 06S

The selected abstracts cover high pressure narcosis, organ preservation, hyperbaric conditions, thermal homeostasis, thermoregulation, cold stress, cold tolerance, physiological effects and cold water immersion as related to hypothermia. (This updated bibliography contains 238 abstracts, 12 of which are new entries to the previous edition.) GRA

N79-32831# Naval Aerospace Medical Research Lab., Pensacola, Fla.

HUMAN PERFORMANCE IN TIME-SHARED VERBAL AND TRACKING TASKS Interim Report

Steven D. Harris, Jerry M. Owens, and Robert A. North Apr. 1979 27 p refs

(ZF5154004)

(AD-A070275; NAMRL-1259) Avail: NTIS HC A03/MF A01 CSCL 17/2

Significant progress has been made in the development of automated speech understanding systems for application to naval aviation systems. One advantage that is anticipated for speech over conventional man-machine interfaces is that speech could function as an independent channel for the control of systems. The experiment reported in this paper represents an initial effort to investigate the assumption that an automatic speech understanding system will provide a parallel channel for the performance of an information processing task currently with a visual/manual control task. The experiment required human subjects to time-share a digital information processing task and a continuous compensatory tracking task. Independent variables in the design were task loading (single- vs. dual-task conditions), stimulus presentation modality for the digital task (auditory vs. visual), and response modality for the digital task (voice vs. keyboard). Data from 16 subjects were analyzed. The results indicated that the combination of visual stimulus modality and voice response provided optimum joint-task performance. No combination of stimulus and response modalities resulted in equivalent single- and dual-task performance. Future experiments should be designed to investigate the joint-task performance space for tasks that are more representative of the information processing performance requirements of specific systems. However, the interpretability of the results of such research will depend upon the solution of methodological problems, such as how to control or account for subjects' speed-accuracy tradeoff strategies and the priorities they place upon the concurrent tasks. GRA

N79-32832# Air Force Human Resources Lab., Brooks AFB, Tex.

PILOT PERFORMANCE IN SIMULATED AERIAL REFUELING AS A FUNCTION OF TANKER MODEL COMPLEXITY AND VISUAL DISPLAY FIELD-OF-VIEW Final Report, Oct. 1977 - Feb. 1978

Robert R. Woodruff, Thomas M. Longridge, Jr., Philip A. Irish, III, and Richard T. Jeffreys May 1979 25 p refs

(AF Proj. 1123)

(AD-A070231; AFHRL-TR-78-98) Avail: NTIS HC A02/MF A01 CSCL 05/9

This research was conducted in the Advanced Simulator for Pilot Training (ASPT) to determine Computer Image Generation (CIG) complexity and field-of-view (FOV) requirements for aerial refueling (AR). The adequacy of three detail levels and five FOVs was assessed. Aircraft simulated, in addition to the KC-135 tanker, were the A-10, F-4, B-52, and F/FB-111. Twelve experienced pilots (three per aircraft) served as subjects. Performance measures included elapsed time to criterion, number of disconnects and aircraft control profile. An assessment of FOV position employed for takeoff/landing versus AR was also made. A-10 and F-4 pilots found the visual FOV position employed for simulated takeoff/landing must be raised approximately 12 degrees to accomplish AR. B-52 and F-111 pilots found AR could be satisfactorily performed using the same FOV position employed for takeoff/landing. Performance measures clearly indicated that AR performance varies as a function of both FOV size and tanker detail level. The larger the FOV, the better the performance. Similarly, the more detailed the tanker model, the better the performance. GRA

N79-32833# Catholic Univ. of America, Washington, D. C. Dept. of Psychology.

A COMPARISON OF VERBAL AND VISUAL IMAGERY LEARNING STATEGIES: THEIR IMPORTANCE FOR INSTRUMENTAL TECHNOLOGY Final Report, Jan. 1976 Dec. 1978

Forrest R. Ratliff, James A. Earles, James D. Ratliff, and Dale Wissman 1 Dec. 1978 214 p refs

(Grant AF-AFOSR-2973-76; AF Proj. 2313)

(AD-A069983; AFOSR-79-0673TR) Avail: NTIS HC A10/MF A01 CSCL 05/10

Two learning experiments were conducted to compare verbal and imagery based encoding techniques. Experiment 1 was conducted under rigorously controlled conditions comparing four encoding methods, and Experiment 2 compared the imagery matrix and eclectic verbal encoding in a classroom environment. The results showed the imagery matrix to be superior to all other methods and imagery based methods were superior over all to verbally mediated methods. The imagery matrix is suitable for use in an instructional technology. Author (GRA)

N79-32834# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.

PERFORMANCE AND WORKLOAD ANALYSIS OF INFLIGHT HELICOPTER MISSIONS

P. H. Wewerinke 10 Apr. 1979 34 p refs Presented at 13th Ann. Conf. on Manual Control, Cambridge, Mass., 15-17 Jun. 1979 Sponsored by Res. Branch of the Directorate of Mat. Air RNLAF

(NLR-MP-77013-U) Avail: NTIS HC A03/MF A01

The potentials of an optimal control model for predicting the characteristics of realistic operational helicopter missions were assessed. The theoretical and experimental results indicate that the optimal control model succesfully predicts the best attainable (rather than the average) performance of a group of well-trained, highly motivated subjects. Furthermore, the model

allows a description of inter-subject variability. The control effort model predictions are supported by subjective ratings. The model provides a meaningful representation of pilot workload relative to complex control tasks. Author (ESA)

N79-32835# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.

A THEORETICAL AND EXPERIMENTAL ANALYSIS OF THE OUTSIDE WORLD PERCEPTION PROCESS

P. H. Wewerinke 15 Jun. 1978 23 p refs Presented at 14th Ann. Conf. on Manual Control, Los Angeles, 25-27 Apr. 1978

(NLR-MP-78020-U) Avail: NTIS HC A02/MF A01

The outside scene is often an important source of information for manual control tasks. Important examples of this are car driving and aircraft control. The modeling for this visual scene perception process on the basis of linear perspective geometry and the relative motion cues is discussed. Model predictions, utilizing psychophysical threshold data from baseline experiments and literature on a variety of visual approach tasks, are compared with experimental data. Both the performance and workload results illustrate that the model provides a meaningful description of the outside world perception process, with a useful predictive capability. Author (ESA)

N79-32836# Research Inst. of National Defence, Stockholm (Sweden).

SHALIT PERCEPTUAL ORGANIZATION AND REDUCTION QUESTIONNAIRE (SPORQ). REPORT 2: CHARACTERISTICS AND RELIABILITY

Ben Shalit May 1979 73 p refs

(FOA-C-55031-H6) Avail: NTIS HC A04/MF A01

The characteristics and reliability of the Shalit Perceptual Organization and Reduction Questionnaire are examined. The population to which the test was applied consisted of three main groups: national servicemen-conscripts (N=201), professional soldiers (N=383), and civilians (N=145). Each of these were further subdivided into four groups representing various types of occupations or units. The distributions of their scores (structural - quantitative and content - qualitative) are analyzed and discussed. An analysis of structure and interrelationships between the elements of the test was made and a mapping sentence formulated. Test scoring reliability and test-retest reliability was also investigated. The test was shown to have good overall scoring and retest reliabilities, ranging from .70 to .98 and from .56 to .98, respectively. Author (ESA)

N79-32837# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

THE USE OF ARTIFICIAL SIGNALS DURING SONAR-WATCH

W. A. Wagenaar and A. F. Sanders 1978 7 p

(IZF-1978-25; TDCK-71719) Avail: NTIS HC A02/MF A01

The detection of submarines using CW 610 sonar on board Van Speyk class frigates was evaluated and found to be less than optimal. This loss in detection efficiency is attributed to degradation in operator's vigilance. As a possible solution to the vigilance problem operators were required to monitor the screen only for a short period of time (20 to 30 minutes) after which they either relaxed, or worked on something else, for the same length of time. However, laboratory experiments show that if the rest period is also rather unstimulating alertness is not improved. As an alternative, the frequent presentation of artificial signals, or echoes (without the operator knowing when or where such a signal will occur) was tried and knowledge of results about the detection of these artifical signals was provided to him. Results show that real signals are detected better under such circumstances and, moreover, that lapses of attention are counteracted. Author (ESA)

N79-32838# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

CAR DRIVING AS A CYBERNETIC TASK

G. J. Blaauw 1979 71 p refs In DUTCH; ENGLISH summary

(IZF-1979-6; TDCK-71982) Avail: NTIS HC A04/MF A01

The possibilities of cybernetics in analyzing driver's behavior quantitatively are evaluated. Several task analyses of driving are surveyed. The results of this survey are used systematically in presenting the available cybernetic models of driving. The cybernetic models of driving are grouped with respect to the number of input signals (as related to driver's search) and to the implementation of future information of signals (as related to driver's prediction). Models are described for lateral control as well as longitudinal control (car following). Models are not yet available for combinations of driving tasks. The representation consists of an estimated value and an uncertainty around the estimate for each state. Both values for all states initiate (1) an increase in attention to any state for which the uncertainty becomes too high, and (2) the execution of control actions. This model structure permits an analysis of the multivariable driving task in terms of supervisory control. As a result, driver's internal criterion can be determined in relation to driving experience, among other things. Author (ESA)

N79-32839# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

EFFECTS OF AMPHETAMINE ON RESPONSE SELECTION AND RESPONSE EXECUTION PROCESSES IN CHOICE REACTION TASKS

H. W. Frowein 1979 27 p refs Sponsored by Found. for Med. Res. FUNGO

(IZF-1978-8; TDCK-71983) Avail: NTIS HC A03/MF A01

Two experiments to investigate the effect of an amphetamine derivative (phentermine HCL) on different stages in the reaction process were carried out. Experiment 1 showed that amphetamine shortened the reaction time, but this effect was additive with the effects of relative signal frequency and stimulus-response compatibility, which suggests that the amphetamine effect on the reaction time cannot be attributed to a specific effect on the response selection stage. Experiment 2 showed that amphetamine shortened the movement time in a target-aiming task. This effect was greater for longer movements but independant of target width, which suggests that amphetamine specifically affects the motor processes involved in the execution of aiming responses, but that the visual feedback processes during the movements were not affected by amphetamine. In addition, Experiment 2 showed an effect of amphetamine on the reaction time which was interpreted in terms of an amphetamine effect on the preparatory motor processes proceeding the aiming response. These findings are consistent with findings in the literature suggesting effects of amphetamine in motor tasks rather than in cognitive and perceptual tasks. Author (ESA)

N79-32840# Houston Univ., Tex.

APPLICATION OF A STRUCTURED DECISION PROCESS FOR PROPER INCLUSION OF HUMAN RESOURCES IN THE DESIGN OF A POWER UNIT SUPPORT STAND

Interim Technical Report, 1 Sep. 1977 - 30 Sep. 1978

Benjamin Ostrofsky Sep. 1978 67 p refs

(Contract F49620-77-C-0116; AF Proj. 2313)

(AD-A069978; AFOSR-79-0669TR) Avail: NTIS HC A04/MF A01 CSCL 01/5

A structured design process was applied to the design of the F-16 Aircraft Emergency Power Unit (EPU) Service Stand. Explicit steps in the accomplishment of a set of candidate systems, development of a multi-attribute criteria function along with the attendant parameters and their feasible ranges, and the ordinal ranking of the candidate systems in order of preference were accomplished. An exploration of the design space was made to identify the parameter values which would yield the maximum theoretic value of the criteria for this design space and the results compared with the highest ranked candidate system. During the design of the Service Stand, no unusual emphasis on human factors was made with the design engineers, but the results indicate strong acceptance of human factors and human resource limitations when the problem definition is adequately structured for the designers. GRA

N79-32841# Trinity Univ., San Antonio, Tex. Dept. of Engineering Science.

A THEORETICAL INVESTIGATION OF POWER AND CONTROL CONFIGURATIONS FOR A HIGH G-ONSET CENTRIFUGE DRIVE SYSTEM Final Technical Report, Jun. 1978 - May 1979

T. J. Jones 22 May 1979 11 p
(Grant AF-AFOSR-3622-78; AF Proj. 2313)
(AD-A070912; AFOSR-79-0820TR) Avail: NTIS HC A02/MF A01 CSCL 14/2

An investigation of both the power drive system and the control system for high G-onset rates in a human centrifuge was carried out. Although the analysis was general, much of it specifically considered the A/F 37V-1 centrifuge at Brooks AFB. It is shown that an electric drive system, and gondola passenger control of G forces results in a system capable of simulating aerial combat maneuvers. The drive system consists of an SCR control of the A.C. line voltage applied to D.C. motors. The control system provides for cockpit stick control of the centrifuge's angular velocity and angular acceleration. GRA

N79-32842# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

COMBINED DISCRETE NETWORK: CONTINUOUS CONTROL MODELING OF MAN-MACHINE SYSTEMS Ph.D. Thesis

Deborah J. Seifert Mar. 1979 204 p refs
(AF Proj. 2313)
(AD-A071574; AMRL-TR-79-34) Avail: NTIS HC A10/MF A01 CSCL 05/8

The role of the human operator in control systems is evolving towards that of a supervisor who plans sequences, and monitors and away from strictly tracking. New modeling approaches and techniques are required to realistically represent and examine these new system configurations and resulting performance issues. This dissertation study proposed an alternate modeling approach comprised of discrete network models in combination with elements of an open-loop optimal control model formulation. The feasibility of employing this combined modeling approach was demonstrated through its application to the DAIS (Digital Avionics Information System) system in which pilot duties involve information retrieval and cognitive processing tasks in addition to flight control. GRA

N79-32843# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

TENTATIVE EVALUATION OF ANNOYANCE CAUSED BY NOISE FROM GUNFIRE

G. F. Smoorenburg 1978 52 p refs In DUTCH; ENGLISH summary
(IZF-1978-21; TDCK-71624) Avail: NTIS HC A04/MF A01

Based on an extensive survey of the pertinent literature a method was developed to determine the annoyance that may be expected from noise due to gunfire. This method may be applied to noise from both small and heavy firearms, and also to sonic booms. The annoyance to be expected is derived from the difference between the rating sound level and the noise criterion. The rating sound level is determined by the number of shots per day and the sound levels of the respective shots measured with the A-weighting and the impulse characteristic. Application of the impulse characteristic is based on properties of the hearing organ in the perception of short sounds. If the sound impulses contain a lot of low-frequency energy (heavy firearms, explosions, or sonic booms) the peak level of the sound impulse must be measured with linear frequency weighing. The rating sound level is determined by the lin, peak-level if this level exceeds the A, imp-level by more than 10 dB.
Author (ESA)

N79-33788# Army Research Inst. of Environmental Medicine, Natick, Mass.

COMPOSITION OF CEREBRAL FLUIDS IN GOATS ADAPTED TO HIGH ALTITUDE

V. Fencl, R. A. Gabel, and C. Wolfe 23 Jan. 1979 32 p refs
(DA Proj. 3A1-61101-A-910)
(AD-A070142; USARIEM-M-6/79) Avail: NTIS HC A03/MF A01 CSCL 06/16

The ionic composition of cerebral ISF was explored in 6 unanesthetized goats at sea level (SL) and again after 5 days at simulated high altitude (HA) of 4300 m, by measuring net transependymal fluxes of HCO3 ion, Cl ion and lactate during ventriculo-cisternal perfusions with lactate-free artificial CSF with various (HCO3 ion) and (Cl ion): concentration of an ion in cerebral ISF is indicated by concentration of that ion in the inflowing perfusate, that produces zero flux. We conclude that, at SL, (HCO3 ion) and (Cl ion) in CSF were the same as in cerebral ISF, which is in agreement with previously published findings. In goats adapted to HA, (Cl ion) in cerebral ISF remained equal to (Cl ion) in CSF, while (HCO3 ion) in cerebral ISF was demonstrably lower, and (lactate) presumably higher, than in CSF. The fluid surrounding the central chemoreceptors appears to be more acidic in goats acclimatized to HA than at SL, in spite of the alkalosis in cisternal CSF. This may contribute to ventilatory acclimatization to HA. Author (GRA)

N79-33789# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 4, 1979

9 Oct. 1979 145 p refs Transl. into ENGLISH of Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 145 p
(JPRS-74330) Avail: NTIS HC A07/MF A01

Problems associated with spacecraft habitability are discussed with emphasis on the effects of radiation and weightlessness on physiological processes and chemical reactions in man, animals, and plants.

N79-33790# Joint Publications Research Service, Arlington, Va.

IMMUNOBIOLOGICAL REACTIVITY OF THE BODY UNDER HYPERBARIC AND HYPOBARIC CONDITIONS

A. S. Kaplanskiy *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 1-7 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 3-7
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Data existing in the literature concerning the effects of hyperbaric and hypobaric gas mixtures on resistance to infections and immunobiological reactivity of the body are surveyed. Despite contradictory results obtained by different researchers, the exposure of man and animals to hyperbaric conditions in isolated chambers is associated with an increase in morbidity rate and the aggravation of infectious and inflammatory processes. The increased incidence of infectious diseases is apparently due to the depression of nonspecific resistance of the body as well as to the adverse hygienic conditions in pressure chambers. There is also reason to believe that impairment of immunity under hyperbaric conditions occurs as a result of the development of stress, the etiology of which is not clear, although overcooling of the body could be a factor. The limited number of studies dealing with the effects of hypobarism on resistance to infection, and the contradiction of the published data, preclude the derivation of any conclusions at present. A.R.H.

N79-33791# Joint Publications Research Service, Arlington, Va.

STUDIES OF VENOUS CIRCULATION IN THE CREW OF THE SALYUT-5 ORBITAL STATION

V. A. Degtyarev, A. S. Nekhayev, V. S. Bednenko, O. B. Kulikov, Ye. A. Kobzev, V. M. Bolshov, and A. A. Tsvetkov *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 8-13 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 8-12

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Measurements of venous circulation in the crewmembers of the orbital station Salyut-5 demonstrate weightlessness induced symptoms specifically associated with blood redistribution and pressure increase in the jugular veins. Further studies of venous circulation and regional hemodynamics are recommended to determine the time and degree of human body adaptation to weightlessness. A.R.H.

N79-33792# Joint Publications Research Service, Arlington, Va.

FLUID-ELECTROLYTE METABOLISM IN THE CREW OF SALYUT-4

G. I. Kozyrevskaya, A. I. Grigoryev, B. R. Dorokhova, N. M. Vatulya, and N. D. Radchenko *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 14-21 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 12-18

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Fluid-electrolyte metabolism was studied in two cosmonauts before and after completion of a 63-day orbital flight. Post flight weight losses of 5.6% and 3.5% were attributed to body dehydration. Both men showed a trend for an increased renal excretion of potassium, magnesium, and calcium as compared to their food intake, with increases being more expressed the day after the water load application. Possible causes of the changes and the pattern of recovery of fluid-electrolyte metabolism after a prolonged space flight are discussed. A.R.H.

N79-33793# Joint Publications Research Service, Arlington, Va.

CONTROL OF VERTICAL POSITION AFTER FLIGHTS ABOARD THE SALYUT-4 ORBITAL STATION

V. I. Myasnikov, O. P. Kozerenko, N. M. Rudometkin, V. M. Mikhaylov, and V. S. Georgiyevskiy *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 22-27 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 18-22

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The stabilography method, used on the crews of the Soyuz 4 and 5 spacecraft revealed an increase in amplitude and an undulant change in frequency of oscillations of the body's center of gravity. Post-flight studies of the crews of Soyuz 17 and 18 are discussed to demonstrate the distinctions of regulation of vertical position and autonomic reactions to it after prolonged weightlessness. The process of restoration of the initial level of control of the upright position is examined. A.R.H.

N79-33794# Joint Publications Research Service, Arlington, Va.

EFFECTS ON LIPID METABOLISM IN MAN OF SOME FACTORS THAT SIMULATE SPACE FLIGHT CONDITIONS

V. P. Bychkov, A. G. Kasatkina, and O. S. Khokhlova *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 28-34 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 28-34

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Studies of the effects of space flight simulation factors on lipid metabolism show that space diets developed for space flights of different duration (dehydrated foodstuffs alone or in combination with foods preserved by other methods) do not product noticeable changes in lipid metabolism. Nevertheless, other factors, i.e. hypokinesia, intake of nerobol during hypokinesia, an altered work-rest cycle, an increased carbon monoxide concentration (up to 15 mg/cu m) influenced lipid metabolism. Author

N79-33795# Joint Publications Research Service, Arlington, Va.

ELECTROLYTE COMPOSITION OF RAT BLOOD PLASMA AND SKELETAL MUSCLES AFTER FLIGHT ABOARD THE COSMOS-690 BIOSATELLITE

V. P. Nesterov and R. A. Tigranyan *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 35-39 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 35-39

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Measurements of Na(+), K(+), Mg2(+) and Ca2(+) concentrations in the functionally different muscles (soleus, plantaris, diaphragm muscles) and plasma of the rats flown for 20.5 days aboard the biosatellite Cosmos-690 did not show any significant changes as compared with the controls. At the same time a decrease of the K(+)/Na(+) ratio and a similar shift of Mg2(+) and Ca2(+) concentrations in plasma of irradiated rats as compared with these of non-irradiated animals demonstrated that the combined effects of space flight factors and gamma-irradiation influenced the system of ionic homeostasis in the blood. In the animals sacrificed on the R + 1 day the K(+)/Na(+) ratio in the soleus muscle changed in favor of Na(+) and in the plantaris muscle in favor of K(+), and remained essentially unchanged in the diaphragm. Comparison of the flight experiments with the ground-based controls show that ion changes occur because of ionizing radiation rather than weightlessness. Author

N79-33796# Joint Publications Research Service, Arlington, Va.

INTENSITY OF DNA SYNTHESIS IN ANIMAL ORGANS AFTER FLIGHT ABOARD THE COSMOS-782 BIOSATELLITE

F. T. Guseynov, I. A. Yegorov, G. S. Komolova, and R. A. Tigranyan *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 40-44 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 30-33

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At six hours postflight, the rate of tritiated thymidine incorporation into the liver of flight rats did not differ from normal (vivarium controls) and was 50% higher than in synchronous rats. In the spleen and thymus of flight animals, this parameter was 60% and 33% below the norm. Similar but less pronounced changes in the spleen were found in the synchronous rats. Twenty-five days postflight, the rate of DNA synthesis in lymph organs recovered completely and tended to increase, whereas in the liver it remained significantly below the norm. A.R.H.

N79-33797# Joint Publications Research Service, Arlington, Va.

EFFECT OF BRIEF HEAD-DOWN POSITION ON PARAMETERS OF CARBOHYDRATE METABOLISM AND BETA LIPOPROTEIN CONTENT OF BLOOD

A. A. Seid-Guseynov, V. Ye. Katkov, V. V. Chestukhin, L. I. Shefter, N. S. Zakharova, and Ya. A. Sokolov *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 45-51 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 34-38

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Before and after 5-day bed rest in the head-down position (at an angle of -4.5 deg), the healthy male test subjects were exposed to selective catheterization with blood samples withdrawn from different compartments of the cardiovascular system. The content of glucose, insulin, lactic acid and Beta-lipoproteins was measured. After bed rest the systemic circulation, mixed arterial and venous blood, showed a trend for a decrease of carbohydrate metabolism and an increase of the content of Beta-lipoproteins. Transcapillary metabolism in different organs, first of all, in the brain and liver altered significantly. The liver began to release glucose and ceased to utilize lactic acid whereas the brain increased substantially its release of Beta-lipoproteins. The data obtained were analyzed using a model of carbohydrate metabolism to control and artificial pancreas. Author

N79-33798# Joint Publications Research Service, Arlington, Va.

INFLUENCE OF PRESSURE CHAMBER CONDITIONS ON ADRENOCORTICAL FUNCTION IN MAN (ACCORDING TO RESULTS OF ASSAYING BLOOD PLASMA 11-HYDROXYCORTICOSTEROIDS)

S. Kalandarov, V. P. Bychkov, and A. V. Sergiyenko *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 52-57 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 39-42

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The effect of a changed atmosphere, hypoxia, hypercapnia, their combinations and different motor activities on the adrenocortical function was studied in 36 test subjects kept in an 8 cu

m altitude chamber. Human adaptation to the environmental changes developed with an active involvement of the adrenal cortex. The level and direction of the changes depended on both the force of the influences and on the initial state of the test subjects. Author

N79-33799# Joint Publications Research Service, Arlington, Va.

ENERGY EXPENDITURES OF MAN DURING LONG EXPOSURE TO A PERIODICALLY CHANGING ATMOSPHERE

N. A. Agadzhanyan, V. M. Baranov, M. A. Vytchikova, G. A. Davydov, and Yu. A. Spasskiy *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 58-63 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 42-46

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The results of studying man's gas exchange and energy expenditures as related to the composition of a cyclically changing environment of an altitude chamber are presented. The experiments were carried out on a 24-hour basis. The environmental parameters that physiologically were most adequate as the training factor are given. The respiratory reactions suggest that the enclosed environment used is suitable to prevent hypokinesia effects. G.Y.

N79-33800# Joint Publications Research Service, Arlington, Va.

DISTINCTIONS OF INFLUENCE OF THE RETICULAR FORMATION OF THE MIDBRAIN ON THE HEART AND RESPIRATION WITH EXPOSURE TO CENTRIPETAL ACCELERATIONS

L. D. Klimovskaya *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 64-70 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 46-50

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Experiments were carried out on white rats and rabbits exposed to transverse accelerations of 6-10 g for 5 min. Before, during and after centrifugation the reticular formation of the midbrain underwent high-frequency electric stimulation. During centrifugation the inhibitory effects of the recticular formation on the cardiorespiratory rhythm decreased, whereas stimulatory effects either remained unchanged or increased. Author

N79-33801# Joint Publications Research Service, Arlington, Va.

SIGNIFICANCE OF THE VIBRATION COMPONENT TO THE DELETERIOUS EFFECT OF IMPACT ACCELERATIONS

G. P. Mirolyubov, V. A. Elivanov, and G. P. Stupakov *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 71-76 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 51-54

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Animal experiments demonstrated that damped oscillations of the support construction induced by impact accelerations enhanced their damaging effect on dogs. Within the frequency range tested (from 20 to 178 Hz) the threshold of lesions of the lungs, heart and liver decreased and reached 34% at a frequency of 85 Hz. The level of liver lesions was inversely proportional to the frequency of the support oscillations. Lesions of the lungs and the heart were more expressed at 85 Hz and decreased with an increase or a decrease of the oscillation frequency. At a frequency of 130-176 Hz the effect of the vibration component was not seen. Author

N79-33802# Joint Publications Research Service, Arlington, Va.

EFFECT OF RESTRICTED ACTIVITY ON VESTIBULAR FUNCTION

G. I. Gorgiladze, G. I. Samarin, and G. S. Kazanskaya *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 77-82 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 55-58

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The hypokinetic effect on the nystagmic reaction and illusory sensations upon caloric and galvanic stimulations of the labyrinths was studied on six test subjects (professional gymnasts). Under normal conditions the sportsmen predominantly showed the nystagmic response to the caloric irritation of the left labyrinth. A 10-day hypokinetic exposure produced a noticeable decrease of the above asymmetric nystagmic reaction to the caloric irritation of both labyrinths. Simultaneously an enhancement of illusory sensations and a decrease of their thresholds in response to the direct current labyrinthine stimulation were noted. The above changes can be attributed to the hypokinesia-induced decline of mechanisms of vestibular adaptation of sportsmen. Author

N79-33803# Joint Publications Research Service, Arlington, Va.

EFFECT OF ROCKING ON ABSORPTION OF SOME GROUP B VITAMINS AND ASCORBIC ACID IN THE SMALL INTESTINE OF DOGS

R. P. Faytelberg and T. V. Gladkiy *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 83-88 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 59-62

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On the dogs with a Thiry-Pavlov fistula (an isolated loop of the small intestine) the effect of 30-min acceleration on the absorption of thiamine-bromide, riboflavine, pyridoxine-hydrochloride and ascorbic acid as well as on the gastric juice secretion was studied. It was demonstrated that back-to-forth linear acceleration increased vitamin B1 absorption, decreased vitamins B2 and B6 and ascorbic acid absorption, and altered secretion of gastric juice. Author

N79-33804# Joint Publications Research Service, Arlington, Va.

ULTRASTRUCTURE OF LYMPH NODES OF DOGS EXPOSED TO LONG-TERM EXTERNAL GAMMA RADIATION

V. V. Shikhodyrov, L. A. Bespalova, and V. S. Romanov *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 89-93 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 62-66

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An electron microscopy study of lymph nodes of dogs exposed to chronic gamma-irradiation during 6 years (with a total dose of 125 rad/year) was performed. The exposure induced changes in the cell composition of the paracortical regions due to a decrease of the count of small lymphocytes and a predominant increase of young blast cells with an altered ultrastucture. Chronic gamma-irradiation led to an increase of the number of plasma cells and emergence of intermediate cell forms due to plasmatization of lymphocytes and reticular cells. G.Y.

N79-33805# Joint Publications Research Service, Arlington, Va.

SOME OF THE PROBLEMS INVOLVED IN PLANNING BIOLOGICAL EXPERIMENTS

V. V. Verigo *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 94-99 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 66-69

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Certain cases of using mathematical methods in the planning of biological experiments are described. The paper presents an algorithm of the distribution of the experimental data based on dynamic programming. An application of computer-aided calculations for the formation of homogeneous groups of experimental and control tests is discussed. G.Y.

N79-33806# Joint Publications Research Service, Arlington, Va.

ADAPTIVE OPTIMIZATION OF EXCHANGE OF GASES IN PLANTS IN A SEALED PHYTOTRON

Yu. A. Berkovich, V. L. Korbut, and O. B. Suslova *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 100-104 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 70-73

Avail: NTIS HC A07/MF A01

The study of adaptive optimization of wheat photosynthetic productivity in the phytotron allowed a 25-100% increase in the daily volumes of carbon dioxide assimilated by plants. Author

N79-33807# Joint Publications Research Service, Arlington, Va.

QUALITY OF WATER RECLAIMED FROM URINE AS RELATED TO pH OF INITIAL PRODUCT

N. M. Nazarov, I. V. Yakimova, N. A. Golikova, Yu. Ye. Sinyak, and S. V. Chizhov *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 105-108 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 73 76

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It was demonstrated that the quality of reclaimed water depends on pH of initial urine: the water reclaimed by evaporation at temperatures not higher than 50 C shows higher content of ammonium nitrogen and better oxygenation at pH 3-5. G.Y.

N79-33808# Joint Publications Research Service, Arlington, Va.

EVALUATION OF OXIDIZABILITY OF AIR IN CLOSED AREAS

L. A. Mokhov, L. D. Karpova, and N. Ya. Shuinova *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 109-112 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 76-78

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Acetic acid, aldehydees, as well as a number of other organic substances, are the natural products of human vital functions, and they are released into the environment with exhaled air, sweat, urine, excrements, etc. In the air of a small, closed area, these organic compounds as a whole could induce discomfort, associated with a number of unpleasant sensations (odor, nausea, vertigo, headache, etc.). Heretofore, air oxidability was determined according to the organic impurities capable of oxidation to acetic acid or acetaldhyde, and as a result a number of compounds were overlooked. For this reason, when making a sanitary chemical evaluation of air in closed areas of a limited size, if possible, organic impurities to carbon dioxide must be oxidized. The influence of duration of reaction, acidity of medium, heating conditions and use of catalysts on the reaction of oxidation of ethanol were tested. G.Y.

N79-33809# Joint Publications Research Service, Arlington, Va.

EFFECT OF HYDROSTATIC FACTOR ON ORTHOSTATIC STABILITY AND PHYSICAL FITNESS OF MAN DURING 60-DAY ANTIORTHOSTATIC HYPOKINESIA

O. D. Anashkin, Z. K. Trushinskiy, F. V. Reva, and T. P. Shatunina *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 113-115 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 78-80

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Six essentially healthy male volunteers participated in the studies (age ranged from 19 to 37). Three subjects (control group) were kept on strict bed rest in antiorthostatic (head down) position, with the head of the bed tilted -4.5 deg down, for 60 days. The other three subjects spent 2 hours/day in sitting position (1 hour after breakfast and 1 hour after lunch-dinner), and the remaining 22 hours were spent in the anteriorthostatic position. Heart rates and arterial pressures were recorded and physical fitness was evaluated. G.Y.

N79-33810# Joint Publications Research Service, Arlington, Va.

VERTICAL ORIENTATION OF MAN DURING 5-DAY ANTIORTHOSTATIC HYPOKINESIA (-4, -8 AND -12 DEG HEAD DOWN POSITION)

B. B. Bokhov and Yu. N. Taranenko *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 116-120 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 80-83

Avail: NTIS HC A07/MF A01

Two tests were used to study the effect of 5-day hypokinesia on vestibulopropriocetive orientation: orientation in a field of vision without a reference point and in a field with an image. G.Y.

N79-33811# Joint Publications Research Service, Arlington, Va.

EFFECT OF IMPACT ACCELERATIONS ON CHEMICAL RESISTANCE OF RAT ERYTHROCYTES

Ye. Ye. Simonov *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 121-124 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 83-85

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Experiments were conducted on 36 male albino rats weighing 150-180 g, which were divided into three equal groups. The 1st group was exposed to landing impact accelerations of 410 + or - 50 units at a collision rate of 10 m/s; the 2d group was exposed to accelerations of 760 + or - 50 units at the same collision rate. The accelerations were in the back--chest direction. Blood was taken for tests from the tail before the experiment, then 1, 2 and 3 days after it. Chemical resistance of erythrocytes was determined by a modified method of acid erythrograms. Concurrently, determination was made of total erythrocyte count and hemoglobin content thereof. G.Y.

N79-33812# Joint Publications Research Service, Arlington, Va.

EXTERNAL RESPIRATION AND GAS EXCHANGE REACTIONS OF MAN DURING ROTATION ON A SHORT-ARM CENTRIFUGE

O. L. Golovkina *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 125-126 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 85-86

Copyright. Avail: NTIS HC A07/MF A01

The reactions of the human external respiration system and gas exchange were studied during exposure to accelerations and combination thereof with exercise on a bicycle ergometer, using a short-radius centrifuge. G.Y.

N79-33813# Joint Publications Research Service, Arlington, Va.

BLOOD COAGULATION AND TISSULAR FACTORS OF BLOOD CLOTTING IN HEPARINIZED RABBITS SUBMITTED TO HYPOKINESIA

L. P. Suiridkina, V. I. Inchina, and Yu. I. Grinevskaya *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 129-132 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 87-89

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Some investigators report an increase in blood clotting potential at the early stages of hypokinesia. On this basis, the blood clotting system and coagulant properties of the wall of the aorta, venae cavae and myocardium during brief, strict immobilization of rabbits were studied against the background of giving them heparin, which has a marked hypocoagulant action. G.Y.

N79-33814# Joint Publications Research Service, Arlington, Va.

THIRD SYMPOSIUM ON MOTION SICKNESS

G. L. Komendantov and A. G. Bystrova *In its* Space Biol. and Aerospace Med., No. 4, 1979 (JPRS-74330) 9 Oct. 1979 p 133-135 Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), no. 4, 1979 p 89-90 Symp. held at Moscow, 21-22 Nov. 1978
Copyright. Avail: NTIS HC A07/MF A01

The third symposium on the problem of motion sickness was held in Moscow, on 21-22 November 1978, in accordance with the work schedule of the section of aviation and space medicine of the Moscow department of the All-Union Society of Physiologists. A total of 173 people participated in the work of the symposium, referable to scientists, practicing physicians and specialists from 18 cities of the Soviet Union. The agenda topics were pathogenesis of motion sickness, questions of expertise and pharmacological prevention. G.Y.

N79-33815 California Inst. of Tech., Pasadena.
METHODS FOR LOCALIZATION OF ELECTRICAL SOURCES IN THE HUMAN BRAIN AND APPLICATIONS TO THE VISUAL SYSTEM Ph.D. Thesis
Terrance Michael Darcey 1979 320 p
Avail: Univ. Microfilms Order No. 7920351

Multichannel human visual evoked scalp potential (VESP) recording was combined with results from electric field theory and the methods of nonlinear parameter estimation to see if it was possible to infer the general spatio-temporal course of brain excitation in the processing of a visual stimulus. Various models of the head and underlying sources were tested. Forty Channel VESP measurements were made to briefly appearing checkerboard patterns placed in various areas of the visual field. These data were analyzed in terms of underlying equivalent sources in the brain. The measured potential distributions showed a radical dependence of VESP topography on stimulus locus and indicated that these VESP's are probably volume-conducted field effects arising from a small number of fairly localized sources in the brain. Dissert. Abstr.

N79-33816 Polytechnic Inst. of New York.
ACOUSTIC ATTITUDE ORIENTATION Ph.D. Thesis
Bjorn Jay Matz 1979 138 p
Avail: Univ. Microfilms Order No. 7920790

The phenomenon of acoustical tracking in a multi-axis task was investigated in order to determine whether man's audio system can discriminate or resolve two axes of simultaneous acoustic inputs sufficiently well to acoustically track at least as well as his visual system can track visually. The specific task for this investigation was flying an airplane. The results show that in almost all cases, flying using acoustical instrumentation is as good, or better than, flying with visual instrumentation under the first three out of four turbulence levels tested. At the fourth level of turbulence (severe), the results of individual parameters are mixed, but flying with visual instrumentation is slightly better than flying with acoustical instrumentation, but the result is not statistically significant. Dissert. Abstr.

N79-33817 Rice Univ., Houston, Tex.
A NONLINEAR MAPPING APPROACH TO DISCRIMINATION OF SLEEP STAGES FROM THE HUMAN ELECTROENCEPHALOGRAM Ph.D. Thesis
Roderick Pruett 1979 138 p
Avail: Univ. Microfilms Order No. 7919622

New nonlinear analysis techniques were developed for the discrimination of seven sleep stages from the eight lead human electroencephalogram (EEG). The EEG was preprocessed using Period Analysis. Then, appropriate descriptive measures were derived such that discriminant analysis techniques were able to automatically obtain appropriate classifications of sleep EEG samples. Cluster analysis was used to study the similarities and dissimilarities of sleep EEG samples. A nonlinear dimension reduction algorithm was then used to create a two dimensional (2 D) representation of the multi-dimensional (40 D) data set. Dissert. Abstr.

N79-33819# Civil Aeromedical Inst., Oklahoma City, Okla.
EFFECTS OF CONGENER AND NONCONGENER ALCOHOLIC BEVERAGES ON A CLINICAL ATAXIA TEST BATTERY
David J. Schroeder (Veterans Administration Hospital, Topeka, Kansas) and William E. Collins Jan. 1979 19 p refs
(AD-A069375; FAA-AM-79-9) Avail: NTIS HC A02/MF A01 CSCL 06/20

The performance of normally 'heavy' and normally 'light' young male drinkers on an ataxia test battery before and after drinking either a high congener (bourbon) or low congener (vodka) alcoholic beverage was investigated. To assess possible long term effects of alcohol, testing was conducted 1, 3, 5, 9, 24, and 32 hours after drinking. With the exception of one walking test that showed inferior performance 1 hour after drinking and recovery thereafter, the measures of the ataxia test battery were about equally affected, showing decrements from 1 to 3 hours after drinking and a return to a normal plateau by the fifth postdrinking hour. Normally heavy drinkers tended to display less ataxia following drinking than did normally light drinkers. Comparisons of the low and high congener beverages failed to reveal any significant differential effects. There were also no indications of any significant impairment on ataxia tests during the hangover period. R.E.S.

N79-33820# Civil Aeromedical Inst., Oklahoma City, Okla.
LABORATORY PERFORMANCE DURING ACUTE INTOXICATION AND HANGOVER
William E. Collins and W. Dean Chiles Feb. 1979 30 p refs
(AD-A069373; FAA-AM-79-7) Avail: NTIS HC A03/MF A01 CSCL 06/16

Eleven private pilots (7 men and 4 women) were recruited and trained on the multiple task performance battery (MTPB), static and dynamic tracking of a localizer/glide slope instrument, a speech intelligibility test (single words with a background of aircraft noise), and use of the intoxilyzer. The experiment comprised four test sessions (vodka, bourbon, placebo, and control sessions) held at weekly intervals. Results showed clear deleterious effects of alcohol on the MTPB and the tracking tasks immediately following drinking. During the morning (hangover) tests, scores on the MTPB and on the static and dynamic tracking tasks showed small circadian effects (scores were better) without impairment due to the alcohol. Speech perception scores were unaffected by alcohol; scores were always best in the evening and poorest in the morning. There were no congener effects. These results thus offer no evidence contrary to the 'eight hour rule'. Author

N79-33821# Civil Aeromedical Inst., Oklahoma City, Okla.
DEVELOPMENT OF ELECTROPHYSIOLOGICAL INDICES OF NEUROLOGICAL TOXICITY FOR ORGANOPHOSPHATE PESTICIDES AND DEPRESSANT DRUGS
A. M. Revzin May 1979 18 p refs
(AD-A070299; FAA-AM-79-15) Avail: NTIS HC A02/MF A01 CSCL 06/20

The effects of certain drugs and environmental pollutants on brain mechanisms controlling these visual reflexes were investigated using single nerve cell recordings in animal model systems. Most agents studied deleteriously affected reflex functions at extremely low doses. This was especially true for organophosphate pesticides, related cholinergic compounds, and ethyl alcohol. Some drugs, such as imipramine and amphetamine, seemed to have little deleterious effect. Overall, the results suggest that some drugs and environmental pollutants can impair visual functions at doses not normally considered hazardous, and thus indicate the need for extreme caution in evaluating the safety margins of such materials in aviation medicine. R.E.S.

N79-33822*# National Aeronautics and Space Administration, Washington, D. C.
EXPERIMENTAL AND THEORETICAL INVESTIGATIONS CONCERNING A FREQUENCY FILTER BEHAVIOR OF THE HUMAN RETINA REGARDING ELECTRIC PULSE CURRENTS Ph.D. Thesis
A. Meier-Koll Sep. 1979 58 p refs Transl. into ENGLISH from experimentelle und theoretische untersuchungen ueber ein frequenzfilterverhalten der menschlichen retina gegenveber electrischen impulsstroemen, Tech. Hochschule, Fak. fuer Maschinenwesen und Electrotech., (Munich) 1970 p 90 Original language doc. was announced as A71-14372 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)

(NASA-TM-75372) . Avail: NTIS HC A04/MF A01 CSCL 06P

Investigation involving patients with injuries in the visual nervous system are discussed. This led to the identification of the epithelial ganglion of the retina as a frequency filter. Threshold curves of the injured visual organs were compared with threshold curves obtained with a control group as a basis for identification. A model which considers the epithelial ganglion as a homogeneous cell layer in which adjacent neurons interact is discussed. It is shown the behavior of the cells against alternating exciting currents can be explained. R.E.S.

N79-33823*# National Aeronautics and Space Administration, Washington, D. C.

CONTRIBUTION TO THE THEORY OF PHOTOPIC VISION: RETINAL PHENOMENA

H. Calvet Sep. 1979 13 p Transl. into ENGLISH from Sci. Tech. (Paris), 15 Oct. 1974 p 13-17 Original language document announced as A75-17025 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75507) Avail: NTIS HC A02/MF A01 CSCL 06P

Principles of thermodynamics are applied to the study of the ultramicroscopic anatomy of the inner eye. Concepts introduced and discussed include: the retina as a three-dimensional sensor, light signals as coherent beams in relation to the dimensions of retinal pigments, pigment effects topographed by the conjugated antennas effect, visualizing lights, the autotropic function of hemoglobin and some cytochromes, and reversible structural arrangements during photopic adaptation. A paleoecological diagram is presented which traces the evolution of scotopic vision (primitive system) to photopic vision (secondary system) through the emergence of structures sensitive to the intensity, temperature, and wavelengths of the visible range. Author

N79-33824# Weather Wing (5th), Langley AFB, Va.

MINIMUM SEA SURFACE TEMPERATURES AND ASSOCIATED SURVIVAL TIMES Final Report

Gerald L. Wheeler May 1979 30 p Supersedes Rept-5WW-SS-319

(AD-A070162; Rept-5WW-TN-79-001; Rept-5WW-SS-319) Avail: NTIS HC A03/MF A01 CSCL 06/19

This technical note contains sea-surface isotherm charts, showing the approximate survival times of humans immersed in the waters of the North Atlantic and North Pacific Oceans. Minimum sea-surface temperatures are based on the 95th (North Atlantic) and 97.5th (North Pacific) percentiles. GRA

N79-33825# Texas Univ. at Austin. Bio-Medical Engineering Research Lab.

MEASUREMENTS IN THE LASER IRRADIATED EYE Final Report, 1 Apr. 1977 - 31 Mar. 1978

Ashley J. Welch and Larry D. Forster 15 Nov. 1978 78 p refs

(Grant AF-AFOSR-3314-77; AF Proj. 2312)

(AD-A069842; AFOSR-79-0672TR) Avail: NTIS HC A05/MF A01 CSCL 06/18

The work involves the fabrication and use of a small fiber optic probe to measure (1) the transmission of the ocular media which is the ratio of the total light intensity reaching the retina to the total light intensity incident on the cornea, and (2) the cross-sectional intensity profile of a minimally small image. Information concerning the resolution of the eye is derived from the small image measurements. The transmission of the ocular media, measured on a limited number of animals, compares well with some of the best previously reported data. The transmission was measured via a 600 micron diameter fiber optic probe which collected all the light from a 200 micron diameter irradiating laser beam. Three lasers, providing seven wavelengths, were employed. The minimal images measured in the monkey eye were larger than values reported from subjective acuity tests or by diffraction theory. Some of this poor quality could be attributed to experimental error, but perhaps the most significant factor affecting eye quality was the fact that the neural controls for blinking, tearing, and micro-accommodation, which aid the eye in forming a retinal image, were inactive in the anesthetized animal. GRA

N79-33826# Franklin Research Center, Philadelphia, Pa. Science Information Services Organization.

BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, VOLUME 3, NUMBER 4 Quarterly Report, Mar. - Jun. 1979

Jun. 1979 71 p refs Sponsored by the Navy and Nat. Telecommun. and Inform. Admin.

(AD-A070242; Rept-80G-C5003-01-Vol-3-No-4) Avail: NTIS HC A04/MF A01 CSCL 06/18

This quarterly digest presents current awareness information on the biological effects of nonionizing electromagnetic radiation (microwave and radio frequency) in the range of 0 Hz to 100 GHz. The effects of magnetic and electric fields (static and alternating) are also covered. Each issue contains abstracts of English and foreign current literature, summaries of ongoing research investigations, news items, and a directory of meetings and conferences. GRA

N79-33827# Texas Univ. at Galveston. Marine Biomedical Inst.

FUNDAMENTAL BIOPHYSICAL ASPECTS OF DECOMPRESSION SICKNESS Final Report, 1 May 1975 - 31 May 1979

Brian A. Hills 1 Jun. 1979 13 p refs

(Contract N00014-75-C-1035)

(AD-A069998) Avail: NTIS HC A02/MF A01 CSCL 06/19

The work described in this report is directed at determining the physiological and physical factors which underly the formulation of safe decompression procedures. Some aspects are continuations of studies initiated by the principal investigator at Duke University under contract N00014-67-A-0251-0015. Almost all of the work has been published or is currently in press and a full list of publications arising from these contracts is appended to this report. This report summarizes the results and then goes on to describe the way in which the principal investigator now envisages decompression sickness and its prevention in the light of these and other published studies. GRA

N79-33828# Rochester Univ., N. Y. School of Medicine and Dentistry.

STUDIES OF METABOLISM, FUNCTION AND MECHANISM OF DESTRUCTION OF RED CELLS Final Report, 1 Jul. 1973 - 31 Mar. 1978

Marshall A. Lichtman, Robert I. Weed, Paul L. LaCelle, and Jules Cohen Apr. 1978 44 p refs

(Contract DADA17-73-C-3135)

(AD-A070240) Avail: NTIS HC A03/MF A01 CSCL 06/16

We have studied the effects of propranolol on hemoglobin-oxygen affinity and red cell shape, both in vitro and in vivo. We have also examined the effects of hemodialysis on red cell organic phosphates and on oxygen-binding to hemoglobin. Studies were conducted on the role of blood pH alterations in the elevation of red cell 2,3-DPG and decrease in hemoglobin-oxygen affinity observed in subjects with hypoproliferative anemia. Studies of the interactions of anemia, red cell ATP concentration and changes in plasma inorganic phosphate have been conducted. The interrelationships of red cell magnesium concentration and ATP concentration on hemoglobin oxygen binding have been performed. We have studied patients with acute myocardial infarction and have found that whole blood oxygen consumption remains constant despite a nearly three-fold variation in arterial oxygen flow rate. We calculated that a reduction in hemoglobin oxygen affinity could explain about one-third of the increased extraction of oxygen required to maintain oxygen consumption. Other, probably, tissue compensating mechanisms must account for the remaining adaptation. We have studied water soluble radiographic contrast materials and have found them to produce a significant alteration in the distribution of irons across the red cell membrane. GRA

N79-33829# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
THE RELATIONSHIP BETWEEN AEROBIC FITNESS AND CARDIOVASCULAR RISK FACTORS IN THE CANADIAN FORCES
T. E. Brown, W. S. Myles, and C. L. Allen Mar. 1979 18 p refs
(AD-A069865; DCIEM-TR-79X11) Avail: NTIS HC A02/MF A01 CSCL 06/14

Aerobic fitness and the incidence of risk factors related to cardiovascular disease (CVD) were compared for 1595 Canadian servicemen 20-50 years of age. Aerobic power (V02 max) was predicted from heart rates during submaximal exercise performed on a bicycle ergometer. The risk factors, body fat, serum cholesterol, serum triglycerides and blood pressure were measured by standard procedures. Smoking histories were obtained by questionnaire. A positive relationship was demonstrated between V02 max and all of the CVD risk factors examined. This relationship was most significant among those over 40 years of age, the age group most at risk from CVD. The validity of this and other studies relating aerobic fitness to susceptibility to CVD is discussed. GRA

N79-33830# Tuskegee Inst., Ala. Dept. of Physics.
ANALYTICAL MODELLING OF LOAD-DEFLECTION BEHAVIOR OF INTERVERTEBRAL DISCS SUBJECTED TO AXIAL COMPRESSION Final Research Report, 1 Apr. 1971 - 31 May 1979
Marshall L. Burns May 1979 26 p refs
(Contract AF-AFOSR-3578-78; AF Proj. 2312)
(AD-A071019; AFOSR-79-0795TR) Avail: NTIS HC A03/MF A01 CSCL 06/16

The analytical modelling of creep response phenomena of intervertebral discs subjected to a constant axial compressive load is attempted by using Kelvin-solid models. A mathematical analysis scheme is proposed for unique model identification wherein exact parameter solutions are developed for the one-Kelvin-unit model, the three-parameter-solid model, and the two-Kelvin-unit model. In addition, a method is presented by which the associated Young's moduli and viscosity coefficients for an identified model are obtainable. Most importantly, unique parameter values are obtained for the three-parameter-solid by utilizing exact model parameter solutions on experimental strain, E (t), data. This particular model is observed to yield theoretical strain, E (t)cal, values that are within an average error of 3.48% of the experimentally measured values, E (t)exp, for different intervertebral discs. Further, mechanical properties of the intervertebral discs are obtained by using the values of the three-parameter-solid model parameters to calculate the associated Young's moduli and viscosity coefficient. The appropriate applications, data limitations, and possible generalizations of this exact analysis scheme are fully discussed, along with suggestions for future investigatory efforts. GRA

N79-33831# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.
METABOLIC AND PHYSICAL SCALING IN MICROWAVE/RADIOFREQUENCY BIOEFFECTS STUDIES
S. M. Michelson and S. T. Lu 1979 4 p refs Presented at the Bioelectromagnetics Symp., Seattle, 18 Jun. 1979
(Contract EY-76-C-02-3490)
(UR-3490-1561; Conf-790627-3) Avail: NTIS HC A02/MF A01

The absorbed energy required to cause deleterious changes in body functions of experimental animals were determined through quantitative evaluation and comparison of the many experiments which have been conducted. The results of animal experiments were then extrapolated to the exposure conditions of man. Data obtained on dogs, rabbits, and rats exposed to 2880 MHz and 1280 MHz, pulsed and 200 MHz CW were reevaluated in the light of more recent concepts related to specific absorption rates. DOE

N79-33832# Equitable Environmental Health, Inc., Rockville, Md.
FEASIBILITY OF AN EPIDEMIOLOGICAL STUDY OF WORKERS OCCUPATIONALLY EXPOSED TO HIGH VOLTAGE ELECTRIC FIELDS IN THE ELECTRIC POWER INDUSTRY Final Report
H. M. D. Utidjian Mar. 1979 31 p refs
(EPRI Proj. TPS 76-639)
(EPRI-EA-1020) Avail: NTIS HC A03/MF A01

This feasibility study was conducted for the Electric Power Research Institute to investigate the practicality of an epidemiological study on workers occupationally exposed to high voltage electric fields. Identification of a target population to be studied, examination of the various epidemiologic methods which could be undertaken, and cost estimates were the objectives. As an initial step to address these issues, a sample questionnaire was sent to several utility companies. Tentative recommendations regarding possible approaches and specific cost estimates and time projections were stated. DOE

N79-33833# California Univ., Berkeley. Lawrence Berkeley Lab.
EFFECTS ON POPULATIONS OF EXPOSURE TO LOW LEVELS OF IONIZING RADIATION: IMPLICATIONS FOR NUCLEAR ENERGY AND MEDICAL RADIATION The 1979 Report of the Advisory Committee on the Biological Effects of Ionizing Radiation (the BEIR Report)
J. I. Fabrikant Apr. 1979 46 p refs Presented at Symp. on Known Effects of Low Level Radiation Exposure, Pittsburgh, Penn., 25 Apr. 1979 Sponsored in part by EPA
(Contract W-7405-eng-48)
(LBL-9084; Conf-790474-1) Avail: NTIS HC A04/MF A01

The following aspects of the 1979 BEIR report are described: societal decision-making; nuclear energy needs and medical care services; epidemiological and experimental studies; public acceptance; concept of risks to health; risk estimates and cost-benefit analysis; and comparison of risks. Other topics discussed are as follows: need for advisory committees on radiation; value of the BEIR report; health effects of low levels of ionizing radiation; determination of radiation risk estimates; and quantitation of radio-induced cancer risk estimates. DOE

N79-33834# California Univ., Berkeley. Lawrence Berkeley Lab.
HEALTH EFFECTS OF LOW-LEVEL IONIZING RADIATION
J. I. Fabrikant Apr. 1979 10 p
(Contract W-7405-eng-48)
(LBL-9018) Avail: NTIS HC A02/MF A01

Possible hazards to health of persons exposed to low level ionizing radiation are discussed; specifically, effects following exposure to x-rays and to gamma rays from radioactive sources, since these are the ionizing radiations most often encountered in medicine and in industry. There are a number of biological effects of ionizing radiations, but the three most important health effects are: carcinogenic, teratogenic and genetic. Conclusions on the health effects are presented. R.E.S.

N79-33835# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
INFLUENCE OF LIGHT ADAPTATION ON DARK ADAPTATION TIME FOR PATTERN RECOGNITION TASKS [EINFLUSS DER ART DER HELLADAPTATION AUF DEN DUNKELADAPTATIONSVERLAUF BEI FORMERKENNUNGSAUFGABEN]
E. Schubert Sep. 1977 62 p refs In GERMAN
(FB-31) Avail: NTIS HC A04/MF A01; Forschungsinst. fuer Anthropotech., Meckenheim, West Ger. DM 10

Night vision parameters such as acuity, adaptation, and accomodation were investigated. Physiological aspects of night vision together with eye/telescope interaction characteristics were studied. The effects of color, relative foreground/background illumination levels, and brightness levels, as well as choice of subjects (ships officers) for these experiments are discussed. Experimental setups used to simulate real conditions are described and results are graphically reported. Author (ESA)

N79-33836# National Bureau of Standards, Washington, D. C.
ULTRASONIC TISSUE CHARACTERIZATION II
Melvin Linzer Apr. 1979 346 p refs Presented at Intern. Symp. on Ultrasonic Tissue Characterization, 2d, Gaithersburg, Md., 13-15 Jun. 1977 Sponsored in part by NSF and NIH

(PB-296356/9; NBS-SP-525; LC-79-600026) Avail: NTIS HC A15/MF A01 CSCL 06E

The Second International Symposium on Ultrasonic Imaging and Tissue Characterization was held at the National Bureau of Standards on June 13-15, 1977. The meeting was cosponsored by the National Bureau of Standards, the National Science Foundation, and the National Institutes of Health. This volume contains extended and reviewed papers based on 43 of the 53 talks presented at the symposium. Topics covered include techniques for measurement of ultrasonic tissue parameters, the dependence of tissue properties on physical and biological variables (e.g., ultrasonic frequency, temperature), mechanisms of ultrasonic tissue interactions, propagation through bone and skull, tumor Doppler signatures, computerized tomography, signal processing and pattern recognition, and tissue phantoms. A survey of velocity and attenuation data in mammalian tissue is included. GRA

N79-33837# National Technical Information Service, Springfield, Va.

HYPERBARIC OXYGENATION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun. 1979

Elizabeth A. Harrison Jul. 1979 169 p Supersedes NTIS/PS-78/0676, NTIS/PS-77/0600, NTIS/PS-76/0526, and NTIS/PS-75/236

(NTIS/PS-79/0744/7; NTIS/PS-78/0676; NTIS/PS-77/0600; NTIS/PS-76/0526; NTIS/PS-75/236) Avail: NTIS HC $28.00/MF $28.00 CSCL 06S

Microbiology, respiratory infections, oxygen toxicity, diving, decompression sickness, and metabolism as applied to hyperbaric oxygenation are covered in the citations. This updated bibliography contains 160 abstracts, 4 of which are new entries to the previous edition. GRA

N79-33838*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

MODELS OF HUMAN OPERATORS IN VISION DEPENDENT TASKS

Marvin C. Waller, ed. Oct. 1979 86 p refs Seminars held at the Human Factors Soc. 1979 Ann. Meeting, Boston, 29 Oct. - 1 Nov. 1979; sponsored in part by Human Factors Soc. Visual Performance Tech. Group

(NASA-CP-2103; L-13338) Avail: NTIS HC A05/MF A01 CSCL 05J

Descriptive overviews of some existing models and techniques of modelling the human operator are presented.

N79-33839*# Applied Psychological Services, Wayne, Pa.

A SURVEY OF APPLIED PSYCHOLOGICAL SERVICES' MODELS OF THE HUMAN OPERATOR

Arthur I. Siegel and J. Jay Wolf *In* NASA. Langley Res. Center Models of Human Operators in Vision Dependent Tasks Oct. 1979 p 1-18 refs

Avail: NTIS HC A05/MF A01 CSCL 05H

A historical perspective is presented in terms of the major features and status of two families of computer simulation models in which the human operator plays the primary role. Both task oriented and message oriented models are included. Two other recent efforts are summarized which deal with visual information processing. They involve not whole model development but a family of subroutines customized to add the human aspects to existing models. A global diagram of the generalized model development/validation process is presented and related to 15 criteria for model evaluation. Author

N79-33840*# Analytics, Inc., Willow Grove, Pa.

VISUAL PERFORMANCE MODELING IN THE HUMAN OPERATOR SIMULATOR

Melvin I. Strieb *In* NASA. Langley Res. Center Models of Human Operators in Vision Dependent Tasks Oct. 1979 p 19-31 refs

Avail: NTIS HC A05/MF A01 CSCL 05H

A brief description of the history of the development of the human operator simulator (HOS) model is presented. Features of the HOS micromodels that impact on the obtainment of visual performance data are discussed along with preliminary details on a HOS pilot model designed to predict the results of visual performance workload data obtained through oculometer studies on pilots in real and simulated approaches and landings. Author

N79-33841*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

A BRIEF OVERVIEW OF THE THEORY AND APPLICATION OF THE OPTIMAL CONTROL MODEL OF THE HUMAN OPERATOR

Sheldon Baron *In* NASA. Langley Res. Center Models of Human Operators in Vision Dependent Tasks Oct. 1979 p 33-47 refs

Avail: NTIS HC A05/MF A01 CSCL 05H

The underlying motivation and concepts are presented, along with a review of the development and application of the model. The structure of the model is described and results validating the model are presented. R.E.S.

N79-33842*# AiResearch Mfg. Co., Phoenix, Ariz.

SAINT: A COMBINED SIMULATION LANGUAGE FOR MODELING MAN-MACHINE SYSTEMS

Deborah J. Seifert *In* NASA. Langley Res. Center Models of Human Operators in Vision Dependent Tasks Oct. 1979 p 49-60. refs

Avail: NTIS HC A05/MF A01 CSCL 05H

SAINT (Systems Analysis of Integrated Networks of Tasks) is a network modeling and simulation technique for design and analysis of complex man machine systems. SAINT provides the conceptual framework for representing systems that consist of discrete task elements, continuous state variables, and interactions between them. It also provides a mechanism for combining human performance models and dynamic system behaviors in a single modeling structure. The SAINT technique is described and applications of the SAINT are discussed. R.E.S.

N79-33843*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ANALYSIS OF VISUAL ESTIMATION OF SYSTEM STATE FROM ARBITRARY DISPLAYS

Patrick A. Gainer *In its* Models of Human Operators in Vision Dependent Tasks Oct. 1979 p 61-82 refs

Avail: NTIS HC A05/MF A01 CSCL 05H

A method is presented for implementing the state estimator of the manual control model when the system output is a visual display of arbitrary form; that is, the display may be pictorial, including real world, or made up of dials and pointers. The method is used to provide error criteria for a look-point controller that appears to be capable of modeling human scanning behavior. This model, if combined with a model of the control process, should be useful in predicting effects of changes in displays on performance of flight tasks. Author

N79-33844# Air Force Human Resources Lab., Brooks AFB, Tex. Flying Training Div.

UNDERGRADUATE PILOT TRAINING: VISUAL DISCRIMINATION PRETRAINING FOR LAND TASK Final Report, Jul. 1976 - Jun. 1978

Bernell J. Edwards, Douglas Weyer, and Bruce A. Smith AFSC Feb. 1979 40 p refs

(AF Proj. 1123)

(AD-A068141; AFHRL-TR-78-78) Avail: NTIS HC A03/MF A01 CSCL 05/9

The utility of training task-relevant visual discrimination stalls as prerequisite behaviors for subsequently taught landing skills was investigated in this study. A multi-media training package was developed and used to impart visual skills to student pilots prior to their training on the flightline in landing procedures in the T-37 aircraft. The transfer of the visual discrimination skills of the landing field environment was assessed by measuring students' landing skills in the Advanced Simulator for Pilot Training and in the T-37 aircraft. Results showed that pretrained and non-pretrained student group performances on most measures were not significantly different. In several specific parameters of

performance, non-pretrained groups performed significantly better in the aircraft transfer tests as rated by instructor pilots. GRA

N79-33845# Kentucky Univ., Lexington. Wenner-Gren Research Lab.

THE CAUSES OF DECREMENTS IN AIRCREW PERFORMANCE PHYSIOLOGICAL CHANGES PRODUCED BY VIBRATION AND OTHER ENVIRONMENTAL STRESSES AND RESPONSE OF THE CARDIOVASCULAR SYSTEM TO VIBRATION AND COMBINED STRESS Final Report, 1973 - 1978

Charles F. Knapp, J. M. Evans, and D. R. Randall 20 Sep. 1978 148 p refs

(Contract F44620-74-C-0012; AF Proj. 2312)

(AD-A069952; AFOSR-79-0676TR) Avail: NTIS HC A07/MF A01 CSCL 06/5

The goal of this program is the understanding of cardiovascular responses to whole body, low frequency, sinusoidal acceleration loading of the intact physiological system. Our efforts in the early phase of the program were limited to investigating cardiovascular responses to high frequency whole body acceleration (2-30Hz), but more recently have been extended to the domain between sustained and time-varying acceleration of less than 1 Hz. Results from the early phase indicated that whole-body acceleration in the 2-3Hz range produced an exercise-type response that was directly dependent on the force level applied. Mean heart rate, stroke volume, cardiac output and whole body oxygen consumption were found to be linearly dependent on the peak net force delivered to each animal. Results from the later phase of this study indicated that whole body acceleration in the .005 to 0.25 Hz range included a resonance-type phenomenon in which the neural regulatory systems appeared to be unable to regulate arterial pressure in the middle portion of this frequency range. GRA

N79-33846# Canyon Research Group, Inc., Westlake Village, Calif.

DEVELOPMENT OF AN OBJECTIVE GRADING SYSTEM ALONG WITH PROCEDURES AND AIDS FOR ITS EFFECTIVE IMPLEMENTATION IN FLIGHT Research Note, 15 Nov. 1977 - 14 Nov. 1978

Jerry M. Childs May 1979 49 p refs

(Contract DAHC19-77-C-0008; DA Proj. 2Q7-63743-A-772)

(AD-A071106; FTR-09-79; ARI-RN-79-18) Avail: NTIS HC A03/MF A01 CSCL 05/9

This report contains a description of the characteristics and tests of two alternative inflight scoring procedures. These procedures were designed to meet the requirements of (1) minimal data collection, and (2) objective scores for Initial Entry Rotary Wing (IERW) student performance on Basic Instrument maneuvers. The procedures were criterion-referenced, employing different performance criteria, sampling techniques, and scoring algorithms. They were subjected to tests in the UH-1 simulator to assess the potential value of various characteristics within each procedure for meeting the requirements. Results of the tests provided general indications of those characteristics which best discriminated proficiency within and among students across training days. GRA

N79-33847# National Technical Information Service, Springfield, Va.

HUMAN MEMORY. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - May 1979

Mary E. Young Jul. 1979 307 p Supersedes NTIS/PS-78/0348, NTIS/PS-77/0352, NTIS/PS-76/0352, and NTIS/PS-75/297 (NTIS/PS-79/0640/7; NTIS/PS-78/0348; NTIS/PS-77/0352; NTIS/PS-76/0352; NTIS/PS-75/297) Avail: NTIS HC $28.00/MF $28.00 CSCL 05J

Reports on the abilities and functions of human memory and recall are cited. Reports on memory and learning methods are included; such as semantics, mnemonics, and visual and acoustic aids. (This updated bibliography contains 301 abstracts, 36 of which are new entries to the previous edition.) GRA

N79-33848*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

A SYSTEM FOR STERILIZING OBJECTS Patent Application

Coleman J. Bryan, Edward E. Wright, and Clyde V. Moyers, inventors (to NASA) Filed 8 Jun. 1979 12 p

(NASA-Case-KSC-11085-1; US-Patent-Appl-SN-046739) Avail: NTIS HC A02/MF A01 CSCL 06K

A system for producing a stream of humidified sterilizing gas for sterilizing objects such as the water systems in space vehicles is described. The system includes a source of sterilant gas which is fed to a mixing chamber having inlet and outlet ports. Water is carried in the mixing chamber, with the level of the water only partially filling the mixing chamber, to provide an empty space adjacent the top of the chamber. A heater is provided for heating the water in the chamber producing a humidified atmosphere. The sterilant gas is fed through an arcuate shaped tubular member connected to the inlet port of the mixing chamber to produce a vortex type of flow in the sterilant gas being humidified. A tubular member extends from the mixing chamber to supply the humidified sterilant gas to the object to be sterilized. Scrubbers are provided for removing the sterilant gas after use. NASA

N79-33849*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

SPACELAB SCRUBBER ANALYSIS AND TEST SUPPORT Final Report

30 Sep. 1979 38 p

(Contract NAS8-32628)

(NASA-CR-161309; LMSC/D678552) Avail: NTIS HC A03/MF A01 CSCL 06K

Contaminants to be used in qualification and development tests of the add-on charcoal bed scrubber were established, along with rates and methods for their introduction. The contaminant levels to be achieved were predicted and test results were analyzed. K.L.

N79-33850# Pacer Systems, Inc., Arlington, Va.

WORKLOAD AND THE CERTIFICATION OF HELICOPTERS FOR IFR OPERATION Final Report, Jul. 1978 - Jun. 1979

A. G. DeLucien, D. L. Green, S. W. Jordan, and J. J. Traybar Jun. 1979 127 p refs

(Contract DOT-FA77WA-3966)

(AD-A072758; FAA-RD-79-64; PAR-508-78-3) Avail: NTIS HC A07/MF A01 CSCL 01/3

A review of publications pertaining to workload definitions and evaluation, applicable to instrument flight rules (IFR) helicopter operations was accomplished. The role of aircrew workload in the IFR certification process was identified and a rationale was developed to allow determination of that portion of a pilot's attention and effort available for aircraft control. Performance objectives for required maneuvers were delineated and the interdependence of performance and workload was identified. Workload/performance implications for single and dual pilot IFR operations are reviewed. A series of flight maneuver patterns for use as IFR certification assessment tools was developed. A flying qualities workload evaluation scheme is offered for use in the FAA certification process for IFR approval of helicopters. R.E.S.

N79-33851*# San Jose State Univ. Foundation, Calif.

THE ROLE OF COGNITIVE SWITCHING IN HEAD-UP DISPLAYS

Edith Fischer May 1979 49 p refs

(Grant NsG-2269)

(NASA-CR-3137; A-7776; HUD-5) Avail: NTIS HC A03/MF A01 CSCL 01D

The pilot's ability to accurately extract information from either one or both of two superimposed sources of information was determined. Static, aerial, color 35 mm slides of external runway environments and slides of corresponding static head-up display (HUD) symbology were used as the sources. A three channel tachistoscope was utilized to show either the HUD

alone, the scene alone, or the two slides superimposed. Cognitive performance of the pilots was assessed by determining the percentage of correct answers given to two HUD related questions, two scene related questions, or one HUD and one scene related question. A.W.H.

N79-33852# Army Research Inst. of Environmental Medicine, Natick, Mass.

OPTIMAL METHODS FOR PHYSIOLOGIC RESEARCH ON CLOTHING

Ralph F. Goldman 19 Jun. 1978 8 p
(DA Proj. 3E7-62777-A-845)
(AD-A071855; USARIEM-M-32/78) Avail: NTIS HC A02/MF A01 CSCL 06/17

Comfort is a 'state of contented well being' which depends on the interaction between three factors: (a) the environment, (b) the clothing worn and (c) the body's response to them. Physical, physiological and psychological factors must all be involved in clothing designed for comfort in any environment. Failure to include all three elements in studies of such clothing has frequently led to an unacceptable product. GRA

N79-33853# Defence Research Establishment Suffield, Ralston (Alberta).

A GENERAL MODEL FOR THE TRANSFER OF VAPOUR THROUGH CLOTHED SKIN FROM LIQUID ON AND IN CLOTHING

Stanley B. Mellsen Jun. 1979 58 p refs
(AD-A071577; DRES-TP-495) Avail: NTIS HC A04/MF A01 CSCL 12/1

A mathematical model which was developed by Monaghan at DRES was extended to predict the penetration of vapor through clothed skin for an initial liquid load on or in the clothing. The model and its associated computer program along with some sample calculations are described in this report. GRA

N79-33854*# National Aeronautics and Space Administration, Washington, D. C.

PUBLICATIONS OF THE PLANETARY BIOLOGY PROGRAM FOR 1978: A SPECIAL BIBLIOGRAPHY

Linda G. Pleasant, comp. and Richard S. Young, comp. Oct. 1979 38 p
(NASA-TM-80745) Avail: NTIS HC A03/MF A01 CSCL 06C

The planetary events which are responsible for, or related to, the origin, evolution, and distribution of life in the universe are investigated. Bibliographies from chemical evolution, organic geochemistry, life detection, biological adaptation, bioinstrumentation, planetary environments, and origin of life studies are presented. A.W.H.

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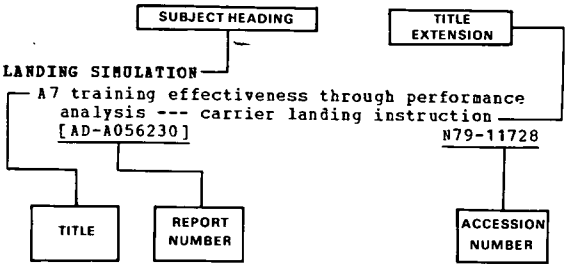

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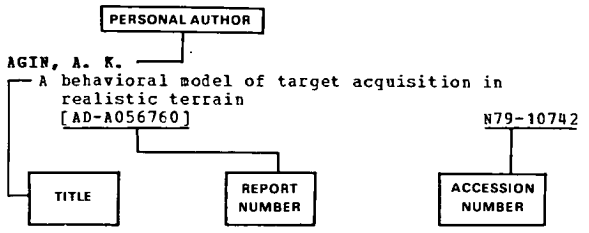

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