

NASA SP-7011 (78)



# AEROSPACE MEDICINE AND BIOLOGY

**A CONTINUING BIBLIOGRAPHY  
WITH INDEXES**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**



NASA SP-7011 (78)

# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Scientific and Technical Information System during June, 1970.



*Scientific and Technical Information Division*

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

WASHINGTON, D.C.

JULY 1970

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# INTRODUCTION

*Aerospace Medicine and Biology* is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the American Institute of Aeronautics and Astronautics (AIAA) and NASA Scientific and Technical Information Facility. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

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

Each entry consists of a standard citation accompanied by its abstract in the following order:

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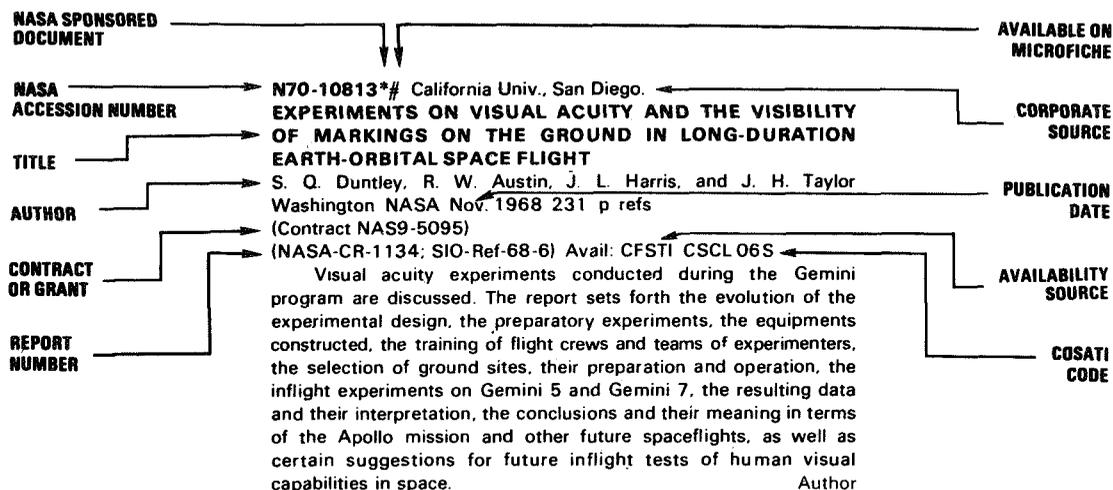
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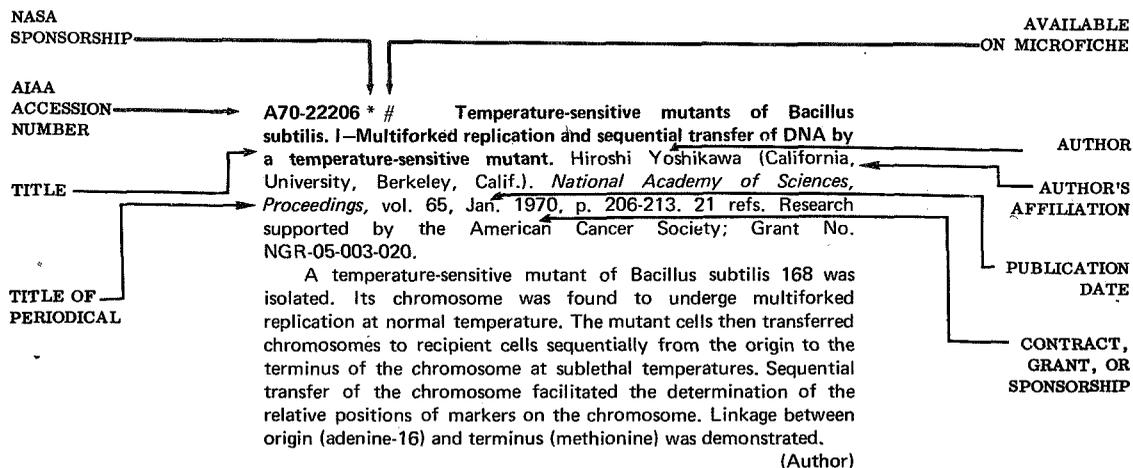
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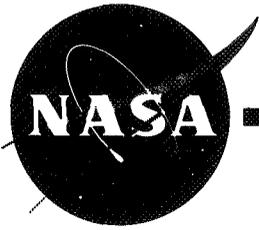
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## TYPICAL CITATION AND ABSTRACT FROM IAA





# AEROSPACE MEDICINE AND BIOLOGY

*a continuing bibliography*

JULY 1970

## STAR ENTRIES

**N70-23997#** Iowa Univ., Iowa City. Dept. of Mechanics and Hydraulics.

**APPLICATION OF OPTIMIZATION PRINCIPLES IN DETERMINING THE INTERNAL MOMENTS IN HUMAN LEG JOINTS DURING GAIT** Technical Report

K. Rim and E. Y. Chao Nov. 1969 46 p refs  
(Contract DA-ARO(D)-31-124-G997)  
(AD-699385; TR-1) Avail: CFSTI CSCL 6/3

To eliminate the difficulties encountered in numerical differentiation in calculating the internal moments at leg joints during gait, an alternative method based on optimal design principles is proposed. In this method, the moments are first estimated in order to solve a set of differential equations for the velocities and displacements involved during gait. The displacements so obtained are compared with the experimentally measured values. An iterative scheme is developed so that as the variations between the calculated and the measured displacements decreases the desired solution for the moments is approached. The analytical model of human gait is derived based on reasonable assumptions. The direct method of steepest descent is applied to pursue the solution. The existence and uniqueness of the solution are discussed based on the characteristics of the physical system and the method of steepest descent. The analysis and the method of solution can easily be extended to other similar biodynamical problems. TAB

**N70-24036#** Michigan Univ., Ann Arbor. Computer and Communication Sciences Dept.

**COMPUTER SIMULATION OF A LIVING CELL: MULTILEVEL CONTROL SYSTEMS**

Roger Weinberg and Bernard P. Zeigler Dec. 1969 48 p refs  
(Contracts N00014-67-A-0181; DA-31-124-ARO(D)-483; Grant NIH GM-12236)  
(AD-699380; Rept-08226-17-T) Avail: CFSTI CSCL 6/4

A simple bacterial cell (*Escherichia coli*) has been modeled, and the input-output behavior of the model has been simulated as a program in FORTRAN IV for an IBM 360/67 digital computer. Automata theoretic analysis of the homomorphic model underlying the computer simulation enables us to investigate the information content and complexity of the simulation and of the measurement space representing our data base. The simulated cell is able to adjust its enzymes and DNA to grow in different chemical environments using allosteric modification of enzymes, and repression of RNA synthesis. It grows at realistic rates and achieves limited metabolic stability. Author (TAB)

**N70-24048#** Human Factors Research Inc., Goleta, Calif.  
**GEOGRAPHIC ORIENTATION IN AIRCRAFT PILOTS: AN ANALYTICAL STUDY OF VISUAL CHECKPOINTS** Technical Report

James J. Mc Grath and Gail J. Borden Jun. 1969 224 p refs  
(Contract Nonr-4218(00))  
(AD-698266; TR-751-9; JANAIR-690614) Avail: CFSTI CSCL 5/5

A major study of the use of visual checkpoints in low-altitude navigation was conducted. The purpose was to develop a method for deriving design criteria for aeronautical charts, particularly those criteria used to select features for portrayal on the charts. Potential checkpoints visible in motion pictures taken at low altitude were cataloged in detail. Each feature was classified according to its category, measured according to its visual parameters (size, shape, contrast, etc.), and coded according to whether or not it was portrayed on standard aeronautical charts. The report presents a large amount of data showing the pilots ability to interpret charts, the cartographers ability to select the best features for portrayal, the categorical and parametric criteria that define the most useful checkpoints, and the effects of low-altitude experience on the pilots evaluations of checkpoints. Author (TAB)

**N70-24054#** Human Resources Research Organization, Alexandria, Va.

**THE EFFECTS OF INTERRUPTION OF DARK ADAPTATION ON PERFORMANCE OF TWO MILITARY TASKS AT NIGHT** Technical Report

David L. Easley, Donald L. Wright, William N. Wörnack, and William N. Gipe Dec. 1969 49 p refs  
(Contract DAHC19-70-C-0012)  
(AD-699489; HUMRRO-TR-69-20) Avail: CFSTI CSCL 6/16

To determine how interruption of dark adaptation (by using an intensifier) affected performance of military tasks with unaided vision at night, two series of studies were conducted. In one series, subjects walked parallel to a guideline, keeping as far as possible to the right; in the other series, subjects fired the M14 rifle at silhouette targets. Interruption of dark adaptation with a simulated monocular intensifier in the shooting eye or both eyes just before the task was begun affected the horizontal distance at which the guideline was followed. A readaptation interval of two to three minutes after interruption of dark adaptation by a binocular intensifier was related to performance under dark-adapted vision. Author (TAB)

**N70-24066#** Information Resources, Inc., Cambridge, Mass.  
**INFORMATION MAPPING FOR LEARNING AND REFERENCE** Final Report, May 1968-Jul. 1969

Robert E. Horn, Elizabeth H. Nicol, Joel C. Kleinman, and Michael G. Grace Bedford, Mass. ESD Aug. 1969 141 p refs  
(Contract F19628-68-C-0212)

(AD-699201; ESD-TR-69-296) Avail: CFSTI CSCL 5/9

Information mapping is a method of organizing categories of information and of displaying them for both learning and reference purposes. The method may be applied to the production of self-instructional books or to the organization of data bases for computer-aided instruction and reference. The report is itself written in modified information map form. The procedures and rules for information mapping were derived from educational research and technology as well as from the communications world. Preliminary work with simulated computer displays has explored the flexibility with which a system so organized can respond with a range of user options and display variations. Cost per instruction hour is competitive with that of other methods, but the method has additional advantages in its versatility and ease of updating.

Author (TAB)

**N70-24078#** Edinburgh Univ. (Scotland). Dept. of Machine Intelligence and Perception.

**EXPERIMENTAL PROGRAMMING, 1968 -1969**

Jun. 1969 83 p refs

(Grant SRC B/SR/3811)

Development and initial experiments with the adaptive graph traverser and a simulated automaton are described, along with the experimental programming. The graph traverser is a heuristic problem solving program for finding a path across a problem graph whose nodes are representations of the problem states and whose connecting arcs represent the application of operators to the states. Experiments solved by the graph traverser, such as the traveling salesman problem and moving a knight around a chessboard so that he lands on every square, are described. The development of a hardware automaton designed and to equip the computing system with a sufficient array of sensory and motor faculties to carry out a mapping exercise in a simulated forest is discussed, along with the mapping and more advanced tasks. The relevance of deductive retrieval to the design of intelligent automata is summarized.

N.E.N.

**N70-24125#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**EFFECTS OF TWO COMMON MEDICATIONS ON COMPLEX PERFORMANCE**

W. Dean Chiles, Harry L. Gibbons, and Paul W. Smith Jun. 1969 5 p ref

(FAA-AM-69-9) Avail: CFSTI

The performance of 10 subjects was measured over 4-hour periods following the administration of normal clinical dosages of Donnatal (two sessions), chlorpheniramine maleate (one session) and a placebo (one session) in a double blind experiment. Prior to the experiment, the subjects were given extensive training on the battery of tasks used. The subjects were tested as two 5-man crews on the tasks which were designed to assess psychological functions of the kind involved in aircraft operations; included were measures of monitoring, information processing, visual discrimination and "crew coordination." Although performance was in general "numerically" inferior under the chlorpheniramine maleate condition, no effects were found that could be statistically attributed to the drugs administered.

Author

**N70-24126#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**METHODOLOGY IN THE ASSESSMENT OF COMPLEX PERFORMANCE: THE EFFECTS OF SIGNAL RATE ON MONITORING A STATIC PROCESS**

W. Dean Chiles, Cherly B. Bruni, and Robert A. Lewis Aug. 1969 11 p refs

(FAA-AM-69-16) Avail: CFSTI

This study concerned the rate of presentation of stimuli on a task involving the monitoring of a static process of the kind

represented by aircraft warning light indicators. The task was performed concurrently with various combinations of tasks requiring the exercise of psychological functions representative of the demands placed on the human operator in aviation operations. The signal rates used were: 10.3 signals/hour, 17 signals/hour, and 22.5 signals/hour. The only task for which performance varied significantly across the three rates of signal presentation was the task requiring the monitoring of a dynamic process; performance of this task was facilitated by the highest rate of signal presentation on the static monitoring task. The two faster rates of signal presentation were found to yield more reliable measures of static monitoring performance than the lower rate.

Author

**N70-24139#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Air Force Human Resources Lab.

**A SYSTEMS APPROACH TO ELECTRONICS MAINTENANCE TRAINING**

Horce H. Valverde 1969 17 p refs Presented at the IEEE and ERS Intern. Symp. on Man-Machine Systems, Cambridge, England, 8-12 Sep. 1969

(AD-698752) Avail: CFSTI CSCL 5/9

The document describes the development and evaluation of an Air Force systems-oriented electronics maintenance course for weapon control systems technicians. The program consisted of three phases: A behavioral description based upon a task analysis of actual job requirements. An experimental 14-week training course prepared from the objectives obtained in Phase 1. A group of subjects with electronics aptitude percentile scores ranging from 60 to 95 received training. Data on all subjects was obtained including aptitude scores, reading ability scores, course grades, end-of-course performance testing, field followup performance testing and supervisory appraisals. The performance of experimental and control groups was compared on the basis of these data.

Author (TAB)

**N70-24161#** Syracuse Univ., N.Y. Dept. of Electrical Engineering.

**ATRIAL AND VENTRICULAR FIBRILLATION AS THE EFFECT OF A NOISE REDUCING SYSTEM Technical Report**

Stanford Goldman 12 Dec. 1969 18 p refs

(Contract N00014-67-A-0378-0002)

(AD-699190; EE-1607-69-12T2; TR-2) Avail: CFSTI CSCL 6/16

It is pointed out that noise reducing systems ordinarily operate to reduce noise only so long as the noise magnitude does not exceed a certain threshold. When this threshold is exceeded, the noise tends to eliminate the desired signal. The theory of atrial and ventricular fibrillation is then reviewed. This is done with the aid of simplified highly diagrammatic figures. The perturbations in the wavefront of depolarization due to such causes as hypoxia are identified with noise. It is pointed out that the cross connections in the Purkinje system and in the syncytial tissue both act to decrease the magnitude of the noise. It is also pointed out that when the noise is sufficiently large, it acts through the same cross connections to eliminate the desired signal, namely the normal heart beat. This amounts to a description of fibrillation in the language of noise reduction threshold theory. Thus fibrillation may be considered the result of a noise reduction system which is thrown into a pathological type of operation because the noise level has exceeded threshold.

Author (TAB)

**N70-24177#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**COMPLEX PERFORMANCE DURING EXPOSURE TO HIGH TEMPERATURES**

P. F. Iampietro, W. D. Chiles, E. A. Higgins, H. L. Gibbons, A. Jennings et al Jun. 1969 18 p refs

(FAA-AM-69-10) Avail: CFSTI

The effects of high temperature on psychomotor performance and physiological function were studied on male pilots (age 30-51)

holding a current medical certificate. A total of 41 runs were made at neutral (23.8 C. (75 F.), or hot (60.0 C. (140 F.), 71.1 C. (160 F.)) temperatures with low humidities (less than 20 mm. Hg at 60.0 and 71.1 C.). Heart rate (ECG), deep body temperature (rectal probe) and skin temperature were recorded at 2-minute intervals. Performance on a complex performance device (two-dimensional tracking, mental arithmetic, and monitoring) was scored for 5-minute intervals which varied in task difficulty. During exposure to 71.1 C. mean rectal temperature reached 38.05 C. (100.5 F.), mean peak heart rate was 132 beats/min., and mean finger temperature peaked at 42 C. (107.6 F.). There were significant decrements in performance (tracking and mental arithmetic) at 71.1 C. At 60.0 C. there were no performance decrements during 30 minutes of exposure. Results are discussed as they apply to aircrew in high performance aircraft. Author

**N70-24190#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**OPTIMIZATION OF RECOGNITION SYSTEM TRAINING**

T. Gergely et al 7 Aug. 1969 15 p refs Transl. into ENGLISH from Avtomatyka (Kiev), no. 6, 1967 p 14-22

(AD-699224; FTD-HT-23-139-69) Avail: CFSTI CSCL 6/4

Several schemes are investigated for training pattern-recognition systems. A method is presented for analyzing the process of training a linear perceptron by means of oriented graphs. A statistical model is also introduced which permits one to minimize the length of the training sequence of a recognition system by means of series analysis. TAB

**N70-24199#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**MEDICAL-BIOLOGICAL STUDIES IN WEIGHTLESSNESS, PART 1**

V. V. Parin et al 22 Aug. 1969 331 p refs Transl. into ENGLISH of the book "Mediko-Biologicheskoye Issledovaniya v Nevesomosti" Moscow, Meditsina, 1968 p 1-464

(AD-699221; FTD-HT-23-1457-68-Pt-1) Avail: CFSTI CSCL 6/19

An evaluation of experimental data derived from manned flights and flights with animals in various types of space vehicles in the earth's atmosphere. Particular attention has been devoted to evaluation of tests conducted during the manned Soviet Vostok and Voskhod flights, and of the results obtained on human performance under conditions of weightlessness. Author (TAB)

**N70-24200#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**MEDICAL BIOLOGICAL STUDIES IN WEIGHTLESSNESS, PART 2**

V. V. Parin et al 22 Aug. 1969 233 p refs Transl. into ENGLISH of the book "Mediko-Biologicheskoye Issledovaniya v Nevesomosti" Moscow, Meditsina, 1968 p 1-464

(AD-699226; FTD-HT-23-1457-68-Pt-2) Avail: CFSTI CSCL 6/19

For abstract see N70-24199.

**N70-24204#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**THE SPIRAL AFTEREFFECT. PART 2: SOME INFLUENCES OF VISUAL ANGLE AND RETINAL SPEED ON THE DURATION AND INTENSITY OF ILLUSORY MOTION**

Mary Jane Williams and William E. Collins Aug. 1969 12 p refs

(FAA-AM-69-15) Avail: CFSTI

The spiral aftereffect (SAE) is an example of one type of visual illusion-that which occurs following the cessation of real

motion. Duration and intensity of the SAE was evaluated under five conditions: visual angle constant with retinal speed also constant; stimulus size constant-the same size spiral was set at a variety of distances (and visual angles) with retinal speed either varying or held constant; distance constant-several spiral sizes (visual angles) were used at a constant distance with retinal speed either varying or held constant. Results indicate that perceived (rather than physical) characteristics of the stimulus situation may have the most significant effects on duration of the SAE. The findings thus have considerable pertinence to the evaluation of effective factors in the production of a variety of other visual illusions which can occur in aviation environments. Author

**N70-24206#** Pittsburgh Univ., Pa. Learning Research and Development Center.

**APPROACHES TO THE VALIDATION OF LEARNING HIERARCHIES Technical Report**

Lauren B. Resnick and Margaret C. Wang Aug. 1969 41 p refs *Its* Preprint-50

(Contract Nonr-624(18))

(AD-699211) Avail: CFSTI CSCL 5/10

The paper describes a program of research in the application of scalogram analysis to the validation of learning hierarchies, together with the development of an alternative method for assessing hierarchical relationships among tests of instructional objectives. The relationship between scalability of tests and positive transfer between objectives in the course of learning is discussed and experimental transfer studies testing hierarchical hypotheses are described. Related research by developmental and learning psychologists and by test designers is discussed along with the authors own research. Author (TAB)

**N70-24208#** Naval Personnel Research Activity, San Diego, Calif. Navy Training Research Lab.

**RETENTION OF ELECTRONIC FUNDAMENTALS: DIFFERENCES AMONG TOPICS Final Report**

Kirk A. Johnson Aug. 1969 32 p refs

(AD-699156; NPRA-STB-70-1) Avail: CFSTI CSCL 5/9

The purpose of the investigation was to explore some of the benefits and problems associated with the use of criterion-referenced tests in an operational training situation. The study was based on the material being taught in the first phase of an avionics fundamentals course, class A. All materials were originally taught by means of programmed instructional booklets. Author (TAB)

**N70-24222\*#** Naval Aerospace Medical Inst., Pensacola, Fla. Bureau of Medicine and Surgery.

**EXPOSURE OF ESCHERICHIA COLI TO LOW-FREQUENCY VIBRATIONS**

Dietrich E. Beischer and Glenda S. Cowart 15 Jan. 1970 12 p refs

(NASA Order W-12766)

(NASA-CR-109494; NAMI-1096) Avail: CFSTI CSCL 06C

The assumption is made that low frequency vibration as experienced in air and space vehicles may increase the genetic load. This hypothesis was tested by studying the effects of vibration on the formation of biochemical mutants in Escherichia coli. No significant differences from unvibrated controls were observed either in growth or in number and kind of nutritionally dependent cells arising in E. coli vibrated at frequencies from 20 to 100 Hz. Exposure times varied from 5 to 60 minutes, and accelerations from 5 to 20 G. The experiments demonstrate that the single linkage chromosome structure of the protokaryotic E. Coli is mechanically stable enough to withstand the mechanical forces of vibration within the limits used. Author

**N70-24258#** Bellarmine-Ursuline Coll., Louisville, Ky.  
**THE RELATIONSHIP BETWEEN SUBJECTIVE AND OBJECTIVE ASSESSMENT OF FATIGUE** Annual Progress Report, 1 Oct. 1968 - 30 Sep. 1969

Joseph H. Voor 30 Oct. 1969 15 p refs  
 (Contract DADA17-68-C-8042)

(AD-699370; BUC-2; APR-2) Avail: CFSTI CSCL 6/16

The reliability of the relationship between subjective and electromyographic assessment of fatigue in an isometric muscle contraction task was established under conditions of competition, monetary reward, and over a series of trials for both male and female Ss. Studies are now under way, or planned, to determine the effects of (a) anxiety, (b) the time at which motivation is introduced, (c) training of the S, and (d) personality variables upon the assessment of fatigue and the efficiency of the performance of the Ss. Author (TAB)

**N70-24298\*** Sierra Engineering Co., Sierra Madre, Calif.  
**[EMERGENCY OXYGEN MASK ASSEMBLIES] Final Report**

Leo F. Hotz 16 Mar. 1970 4 p  
 (Contract NAS9-8776)

(NASA-CR-108341) Avail: CFSTI CSCL 06K

Techniques for modifying emergency oxygen masks are discussed. Problems concerning production of the modified mask are presented. The use of viton as a replacement material for silicone is described. Viton offers a higher degree of flame resistance, but other disadvantages such as cost, weight, and stiffness have caused its use to be discontinued. Other suitable materials are required in order to continue the development effort. PNF

**N70-24299\*#** Public Health Service Hospital, Baltimore, Md.  
**THE EFFECT OF PROLONGED SIMULATED NON GRAVITATIONAL ENVIRONMENT ON MINERAL BALANCE IN THE ADULT MALE, VOLUME 3, EXHIBIT A** Final Report

[1968] 98 p refs  
 (NASA Order T-58941)

(NASA-CR-108337) Avail: CFSTI CSCL 06S

The psychological aspects of prolonged bed rest are reported as part of an overall study to determine the metabolic effects of simulated nongravitational environment over extensive time periods. The study involved three subjects being subjected to a 36 week period of continuous bed rest. The subjects selected were male, young, in good physical health, and possessing the same basic qualifications as required of astronauts. Since the primary goal of the study was metabolic in nature, there were no direct attempts to do psychologic research and the role of the psychologic team was that of enabling the subjects and staff to complete the study. The purpose of psychologic testing during the study was to evaluate any possible change in the subjects' emotional health so that corrective action could be taken if necessary. A synopsis of each weekly meeting, involving the subjects, psychologic team, and hospital staff, is presented. Results of psychologic tests given the subjects prior to, during, and at the completion of the study are included. D.L.G.

**N70-24306\*#** Naval Aerospace Medical Inst., Pensacola, Fla.  
**EVALUATION OF ANTIMOTION SICKNESS DRUGS: A NEW EFFECTIVE REMEDY REVEALED**

Charles D. Wood and Ashton Graybiel Mar. 1970 9 p refs  
 (NASA Order R-93)

(NASA-CR-109500) Avail: CFSTI CSCL 06O

Three single drugs (one used in three dosage levels) and three drug combinations were compared in their effectiveness to prevent motion sickness under standardized stress conditions in a slow rotation room. An unexpected finding was that a combination

of promethazine 25 mg with d-amphetamine 10 mg had the same range of effectiveness as that found in earlier studies (and confirmed here) for scopolamine 0.6 mg plus d-amphetamine 10 mg. When scopolamine was tested alone, halving the "usual" dose (0.6 mg) reduced its effectiveness about one-fifth and doubling the usual dose increased effectiveness by 29 per cent; thus, the optimum dose of scopolamine appeared to be approximately 0.5 mg. Betahistine hydrochloride (4 mg) was ineffective and cinnarizine (50 mg) was of small benefit. Author

**N70-24307\*#** Public Health Service, San Francisco, Calif. Nuclear Medicine Service.

**A STUDY OF BONE MINERAL CONTENT PERFORMED BY THE GAMMA RAY ABSORPTION TECHNIQUE IN PROLONGED BED REST SUBJECTS MAINTAINED IN A METABOLICALLY CONTROLLED ENVIRONMENT: THE ULTIMATE APPLICATION OF GAMMA RAY ABSORPTION TECHNIQUES TO IN-FLIGHT BONE MINERAL MEASUREMENTS, EXHIBIT B** Terminal Report

John Max Vogel [1969] 86 p refs  
 (NASA Order T-58941-G)

(NASA-CR-108316) Avail: CFSTI CSCL 06S

Results of a study to measure the bone mineral changes which occurred in three subjects during and after a nine month period of bed rest are presented. A decision was made to study the left os calcis on all subjects by means of a monoenergetic photon source technique. It was necessary to devise a method whereby the bed-ridden subject could have his os calcis measured repetitively over a long period of time with acceptable reproducibility of position and accuracy of measurement. The development of the instrumentation is described along with observed changes in bone mineral. Results of the study indicate: (1) Bone mineral loss from the central os calcis during a 30 to 36 week period of bed rest is substantial. (2) Areas with the least bone mineral at the beginning of the study lost it more rapidly during bed rest and regained it more rapidly after reambulation. (3) The subject with the least bone mineral, lost the most, conversely, the one with the most, lost the least. (4) The os calcis can be placed at risk, after return to G conditions, if these mineral losses occur during a prolonged period of weightlessness. D.L.G.

**N70-24310\*#** Franklin Inst., Philadelphia, Pa. Research Labs.  
**SPACE RELATED BIOLOGICAL AND INSTRUMENTATION STUDIES** Annual Report, Mar. 1969 - Mar. 1970

R. J. Gibson and R. M. Goodman Mar. 1970 54 p refs  
 (Contract NSR-039-005-018)

(NASA-CR-109394; A-B2299-4) Avail: CFSTI CSCL 06B

Experimental and research effort has continued on high reliability, multichannel telemeters. The first four-channel fm/fm implant was completed and put through bench evaluation. Long-life two-channel units were completed and packaged. Bench results are reported. Preliminary data shows great promise for the successful development of long-life, pressure-sensing implants. Based on earlier predictions, use of piezo-junction devices for this purpose shows feasibility. Studies of implantable, ion concentration transducers were continued at a somewhat reduced effort level. Details on the formulation of a flexible, paraffin-base, encapsulating material are included. Author

**N70-24322#** Aztec School of Languages, Inc., Maynard, Mass.  
**THEORY OF NEURAL EXCITATION AS COOPERATIVE CATION EXCHANGE IN A TWO-DIMENSIONAL LATTICE. PART 1: THE ION CURRENT AFTER A DEPolarizing JUMP IN THE MEMBRANE POTENTIAL [THEORIE DES NERVENERREGUNG ALS KOOPERATIVER KATIONEN-AUSTAUSCH IN EINEM ZWEIDIMENSIONALEN GITTER. I. IONENSTROM NACH EINEM DEPolarISIERENDEN SPRUNG IM MEMBRANPOTENTIAL]**

Gerold Adam Nov. 1969 49 p refs Transl. into ENGLISH from

Z. Naturforsch. (Tubingen), v. 23b, 1968 p 181-197 Prepared for Lincoln Lab., MIT  
(AZT-69-626-Gell) Avail: CFSTI

The presently accepted theory of nerve excitation fails to explain the mechanism of regulation of the state of the axon membrane by the membrane potential or the cation activities. A physicochemical mechanism is proposed for the regulation of the excitation state based on a model of the axon membrane as a two dimensional cooperative cation exchanger in contact with the electrolyte reservoirs inside and outside. In the resting state, the lattice units of the cation exchanger bind calcium ions. Upon depolarization or decrease of the calcium activity in the outside medium, the resting state becomes unstable and univalent cations are bound by the lattice units. The ion movements accompanying the cation exchange give rise to the inward excitation current, as observed in a voltage clamp experiment. This cooperative cation-exchange can be considered as a two dimensional phase transition. Its kinetics are described by the processes of nucleation and nucleus-growth. The theory in good agreement with experiment described the dependence of the ion current on time and on membrane potential for small depolarizations. Author

**N70-24360#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**THE USE OF A TRANQUILIZER (CHLORDIAZEPOXIDE) IN FLIGHT TRAINING**

C. E. Melton, Jr., Marlene Hoffmann, and R. H. Delafield Jul. 1969 8 p refs

(FAA-AM-69-12) Avail: CFSTI

Eleven male subjects were given flight training according to a conventional but rigidly standardized private pilot syllabus. On half of the dual flights chlordiazepoxide was given; identical-appearing placebo capsules were given on the remaining dual flights. No treatment was given on solo flights. Differences could not be distinguished between tranquilizer and placebo with respect to the urinary excretion of catecholamines and 17-OH corticosteroids and heart rates recorded continuously in flight. Author

**N70-24363#** Michigan Univ., Ann Arbor. Logic of Computers Group.

**SYSTEM THEORETIC ANALYSIS OF MODELS: COMPUTER SIMULATION OF A LIVING CELL Technical Report**

Bernard P. Zeigler and Roger Weinberg Nov. 1969 41 p refs (Contracts N00014-67-A-0181; DA-31-124-ARO(D)-483; Grant PHS GM-12236)

(AD-699379; Rept-08226-T-16-T) Avail: CFSTI CSCL 6/4

In modelling a natural system for computer simulation one must often reduce the complexity of the system in accord with practical considerations of computer size and length of computation time. In a model of a living cell, the formal concepts of systems theory valuable were found in this regard. In particular, the notion of homomorphism is applicable to the problem of assuring that the model preserves interesting properties of the system under study while at the same time being simpler with respect to computer implementation. TAB

**N70-24424\*#** California Univ., Berkeley. Dept. of Nutritional Sciences.

**INTEGRATED RESEARCH PROGRAM IN SPACE NUTRITION Semiannual Report, 1 Aug. 1969-31 Jan. 1970**

Doris Howes Calloway and Sheldon Margen Feb. 1970 20 p refs

(Grant NGR-05-003-351)

(NASA-CR-109490) Avail: CFSTI CSCL 06P

An experiment to prove that increasing dietary protein intake raises urinary uric acid excretion in humans is reviewed. A direct relationship between dietary protein intake and uric acid excretion was shown for strictly purine-free, formula diets containing up to 96 g nitrogen per day. Another experiment with four men studied the effect of water diuresis associated with a high protein diet on uric acid excretion. The study indicates that elevated blood and urinary urea concentration may enhance renal uric output. A third experiment suggests that, even in the presence of a large exogenous purine load, allopurinol suppresses uric acid formation from purines synthesized endogenously. Fasting and postprandial serum amino acid patterns are given for healthy men fed formula diets containing either an adequate amount or no protein. Attempts were made to characterize the radioprotective factor in alfalfa. S.S.

**N70-24447\*#** Food and Drug Administration, Cincinnati, Ohio. Div. of Microbiology.

**ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS Quarterly Progress Report, 1 Oct. -31 Dec. 1969**

R. B. Read, Jr. Mar. 1970 15 p

(NASA-Order R-36-015-001)

(NASA-CR-109406; QPR-19) Avail: CFSTI CSCL 06M

The results of thermal inactivation research are presented. Accomplishments reported include: (1) preliminary studies on the inactivation of *B subtilis* var. *niger* in the range of mean concentrations of 1 million to 0.01 test organisms per sample, (2) determined the amount of water in the system when spores were exposed to heat, and (3) characterized 1247 isolates from Apollo 12. Author

**N70-24449\*#** Southwest Research Inst., San Antonio, Tex.

**SOUTHWEST RESEARCH INSTITUTE ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Final Report, 1 Feb. 1969-28 Feb. 1970**

David F. Culclasure and Betty J. Wall 31 Mar. 1970 247 p refs

(Contract NASw-1867; SwRI Proj. 13-2538)

(NASA-CR-109404) Avail: CFSTI CSCL 06B

The transfer of applicable aerospace generated research products to the field of biomedicine is reported. Individual problems submitted to the Biomedical Applications Team are described along with statements of action taken and transfers accomplished. D.L.G.

**N70-24466#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**EFFECTS OF ALCOHOL ON COMPLEX PERFORMANCE**

W. Dean Chiles and Alan E. Jennings Aug. 1969 11 p refs

(FAA-AM-69-14) Avail: CFSTI

Nine subjects were tested on a battery of tasks involving monitoring two-dimensional compensatory tracking, and mental arithmetic. The subjects ingested 2.5 ml. of an alcoholic beverage per kilogram of body weight two hours before testing; mean blood alcohol at the beginning of testing was 102 mg.%. Significant workload effects were found for three of the four measures of tracking performance, for simple reaction time, and for movement time in the choice reaction time task. Significant alcohol effects were found for reaction time in choice reactions, detection times for meter signals, and for three of the four measures of tracking. There was a significant interaction between workload and alcohol in the case of one tracking measure - RMS error in the vertical dimension. Nonsignificant interactions were found between alcohol and workload for absolute error in both dimensions as well as for reaction time and movement time in the choice reaction time task. Author

N70-24481

**N70-24481**\*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

**EARTH-ORBITING SPACE-BASE CREW SKILLS ASSESSMENT**

Robert T. Gundersen Washington Apr. 1970 78 p refs (NASA-TM-X-1982; 5-235) Avail: CFSTI CSCL 051

Many aspects of the crew skills required for an earth-orbiting space base are discussed. Problems associated with the design aspects are considered, and an assessment of a line-type organization is made. The problems discussed are the crew billets related to work periods, cross skills, manpower allocation, weekly crew schedules, duty cycles, and crew efficiency. Crew compartmentation and crew distribution are also discussed and analyzed. The study results, problem areas, and recommendations are presented for a nominal spacebase crew. Author

**N70-24497**# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**THREE THEORETICAL SCHEMES OF LEARNING RECOGNITION SYSTEMS**

V. A. Yakubovich 4 Aug. 1969 23 p refs Transl. into ENGLISH from the Publ. "Samonastravayushchiyesya Sistemy. Trudy" Moscow, Nauka, 1967 p 183-191 (AD-699232; FTD-MT-24-152-69) Avail: CFSTI CSCL 6/4

A perfect perceptron-type learning pattern recognizer function is described. A real recognizer can be described by a function  $f(x, u)$ . The learning problem includes the selection of the  $u$ -parameter in such a way that the approximation is as accurate as possible; the values of  $s(x)$  are known only at given points. TAB

**N70-24595**# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

**SLEEP LOSS AND ITS EFFECTS ON PERFORMANCE**

Paul Naitoh Aug. 1969 75 p refs (AD-699505; Rept-68-3) Avail: CFSTI CSCL 6/5

The effects of sleep loss on human task performance are discussed under total, partial, and selective deprivations of sleep. Some of the frequently used psychological tasks in studies of total sleep loss are described in sufficient detail so that experimenters could choose, on the basis of materials presented in this monograph, adequate tasks to fit their experimental objectives. Factors which play critical roles in determining the degree of task sensitivity to total sleep loss are listed. Effects of shortened hours of sleep on human task performance are discussed. Effects of selected sleep deprivation on performance are also commented upon. The commentary is followed by a bibliography on sleep deprivation with author and subject indices. Author (TAB)

**N70-24611** California Univ., Los Angeles.  
**THEORY AND APPLICATION OF REMOTE INSTRUMENTATION SYSTEMS FOR BEHAVIORAL RESEARCH**

Richard Max Bird (Ph.D. Thesis) 1969 557 p Avail: Univ. Microfilms: HC \$25.20/Microfilm \$7.10 Order No. 69-19491

The measurement of the output factors, and the measurement and/or control of the input factors, from remote distances while the subject is in the natural environment setting is discussed. This area of interest is traced from a historical point of view indicating how specific advances in technology facilitated related advancements in RIS techniques. A generalized system model is developed for remote instrumentation systems (RIS's) for behavioral research, with major system parameters such as operational function, physical configuration of personal unit, coding and transmission, propagation, noise, antennas, portable power sources, electronic hardware, rules and regulations of the FCC, and legal and social considerations. Each is briefly qualitatively described and a design methodology is introduced which can be used to optimize the features in the design of a functional RIS. Dissert. Abstr.

**N70-24704**# Eidgenossische Technische Hochschule, Zurich (Switzerland).

**STUDIES ON INTERFERENCE MICROSCOPIC MASS DETERMINATION FOR INHOMOGENEOUS OBJECTS [UNTERSUCHUNGEN ZUR INTERFERENZMIKROSKOPISCHEN MASSENBESTIMMUNG AN INHOMOGENEN OBJEKTEN]**

Werner Mueller (Ph.D. Thesis) 1968 65 p refs In GERMAN (DISS-4272) Avail: CFSTI

The photometric integration method of Davies and Deeley (1956) and Mitchison et al (1956) has been further developed. A preparation technique for interference microscopy has been studied. The determination of the parameter (referred to the refractive index of water) of fixed, dried calf thymus nuclei gave 0.155 by comparison of a gravimetric with the interference microscopical mass determination. Author

**N70-24804**\*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**STUDIES ON THE PSYCHOPHYSIOLOGY OF THE WORK OF ASTRONAUTS**

N. N. Gurovskiy, ed. Washington NASA Mar. 1970 144 p refs Transl. into ENGLISH of the Book "Ocherki Psikhofiziologii Truda Kosmonavtov" Moscow, Meditsina Press, 1967 p 1-140 (Contract NASw-1692) (NASA-TT-F-593) Avail: CFSTI CSCL 05J

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**N70-24805\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**SEVERAL PECULARITIES IN WORK ACTIVITY OF ASTRONAUTS ON PROLONGED SPACE FLIGHT**

N. N. Gurovskiy *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 1-8 (see N70-24804 11-04)

Avail: CFSTI CSCL 05J

The work regimen defines the structure of life during a prolonged space flight. Specifications must be developed for the precise regulation of the work process of the astronauts. Author

**N70-24806\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE PHYSIOLOGICAL BASIS OF HUMAN ADAPTATION TO SPECIFIC CONDITIONS OF ACTIVITY**

S. A. Kosilov et al *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 9-24 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 05J

Under the conditions of a space flight, the work and rest regimen must be grounded, taking into account the necessity of a gradual but significant restructuring of the astronaut's physiological functions. Specific conditions of the astronaut's activities must be determined in order to overcome the difficulties produced by the environment and to design a satisfactory program for work activity. Author

**N70-24807\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE RATIONAL DESIGN OF A REGIMEN OF WORK FOR ASTRONAUTS**

F. P. Kosmolinskiy et al *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 25-31 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 05J

Experiments have evidenced the changes in bodily and mental functions which result from the unique environment peculiar to space flights. Methods of organizing the astronaut's work and rest regimen to compensate for and/or avoid these changes are proposed. Author

**N70-24808\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**SENSORY DEPRIVATION IN SPACE FLIGHT**

F. P. Kosmolinskiy et al *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 32-48 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 06S

The effects of a lack of external stimuli and motor activity during prolonged space flights are discussed. Experiments show that isolation and sensory deprivation create complex physiological and psychological reactions in the human organism. Author

**N70-24809\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**INFLUENCES ON THE HUMAN ORGANISM OF ALTERED AFFERENTATION**

F. P. Kosmolinskiy *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 49-57 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 06S

Among the factors acting on the astronaut during prolonged space flights, variations between sensory understressing and sensory overstressing have the greatest significance. An informational

overload is shown to affect the organism as detrimentally as the opposite phenomenon (sensory deprivation). Several solutions to the problem of overcoming these difficulties are discussed, including total organization and control of the interior arrangement of the spaceship, ordering of work and rest regimen for the crew, and preflight training. Author

**N70-24810\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**PRINCIPLES AND MEANS OF INVESTIGATION OF PROBLEMS OF DAYS IN SPACE**

B. S. Alyakrinskiy *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 58-64 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 06P

The various factors influencing the possible organizations of daily periodicity under space flight conditions are discussed. Suggestions are made as to need for further investigations relating to the organization of the space day. Author

**N70-24811\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE INFLUENCE OF VARIOUS REGIMENS OF WORK AND REST ON THE FUNCTIONAL CONDITION OF A MAN DURING A LONG STAY IN A HERMETICALLY SEALED CHAMBER**

A. A. Veselova et al *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 65-90 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 06S

Two experiments were conducted in which subjects were placed in a hermetically sealed chamber and their reactions were studied. As a result, the specific effects of these unusual environmental conditions and of an unaccustomed regimen of work and rest were able to be pinpointed. Author

**N70-24812\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

**THE INFLUENCE OF A CHANGE IN REGIMEN OF THE DAILY ACTIVITY ON THE HUMAN ORGANISM UNDER CONDITIONS OF ISOLATION**

V. I. Myasnikov *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 91-105 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 05J

A number of experiments were conducted in which men were isolated in a soundproof chamber for extended periods of time. The regimens of work and rest which the subjects followed were varied. The results of these investigations, particularly the psychophysical effects on the organism, are presented. Author

**N70-24813\*#** Aztec School of Languages, Inc., Maynard, Mass. **THE CAPACITY FOR WORK AND THE CONDITION OF HIGHER NERVOUS ACTIVITY UNDER VARIOUS LIFE REGIMENS**

M. A. Gerd *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 106-115 refs (See N70-24804 11-04)

Avail: CFSTI CSCL 05J

The results of various tests of mental and physical reflexes during a two-week experiment with three subjects are presented. Round-the-clock watches were established and results are given presenting comparisons of responses of subjects according to the shifts worked. Author

## N70-24814

**N70-24814\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

### **DYNAMICS OF THE INTELLECTUAL CAPACITY FOR WORK AND THE CONDITIONS OF HYPODYNAMIA, ISOLATION, AND ELEVATED TEMPERATURE IN A HERMETICALLY SEALED CHAMBER**

Y. M. Krutova *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 116-124 refs (See N70-24804 11-04)

Avail: CFSTI CSCL05J

Three experiments on isolation effects in a hermetically sealed chamber on memory and mental concentration are discussed.

Author

**N70-24815\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

### **SIGNIFICANCE OF MUSCULAR ACTIVITY FOR THE PRESERVATION OF STABILITY OF AN ASTRONAUT'S MOTOR FUNCTIONS**

A. V. Korobkov et al *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 125-134 refs (See N70-24804 11-04)

Avail: CFSTI CSCL05J

The psychological and physiological effect of weightlessness, limited mobility, and hypoxia are examined. The use of exercises as a means of prophylaxis of these effects is discussed. Author

**N70-24816\*#** Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

### **INVESTIGATIONS OF HUMAN MOTOR FUNCTIONS UNDER THE CONDITIONS OF AN ALTERED DAILY REGIMEN**

V. M. Devishvili et al *In its* Studies on the Psychophysiol. of the Work of Astronauts Mar. 1970 p 135-140 refs (See N70-24804 11-04)

Avail: CFSTI CSCL06S

Investigations of the effects of an altered daily regimen upon muscular strength and endurance are reported. Author

**N70-24822\*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

### **FIFTY-MAN SPACE BASE POPULATION ORGANIZATION**

Georg von Tiesenhausen 31 Jan. 1970 19 p ref (NASA-TM-X-53989) Avail: CFSTI CSCL05H

An attempt is made to establish a baseline social and functional structure for a 50-man Space Base and to show how the requirements and activities of the personnel affect the Space Base layout. Author

**N70-24919#** Joint Publications Research Service, Washington, D.C.

### **MYSTERIOUS BEHAVIOR OF DOLPHINS**

A. Tomilin 30 Mar. 1970 8 p ref Transl. into ENGLISH from Sots. Industriya (Moscow), 25 Jan. 1970 4 p (JPRS-5Q182) Avail: CFSTI

Physical and behavioral patterns and characteristics of dolphins are described in terms of their application in signal and information transmission, rapid and safe submergence, and construction of a sensitive and portable hydrolocator. Use of the skin of dolphins as a model for the outer coatings of high speed ships and the domestication and practical utilization of dolphins in fishing and sea investigations are also discussed. S.S.

**N70-24951\*#** Hamilton Standard, Windsor Locks, Conn.

### **TRADE-OFF STUDY AND CONCEPTUAL DESIGNS OF REGENERATIVE ADVANCED INTEGRATED LIFE SUPPORT SYSTEMS (AILSS), FEBRUARY 1968-JANUARY 1970**

Washington NASA Jan. 1970 668 p refs

(Contract NAS1-7905)

(NASA-CR-1458) Avail: CFSTI HC\$10.00/MF\$0.65

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**N70-24952\*#** Hamilton Standard, Windsor Locks, Conn.

### **CONDUCT OF STUDY**

*In its* Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 9-64 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL06K

Presented are the pertinent factors regarding the conduct of the AILSS study. Discussed are the study approach, selection philosophy, study flow, and study method. In addition, this section contains a specification requirements summary and general discussions of special system considerations including reliability, maintainability, modularity, commonality, fire safety, and microbiology. Author

**N70-24953\*#** Hamilton Standard, Windsor Locks, Conn.

### **OXYGEN AND NITROGEN STORAGE**

*In its* Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 65-108 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL06K

Metabolic oxygen requirements are provided by reduction of crew-produced carbon dioxide and water in the oxygen regeneration subsystem. Estimated onboard storage requirements of oxygen and nitrogen lead to the selection of high pressure (3000 psi) gaseous storage tanks manufactured of filament wound material to provide oxygen and nitrogen for cabin repressurization and cabin leakage. A single tank is used for nitrogen storage and four one-third-size tanks for oxygen storage. This form of storage demands little crew time and assures high reliability, as well as low weight

and good reflexivity. The selection is further supported by the decision to provide oxygen tank redundancy and low vehicle leakage probability for a 500 day mission. G.G.

**N70-24954\*#** Hamilton Standard, Windsor Locks, Conn.

**PRESSURE AND COMPOSITION CONTROL**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 109-115 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

Control of the oxygen to nitrogen ratio in the cabin atmosphere is obtained by regulating partial oxygen pressure through an O2 generation system and the cabin total pressure of 7.0 psia by a leakage makeup system. A solid electrolyte process generates the oxygen required for metabolic consumption through combined electrolysis of collected carbon dioxide and water. Cabin repressurization is triggered by a pressure-actuated warning signal that alerts the crew to take manual corrective action. This selected gas storage/pressure and control system is highly reliable and possesses inherent simplicity and flexibility. Weight is not considered since tankage valving, pressure regulators, and heat exchanger weights are included in the gas storage system evaluation. G.G.

**N70-24955\*#** Hamilton Standard, Windsor Locks, Conn.

**WATER ELECTROLYSIS**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 117-156 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

A gas circulation concept is selected for the advanced integrated life support system that uses oxygen-side gas circulation in the water electrolysis configuration. This concept has a low equivalent weight, no inherent water feed or gas collection problems, and good thermal process control. G.G.

**N70-24956\*#** Hamilton Standard, Windsor Locks, Conn.

**CO2 REMOVAL AND CONCENTRATION**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 157-205 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

Candidate CO2 removal and concentration are discussed in terms of advanced integrated life support systems criteria. A steam desorbed resin concept is selected for all three systems designs considered. It provides regenerable solid absorption during cyclic use of two steam regeneration beds and delivers wet CO2 with some N2 in the desorption phase to the accumulator. The system provides high reliability, good total equivalent weight, flexibility, and volume. G.G.

**N70-24957\*#** Hamilton Standard, Windsor Locks, Conn.

**O2 GENERATION/CO2 CONTROL**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 207-251 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

Detailed requirements for oxygen generation and carbon dioxide removal and reduction are given in the system specification. In general, the requirements are to generate 15.1 pounds of oxygen per day and to remove and process 18.5 pounds of carbon dioxide per day for the nine man crew. Overboard discharge of oxygen itself or oxygen in the form of carbon dioxide or carbon monoxide

is to be avoided if possible. The problem is to select the system that best meets these requirements with regard to the ALLSS evaluation criteria. The solid electrolyte concept is selected for all ALLSS designs, primarily on the basis of its low equivalent weight, its superior secondary criteria ratings, and because a separate water electrolysis unit is not needed. A simplified representation of this concept is shown. Author

**N70-24958\*#** Hamilton Standard, Windsor Locks, Conn.

**ATMOSPHERIC CONTAMINATION CONTROL**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 253-283 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

The atmospheric contamination control system consists of a trace gas control subsystem composed of a large sorbent bed, a catalytic oxidizer, and several small sorbent beds; a bacterial contamination control subsystem consisting of three high flow rate, 0.3 micron filters; and a particulate contamination control subsystem composed of several debris traps and roughing filters. The catalytic oxidizer is the main trace gas contaminant control device. In this way the large expendable weight penalty associated with charcoal is avoided. A small sorbent bed placed before the oxidizer prevents ammonia oxidation to toxic products, but, except for ammonia, no other contaminants are kept out of the oxidizer. Contaminants that may poison the bed, such as H2S and the halogenated hydrocarbons, are allowed to do so; for this reason, the beds are provided with an excess amount of catalyst. Complete oxidation of all contaminants is assured, because the oxidizer is maintained at 700 F, which is high enough to oxidize 100 percent of any contaminant including methane. Another small sorbent bed is placed downstream of the oxidizer. It contains lithium carbonate and is used to remove acid gases formed in the oxidizer. Author

**N70-24959\*#** Hamilton Standard, Windsor Locks, Conn.

**THERMAL CONTROL**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 285-335 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

A detailed discussion of water separation concepts precedes the temperature and humidity control section. This discussion includes descriptions of the water separators used with the cabin heat exchangers, and other separation concepts considered for use as part of the other ALLSS subsystems. Air flow for temperature and humidity control provides a significant portion of the ventilation or, more specifically, the cabin air circulation requirements. Additional ventilation fan flow requirements are derived and defined in this section. The design of the liquid heat transport circuit is based largely on the integration subsystems and internal cabin heat loads. Several assumption must be made concerning the total energy load to be dissipated and its location in the vehicle. A load range must be specified to ensure adequate performance over all anticipated operating conditions. Lastly, because of a hard definition of the vehicle or its exact loads does not exist, the selected system concept must exhibit some degree of flexibility and be capable of adapting to other than defined conditions. The choice of a power plant has a significant influence upon the liquid heat transport system design, not only from the standpoint of equipment selection but also from the standpoint of process heat availability and characteristics. Author

**N70-24960\*#** Hamilton Standard, Windsor Locks, Conn.

**WATER MANAGEMENT**

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems Jan. 1970 p 339-424 (See N70-24951 11-05)*

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

## N70-24961

The AILSS water management subsystem consists of facilities to collect and purify waste water derived from urine, washwater, and humidity condensate, and to store the resulting potable water in a sterile manner. The major water reclamation equipment selected for the AILSS mission is vapor diffusion/compression and vapor diffusion. In all designs, all waste water is processed together in a single unit. The major factors influencing the selection of the two vapor diffusion concepts were: (1) best inherent sterility; (2) low maintenance time; and (3) relatively low equivalent weight. The auxiliary equipment selected includes bacterial filters and high temperature (160 F) storage tanks to control bacterial contamination, and bladderless collection and storage tanks. The former were chosen because of their high positive effectiveness in controlling bacteria and because they do not contaminate the water. Bladderless tanks were chosen because of their high reliability and low maintainability requirements. Author

**N70-24961** \*# Hamilton Standard, Windsor Locks, Conn.

### WASTE CONTROL

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems* Jan. 1970 p 425-472 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

An integrated vacuum decomposition concept is selected as optimal procedure for disposing waste material during long manned space flights in controlled atmospheres. The system provides the following functions: (1) it collects, treats, and stores/or disposes of all solid and liquid wastes, and collects and transfers raw urine to the water management subsystem; (2) it eliminates odors, aerosols, and existing gases; (3) it sterilizes waste matter; and (4) it reduces storage mass and volume of waste materials. Different levels of micro-organism activity present significant problems in the selection of a waste control system. Author

**N70-24962** \*# Hamilton Standard, Windsor Locks, Conn.

### CREW PROVISIONS

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems* Jan. 1970 p 473-518 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

A freeze-dried diet is the best approach to food and feeding. This basic technique should be supplemented with dried and vacuum-packaged items. Newer techniques such as irradiation and osmotic drying should also be further investigated. Personal hygiene consists of grooming, dental hygiene, selective body cleaning, and whole body cleaning. Grooming equipment includes vacuum devices for collecting nail and hair clippings, an electric hair clipper, and electric razors. Dental hygiene is accomplished with an electric toothbrush, using a liquid dentrifice. Reuseable wipes are provided for selective body cleaning. A head-in shower is selected as the best approach to whole body cleaning primarily on the basis of psychological acceptability and cleaning thoroughness. These advantages compensate for relatively high equivalent weight. Author

**N70-24964** \*# Hamilton Standard, Windsor Locks, Conn.

### SELECTED EC/LS SYSTEMS

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems* Jan. 1970 p 573-696 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

Based on the results of the AILSS study, total equivalent weight (TEW), although extremely critical during any actual flight hardware design, is not significantly affected by the type of power/heat source. The other primary criteria, crew time and reliability, are also not strongly effected by power/heat source selection at the EC/LS system level. In summary, although the

subsystems designs selected for the general system and each of the three specific systems have significantly different weight and power requirements, the basic concepts do not vary greatly. This is because of the AILSS selection criteria emphasis on maintenance and reliability and because of the assignment of similar weight penalties to the power sources. This leads to the selection of baseline concepts which, with minor modifications, are essentially independent of the power supply/heat source. As a result of this study, it is evident that a practical regenerative AILSS, suitable for the support of nine men for a 500-day non-resupply mission, is within the state-of-the-art projected for the 1976 and 1980 period, provided the concepts selected for the AILSS undergo extensive and concentrated development effort starting early 1970. This must be followed by comprehensive manned system testing. Author

**N70-24965** \*# Hamilton Standard, Windsor Locks, Conn.

### PACING TECHNOLOGY

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems* Jan. 1970 p 697-713 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

Pacing technology discussed presents a summation of the research and development which is anticipated throughout the study. The primary attention of this section is focused on critical areas of the selected AILSS systems that require concentrated research and development effort. Considered are: (1) oxygen and nitrogen storage materials and fabrication processes; (2) vapor diffusion subsystems for water reclamation; (3) design of bladderless water storage tanks; (4) waste control by vacuum decomposition process; (5) solid electrolyte cell for oxygen generation; (6) carbon dioxide adsorption and removal; (7) food selection and storage; (8) liquid-gas phase separation; (9) pressure sensors and bioluminescent microbiological measurements; and (10) alternate system concepts. Author

**N70-24966** \*# Hamilton Standard, Windsor Locks, Conn.

### DILUENT STUDY

*In its Trade-Off Study and Conceptual Designs of Regenerative Advanced Integrated Life Support Systems* Jan. 1970 p 715-738 (See N70-24951 11-05)

Avail: CFSTI HC\$10.00/MF\$0.65 CSCL 06K

This study considers the changes in system weight and power that would result if the diluent were changed from nitrogen to either helium or neon, assuming unchanged functional performance. To make the study more useful, this was done for both relative (normalized) power and specific AILSS total equivalent weights. A list of gas mixtures, pressures, and pertinent properties is included. Author

**N70-25051** # Royal Aircraft Establishment, Farnborough (England).

### IMPACT VIBRATIONS IN HUMAN WALKING [UEBER STOSSERSCHUETTERUNGEN BIEM GANG DES MENSCHEN]

R. Gunther Nov. 1969 18 p refs Transl. into ENGLISH from Intern. Z. angew. Physiol. (W. Berlin), no. 25, 1968 p 130-141 (RAE-Lib-Trans-1388) Avail: CFSTI

Impact vibrations in walking and running on surfaces of different consistency (elastic floor, concrete, and lawns) were investigated using accelerometers attached to the head, pelvis and heel. 31 subjects (18 men and 13 women) were used and the accelerations measured ranged from 23-31 g at the heel, 1.1-2.1 g at the pelvis and 0.6-1.1 g at the head. The duration of the vibrations was measured and the velocity of propagation of the impact wave was calculated. The intensity of the impact was attenuated during propagation through the body, the values at the pelvis and the head being 1/17 and 1/27 respectively of those measured at the heel. In walking and running, the impact vibrations

were the same for men and women when measured at the heel. In men the values obtained at the pelvis and head whilst running were about twice those recorded at the heel. Due to the different damping characteristics the values recorded for women at the pelvis were about 50% greater than those of men and at the head about 20% less. No correlation was found between the impact vibrations and body weight of the subjects. Author

**N70-25057#** Eidgenossische Technische Hochschule, Zurich (Switzerland).

**ON THE VITRIFICATION OF DILUTED AQUEOUS SOLUTIONS [UEBER DIE VITRIFIZIERUNG VERDUENNTER WAESSRIGER LOESUNGEN]**

Udo Riehle (Ph.D. Thesis) 1968 133 p refs In GERMAN /ts Diss. No. 4271

Avail: CFSTI

The normally encountered formation of ice crystals of 1 to 10 millimicron in size destroys the fine structure and viability of frozen cell materials. As the cooling rate is increased, the crystal size is found to decrease approximately in proportion. When a critical value is reached, the crystal size suddenly reduces to 50 to 100 AU. By optimizing the heat transfer and freezing under a hydrostatic pressure load, the so-called "vitreous state" with a particle size of 50 to 100 AU was obtained for the first time in a 5% by weight glycerol-water solution. Additional experiments with some other substances and good agreement of the observed effects with the theoretical approach suggest that all biological materials exhibit a critical cooling rate and many thus be vitrified in samples of a few hundred millimicron in thickness. Author

**N70-25064#** European Atomic Energy Community, Ispra (Italy). Joint Nuclear Research Center.

**ENVIRONMENTAL RADIOACTIVITY, ISPRA 1968**

M. de Bortoli and P. Gaglione 1970 60 p refs

(EUR-4412.E) Avail: CFSTI

The measurements of environmental radioactivity performed during 1968 by the site survey group of the Protection Service are described. Data are given on the concentrations of strontium-90, cesium-137 and other radionuclides in fallout, air, soil, waters, herbage, animal bones and foods. Author

**N70-25074#** Flying Personnel Research Committee, London (England).

**INSPIRATORY AIRFLOW PATTERNS IN SUBJECTS AT REST AND DURING SPEECH WITH AND WITHOUT ADDED EXPIRATORY RESISTANCE**

G. R. Sharp and G. A. Patrick Jul. 1969 23 p refs

(FPRC/1289) Avail: CFSTI

Inspiratory flow patterns were analyzed using an analog computer, with subjects at rest and during speech with and without added expiratory resistances. It is shown that speech causes a marked increase in the resting peak inspiratory flow, and in the rate at which the flow changes, as compared with resting values. The imposition of expiratory resistances during speech further modifies the inspiratory flow pattern causing significant increase in the peak flow and rate of change of flow over values obtained with unrestricted speech. Inspiratory flow patterns which include 95 per cent of the observations obtained in this study are given for subjects at rest and during speech with and without imposed expiratory resistances. Since expiratory resistance during speech may occur in flight as a result of mask hose pumping, this condition imposes one of the most severe demands on oxygen equipment. It is noted, however, that the limit values of inspiratory peak flow and rate of change of flow laid down in current specifications for the design of oxygen systems, will meet the additional demands imposed by this condition in the resting subject. Author

**N70-25091#** Flying Personnel Research Committee, London (England).

**FURTHER EVALUATION OF THE IRN HOT ESCAPE SUIT**

J. R. Allan and R. W. J. Needham Jul. 1969 15 p refs

(FPRC/MEMO-247) Avail: CFSTI

Further tests of the hot escape suit were undertaken in conditions of 70 C DB/52 C WB, and at rest and stepping routines were devised to simulate the actual escape circumstance. Additional tests were made to assess insulation. It is concluded that the suit will probably give the protection required although realistic testing is not possible. Author

**N70-25116#** Catholic Univ. of America, Washington, D.C.

**A NEW APPROACH TO IMPACT ATTENUATION**

Nicholas Perrone (ONR) Feb. 1970 24 p refs

(Grant NSF GK-2802)

(Rept-15) Avail: Issuing Activity

Impact attenuation associated with vehicle related accidents is reviewed. Technical and economical problems that arise in the design of energy absorbing devices are discussed. The main technical problems are very large deformations and rate sensitivity effects. A very brief overview of important recent developments in analyzing for rate sensitivity effects is given. A specific new generic structural element is suggested for impact attenuation: the tube. Preliminary calculations have been performed to determine design curves for steel tubes. Application of this energy absorbing element for various parts of the vehicle are discussed in some detail. A discussion is also contained of the overall problem of crashworthiness; a unit crashworthy element is recommended. Author

**N70-25127\*#** Naval Aerospace Medical Inst., Pensacola, Fla.

**A STANDARDIZED LABORATORY MEANS OF DETERMINING SUSCEPTIBILITY TO CORIOLIS (MOTION) SICKNESS**

Earl F. Miller, II and Ashton Graybiel 7 Feb. 1969 31 p refs

(NASA Order R-93; NASA Order T-81633)

(NASA-CR-109425; NAMI-1058) Avail: CFSTI CSCL 06S

With the method described, the subject is required to move his head within a standardized time and space pattern while the chair rotates at an individually preselected constant velocity. Such movements evoked the common endpoint of severe malaise (M III) in 98.8 per cent of the 250 normal subjects. Susceptibility was scaled by the magnitude of the stressor stimulus and scored (Coriolis Sickness Susceptibility Index, CSSI) as the number of head movements executed at a given chair velocity in reaching the test endpoint, multiplied by the stressor effect (E factor) of each head movement as previously determined for each chair velocity. In most cases the test velocity that evoked M III within the set limits of 40 and 166 head movements could be predicted on the basis of the subject's past history of motion sickness. The frequency distribution of CSSI values of the normal subjects was markedly right skewed on an arbitrary scale of 0 to 100 points; 90 per cent fell within 0.4 and 26.0 points. At the M III level, mild nausea, epigastric awareness, or discomfort was manifested by the majority of the group, but 9.6 per cent reached this level completely free of these symptoms. High reliability, simplicity, minimal time, conventional apparatus, and quantitative scaling of susceptibility are advantages of this new standardized test. Author

**N70-25189\*#** Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

**[COMMUNICATIONS BIOPHYSICS: THE TEMPORAL STRUCTURE OF ELECTROPHYSIOLOGICAL DATA, MARCH 16, 1970] Quarterly Status Report, 1 Dec. 1969-28 Feb. 1970**

Stephen K. Burns and Roger G. Mark 16 Mar. 1970 13 p refs

## N70-25205

(Grant NGL-22-009-304)

(NASA-CR-109407) Avail: CFSTI CSCL 06B

Most effort has been focused on the electrical characterization and display of ectopic heartbeats appearing in the electrocardiogram. The greater part of this effort has been spent in developing data acquisition instruments. The design of the analog input-output interface for our digital data processor has been completed. This interface can accommodate 16 analog input channels, 16 digital inputs, 4 fully buffered analog output channels, and 16 digital outputs. Construction of the analog input-output circuitry has been completed and is operating nicely. We anticipate repackaging it into a companion cabinet to the Tektronix model 601 display oscilloscope. This system will fit into a 10.5-inch rack cabinet and is highly portable.

Author

**N70-25205\*#** Public Health Service Hospital, San Francisco, Calif. Metabolic Unit.

### **THE EFFECT OF PROLONGED SIMULATED NON-GRAVITATIONAL ENVIRONMENT ON MINERAL BALANCE IN THE ADULT MALE, VOLUME 1 Final Report**

Charles L. Donaldson, Stephen B. Hulley, Donald E. McMillan, Robert S. Hattner, and Jon H. Bayers [1970] 91 p refs (NASA Order T-58941)

(NASA-CR-108314) Avail: CFSTI CSCL 06S

Three healthy adult males were restricted to complete bed rest for periods of 30 to 36 weeks; freedom of movement in the horizontal plane was permitted. Tests conducted are described and results are reported. Findings include: (1) Urinary calcium excretion was elevated throughout bed rest, averaging 67 mg/day above the baseline value of 193 mg/day. Mean peak excretion occurred during the 7th week and was 136 mg/day above the baseline value. (2) Mean calcium balance during bed rest ranged from -200 to 256 mg/day for the three subjects. This represents an estimated loss of 0.5 to 5.5 percent of the skeleton. (3) Recovery of calcaneus mineral to values above the initial (3 month) level was observed 5 - 10 months following reambulation; disuse osteopenia therefore may be reversible. (4) Serum parathyroid hormone concentration increased during bed rest and achieved levels compatible with hyperparathyroidism in all three subjects. (5) Clinical evaluation revealed no major morbidity during bed rest. During reambulation the soles of the feet were tender for 3 - 4 weeks and easy fatigability was subjectively noted for 4 - 6 months.

Author

**N70-25206\*#** Public Health Service Hospital, San Francisco, Calif. Metabolic Unit.

### **THE EFFECT OF PROLONGED SIMULATED NON-GRAVITATIONAL ENVIRONMENT ON MINERAL BALANCE IN THE ADULT MALE, VOLUME 2 Final Report**

[1970] 58 p (NASA Order T-58941)

(NASA-CR-108315) Avail: CFSTI CSCL 06S

Additional data in tabular and graphical form are presented in support of the study on the effect of prolonged simulated non-gravitational environment on mineral balance in the adult male. For abstract, see N70-25205.

**N70-25224#** Epoxylyte Corp., South El Monte, Calif. **IMPROVED ENCAPSULATION MATERIALS FOR IMPLANTATION Annual Report, 25 Jun. 1968 - 24 Jun. 1969**

Henry L. Lee, Jr., Arthur L. Cupples, and Ronald J. Schubert. 24 Jun. 1969 173 p refs (Contract PH-43-68-1409)

(PB-187562; RR-69-154) Avail: CFSTI CSCL 06L

Epoxy-resin formulations were developed as improved encapsulation systems for isolation and insulation of artificial heart components intended for implantation. Several represent substantial improvements over commercial formulations. When coupled with

coatings of parylene in sandwich constructions, the best of these systems offer markedly improved properties. Polyurethane systems are being developed for use with these systems to provide soft overcoats. Procedures and formulations used for coating artificial-heart adnexa subsequently implanted in animals are described. A detailed literature survey on techniques for mounting artificial internal organs (internal prosthopy) is presented.

Author (USGRDR)

**N70-25257\*#** Techtran Corp., Glen Burnie, Md. **DAILY FLUCTUATIONS OF METABOLISM AND BODY TEMPERATURES IN SOBER CONDITION AND COMPLETE MUSCULAR REST**

J. E. Johansson Washington NASA Mar. 1970 80 p refs Transl. into ENGLISH from *Scandinavisches Archiv fuer Physiol.*, v. 8, 1898 p 85 - 142

(Contract NASw-2037)

(NASA-TT-F-12875) Avail: CFSTI CSCL 06P

The variation of the gaseous metabolism (release of CO<sub>2</sub>), the secretion of N and fluctuation of body temperature were investigated during periods of complete muscular inactivity and ordinary bed rest. It is shown that daily fluctuations of these values are primarily functions of the state of activity and largely independent of the time of the day, although they are affected to some extent by daylight, environmental noise and mental activity. The regularity in metabolism and body temperature observed is interpreted as the adaptation of the organism to varying conditions and not as the expression of some unknown factor controlling daily periodicity.

Author

**N70-25260\*#** Biospherics, Inc., Rockville, Md.

**AUTOMATED MICROBIAL METABOLISM LABORATORY Final Report**

Donald G. Shaheen and William A. Lindgren 1 Mar. 1970 230 p refs

(Contract NASw-1731)

(NASA-CR-109489) Avail: CFSTI CSCL 06A

The discovery of the photosynthesis activity index offered by phosphate uptake led to the recommendation that a photosynthetic component be examined in all the experiments. In addition, a number of problem areas were uncovered. These were principally the nonbiological signals from soils and substrates which interfere with the phosphate assay procedures. The engineering effort was directed toward the development and fabrication of an automated instrument that could be programmed to perform the various liquid biochemistry assays. The instrument mechanism uses a 1 ml syringe-type transfer pump combined with a dual micro-slide-valve and roll-tape filter. The controller is a solid-state programmer which uses a teletypewriter tape-reader as a stored program input.

Author

**N70-25261\*#** California Univ., Berkley. Space Sciences Lab. **ENZYME ACTIVITY IN TERRESTRIAL SOIL IN RELATION TO EXPLORATION OF THE MARTIAN SURFACE Semiannual Progress Report, 1 Jan. - 30 Jun. 1969**

J. J. Skujins and A. D. McLaren 1 Jul. 1969 46 p refs *Its Ser.* 10, Issue 33

(Grant NGL-05-003-079)

(NASA-CR-109548; SAPR-10) Avail: CFSTI CSCL 06A

Degradability of soil organic matter and the properties of soil organic matter resistant to the activities of microorganisms were studied. In particular, the retention of enzymatic activities in soil subjected to various treatments of partial or total sterilization were determined.

Author

**N70-25284\*#** General Electric Co., Philadelphia, Pa. Missiles and Space Div.

**DEVELOPMENT OF PAYLOAD SUBSYSTEM, PRIMATE MISSION, BIOSATELLITES PROGRAM**

James F. Hall, Jr. [1970] 12 p

(Contract NAS2-1900)

(NASA-CR-73424) Avail: CFSTI CSCL 06K

A biosatellite primate payload subsystem consisting of primate support equipment (PSE) is considered. Design development discussions are limited to the PSE as follows: pellet feeder assembly, water dispenser assembly, feces collector assembly, trace gas contaminant control assembly, camera assembly, lighting assembly, camera/lighting controller, primate life support controller, and couch assembly.

Author

**N70-25290\*#** Fort Detrick, Frederick, Md. Protection Branch.

**BACTERICIDAL ACTIVITY OF ETHYLENE OXIDE AND METHYL BROMIDE AGAINST MICROORGANISMS ON VARIOUS TYPES OF SURFACES**

Dorothy M. Portner, Joel E. Sheinmel, and Robert A. Urhin 8 Apr. 1970 11 p refs

(NASA Order R-35)

(NASA-CR-109480; Rept-12-70) Avail: CFSTI CSCL 06F

The bactericidal activity of EtO, MeBr, and their mixture against microorganisms on glass and fiberglass and cotton fabrics is reported. The conditions included preconditioning and exposing organisms in various combinations of 1 and 33% relative humidity.

Author

**N70-25334** State Univ. of New York at Buffalo.

**ANALYSIS OF THE SLOW TRANSRETINAL POTENTIALS IN RESPONSE TO LIGHT**

Donald S. Faber (Ph.D. Thesis) 1969 319 p

Avail: Univ. Microfilms: HC \$14.40/Microfilm \$4.10 Order No. 69-20590

The stimulus-response characteristics and the depth distributions of the transretinal potentials in response to illumination (ERG) were analyzed in the rabbit under urethan anesthesia. The laminar profiles of the various ERG components, the fast waves (a-wave and b-wave) and the complex slow waves consisting of cornea-positive and cornea-negative transients, were correlated with the depth distributions of transretinal resistance, d.c. potential, and the voltage change produced by intravenously administered sodium azide. The slow ERG potentials were altered by transretinal cathodal (vitreal scleral) current application in the range of 300 to 600 micro Angstrom which together with producing a decrease in transretinal resistance eliminated or reduced components of the c-complex which previous studies suggested were functions of the pigment epithelium. The removal of the c-complex unmasked slow responses, cornea-negative following the onset and cornea-positive at the termination of illumination.

Djssert. Abstr.

**N70-25371\*#** National Aeronautics and Space Administration, Washington, D.C.

**REGULARITIES IN THE BIOCHEMICAL DECOMPOSITION OF ALBITE AND MUSCOVITE [ZAKONOMERNOSTI BIOKHMICHESKOGO RAZLOZHENIYA ALBITA I MUSKOVITA]**

I. N. Antipov-Karatayev et al Apr. 1970 43 p refs Transl. into ENGLISH from Kora Vyvetrivaniya, Akad. Nauk SSSR, Inst. Geol. Rudnykh Mestorozhd, Petrogr., Mineralog. i Geokhim. (Moscow), v. 7, 1966 p 53-88

(NASA-TT-F-12749) Avail: CFSTI CSCL 06C

This study determines the principles of the decomposition process of albite and muscovite by soil bacteria cultures, and the composition and nature of the residual products and secondary synthetic compounds. It is found that biochemical reagents, the "soil silicate" bacteria, influence the weathering of primary minerals. Weathering with the participation of organic matter leads to the formation of specific metalloorganic compounds and to the accumulation of humus-like mass.

Author

**N70-25391#** California Univ., Livermore. Lawrence Radiation Lab.

**BIOLOGICAL IMPLICATIONS OF THE NUCLEAR AGE**

Dec. 1969 334 p refs Presented at the Proc. of a Symp., Livermore, Calif., 5-7 Mar. 1969 /ts AEC Symp. Series No. 16 (CONF-690303) Avail: CFSTI

Biological systems, ecosystems, environmental contamination, and nuclear medicine are discussed in terms of an expanding nuclear technology and increased applications of nuclear energy in industry.

NSA

**N70-25395#** Liege Univ. (Belgium). Genetics Dept.

**EFFECTS OF THERMAL, MONOENERGETIC AND FISSION NEUTRONS ON NIGELLA CHROMOSOMES**

J. Moutschen and M. Moutschen-Dahmen [1969] 18 p refs Presented at the Symp. on Neutrons in Radiobiology, Oak Ridge, Tenn.

(BNL-14197; CONF-691106-4) Avail: CFSTI

*Nigella damascena* seed was found to be highly radiosensitive. Dry seed irradiation results exclusively in aberrations of the chromosome class which is the only one investigated herein. The effects of the neutron irradiations were compared with those of Cs-137 gamma rays for each kind of aberrations. RBE's were computed and found to be high in all cases being higher for two-break than one-break aberrations. The inverse relation of effects with neutron energy is discussed. Nonrandom distribution of chromosome exchanges was demonstrated and was related to the occurrence of sites. Exchanges were localized in the cases of gamma rays and three neutron energies. Dicentric scored at the first mitosis were correlated with symmetrical translocations observed at meiosis. Some genetical implications of this correlation are discussed.

Author (NSA)

**N70-25476\*#** Earth Sciences, Pasadena, Calif.

**ASTRONAUT BREATH ANALYZER Final Report**

W. M. Brubaker Jul. 1969 55 p refs

(Contract NAS9-8371)

(NASA-CR-108384; ES-4107) Avail: CFSTI CSCL 06B

A miniature vacuum system, comprising a molecular leak from atmospheric pressure, an ion pump, and a quadrupole mass spectrometer has been designed for use as a breath analyzer by an astronaut. The most critical elements of the system, a molecular leak and an associated ion pump of small dimensions, have been assembled and have demonstrated capability to work together in a satisfactory manner. The leak utilizes an electro-polished tungsten needle in a gold foil seat. An experimental assembly of the leak, 5-inch heated inlet tube, ion source, quadrupole, and laboratory auxiliaries demonstrated a negligible lag time between the change of the composition of the gas at the inlet and the onset of the instrument response. The near completion of the step change (to within 10 percent) in composition of inlet gas in 120 milliseconds indicates a time constant of 52 milliseconds based on an exponential decay.

Author

**N70-25484\*#** Massachusetts Inst. of Tech., Cambridge.

**UNIVERSITY ROLE IN ASTRONAUT LIFE SUPPORT SYSTEMS: ATMOSPHERES**

Robert C. Reid Washington NASA May 1970 114 p refs

(Grant NGR-22-009-312)

(NASA-CR-1552) Avail: CFSTI CSCL 06K

Existing technology involved in keeping crews' alive in spacecraft and in the extravehicular environment is presented. Critical problem areas in life support and protective systems are discussed. Topics covered include: (1) storage of atmospheric gases, (2) regenerative carbon dioxide removal systems, (3) recovery of oxygen from carbon dioxide, and (4) electrolysis of water. A separate section dealing with recommendations for university research is included.

D.L.G.

**N70-25497**

**N70-25497** South Dakota Univ., Vermillion.  
**A COMPARISON OF AUDITORY, VISUAL, AND ELECTROCUTANEOUS DISPLAYS IN A VIGILANCE TASK**  
David Kenneth Damkot (Ph.D. Thesis) 1969 88 p  
Avail: Univ. Microfilms: HC \$4.60/Microfilm \$3.00 Order No. 69-20607

Comparisons of performance on vigilance tasks in which signals were presented on auditory, visual and electrocutaneous displays were examined. Ten groups of 10 Ss were presented with one or a combination of these three types of signals. In addition, three of the groups received either auditory, visual or simultaneous auditory-visual signals while irrelevant electrocutaneous stimulation was presented briefly every five minutes. Number of detections, number of false responses and latency of response were used to measure performance. While analyses of the three response measures did not show complete agreement in terms of which display was best the data suggested that: (1) if signals were presented to a single modality an auditory display was superior, (2) the auditory display resulted in performance which was generally as good as the multiple mode displays; and (3) in terms of all three response measures used, the simultaneous presentation of auditory, visual and electrocutaneous signals produced optimal performance.  
Dissert. Abstr.

**N70-25502#** Hydrospace Research Corp., Rockville, Md.  
**ENCAPSULATION PROCEDURE TO ISOLATE COMPONENTS FROM BODY FLUIDS** Final Summary Report, 24 Jun. 1968 - 23 Jun. 1969  
Charles R. Nichols 31 Oct. 1969 47 p refs  
(Contract PH-43-68-1410)  
(PB-187484; Rept-245) Avail: CFSTI CSCL 06L

The goals of the program were to develop encapsulation materials and techniques that will effectively isolate implanted components from body fluids, while retaining other necessary properties. The technical approach is to load a standard, medically-acceptable, encapsulation material with impermeable inclusions which will partially block the diffusive path within the base material. In this way a less permeable coating material is formed while mechanical properties and surface characteristics are retained. Seventeen separate aggregate formulations were prepared from basic filler and encapsulating materials selected from strength, toughness, permeability and biological acceptability considerations. The most promising were determined to be glass bubble microspheres uniformly distributed at concentrations up to 70 per cent by volume in medical-grade RTV elastomer; samples of which were further subjected to standard strength, toughness, permeability and absorption tests. The results of the permeability tests and their interpretation using predictive models, developed for diffusive penetration of the samples, indicate that significant potentials exist for the inclusion-loading technique. Recommendations are given for progressing beyond the present limitations. Author (USGRDR)

**N70-25505#** McDonnell-Douglas Astronautics Co., St. Louis, Mo. Eastern Div.  
**VIDEO TAPE RECORDING AS A TECHNIQUE FOR PERSONNEL SUBSYSTEM TEST AND EVALUATION**  
Technical Report, 15 May 1968 - 15 Jul. 1969  
Cyrus D. Crites Sep. 1969 191 p refs  
(Contract F33615-68-C-1476)  
(AD-700102; AFHRL-TR-69-18) Avail: CFSTI CSCL 5/5

A study was performed to develop new Personnel Subsystem Test and Evaluation (PSTE) techniques for use in testing of ground operator and maintenance type functions. The report is concerned with the development, modification, and refinement of a video tape recording system as a PSTE technique. Equipment and operational procedures developed for the technique were evaluated under various conditions including testing at an Air Force base.  
Author (TAB)

**N70-25513** University of Southern Mississippi  
**A STUDY OF THE ABILITY TO RECOGNIZE WORDS IN A NOISE ENVIRONMENT AS DEPENDENT ON PARAMETERS OF BINAURAL INTEGRATION**  
Hugh Elton Bateman (Ph.D. Thesis) 1969 134 p  
Avail: Univ. Microfilms: HC \$6.40/Microfilm \$3.00 Order No. 69-20141

In this study objectives were set with regard to exploring the relation of binaural fusion and intelligibility scores that are based on speech in various signal-to-noise ratios. The parameters of binaural fusion of two sounds with varying interaural time differences were investigated with the view that some aspects of temporal processing of these acoustic stimuli might be shown as to how the auditory system handles competing messages. A procedure for determining critical binaural fusion times was devised. These values were compared with intelligibility thresholds found by presenting speech in combination with masking noises of several intensity levels. Both correlated and uncorrelated noise sources were used with the speech. The results of the investigation in general were unresponsive of much of the literature concerned with anti-phasic conditions for presenting speech and noise binaurally.  
Dissert. Abstr.

**N70-25539** Pennsylvania Univ., Philadelphia.  
**A STUDY OF THE THERMOSENSITIVE UNITS OF THE POSTERIOR HYPOTHALAMUS**  
Henry Milton Edinger (Ph.D. Thesis) 1969 119 p  
Avail: Univ. Microfilms: HC \$5.80/Microfilm \$3.00 Order No. 69-21344

The posterior hypothalamus is essential for the metabolic and other thermoregulatory responses to cold exposure. I have studied the responses of the neurons of this area to local thermal stimulation. Stainless steel microelectrodes were used to obtain single unit recordings in urethane anesthetized cats. The following results were obtained: (1) the posterior hypothalamus contains units whose firing rates have a Q sub 10 of 1, units with a Q sub 10 of 2 units, units with Q sub 10 greater than 2 (thermodetectors), warm sensitive and cold sensitive interneuron - type units; (2) thermodetector and warm and cold interneuron - type units do not respond to gastric distension; (3) if the preoptic region is destroyed or its temperature held constant, the posterior hypothalamic units retain their thermosensitivity; (4) the proportion of high Q sub 10 units is smaller in posterior hypothalamus than in the preoptic area; and (5) the proportion of cold sensitive neurons is slightly greater in the posterior hypothalamus than in the preoptic region.  
Dissert. Abstr.

**N70-25542** Kansas Univ., Kansas City.  
**BIOCHEMICAL CHANGES IN STIMULATED BRAIN AND MECHANISMS OF INFORMATION PROCESSING**  
Louis Neal Irwin (Ph.D. Thesis) 1969 160 p  
Avail: Univ. Microfilms: HC \$7.40/Microfilm \$3.00 Order No. 69-21533

The purpose of this study was to determine neurochemical correlates of stimulation, in relation to several important variables. The experiments were specifically concerned with the response of gangliosides and N-acetylneuraminic acid (NANA), as specialized components of the brain cell micro-environment, and of protein, as a general reference compound, to behavioral (external) and hormonal (internal) stimulation. In the first series of experiments, optimal procedures were determined for measuring the biochemical parameters. In a second series of experiments, one week of environmental stimulation or isolation led to changes in metabolic turnover of ganglioside fractions, but non-ganglioside components were affected as well. These experiments demonstrate significant changes in protein and NANA content resulting from both behavioral and hormonal stimulation, and suggest the participation of gangliosides in the complex metabolic interactions occurring in the stimulated brain.  
Dissert. Abstr.

**N70-25549#** Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.

**TEMPORARY THRESHOLD SHIFT RECOVERY FROM IMPULSE AND STEADY STATE NOISE EXPOSURE Progress Report**

John L. Fletcher 6 Aug. 1969 12 p refs  
(AD-699790; USAMRL-829) Avail: CFSTI CSCL 6/19

Fifteen young male subjects with hearing levels in the range of 125-8000 Hz no worse than 25 dB were exposed to impulse and continuous noise separately until a criterion temporary threshold shift (TTS) of 25 dB at any of the frequencies monitored was reached. Recovery from the TTS was then observed at frequencies from 3-14 KHz for time intervals of 15 mins, 30 mins, 1 hr, 2 hrs, 4 hrs, and 7 hrs post-exposure. Recovery curves from impulse noise induced TTS differed significantly from the continuous noise TTS curves, with recovery much slower from impulse TTS. Results indicate the need for further research in this area. Author (TAB)

**N70-25611#** Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

**EXTENSION OF HUMAN DESCRIBING FUNCTION MODELS TO STEP PLUS RANDOM APPEARING INPUTS**

Jack Dexter Fisher (M.S. Thesis) May 1969 167 p refs  
(AD-699571; GE/EE/69S-2) Avail: CFSTI CSCL 5/8

A study was made of describing function models of human trackers while operating control systems with Gaussian plus step inputs. The parameters in the describing function model were adjusted using existing parameter adjustment rules and experimental data. Four performance measures were determined from the experimental data to assess their usefulness in adjusting the parameters of human pilot describing function models. The experiments were run using three subjects with varied levels of flying experience. Each subject was given the single task of controlling a system with one of three different controlled elements; K, K/S, K/S squared. Data were collected on each subject for each system with a single step input, Gaussian input, and Gaussian plus step input. Comparisons of the output of the piloted systems and the model systems were made, and suggestions for applications to the controlled element dynamics were offered. Author (TAB)

**N70-25661\*#** Techtran Corp., Glen Burnie, Md.

**THE PROBLEM OF HOMEOSTASIS IN SPACE MEDICINE**

I. M. Hazen *In its* Trans. of the First Lectures Dedicated to the Develop. of the Sci. Heritage of K. E. Tsiolkovskiy Apr. 1970 p 91-98 refs (See N70-25651 12-34)  
Avail: CFSTI CSCL 06E

Discussed are life support systems and space suits able to preserve the homeostatic reactions of astronauts. Effects of habitation environment, acceleration, and weightlessness determine the design of life support systems. Emphasis is placed on the mechanisms of the effect of acceleration on physiological systems and the maintenance and preservation of the relative constancy of bodily functions. Highly suggested is a reclining position for man during launching in a rocket in conjunction with preliminary physical training and preparation. G.G.

**N70-25662\*#** Techtran Corp., Glen Burnie, Md.

**PSYCHOLOGICAL FACTORS OF PROLONGED SPACE FLIGHTS**

B. S. Alyakrinskiy *In its* Trans. of the First Lectures Dedicated to the Develop. of the Sci. Heritage of K. E. Tsiolkovskiy Apr. 1970 p 98-105 (See N70-25651 12-34)  
Avail: CFSTI CSCL 05J

The basic trends in research within the scope of space psychology are established by the features of the conditions of life and activity of man in space. Among these conditions, the most important significance accrues to: modified-increased, decreased and zero-gravitation; the scarcity of sensory impressions, or sensory

deprivation, sensory inadequacy, or sometimes its unusualness and excess; isolated state and confinement in a small space; novelty and unexpectedness of situations in which the cosmonauts find themselves in various flight stages; the boredom and continuous contact between participants in the space flight; the appreciable and continually increasing separation of the cosmonauts from large human groups; the differing (as compared with the Earth conditions) so-called time cues, i.e. agents signalling the start of given periods of days, primarily work and rest periods and, finally, the unusual combinations and unusual intensities and duration of the effect of a number of factors also occurring under ordinary conditions of man's life (noise, vibration, radioactive radiation, temperature fluctuations, etc.). Author

**N70-25670** State Univ. of New York at Buffalo.

**JUDGMENT OF VELOCITY IN TWO DIMENSIONS**

Edwin A. Kidd 1969 144 p  
Avail: Univ. Microfilms: HC \$6.80/Microfilm \$3.00 Order No. 69-20568

Results of laboratory and full-scale experiments on judgment of collision courses are presented. Experimental variables include velocities of the observer and the stimulus object, dark and illuminated field, stimulus temporal pattern, and distance of stimulus from the observer. Collision judgments, travel time estimates, response latencies, and evasive actions are examined and presented in a generalized formulation. Dissert. Abstr.

**N70-25700#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**ADAPTATION TO VESTIBULAR DISORIENTATION. 11: THE INFLUENCE OF SPECIFIC AND NONSPECIFIC GRAVI-RECEPTORS ON NYSTAGMIC RESPONSES TO ANGULAR ACCELERATION**

William E. Collins and Billy P. Updegraff Oct. 1969 12 p refs  
(FAA-AM-69-20) Avail: CFSTI

Data from several recent experiments indicate that the otoliths (detectors of linear acceleration) may exert regulatory effects on responses of the semicircular canals (detectors of angular acceleration). This study was designed to explore further this notion. Horizontal ocular nystagmus from restrained birds was habituated in a directionally specific fashion by means of repeated angular accelerations. Substantial response recovery was evident following 2 weeks of rest. Vertical nystagmus was similarly habituated in a separate group of birds. The reduction of the latter response was obtained with the birds positioned so that vertical semicircular canals were in the plane of rotation. By changing the position of the birds 180° after the habituation trials, the same set of canals could be stimulated but with the otoliths and other gravi-receptors oriented differently. Habituation was specific for the direction of nystagmus repeatedly elicited and for the head and body position maintained during habituation trials. A dynamic interaction between gravi-receptors and the semi-circular canals is suggested as a possible feature of nystagmic habituation. Author

**N70-25721#** RAND Corp., Santa Monica, Calif.

**SOVIET CYBERNETICS REVIEW, VOLUME 3, NUMBER 9, 1969**

Wade B. Holland Sep. 1969 140 p refs  
(Contract F44620-67-C-0045)

(AD-696571; RM-6000/9-PR) Avail: CFSTI CSCL 6/4

The issue features articles and photographs of computers displayed at the Automation-69 Exhibition in Moscow, especially the Mir-1 and Ruta-110. Also discussed are the Doza analog computer for radiological dosage; on-the-fly output printers; other ways to increase computer speed and productivity; and the planned ultra-high-energy 1000-Bev synchrotron. Two articles give opposite approaches to the structuring of the State Network of Computer

Centers, those of the Central Statistical Administration and of Gosplan. Other articles discuss the effects of automation on the work force; mathematical training and research; computers in economics; the Latvian Academy of Sciences research; and the Delphi method of scientific forecasting. Author (TAB)

**N70-25727#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**RECOVERY OF MOTOR PERFORMANCE FOLLOWING STARTLE**

Richard I. Thackray and R. Mark Touchstone Oct. 1969 13 p refs

(FAA-AM-69-21) Avail: CFSTI

Sudden, high-intensity sounds, such as those produced by sonic booms, can be quite startling. Although many studies have investigated physiological response to startle, much less is known concerning the effects of startle on performance. The present study was designed to provide further information concerning the extent to which startle disrupts performance, the rate of recovery, and characteristics of subjects (Ss) who differ in susceptibility to startle. Thirty Ss were trained on both reaction time and tracking tasks. Continuous recordings were taken of heart rate and skin conductance. During a subsequent period of continuous tracking startle stimuli (115 db random noise) were unexpectedly presented. Results revealed the recovery of tracking performance following startle to be quite rapid; performance returned to pre-stimulus levels within 15 seconds following stimulation. Contrary to several previous studies, reaction times to the startle stimuli decreased relative to nonstartle reaction times. Ss with the greatest increase in tracking error following startle were least proficient prior to startle. There was also an indication that these Ss reacted more strongly to startle, both in terms of subjective response and heart rate acceleration, than those Ss whose tracking was least impaired by startle. An apparent covariation between recovery curves for heart rate and tracking error was found following startle. Author

**N70-25734\*#** Scripta Technica, Inc., Washington, D.C.

**RESISTANCE OF THE HUMAN BODY TO HIGH ACCELERATIONS OF SHORT DURATION [RESISTANCE DU CORPS HUMAIN AUX ACCELERATIONS ELEVEES ET DE COURTE DUREE]**

Seris et al NASA Mar. 1970 7 p refs Transl. into ENGLISH from Assoc. pour le Develop. des Sci. et Tech. de l'Environnement (Paris), 31 Mar. - 1 Apr. 1969 p 97 - 103

(Contract NASw-1694)

(NASA-TT-F-12828) Avail: CFSTI CSCL 06S

In aeronautical medicine, it is classic to separate by their physiological effects, accelerations of short duration (ejection seat, for instance), from accelerations of longer duration (a sharp turn, for example). A set of experiments was carried out with a centrifuge in order to determine physiological tolerance to these accelerations. Author

**N70-25745\*#** Baylor Univ., Houston, Tex. Coll. of Medicine.

**EEG SLEEP ANALYZER Patent Application**

James D. Frost, Jr. (to NASA), inventor Filed 4 Feb. 1970 28 p (Grant NGR-44-003-025)

(NASA-Case-MS-C-13282-1; US-Patent-Appl-SN-8498) Avail: CFSTI CSCL 06B

An apparatus and a method are described for quantitatively measuring brain activity as an automatic indication of level of consciousness. Amplitude weighted signals representative of frequency of brain activity are generated and combined to produce a level of consciousness output signal, which signal may be monitored and recorded. NASA

**N70-25819#** New Mexico State Univ., University Park.

**A CLOSED SYSTEM AUDIO HELMET FOR MONKEYS**

Leslie W. Dalton, Jr., Wenden W. Henton, Henry L. Taylor, and

James N. Allen Dec. 1969 11 p refs

(Contract F29600-67-C-0029)

(AD-700059; ARL-TR-69-17) Avail: CFSTI CSCL 6/12

This report describes a closed system audio helmet for monkeys which is both reliable and inexpensive. The need for head restraint is eliminated and also permits self-feeding. No problem was experienced in the daily fitting of the helmet; the operation required less than 5 minutes. Author (TAB)

**N70-25821#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**ESTIMATION OF TARGET LOCATIONS WITH CONVENTIONAL MEASUREMENT UNITS Final Report, Dec. 1967 - Mar. 1968**

Nilss M. Aume Sep. 1969 37 p refs

(AD-700060; AMRL-TR-69-21) Avail: CFSTI CSCL 1/2

Human ability to estimate lateral distances from an identified point was studied in three experiments. Two of these experiments were carried out indoors on table-top visual ranges, and one was conducted outdoors on a landing field. Reference markers were placed on these ranges. Subjects were required to point a simple aiming device at various points which they estimated to be a required distance (specified by the experimenter) laterally away from the reference markers. Author (TAB)

**N70-25831#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**THE SAFETY SIGNIFICANCE OF AIRCRAFT ACCIDENT POST MORTEM FINDINGS**

P. V. Siegel, S. R. Mohler, and A. Cierebiej Oct. 1969 14 p refs Presented at the 7th Sci. Session of the Joint Comm. on Aviation Pathol., Halton, Engl., 15 Oct. 1969

(FAA-AM-69-18) Avail: CFSTI

A review of post mortem examinations obtained in 1968 of pilot victims of general aviation aircraft accidents reveals that 51 percent of the pilot victims were studied by pathologists. The post mortem examination population was taken from 687 pilot fatalities in general aviation accidents occurring within the United States in 1968. The percent of post mortem examinations obtained in 1968 represents considerable progress in comparison to earlier years. Without an aircrew autopsy, the probable cause almost always consists of a higher proportion of conjecture than is otherwise the case. The full utility of the important data resulting from these examinations is going to depend, however, upon the addition of certain quantitative data to that in the current verbally descriptive protocol almost universally encountered. This is particularly pertinent in relation to computer assisted analytic studies of broad scale concerning post mortem findings. Author

**N70-25839#** McDonnell-Douglas Astronautics Co., St. Louis Mo.

**MINIATURE EVENT RECORDING AS A TECHNIQUE FOR PERSONNEL SUBSYSTEM TEST AND EVALUATION Technical Report, 15 May 1968 - 15 Jul. 1969**

Cyrus D. Crites Sept. 1969 89 p

(Contract F33615-68-C-1476)

(AD-700100; AFHRL-TR-69-16) Avail: CFSTI CSCL 5/5

A study was performed to develop new Personnel Subsystem Test and Evaluation (PSTE) techniques for use in testing of ground operator and maintenance functions. The report describes the development, modification, and refinement of a miniature event recording system as a PSTE technique. Equipment and operational procedures developed for the technique were evaluated under various conditions, including testing at an Air Force base. Author (TAB)

**N70-25842#** Educational Testing Service, Princeton, N.J.

**A THEORETICAL STUDY OF TWO-STAGE TESTING Technical Report**

Frederic M. Lord Dec. 1969 30 p refs  
(Contract N00014-69-C-0017)

(AD-699552; RB-69-95) Avail: CFSTI CSCL 5/10

When items cannot be answered correctly by guessing, certain two-stage testing procedures are about as effective over the ability range of interest as the best up-and-down procedures studied previously. A two-stage testing procedure consists of a routing test followed by one of several alternative second-stage tests. The choice of the second-stage test administered is determined by the examinees score on the routing test. The study attempts to find, under specified restrictions, some good designs for two-stage testing. A good procedure is one that provides reasonably accurate measurement for examinees who would obtain near-perfect or near-zero scores on a conventional test. Author (TAB)

**N70-25912#** Stevens Inst. of Tech., Hoboken, N.J. Davidson Lab.

**MEASUREMENT OF OPERATOR LOADING IN PURSUIT ROTOR TRACKING BY A RANDOM DIGIT GENERATION SUBSIDIARY TASK Final Report**

L. R. Zeitlin and J. M. Finckelman Aug. 1969 21 p refs

(Grant PHS-5-ROL-U1-0031-01/02/03)

(PB-187564; Rept-1401) Avail: CFSTI CSCL 05J

Random digit generation was used as a subsidiary-task measure of the load imposed by a simple perceptual-motor tracking function. As expected, primary task performance increased with practice and was not degraded by the introduction of the subsidiary task. Scores on the subsidiary task distinguished between primary-task load and no load, and also indicated a drop in information-processing load as primary task performance approached an asymptote after extensive practice. Although the present subsidiary task may be somewhat insensitive to small changes in loading, it should, upon refinement, prove a valuable research tool in the development of man machine systems and in the assessment of operator information-processing requirements.

Author (USGRDR)

**N70-25943#** Naval Submarine Medical Center, Groton, Conn. Submarine Medical Research Lab.

**DIFFERENTIAL SENSITIVITY FOR ALTERNATE, INTERAURAL LOUDNESS BALANCING IN THE PSYCHOACOUSTIC CALIBRATION OF EARPHONES Interim Report**

James F. Willott, Cecil K. Myers, and Donald J. Harris 2 Sep. 1969 13 p refs

(AD-700243; SMRL-594) Avail: CFSTI CSCL 5/5

The variances were examined associated with the psychoacoustic calibration of audiometric earphones by the usual method of alternate interaural loudness balancing with a standard earphone first on one side of the head and then on the other. Eight major sources of variance can be identified, the result of coupling two earphones first on one ear and then on the other, collecting two absolute thresholds first on one ear and then on the other using the standard earphone, and collecting two interaural loudness balances. On 13 subjects the differential sensitivity for alternate interaural loudness balancing was 1.5 - 2.5 dB, the higher frequencies giving somewhat larger values. Variances due to coupling and to absolute threshold testing were estimated at about 1 dB for the former and from 1.27 - 2.51 dB for the latter. It was considered that the sizes of these variances were quite sufficient to explain the test-retest consistency of mean transfer functions, which were of the order of 6 dB. The group mean transfer function could be specified for either of two new circumaural earphones with a precision of 0.92 - 4.84 dB at various audiometric frequencies (plus or minus 1 Standard Error). Author (TAB)

**N70-25947#** Naval Submarine Medical Center, Groton, Conn. Research Lab.

**THE EFFECT ON RESPIRATORY DEAD SPACE PROLONGED**

**EXPOSURE TO A SUBMARINE ENVIRONMENT Interim Report**

James K. Gude and Karl E. Schaeffer 27 Jun. 1969 11 p refs

(AD-700240; SMRL-587; NAVMED-MF12-524-006-9028-02)

Avail: CFSTI CSCL 6/19

Measurements were made of arterialized capillary carbon dioxide tension and mixed expired carbon dioxide as well as respiratory minute volume, tidal volume and respiratory frequency on 10 subjects during control periods and following 20 days of exposure to submarine atmospheres on two patrols. The physiological dead space was found increased 60 and 61% during the first and second patrols, respectively, in which the average CO<sub>2</sub> concentrations were 0.8 and 0.9% CO<sub>2</sub>. The findings correspond with previous observations obtained under laboratory conditions showing a 62% increase in physiological dead space following 40 days of exposure to 1.5% CO<sub>2</sub>. Six of the same 10 subjects on the second patrol had also served on the first patrol. Their physiological dead space returned to control values after the patrol showing that the effect is reversible. Smoking habits and length of service on submarines did not change either control values of physiological dead space or the values obtained during the patrols. The significance of these findings for the evaluation of the health hazards of prolonged exposure to the submarine atmosphere is discussed. Author (TAB)

**N70-25963#** Columbia Univ., New York. Psychophysics Lab.

**HUMAN RANGING OF A SOUND SOURCE OF UNKNOWN INTENSITY**

John Molino 30 Oct. 1969 13 p refs

(Contract N00014-67-A-0108-0005)

(AD-699948; PLR-9) Avail: CFSTI CSCL 6/16

A modification is proposed in Hirschs equation for determining the range of a sound source of unknown strength (H. R. Hirschs, J. Acoust. Soc. Am. 43, 373-374 (1968)). The modified formula is free of approximations and reduces to Woodworths solution in the limit. Greenes Comments on Hirschs Letter are shown to incorrectly estimate the relative error in human auditory ranging (D. C. Greene, J. Acoust. Soc. Am. 44, 634 (1968)). In a brief experiment two subjects were unable to make distance judgments.

Author (TAB)

**N70-25974** Advisory Group for Aerospace Research and Development, Paris (France).

**SUBATMOSPHERIC DECOMPRESSION SICKNESS IN MAN**

D. I. Fryer (Royal Air Force) Slough, Engl. Technivision Services Apr. 1969 339 p refs

(AGARDograph-125) Copyright. Avail: Technivision, Braywick House, Maidenhead, Berks, Engl. US Distributor: Circa Publications Inc., 415 Fifth Ave., Pelham, New York 10803 (Attn. Mr. A. L. Candido)

The clinical and pathological aspects of the altitude form of decompression sickness are described and discussed, and the factors influencing susceptibility are explained. Possible mechanisms are discussed, the relevant literature is reviewed, and original experiments are cited. Cases are described in detail where they contribute to the tasks of characterization of the illness, differentiation from other conditions, and evaluation of possible consequences. Theoretical and practical aspects of prevention and treatment are described. Author

**N70-26049#** Army Behavioral Science Research Lab., Arlington, Va. Support Systems Research Div.

**CHECKER CONFIDENCE STATEMENTS AS AFFECTED BY PERFORMANCE OF INITIAL IMAGE INTERPRETER**

Michael G. Samet Sep. 1969 34 p refs

(AD-700127; BESRL-TRN-214) Avail: CFSTI CSCL 14/5

The specific objective of the present study was to determine how different levels of identification accuracy and of confidence validity associated with an initial interpreter affect the confidence

validity of the checker. Of secondary interest was whether checkers supplied with some knowledge of their own prior identification and confidence performance would be affected differently.  
Author (TAB)

**N70-26082#** Joint Publications Research Service, Washington, D.C.

**METHODOLOGICAL ASPECTS OF SPACE BIOLOGY**

I. Khazen 30 Apr. 1970 5 p Transl. into ENGLISH from Med. Gazeta (Moscow), 10 Apr. 1970 p 3  
(JPRS-50427) Avail: CFSTI

A brief review of different aspects of space biology development is presented dating from the first manned space flight in 1961. Emphasis is placed on the problems of weightlessness and technological and scientific advances achieved in overcoming this vital problem.  
E.M.C.

**N70-26089#** Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N.Mex.  
**ACQUISITION OF THE ODDITY CONCEPT IN THE CHIMPANZEE Final Report**

James V. Devine (Texas Univ., El Paso) and John R. Ivens, Jr. (Texas Univ., El Paso) Oct. 1969 37 p refs  
(AD-700058; ARL-TR-69-16) Avail: CFSTI CSCL 5/10

The purpose of this research was the description and quantification of response regularities observed in the subjects acquisition of the oddity concept. A procedure was employed which presented many unique problems using each discriminandum as both a positive and a negative instance; this procedure was designed to eliminate correct performance by nonrelational responding. Naive Ss with minimal pre-training experience were used to allow identification of response tendencies which existed in the Ss response hierarchy prior to experimental sophistication.  
Author (TAB)

**N70-26122#** Joint Publications Research Service, Washington, D.C.

**SIXTH GAGRA MEETING ON THE MECHANISM OF MEMORY**

M. Khromchenko 7 Apr. 1970 14 p Transl. into ENGLISH from Znaniye-Sila (Moscow), no. 9, 1969 p 30 - 34  
(JPRS-50256) Avail: CFSTI

The developments in the knowledge of memory processes in the brain are reviewed. Various hypotheses are discussed including the neuron chain, glia cells and the hippocampus.  
F.O.S.

**N70-26166\*#** National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

**COMMENTS ON SEVERAL REDUCED-GRAVITY SIMULATORS USED FOR STUDYING LUNAR SELF-LOCOMOTIVE TASKS**

Amos A. Spady, Jr. Washington May 1970 27 p refs  
(NASA-TN-D-5802; L-6384) Avail: CFSTI CSCL 14B

The uncertainties concerning the physical capabilities and limitations of an explorer in performing locomotive and other working tasks in the lunar environment have led both industrial and governmental organizations to develop a variety of reduced-gravity simulators. This report presents a subjective review of the feel and operating characteristics of some of the simulators which are currently being used. The observations are those of an engineer who has acted as a test subject in a number of the currently developed simulators.  
Author

**N70-26175#** Technische Hochschule Munchen (West Germany).  
**OPERATIONAL DECISIONS AS PART OF THE LEARNING PROCESS [BETRIEBLICHE ENTSCHEIDUNGEN ALS TEILE**

**EINES LERNPROZESSES]**

Peter Horvath (Ph.D. Thesis) 30 Sep. 1969 235 p refs In GERMAN  
Avail: CFSTI

It is shown that operational decision making can be done by computer in a business system that is subject to learning. Learning takes place by coordinating output information with increasing probability to the time operating sequence of the input information and each decision leads to a consequence that is subjected to rentability evaluation. Learning processes introduced by decision making form the basis for business increase. Heuristic methods for problem solving and decision making units composed of man-machine communication, are recommended for operational decision making processes in a business environment.  
Transl. by G.G.

**N70-26186#** Joint Publications Research Service, Washington, D.C.

**THE BRAIN AND THE PSYCHE**

A. R. Luriya 8 Apr. 1970 18 p refs Transl. into ENGLISH from Priroda (Moscow), no. 2, 1970 p 20 - 29  
(JPRS-50266) Avail: CFSTI

The differences in physiological mechanisms and nervous systems affecting patterns of human behavior are compared. Neuropsychological observations indicate that lesions to the inferior parietal segments of the left hemisphere of the brain affect such different processes as orientation in space, arithmetic operations, and comprehension of complex logical-grammatical relations. Investigations show that the internal structure of mental processes can be penetrated much more deeply using neuropsychological methods than by a simple phenomenological description.  
R.B.

**N70-26239#** Oxford Univ. (England). Engineering Lab.  
**A STUDY INTO THE AVAILABILITY OF CONTROL SITES FOR THE ACTUATION OF POWERED UPPER LIMB PROSTHESES FOR THE CONGENITAL LIMB DEFICIENT CHILD**

E. E. Rogers 1969 134 p refs Sponsored by Dept. of Health and Social Security  
(Rept-1086/69) Avail: CFSTI

A study into the availability of control sites for the actuation of powered upper limb prostheses for the congenital limb deficient child was undertaken, from which the following conclusions were drawn. 1) None of the children involved in this study seem to follow any general pattern of movement in their rudimentary limbs. 2) The shoulder joint could be used more effectively for the position control of a prosthetic arm, than is so at present. 3) No abnormalities were found with regard to position sense. 4) Utilization of EMG control is impractical for use by children. 5) Further investigations with more sophisticated equipment relating to the pressures obtained during sustained movement would be valuable. 6) Further investigations into grip would be valuable, using more sensitive instruments. Each child should be taken and fitted with control points to suit their own individual requirements.  
Author (ESRO)

**N70-26253#** Technische Hochschule Munchen (West Germany).  
**THE PHASE DEPENDENT PITCH VARIATIONS AT OUT OF TUNE OCTAVE FREQUENCIES AND AUDITORY THEORIES [DIE PHASENABHAENGINEN TONHOEHENSCHWANKUNGEN BEI DEN SCHWEBUNGEN DER VERSTIMMTEN OKTAV UND DIE HOERTHEORIN]**

Joachim L. Heinzl (Ph.D. Thesis) 29 Sep. 1969 86 p refs In GERMAN  
Avail: CFSTI

An amplitude ratio for maximal frequencies with a base tone of 200 Hz is used to analyze out of tune octave pitch. Experiments with humans showed a well defined and reproducible

dependence of the perceived octave tonal pitch on the alignment of the null phase angle. Subjects able to perceive the pitch fluctuations exhibited similar saw-tooth perceptions of tone pitch characteristics in the same frequency period; octave tone pitch decreased slowly with increasing null phase angle only to increase again in one jump with tone fluctuations of up to three levels above and below the undisturbed sounding octave. Phase dependent tone fluctuations were most pronounced at soft octave tones in comparison to the basic tone. Observed local patterns of impulse distribution along sensory cells of the Cortical organ showed that impulse waves of the base tone overtook impulse waves of the octave tone at the region of maximal excitation. Transl. by G.G.

**N70-26271\***# Baylor Univ., Houston, Tex. Coll. of Medicine.  
**EVALUATION OF URINARY COLLECTION DEVICE Final Report, 18 Aug. 1969 18 Apr. 1970**  
 Russell Scott, Jr. Apr. 1970 7 p  
 (Contract NAS9-9940)  
 (NASA-CR-108399) Avail: CFSTI CSDL06B

Field tests are presented for the acceptability of the form fitted urinary collection device with lack of skin irritation, the ability of the condom to stay on the penis with comfort, and ease of urination. Field testing involved utilization of six hospital patients and six normal volunteers wearing the formfitted urinary collection device for five consecutive days without removal. The volunteers and patients were examined daily. None of the subjects tested showed signs or symptoms of skin irritation for the period of five days during which the condom device was worn. It was felt by the entire group that the condom was too short for the length of the penis in every size tested. Once the form fitting urinary collection device had been applied, it required only an hour or two before the subject had become adapted to this and there were no complaints of discomfort by any of the subjects. In the normal group of subjects going about their daily activities, they were able to void without difficulty provided there was a straight connection between the end of the condom and the tube collecting the urine.

Author

**N70-26275\***# Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.  
**A COMPARISON OF THE BEHAVIORAL EFFECTS OF VARIOUS LEVELS OF CHRONIC DISULFOTON POISONING**  
 David W. Pearson, George Clark, and Carl M. Moore Oct. 1969 8 p refs  
 (FAA-AM-69-19) Avail: CFSTI

Exposure of general aviation pilots to toxic pesticides was reported as a possible cause of impairment of flying performance. Of particular concern and interest are the organophosphates that are known to be AChE (acetylcholinesterase) inhibitors. Inhibition of the enzyme AChE in the central nervous system affects ACh (acetylcholine) destruction, a normal process which follows nerve impulse transmission at the synapse, thus permitting excessive accumulations of ACh which could possibly interfere with memory and/or learning processes. The extent to which chronic cholinesterase inhibition in albino rats affects performance in a complex maze situation was explored. Disulfoton-exposed rats were capable of performing a mazerunning task with fewer errors and shorter trial times than control animals, although AChE levels for the most severely exposed group were more than 75 percent below normal. The latter was attained by the animals on 50-ppm of the poison. At this level an occasional animal had convulsions or severe tremors which temporarily incapacitated the rat.

Author

**N70-26290\***# Joint Publications Research Service, Washington, D.C.  
**INVOLVEMENT OF THE CHOLINERGIC STRUCTURES OF**

#### THE BRAIN IN THE MECHANISM OF EMOTIONAL MEMORY

R. Yu. Ilyuchenok et al 6 Apr. 1970 13 p refs Transl. into ENGLISH from Zh. Vyssh. Deyatel'n. (Moscow), no. 1. 1970 p 176 183  
 (JPRS-50241) Avail: CFSTI

Experiments were performed on dogs 3 to 5 years old. Motor food conditioned reflexes to the sounding of a bell and whistle were formed in freely moving animals. When the bell sounded, the dogs jumped from a raised platform and went to the right feed box; when the whistle was blown, the animals went to the left feed box. After these reflexes were formed and consolidated, a conditioned stimulus was presented and as the animal tried to take food from one of the boxes, it received a painful electric shock (110 v). After one or two shocks, the dogs developed a defensive conditioned reaction, local with different intensities of the emotional reaction of fear (ERF). The central specific mechanism of the conditioned ERF is activated by the functional system made up of muscarinic cholinergic neurons. Exclusion of the functional system responsible for the ERF by blocking it with muscarinic anticholinergic substances disturbs defensive behavior severely. If the blocking of the cholinergic mechanism of the ERF is shallow and brief, the impairment of emotional memory is transient and functional. If the blocking of emotional memory on which the ERF is based is deep and prolonged, it is completely obliterated.

Author

**N70-26293\***# Reilly Translations, Gardena, Calif.

#### SOIL ALGAE: A BIBLIOGRAPHY

M. M. Gollerbach et al 1970 26 p refs Transl. into ENGLISH from the publ. "Pochvennyye Vodrosli" Leningrad, Nauka, 1969 p 196 212 Prepared for JPL  
 (Contract NAS7-100)  
 (NASA-CR-109515) Avail: CFSTI CSDL06C

The bibliography contains 506 items, arranged alphabetically by author, on the structure, life, and significance of soil algae.  
 E.M.C.

**N70-26306\***# Bunker-Ramo Corp., Canoga Park, Calif. Human Factors Dept.

#### THE DESIGN ENGINEER'S CONCEPT OF THE RELATIONSHIP BETWEEN SYSTEM DESIGN CHARACTERISTICS AND TECHNICIAN SKILL LEVEL Technical Report, 1 Apr. 1968 - 31 Mar. 1969

David Meister, Dennis J. Sullivan, Dorothy L. Finley, and William B. Askren (AF Human Resources Lab.) Oct. 1969 78 p refs  
 (Contract F33615-68-C-1367)  
 (AD-699578; AFHRL-TR-69-23) Avail: CFSTI CSDL5/15

The purpose of the study was to investigate the relationships between design characteristics and skill dimensions. A series of paper and pencil tests to examine these relationships was administered to eight design engineers during two four-hour sessions. Design characteristics related to skill level were test points, internal components, checkout and troubleshooting procedures, type of test equipment required and go/no-go displays. The engineers concept of skill level appears to be more performance-oriented than that of Air Force specialty code designations.

Author (TAB)

**N70-26351** National Lending Library for Science and Technology, Boston Spa (England).

#### VARIATIONS IN THE UROPEPSINOGEN IN THE FATIGUE SYNDROME. DEVELOPMENT OF THE METHOD OF ANALYSIS [VARIAZIONI DELL'UROPEPSINOGENO NELLA SINDROME DA AFFATICAMENTO]

C. Mellino et al 24 Feb. 1970 22 p refs Transl. into ENGLISH from Nuovi Ann. Igiene Microbiol. (Rome), v. 17, no. 1. Feb. 1966 p 31 - 41  
 (NLL-RAE-Lib-Trans-1333-(5207)) Avail: Natl. Lending Library.

**N70-26383**

Boston Spa, Engl.: 2 NLL photocopy coupons

Quantitative changes in daily uropepsinogen output were studied on subjects working in several installations of the Italian Railway Administration as an indication of nervous fatigue. The values obtained in 500 subjects, aged between 30-50 years are reported in microgrammes of tyrosine emitted by the enzyme in 100 ml of urine. The data which present the greatest frequency oscillate around the arithmetic average of 62.60 with its relative sigma of + or - 6.40. Author

**N70-26383#** Atomic Energy of Canada, Ltd., Chalk River, (Ontario). Nuclear Labs.

**CHALK RIVER NUCLEAR LABORATORIES, BIOLOGY AND HEALTH PHYSICS DIVISION PROGRESS REPORT, 1 OCTOBER - 31 DECEMBER 1969**

31 Dec. 1969 95 p refs

(AECL-35665) Avail: CFSTI; Atomic Energy of Can., Ltd., Chalk River: \$2.00

The guidelines established for reactor safety and siting were reviewed. At the molecular level, studies continued on the mechanisms by which radiation injury is repaired, and the magnitudes and importance of the radiation effects in cells, organisms, and populations. Other studies concentrated on the practical use of radiation and radioactive materials, or potential useful byproducts of radiation effects research. Environmental monitoring studies which involve quantitative knowledge of movement and exchange of radionuclides in air, water, soil, and living material were continued. These investigations provide a fertile field for the behavior of trace-elements in nature and furnish techniques for solution of problems in hydrology, limnology, meteorology, and biology. In the Health Physics Branch, work was continued in neutron dosimetry, radiation instrument development, personal dosimetry systems, tritium health physics, and biophysics. The radiation facilities of the Branch are being improved and extended with the erection of a shielded building. E.M.C.

**N70-26444#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**MULTIDIMENSIONAL SCALING OF SELECTED HOW-MALFUNCTION CODE CLUSTERS Final Report, Sep. 1967 - Apr. 1968**

William H. Pearson Oct. 1969 20 p refs

(AD-701040; AMRL-TR-69-15) Avail: CFSTI CSCL 15/5

At present there are approximately 230 How-Mal (AFM 66-1) code words used to describe equipment failures occurring in Air Force equipment. Some of these code words are very similar in meaning. Unnecessary time spent by the technician searching through the list of code words for the appropriate code can be avoided if the number of code words is minimized by eliminating or consolidating those which, as used, are redundant. The study corroborates by multi-dimensional scaling methods groups of redundant How-Mal code words previously identified by factor analytic methods. TAB

**N70-26483#** Royal Aircraft Establishment, Farnborough (England).

**PHYSIOLOGICAL ASPECTS OF THE BASIC LAW OF THE PERCEPTION OF LIGHT STIMULI [ZUM PHYSIOLOGISCHEN GRUNDGESETZ DER WAHRNEHMUNG VON LICHTREIZEN]**

M. Berek Jul. 1969 25 p refs Transl. into ENGLISH from Z. Instrumentenk. (Brunswick, W. Ger.), v. 63, no. 9, 1943 p 297-309

(RAE-Lib-Trans-1362) Avail: CFSTI

An empirical equation is derived which can be used to represent the variation of foveal visual acuity with background brightness and target contrast over a very wide range of both factors. The equation used is sensibly derived from known facts about the eye and is fitted to a number of different sources of data. Author

1969, p. 257-260. 15 refs. Translation.  
(For abstract see issue 03, page 422, Accession no. A70-13702)

## IAA ENTRIES

**A70-25503** Influence of a diet consisting of dehydrated products on the functional state of the human organism. V. P. Bychkov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 17-23.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 261-266. 38 refs. Translation.  
(For abstract see issue 03, page 435, Accession no. A70-13703)

**A70-25505** Calculation of the dose of justified risk in relation to long-term space flights. E. E. Kovalev, V. I. Popov, and V. A. Sakovich. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 29-32.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 272-274. 11 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13705)

**A70-25506** Hematopoietic changes in dogs undergoing periodic irradiation. M. F. Sbitneva, M. N. Trushina, N. I. Gvozdeva, and E. M. Samoilova. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 33-36.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 275-278. 13 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13706)

**A70-25507** Value of immunologic indices for the detection of radiation injury. G. M. L'vitsyna and S. A. Davydova. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 37-40.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 279-281. 7 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13707)

**A70-25508** Biological effects of 50 MeV protons on intestinal epithelial cells of mice. V. M. Matriukova and A. D. Strzhizhovskii. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 41-45.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 282-285. 11 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13708)

**A70-25509** Medical investigations carried out during the flights of the Soyuz-3, Soyuz-4, and Soyuz-5 spacecraft. E. I. Vorob'ev, L. I. Kakurin, B. B. Egorov, A. D. Egorov, A. G. Zerenin, and G. I. Kozyrevskaia. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 46-54.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 286-292. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13709)

**A70-25510** Methods of studying the effectiveness of local protection of the astronaut. G. M. Abramova, E. V. Ginsburg, R. A. Kuzin, G. F. Nevskaja, V. I. Popov, M. A. Sychkov, A. V. Shafirkin and V. V. Iurgov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 54-59.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 293-296. 18 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13710)

**A70-25511** Experimental study of the diurnal rhythm of human physiological functions and performance following a shift of the sleep-wakefulness cycle. A. N. Litsov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 59-66.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 297-303. 29 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13711)

**A70-25512** Change of the acceleration tolerance of the skeleton after prolonged weightlessness. S. A. Gozulov and N. I. Frolov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969,

**A70-25351 #** Effect of near-vacuum exposures on pulmonary circulation in dogs. Julian P. Cooke and George F. Gee (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Society for Experimental Biology and Medicine*, vol. 133, Mar. 1970, p. 911-913. 9 refs.

Investigation of the direction and distribution of pulmonary blood flow in dogs during near-vacuum exposure. The findings indicate that a small, perhaps insignificant, amount of pulmonary flow occurs after about 20 sec of near-vacuum exposure or during the recompression in the animals tested. This movement of blood appears to be independent of a functional heart. M.V.E.

**A70-25352** Tracking by 'eye control.' William Vaughan. *Optical Spectra*, vol. 4, Mar. 1970, p. 37-42.

Because the eye is quicker than the hand, a pointing and tracking system based on human eye motions can have valuable aerospace applications. The system discussed here, devised by Honeywell for NASA, employs an ingenious infrared electro-optical tracker called an Oculometer. (Author)

**A70-25400 #** Certain regular correlations between the degree of manifestation of the skin galvanic reaction and changes in the EEG accompanying local injuries of limbal (rhinencephalic) structures of the human brain (Nekotorye zakonomernye sootnosheniia vyrazhennosti K.G.R. i izmenenii E.E.G. pri lokal'nykh povrezhdeniakh limbicheskikh /rintentsefal'nykh/ struktur mozga cheloveka). I. G. Dallakian, L. P. Latash, and L. T. Popova (Akademiia Nauk SSSR, Laboratoriia Problem Upravleniia v Organizme Cheloveka i Zhivotnykh, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 190, Feb. 1, 1970, p. 991-994. 13 refs. In Russian.

Investigation of the role of a selective injury of only one specific formation of a limbal system (or of a disturbance of certain components of the system) in the suppression of the skin galvanic reaction. A study was made of patients with various types of focal brain injuries, involving a comparison of the special features of the dynamics of the skin galvanic reaction with the nature of the changes in the EEG and the location of the pathological process in the brain. Comparisons of changes in the biocurrents in the brains of patients with injuries in various parts of the brain and with various degrees of manifestation of the skin galvanic reaction revealed some interesting relations. It was found that the skin galvanic reaction is absent significantly more often in patients with injuries of the mediobasal temporal formations, in the EEGs of whom there are signs of disturbances of the activity of similar (symmetrical) formations in the opposite hemisphere. The presence of 'mirror' foci in the EEGs of patients with convexital injuries in the temporal portion of the brain was, as a rule, not associated with the suppression of the skin galvanic reaction. A.B.K.

**A70-25501** Nature of resistance in an organism and the mechanisms whereby it is altered. Z. I. Barbashova. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 6-12.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 252-256. 37 refs. Translation.  
(For abstract see issue 03, page 422, Accession no. A70-13701)

**A70-25502** Respiration and mineral nutrition of hypothetical Martian organisms and other problems of Martian biology. K. A. Liubarskii. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 12-17.) *Environmental Space Sciences*, vol. 3, July-Aug.

p. 67-71.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 304-307. 22 refs. Translation.  
(For abstract see issue 03, page 423, Accession no. A70-13712)

**A70-25513** Excretion and balance of certain elements during prolonged utilization of dehydrated diets. E. I. Pokrovskaja, A. P. Tereshchenko, and V. P. Bychkov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 71-75.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 308-311. 7 refs. Translation.  
(For abstract see issue 03, page 435, Accession no. A70-13713)

**A70-25514** Contactless method of recording indices relating to the cardiovascular system and respiration. R. M. Baevskii and I. I. Funtova. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 76-78.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 312, 313. 6 refs. Translation.  
(For abstract see issue 03, page 435, Accession no. A70-13714)

**A70-25515** Application of methods of mathematically planning an experiment in studying the process of biological mineralization. I. M. Chirkov, S. I. Tsitovich, I. L. Chernovich, and V. F. Varlamov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 78-81.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 314, 315. 6 refs. Translation.  
(For abstract see issue 03, page 435, Accession no. A70-13715)

**A70-25516** The Stockholm phytotron. V. P. Dadykin and M. V. Vil'iams. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 82, 83.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 316, 317. Translation.  
(For abstract see issue 03, page 435, Accession no. A70-13716)

**A70-25517** Reflex reactions and state of certain autonomic functions of white rats in hypothermia. G. V. Altukhov, L. N. Khruleva, R. I. Gritsiuk, and P. A. Tkachenko. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 84, 85.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 318, 319. Translation.  
(For abstract see issue 03, page 424, Accession no. A70-13717)

**A70-25518** Use of acids to increase resistance of the organism to hypoxia. A. Kh. Kogan, I. I. Pulin, and N. I. Losev. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, July-Aug. 1969, p. 86.) *Environmental Space Sciences*, vol. 3, July-Aug. 1969, p. 320. Translation.  
(For abstract see issue 03, page 424, Accession no. A70-13718)

**A70-25668 #** Electroencephalogram during F104-J flight. Ichiro Saito, Kunio Sakuma, Noriko Kato, and Masaru Goto (Japan Air Self-Defense Force, Aeromedical Laboratory, Tashikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 10, Sept. 1969, p. 61-69. In Japanese, with abstract in English.

Study of the electroencephalograms on five pilots during flights in F-104J aircraft, recorded by telemetering. Nine records were made, one of which was examined visually with the following results: The characteristic finding was a mixture of 5 to 6 Hz, 40 to 60 microvolt theta waves, low-voltage fast waves, and few alpha waves, i.e., desynchronization. When the pilot had to concentrate, as in takeoff, landing, and accelerated climb, an increase of beta activity was recognized. Even while flying, eye-closing induced prominent alpha activity. When the pilot concentrated on a task such as measurement of direction and distance from a certain TACAN station, the theta wave disappeared and was replaced by a beta wave. It is considered that the significance of the theta wave is worth careful examination in the future. F.R.L.

**A70-25669 #** Hearing acuity of the aged pilots of JASE. II - The results of hearing examination for verbal sound. Noriko Kato, Ichiro Saito, and Hiroshi Wada (Japan Air Self-Defense Force,

Aeromedical Laboratory, Tashikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 10, Sept. 1969, p. 70-81. In Japanese, with abstract in English.

Study of the hearing acuity of pilots over forty years of age, which tends to deteriorate at high audiometric frequencies. Fifty such pilots were examined, using speech audiometry. It was found that there was discrimination loss for high frequency verbal sounds, with diminished pure tone hearing acuity at high frequency. Though pilots who have hearing disturbances for high pitch pure tones tend to show poor discrimination for high frequency verbal sounds, it does not necessarily mean disqualification, because verbal communication can be smoothly performed without discrimination of each individual sound. Further intensive studies of the effect of frequency characteristics of aircraft radio, SNR, differential atmospheric pressure, and other factors are recommended. F.R.L.

**A70-25670 #** Study of aviation psychological fitness capacity - Analysis of the causes for elimination. Miyako Okaue, Hayao Hori, and Sakurako Takigawa (Japan Air Self-Defense Force, Aeromedical Laboratory, Tashikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 10, Sept. 1969, p. 82-95. 10 refs. In Japanese, with abstract in English.

Analysis of reports of faculty boards, which are held to decide whether or not flying training of a student should be continued, in order to determine traits unfavorable for flight. Intelligence factors appear to be the most important. With respect to perception and sensation, poor division of attention, channelized attention, and poor visual perception of distance are frequently considered to be faults. Psychomotor factors should not be overlooked; some eliminated students were too tense. Some of the unfavorable traits were significantly different in the various flying curriculums. In the case of students eliminated during takeoff and landing training, poor depth perception and slow reaction were frequently observed. In formation flying, slow reaction and overcontrolling was noted. Many pilots eliminated on instrument flight checks showed poor sense of direction. F.R.L.

**A70-25671 #** Changes of heart rate during running at altitude in rats. Hiroshi Fujiwara, Yoshihisa Yamazaki, and Tsuneatsu Nanba (Japan Air Self-Defense Force, Aeromedical Laboratory, Tashikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 10, Sept. 1969, p. 96-101. 10 refs. In Japanese, with abstract in English.

Examination of changes of heart rate in rats when exercising at altitude. The exercise consisted of running on a treadmill at simulated altitudes of 2300, 3000, 4000, 6000, and 8000 m. Electrocardiograms were recorded before, during, and after running continuously. The effect of respiratory-circulatory training at altitude is discussed. F.R.L.

**A70-25672 #** Vital function changes by cold stress. III - Vital function changes by cold air inhalation. Michihiko Iizuka (Japan Air Self-Defense Force, Aeromedical Laboratory, Tashikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 10, Sept. 1969, p. 102-109. 15 refs. In Japanese, with abstract in English.

Study of the effect of cold air inhalation on vital functions, such as would be experienced in the case of high altitude bailout, or in surviving or working in cold regions. A cold air inhalation experiment was carried out on dogs. A heat exchange simulator of the upper respiratory tract is described. It appears that under conditions of extreme cold, and with frostbite of the upper respiratory tract and loss of body heat by cold air exhalation, there might not be an active mechanism for warming cold inspired air. F.R.L.

**A70-25673 #** General inspection of PE and SV equipment. Yutaka Mine (Japan Air Self-Defense Force, Aeromedical Laboratory, Tashikawa, Japan). *Japan Air Self Defence Force, Aeromedical*

*Laboratory Reports*, vol. 10, Sept. 1969, p. 110-113. 7 refs. In Japanese, with abstract in English.

Review of results and recommendations following the general inspection of life support systems under the command of Headquarters, Fifth Air Force, USAF. The check list is included. The recommendations are considered to be good references for the Japan Air Self Defense Force. The procedures, equipment, and accessories used are discussed. F.R.L.

**A70-25674**      **Respiratory response to arterial H(+) at different levels of arterial carbon dioxide pressure during hyperoxia or hypoxia.** T. Natsui (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv*, vol. 316, no. 1, 1970, p. 34-50. 41 refs.

Experiments were carried out in 12 dogs anesthetized with halothane of constant alveolar concentration (mean: 0.89%). The ventilatory response to arterial carbon dioxide pressure with hyperoxia was determined in metabolic acidosis (by infusion of 0.5 N HCl solution). The ventilatory response to arterial carbon dioxide pressure with constant hypoxia was determined in both metabolic acidosis and alkalosis. The arterial H(+)-ventilation response curve was obtained at different constant levels of carbon dioxide pressure. Ventilation in hyperoxia was largely dependent on carbon dioxide pressure if acid-base balance was near normal, but became independent of carbon dioxide pressure and dependent on arterial H(+) as this increased. It was postulated that this was partly due to the negative interaction between carbon dioxide pressure and H(+). The H(+)-ventilation response curves showed the same pattern in hypoxia, but only on the alkalotic side. However, with hypoxia in the range of normal to acidotic condition, control of ventilation was mainly dependent on H(+) and independent of carbon dioxide pressure; this implies an interaction between hypoxia and H(+) at the peripheral chemoreceptors. (Author)

**A70-25675 \***      **A model of the human postural control system.** J. C. Hill (Oakland University, Rochester, Mich.). In: Institute of Electrical and Electronics Engineers, Systems Science and Cybernetics Conference, Philadelphia, Pa., October 22-24, 1969, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 152-162. 29 refs. Grant No. NGR-23-054-003.

A nine degree of freedom pitch axis model of the human postural control system is proposed. Expressions for the kinetic and potential energies of the system are derived. The trunk, thigh, shank, foot, upper arm, forearm, and head are each modeled by a lumped mass at the element center of mass and an associated rotational inertia. (Author)

**A70-25702 \***      **Non-enzymatic hydrolysis of adenosine phosphates.** H. R. Hulett (Stanford University, Stanford, Calif.). *Nature*, vol. 225, Mar. 28, 1970, p. 1248, 1249. 5 refs. NASA-supported research.

Study of the reactions of ATP, ADP, and AMP over a range of temperatures in distilled water, in a solution containing 0.02 moles of Calcium ions, and in a synthetic seawater. Experimental results are shown in a graph in which the logarithm of the hydrolysis rate is plotted against the reciprocal of absolute temperatures. It is pointed out that of all the compounds, only AMP would be expected to survive in such solvents for more than a few years at temperatures near present ambient. G.R.

**A70-25705**      **Closed-loop simulation of congenital heart defects.** Paul F. Bohn (Johns Hopkins University, Silver Spring, Md.) and L. Jerome Krovetz (Johns Hopkins Hospital, Baltimore, Md.). *Simulation*, vol. 14, Mar. 1970, p. 117-122. 9 refs.

Description of the development of a cardiovascular model and of its implementation on an analog computer designed to increase the understanding of the hemodynamics of congenital heart defects. The method is based on McLeod's (1964 and 1968) model of the cardiovascular system. The simulation, however, has been expanded

by the addition of ten cardiovascular defects and modified by a new heart pump circuit. It is believed that this simulation realistically reproduces the effects of congenital heart defects and that it should be of considerable value in three ways: (1) in affording deeper understanding of many cardiovascular problems; (2) in predicting what might happen with surgical intervention in patients with unusual combinations of defects, and (3) in examining the effects of varying compliance of ventricular function. M.V.E.

**A70-25707**      **Psychological and physiological reactions of man in space (Psychologische und physiologische Reaktionen des Menschen im Weltraum).** Wassili Parin (Akademiia Nauk SSSR, Moscow, USSR), Iosif Chasen, and Fedor Kosmolinskii (Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *VDI-Z*, vol. 112, no. 6, 1970, p. 359, 360. In German.

Discussion of some physiological and psychological problems encountered by man during space flights in the light of the contemporary space biology, space medicine, and space psychology. Problems of human hypokinesia, space kinetosis, and human reactions to life conditions in an isolated and very limited room are considered. Some predictions concerning the orientation of future research are outlined. O.H.

**A70-25821 #**      **Physiopathologic effects of longitudinal and tangential accelerations, as well as decelerations, vibrations, and weightlessness (Effetti fisiopatologici delle accelerazioni longitudinali, tangenziali, delle decelerazioni, delle vibrazioni, dell'assenza di peso).** F. Rossanigo (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) and G. Meineri. *Rivista di Medicina Aeronautica e Spaziale*, vol. 32, Oct.-Dec. 1969, p. 447-561. 197 refs. In Italian.

Synthetic description of the current and most modern knowledge in the field of investigations of accelerations. In order to provide an organic treatment of the subject matter from the physiopathologic standpoint, the treatment is subdivided by organs and apparatuses relative to their reactions to accelerations. The effects of acceleration on the heart and circulation are considered, together with accelerations and the respiratory tract, changes in lung volume, pressure of the pulmonary artery, regional distribution of blood flow, interstitial and alveolar edema, acceleration atelectasis, discrepancy in the ventilation-perfusion ratio and gaseous exchange. Changes induced by accelerations in the hematic crisis level, and effects of accelerations on functions of the kidneys and the uropoietic apparatus are examined, together with resistance to accelerations, effects of accelerations on performance, factors which influence resistance to accelerations; increase in resistance to accelerations by pharmacological means, decelerations and impacts, vibrations, and weightlessness. M.M.

**A70-25822 #**      **Function of the vestibular apparatus and adaptation problems (Sulla funzione dell'apparato vestibolare ed i problemi dell'adattamento).** R. Caporale, L. Bianco, and G. D'apollò. *Rivista di Medicina Aeronautica e Spaziale*, vol. 32, Oct.-Dec. 1969, p. 562-643. 139 refs. In Italian.

Discussion of vestibular adaptation. Elementary vestibular adaptation is discussed, together with complex vestibular adaptation per stimulator, vestibular habituation to heat stimulation in animals and men, habituation to rotatory stimulation in animals and men, skaters and ballet dancers. Experimental investigations on vestibular adaptation in man are treated. They include the stimulation of the vestibular apparatus with square-wave acceleration, preliminary investigations, and investigations on the adaptation of pilots, both in subjects with experience in rotatory tests and subjects with no such experience. M.M.

**A70-25828**      **Visual performance after preadaptation to colored lights.** C. R. Cavonius and R. Hilz (Eye Research Foundation, Bethesda, Md.). *Journal of Experimental Psychology*, vol. 83, Mar. 1970, p. 359-365. 12 refs. Army-supported research; NSF Grant

No. GB-4260.

Six Ss performed visual acuity and light-detection tasks after exposure to monochromatic lights matched in photopic luminance. As found in other studies, visual sensitivity to dim lights recovers most rapidly after exposure to long wavelength (red) light. However, if S is required to discriminate detail, his sensitivity recovers more rapidly after exposure to wavelengths around 600 nm. (orange) than after exposure to other regions of the spectrum. This unexpected result may be due to interference by the scotopic system when viewing test objects it cannot resolve. The traditional deep red filters used to preserve dark adaptation are therefore appropriate only when the subsequent visual task can be performed with scotopic vision alone. (Author)

**A70-25829 Knowledge of alternatives and perception of tachistoscopic stimuli.** Kent Gummerman (California, University, San Diego, Calif.). *Journal of Experimental Psychology*, vol. 83, Mar. 1970, p. 385-390. 21 refs.

Perceptual tuning was investigated in a tachistoscopic identification task with alternatives provided either after or before and after the stimulus. A performance difference was found that favored prior knowledge of the alternatives, but the difference disappeared when a masking pattern was added to the poststimulus display. The difference found with the mask present was attributed to the adverse influence of presenting alternatives only after the stimulus: Ss were unable to make full use of the stimulus and its persisting visual image. The mask was designed to terminate the visual image at the offset of the physical stimulus so that performance reflected perceptual processing efficiency during an interval of constant duration, regardless of when alternatives were presented. The present study does not suggest that perceptual tuning can occur. (Author)

**A70-25830 Processing symbolic information from a visual display—Interference from an irrelevant directional cue.** John L. Craft and J. Richard Simon (Iowa, University, Iowa City, Iowa). *Journal of Experimental Psychology*, vol. 83, Mar. 1970, p. 415-420. 7 refs.

In a choice reaction time (RT) task, Ss pressed either a right- or left-hand button in response to directional commands provided by colored lights. In one experiment, the command was presented both monocularly and binocularly. On monocular trials, RT was significantly faster when the symbolic content of the command corresponded to the eye stimulated (corresponding trials) than when it did not (noncorresponding trials). A comparison of monocular with binocular RT indicated that the Command X Eye Stimulated interaction was due to interference on the noncorresponding trials. Results of a second experiment indicated that the source of this interference was not the eye stimulated per se, but rather the spatial locus of the command. An initial tendency to react toward the source of stimulation was postulated to explain this interference with information processing. (Author)

**A70-25849 \* Reassembly of living cells from dissociated components.** K. W. Jeon, I. J. Lorch, and J. F. Danielli (New York, State University, Buffalo, N.Y.). *Science*, vol. 167, Mar. 20, 1970, p. 1626, 1627. 12 refs. Grant No. NsG-015-16.

Combining the techniques of nuclear transplantation and cytoplasmic transfer, dissociated amoeba nuclei, cytoplasm, and membranes were reassembled to form viable amoebae. The techniques of cell reassembly appear to be sufficiently adequate so that any desired combination of cytoplasm, nucleus, and membrane can be assembled into living cells. (Author)

**A70-25875 Airplane cockpit noise levels and pilot hearing sensitivity.** Kenneth J. Kronoveter (Bureau of Occupational Safety and Health, Salt Lake City, Utah). (*American Industrial Hygiene Conference, Denver, Colo., May 12-16, 1969.*) *Archives of Environmental Health*, vol. 20, Apr. 1970, p. 495-499. 10 refs.

Study of the influence of the inflight cockpit noise exposure on

the pilot hearing sensitivity. Audiometric examinations of 89 commercial line pilots, and cockpit noise level determinations made in 18 different types of airplanes at various power settings are described, and the results are tabulated, plotted graphically, and discussed. The correlation of the cockpit noise exposure with the hearing sensitivity indicates hearing losses in pilots which increase with age and logged flight time and are greater than what could be expected in the normal population. O.H.

**A70-25903 Human factors in aircraft interior design.** Christopher L. Lair (Aerosonic Corp., Clearwater, Fla.). *Society of Automotive Engineers, National Business Aircraft Meeting, Wichita, Kan., Mar. 18-20, 1970, Paper 700234*. 5 p. 8 refs. Members, \$1.00; nonmembers, \$1.50.

Dark colors make a small space seem smaller. Light colors make it appear larger. Blue and green suggest a tranquil surrounding and red causes one to anger more easily. These are human reactions to confined interiors. The first part of this paper examines human-environment interactions which are present in aircraft. The second part discusses sorting and classifications of factors by the engineer. (Author)

**A70-25928 # Method of data handling by groups in the problem of designing the 'associative' analogue of coming to decisions by a man (Metod grupovogo vrakhuvannia argumentiv u zadachi pobudovi 'asotsiativnoi' modeli priiniattia rishen' liudinoiu).** L. M. Ivakhnenko, V. D. Dimitrov, and N. V. Gulian. *Avtomatika*, vol. 15, Jan.-Feb. 1970, p. 31-42. 6 refs. In Ukrainian.

An 'associative' analogue is designed of coming to decisions by a man when searching the extremum in a form of multilayers stochastic automaton. The analogue is based on application of factor analysis for contraction of six-dimensional space of input variables into three-dimensional space of factors and on the application of method of data handling by groups for the replacement of a complete description 'stimul-reaction' by a series of particular descriptions. Comparatively high precision of prediction of man decisions shows the possibility of using the 'associative' analogue in engineering. (Author)

**A70-25938 # Effect of the gas mixture composition on the growth of bacteria assimilating gaseous hydrocarbons (Vliianie sostava gazovoi smesi na rost bakterii, usvaivaiuschchikh gazoobraznye uglevodorody).** Z. S. Smirnova (Akademiia Nauk SSSR, Institut Biokhimmii i Fiziologii Mikroorganizmov, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seria Biologicheskaiia*, Jan.-Feb. 1970, p. 30-37. 14 refs. In Russian.

Results of a study of the effect of the composition of the gas mixture on the growth of bacteria oxidizing methane and propane. It is established that the concentration of the biomass in the medium, all other conditions being equal, is directly proportional to the concentration of hydrocarbon and oxygen in the gas mixture. An oxygen concentration of up to 50% in a methane medium and up to 55% in a propane medium does not inhibit the growth of bacteria. The degree of utilization of methane or propane in constructing cell material depends on the ratio of oxygen to hydrocarbon. Methane is most effectively used by bacteria when the oxygen to methane volume ratio is equal to 1.5. The assimilation of propane occurs most effectively when this ratio is equal to 3. It is shown that carbon dioxide is necessary for the growth of methane-oxidizing bacteria. The optimal carbon dioxide concentration ranges from 5 to 10%. A higher carbon dioxide concentration exerts an inhibiting effect on the development of gas-oxidizing bacteria. A carbon dioxide concentration of more than 20% completely suppresses growth. A.B.K.

**A70-25939 # Methods and criteria for selecting highly productive cultures of hydrocarbon-assimilating microorganisms (Metody i kriterii otbora vysokoproduktivnykh kul'tur mikroorganizmov, assimiliruiuschchikh uglevodorody).** G. K. Skriabin, E. L. Golovlev, and L. P. Volynkina (Akademiia Nauk SSSR, Institut

Biokhimi i Fiziologii Mikroorganizmov, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Jan.-Feb. 1970, p. 53-57. 15 refs. In Russian.

Study of the main criteria for selecting highly productive hydrocarbon-assimilating bacterial cultures. It is shown that in continuous cultivation of mixed cultures with an increasing rate of dilution a washing out of individual strains occurs in a sequence corresponding out of individual strains occurs in a sequence corresponding to the increase in their maximum growth rates. As a result of such selection, a culture is built up which possesses the highest specific growth rate and maximum productivity. A.B.K.

**A70-25940 # Carbon dioxide fixation by a developing population of hydrogen bacteria (Fiksatsiia uglekisloty razvivaiushcheisia populatsiei vodorodnykh bakterii).** N. V. Zolotukhin (Akademiia Nauk SSSR, Institut Mikrobiologii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Jan.-Feb. 1970, p. 58-63. 16 refs. In Russian.

Description of a method of determining the consumption and kinetics of utilization of carbon dioxide by a growing population of hydrogen bacteria, and summary of the results of a study of the carbon dioxide fixation process in *Hydrogenomonas eutropha* in a stationary culture. The proposed method is based on the titration of a liquid culture of hydrogen bacteria with carbon dioxide. It is shown that under the experimental conditions there was practically no lag phase in the carbon dioxide fixation process and biomass synthesis. The maximum rate of utilization of carbon dioxide by the bacteria (0.32 ml/mg/hr) was attained within 10 to 15 hours after introduction of the inoculum. By the start of the steady phase this rate was equal to 0.013 ml/mg/hr. It is found that the process of carbon dioxide fixation by the cells depends entirely on the oxygen content in the gas mixture. A.B.K.

**A70-25941 # Changes in the free radical (FR) content in the organs of mice under conditions of hypo- and hyperoxia (Izmenenie soderzhanii svobodnykh radikalov (SR/ v organakh myshei v usloviakh gipo- i giperoksii).** L. A. Piruzian, E. Ia. Kaplan, I. A. Maksimova, and M. A. Rozenfel'd (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Jan.-Feb. 1970, p. 93-99. 33 refs. In Russian.

Summary of experimental data on the kinetics of changes in the free radical content in the organs of mice under conditions of hyperoxia and hypoxia. In the case of hyperoxia the nature of the change in the free radical activity is the same in the liver, the heart, the brain, the lungs, and muscle: a tendency toward an increase in the free radical content on the second day with a subsequent decrease on the third is observed. On the fourth day a pronounced increase in free radical activity is noted. With an increase in the residence times of the animals under conditions of hypoxia the change in the free radical concentration in the liver, the spleen, the brain, and the lungs are of the same type. An increase in free radical activity is noted on the first day, but a reduction below the control values occurs subsequently. However, the rates of change in the free radical concentration are different for different organs. A.B.K.

**A70-25942 # Participation of the anterior lobe of the limbic region in respiration control (Ob uchastii perednego otdela limbicheskoi oblasti v regulatsii dykhanii).** A. V. Pogrebkova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Jan.-Feb. 1970, p. 100-103. 11 refs. In Russian.

Study of the role of the anterior lobe of the limbic cortex of the brain in the analysis of afferent pulses arising in the receptors of the respiratory system. It is shown by chronic experiments on dogs involving the formation of a system of different reflexes that bilateral removal of this section of the cortex resulted in prolonged disturbances in the analysis of stimuli addressed to the receptors of the respiratory apparatus. At the same time, reflexes formed in response to stimulation of other receptor regions did not undergo

any changes. A control removal of other regions of the brain cortex (occipital) also failed to disturb the activity of the respiratory system. On the basis of the data obtained and the results of previous studies, the anterior lobe of the limbic cortex and the cortex region of the sigmoid gyri are classed as part of the structure of the respiratory analyzer. A.B.K.

**A70-26002 \* Dietary protein level and uric acid metabolism in normal man.** Jean Bowering, Doris Howes Calloway, Sheldon Margen, and Nathan A. Kaufmann (California, University, Berkeley, Calif.). *Journal of Nutrition*, vol. 100, Feb. 1970, p. 249-261. 38 refs. NIH Grant No. AM-10202; Grant No. NGL-05-003-012.

Study of the influence of different dietary levels of protein and yeast ribonucleic acid (RNA) on uric acid metabolism in six healthy young men living in a metabolic unit for 60 days. It was found that the increased uric acid excretion with the high protein diet was the result of a two-fold increase in uric acid turnover rate without alteration of urate pool size, whereas a similarly increased uric acid excretion with RNA feeding was the result of a very slight increase in turnover rate and a 100% expansion of miscible pool size. The role of dietary changes in altering uric acid production and excretion is discussed with respect to postulated feedback controls on purine metabolism. G.R.

**A70-26006 \* # Nerve membrane current noise - Direct measurements under voltage clamp.** Denis J. M. Poussart (MIT, Cambridge, Mass.). *National Academy of Sciences, Proceedings*, vol. 64, Sept. 1969, p. 95-99. 16 refs. NIH Grant No. 5P01 GM14940-02; Grant No. NGL-22-009-304.

Fluctuations in the steady-state current of the membrane of the lobster giant axon have been measured under voltage-clamp conditions. These fluctuations have a power density spectrum that is inversely proportional to frequency. The magnitude of the fluctuations is determined largely by the potassium component of the membrane current. (Author)

**A70-26007 \* Pepsinogens A, C, and D from the smooth dogfish.** Terence G. Merrett (U.K. Atomic Energy Authority, Radiochemical Centre, Amersham, Berks., England), Estelle Bar-Eli (Tel Aviv University, Tel Aviv, Israel), and Helen Van Vunakis. *Biochemistry*, vol. 8, Sept. 1969, p. 3696-3702. 34 refs. NSF Grant No. GB-4302; Grants No. NsG-375; No. NGR-22-005-001.

Four pepsinogens have been separated from the stomach mucosae of the smooth dogfish by chromatography on DEAE-cellulose. Pepsinogen B, which at pH 2 had enzymic activity toward the synthetic substrate, carbobenzoxyglutamyltyrosine, first emerged followed by pepsinogens D, A, and C with potential enzymic activity toward protein substrates. The latter three precursors were purified further by DEAE-cellulose and Sephadex chromatography. Their molecular weights, determined by ultracentrifugal analysis, were found to be approximately 42,000. Their amino acid composition showed a predominance of acidic over basic residues. In these respects, the dogfish pepsinogens resemble the swine and bovine zymogens. The compositions of pepsinogens A and D were similar to each other and differed from pepsinogen C. The immunological experiments with antipepsinogens A, D, and C also indicated that pepsinogens A and D were similar and that pepsinogen C was distinct. (Author)

**A70-26110 Formation of gas bubbles in supersaturated solutions and in the living organism during decompression.** V. P. Nikolaev. (*Kosmicheskaja Biologiya i Medicina*, vol. 3, Sept.-Oct. 2nd, New York, N.Y., Oct. 26, 27, 1967.) *New York Academy of Sciences, Annals*, vol. 163, Sept. 4, 1969, p. 29-39. 33 refs. National Research Council of Canada Grant No. A-2917.

Study of the problem of the gravitational effect on microorganisms, considered as part of the problem of the possibility of interplanetary transport of life forms, which would be in the dormant or anabiotic state. Examples of relatively recent reports on

types of gravitational research are presented. Specific attention is given to the question of extraterrestrial types of gravitational force acting on microbiological and single-cell systems. Some centrifugal studies are briefly reviewed, followed by a more extensive description of an impulse-applied high-g study. This involved firing packaged organisms from a ballistic device. In the freeze-dried or dormant state, the organisms stood accelerations of up to 250,000 g, showing a slight loss of population viability as the g peak increased. There was no evidence of mutation. The possibility of performing a zero or neutral g experiment is discussed.

F.R.L.

**A70-26049**      **Comments on the in-flight recontamination hazards for a sterilized planetary lander.** J. Friedrich Vandrey (Martin Marietta Corp., Research Institute for Advanced Studies, Baltimore, Md.). (*New York Academy of Sciences, Conference on Planetology and Space Mission Planning, 2nd, New York, N.Y., Oct. 26, 27, 1967.*) *New York Academy of Sciences, Annals*, vol. 163, Sept. 4, 1969, p. 307-309.

Discussion of various measures of how to prevent a recontamination of a sterile lander by microorganisms by their inflight transfer from an unsterilized carrier vehicle. Some actual examples of an effective reduction of the 'biota load' to a minimum are described, and some simple precautions and relatively inexpensive design changes in this respect are suggested. Some special decontamination problems involved in interplanetary missions are also considered.

O.H.

**A70-26101**      **Physiological and hygienic considerations determining the optimum atmosphere for spacecraft cabins.** N. A. Agadzhanian. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 3-13.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 327-334. 17 refs. Translation.

(For abstract see issue 07, page 1220, Accession no. A70-19502)

**A70-26102**      **Morphological changes in parenchymatous organs following exposure to high oxygen pressures.** S. N. Efuni, Iu. E. Mikhailov, T. S. Fokina, and L. L. Shimkevich. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 14-18.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 335-338. 10 refs. Translation.

(For abstract see issue 07, page 1207, Accession no. A70-19503)

**A70-26103**      **Tolerance of rats to rapidly increasing hypoxia in a helium-oxygen atmosphere.** L. A. Briantseva, A. G. Dianov, and R. M. Ivanova. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 18-21.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 339-341. 6 refs. Translation.

(For abstract see issue 07, page 1207, Accession no. A70-19504)

**A70-26104**      **Simulation of brain tissue oxygen tension changes in animals with anoxic anoxia.** V. Sh. Berikashvili, E. A. Kovalenko, and A. B. Savvin. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 22-27.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 342-346. 7 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19505)

**A70-26105**      **Effect of increasing anoxia on 'motivation behavior' of rabbits.** G. P. Goroian and L. V. Kaliuzhnyi. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 28-33.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 347-351. 15 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19506)

**A70-26106**      **Effect of alpha-particles on survival and mutation in chlorella.** L. K. Vekshina, I. G. Kogan, E. I. Kudriashov, D. R. Piatyshev, I. S. Sakovich, and V. A. Shevchenko. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p.

34-38.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 352-355. 9 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19507)

**A70-26107**      **Action of high-energy protons on biological objects.** Iu. G. Grigor'ev, N. I. Ryzhov, N. N. Derbeneva, V. I. Popov, and M. A. Sychkov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 38-43.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 356-360. 12 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19508)

**A70-26108**      **Effect of hypokinesia on cellular and humoral indices of antibody formation in rats.** V. G. Galaktionov and A. S. Ushakov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 43-47.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 361-364. 11 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19509)

**A70-26109**      **Chemical modification of radiation damage to plants caused by fast neutrons.** D. M. Grodzinskii and A. A. Petrov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 48-55.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 365-371. 12 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19510)

**A70-26110**      **Formation of gas bubbles in supersaturated solutions and in the living organism during decompression.** V. P. Nikolaev. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 55-62.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 372-377. 20 refs. Translation.

(For abstract see issue 07, page 1208, Accession no. A70-19511)

**A70-26111**      **Automatic continuous medical monitoring systems for manned space flights.** L. M. Komarova and I. S. Shadrintsev. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 62-66.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 378-382. 35 refs. Translation.

(For abstract see issue 07, page 1220, Accession no. A70-19512)

**A70-26112**      **Changes in the EKG and phases of cardiac contraction during orthostatic tests after prolonged hypokinesia.** B. A. Korolev. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 67-71.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 383-386. 8 refs. Translation.

(For abstract see issue 07, page 1209, Accession no. A70-19513)

**A70-26113**      **Investigation of human expired air for contaminants.** Iu. G. Nefedov, V. P. Savina, N. L. Sokolov, and V. E. Ryzhkova. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 71-77.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 387-391. 12 refs. Translation.

(For abstract see issue 07, page 1220, Accession no. A70-19514)

**A70-26114**      **Criteria of illumination in cabins of manned spacecraft.** E. S. Kotova, S. M. Zalkind, and V. A. Pestova. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 77-81.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 392-395. 7 refs. Translation.

(For abstract see issue 07, page 1221, Accession no. A70-19515)

**A70-26115**      **Methods of evacuating the gas-air mixture from airtight containers during chemical and hygienic investigations of synthetic materials.** V. D. Bartenev and V. V. Naletov. (*Kosmicheskaiia Biologiia i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 82-85.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 396-399. Translation.

(For abstract see issue 07, page 1221, Accession no. A70-19516)

**A70-26116** Relationship between oxygen consumption and pulmonary ventilation in orthostatic tests. A. D. Voskresenskii and V. I. Sokolov. (*Kosmicheskaja Biologija i Meditsina*, vol. 3, Sept.-Oct. 1969, p. 86-88.) *Environmental Space Sciences*, vol. 3, Sept.-Oct. 1969, p. 400-402. 11 refs. Translation.  
(For abstract see issue 07, page 1209, Accession no. A70-19517)

**A70-26231 \*** Dynamic modeling in microanatomy - The mammalian otolith membrane. Jacques J. Vidal (California, University, Los Angeles, Calif.). In: University of Hawaii, Hawaii International Conference on System Sciences, 3rd, University of Hawaii, Honolulu, Hawaii, January 14-16, 1970, Proceedings. Part 2. (A70-26226 11-10) Conference supported by the U.S. Army and the U.S. Air Force. Edited by B. S. M. Granborg. North Hollywood, Calif., Western Periodicals Co., 1970, p. 629-631. Research supported by the Palsy Foundation, NIH, and NASA.

Description of an attempt to infer the state of the mammalian utricular macula taking into consideration microelectrode data and information gathered from light and electron microscopy, behavioral experiments and computer simulation. Experiments conducted by placing cats on a tilting table and monitoring utricular afferents fibers in the nerve are evaluated. The type of membrane motion is discussed. It is found that distributed deformations occur. The results obtained re-enforce the original theory regarding the peripheral clamping of the membrane, since it can be shown that the computer patterns are affected principally by the boundary conditions.  
G.R.

**A70-26275** Cockpit noise environment of airline aircraft. Richard B. Stone. (*Aerospace Medicine*, vol. 40, Sept. 1969, p. 989-993.) *Acoustical Society of America*, vol. 47, Feb. 1970, pt. 1, p. 449.  
(For abstract see issue 23, page 4102, Accession no. A69-41682)

**A70-26299 \*** Lack of a direct effect of morphine on the synthesis of pineal C14-indoles in organ culture. Harvey M. Shein (McLean Hospital, Belmont, Mass.), Frances Larin (Harvard University, Boston, Mass.), and Richard J. Wurtman (Massachusetts Institute of Technology, Cambridge, Mass.). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Jan. 1, 1970, p. 29-33. 9 refs. NIH Grants No. NB-06610; No. AM-11709; Grant No. NGR-22-009-272.

Investigation of the effect of morphine on pineal synthesis of C14-serotonin, C14-melatonin, and C14-protein from C14-tryptophan in the presence or absence of 1-norepinephrine. Tests made on pineal glands removed from female rats are described, and the results are tabulated and discussed. They indicate that morphine in concentrations as high as 0.0001 M does not affect the in vitro synthesis of C14-serotonin, C14-melatonin, or C14-protein by rat pineal glands. Under similar conditions, 1-norepinephrine stimulates the formation of both C14-melatonin and C14-protein, but also has no effect on C14-serotonin synthesis.  
O.H.

**A70-26363 \* #** Application of modern optimal control theory to environmental control of confined spaces and life support systems. L. T. Fan, Y. S. Hwang, and C. L. Hwang (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). In: Thermodynamics and thermophysics of space flight; Proceedings of the Symposium, Palo Alto, Calif., March 23-25, 1970. (A70-26351 11-32) Symposium sponsored by the U.S. Air Force and the Lockheed Missiles and Space Co. Sunnyvale, Calif., Lockheed Missiles and Space Co., 1970, p. 175-189. 24 refs. Contract No. AF 44(620)-68-0020; Grant No. NGR-17-001-034.

Mathematical model of an environmental control system which consists of a confined space or cabin, a heat exchanger, and a feedback element such as a thermostat are presented. The perfor-

mance equations of the system, which represent the dynamic characteristics of the air-conditioned cabin (the system proper) and the heat exchanger (the control element of the system), are derived. In the basic model the flow of air in the confined space is considered to be in the state of complete mixing and the disturbance is caused by an impulse heat input. The flow of air in the confined space or cabin characterized by the two completely stirred tanks-in-series (a CST's-in-series) model is also considered. Pontryagin's maximum principle, which is a keystone of the modern optimal control theory, is applied to the determination of optimal control policies of the temperature control of the life support systems.  
(Author)

**A70-26396 \*** Nonlinear time-domain models of human controllers. Lawrence W. Taylor, Jr. (NASA, Flight Research Center, Edwards, Calif.). *Journal of Optimization Theory and Applications*, vol. 5, Jan. 1970, p. 23-38. 12 refs.

Data from a compensatory tracking task are analyzed by using time-domain models. The linear time-domain results are transformed and compared with frequency-domain results. The nonlinear time-domain model of the same data reduced the remnant or residual power by only a small amount. The need for testing models on independent data is discussed. A novel, but attractive, method of generating functions for an efficient functional expansion of time-domain models is offered.  
(Author)

**A70-26479 #** Shock waves in mathematical models of the aorta. George Rudinger (Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y.). (*International Congress of Applied Mechanics, 12th, Stanford University, Stanford, Calif., Aug. 26-31, 1968.*) *ASME, Transactions, Series E - Journal of Applied Mechanics*, vol. 37, Mar. 1970, p. 34-37. 26 refs. Research supported by the Cornell Aeronautical Laboratory.

If the nonlinear equations for nonsteady blood flow are solved by the method of characteristics, shock discontinuities may develop as a result of omitting from the mathematical model some aspect of the system that becomes significant at rapid flow changes. As an illustration, the flow from the heart into the aorta at the beginning of systole is analyzed. An equation is derived which yields shock formation distances between a few centimeters and several meters depending on the elastic properties of the aorta. Since knowledge of the actual wave form would be useful for computer programming, a few exploratory experiments were performed with an unrestrained latex tube. They indicated wave transitions extending over several tube diameters, but maximum steepening of the wave has not yet been achieved.  
(Author)

**A70-26494 #** Mechanism of production of cochlear microphonics. Vicente Honrubia and Paul H. Ward (California, University, Los Angeles, Calif.). *Acoustical Society of America, Journal*, vol. 47, Feb. 1970, pt. 2, p. 498-503. 15 refs. PHS-supported research.

An analog equivalent electrical circuit of the cochlea that follows the principles of the electromechanical hypothesis for the function of the organ of Corti has been studied. The steady-state parameters of this heuristic electrical model were calculated from data about the impedance and potentials' differences that exist across the walls of the cochlear partition. The behavior of the model is such that it replicates many observations obtained during experiments on the cochleas of guinea pigs. The model also affords a qualitative as well as quantitative approach to the study of the directions, magnitude, and source of electric currents flowing through the inner ear during acoustic stimulation. It also offers a deeper insight into the role played by the main functional elements of the organ of Corti.  
(Author)

**A70-26510** Cardio-respiratory events preceding syncope induced by a combination of lower body negative pressure and head-up tilt. P. D. Newberry, A. W. Hatch, and J. M. MacDonald (Royal Canadian Air Force, Institute of Environmental Medicine, Toronto, Canada). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 373-378. 15 refs.

Several of the variables, forearm blood flow, venous compliance, blood pressure, heart rate, ventilation and end-tidal carbon dioxide tension were measured in each of 42 fainted in 29 normal subjects, induced by lower body negative pressure (LBNP) and head-up tilt. Three of the subjects lost consciousness without developing bradycardia. End-tidal carbon dioxide tension fell continuously, to between 25 and 14 mm Hg. Forearm vascular resistance fell in most cases; but in a few it was maintained. Venous compliance decreased in all cases. In one subject with a history of fainting on venipuncture, a great decrease in forearm vascular resistance occurred during the anticipation of venipuncture. In syncope induced by LBNP, the failure of cardio-respiratory homeostatic mechanisms may occur in any order. Peripheral resistance usually falls first at a comfortable temperature, while heart rate usually falls first in a hot environment. Hyperventilation (in a hot environment) and decreased venous compliance are part of the response to the stress used here to induce syncope. (Author)

**A70-26511** Factors influencing the Time of Safe Unconsciousness (TSU) for commercial jet passengers following cabin decompression. James G. Gaume (Douglas Aircraft Co., Long Beach, Calif.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 382-385. 5 refs.

A review of the need for passenger emergency oxygen for cabin decompressions is worthy of detailed analysis from a physiological point of view. Statistical analysis of the results of past decompressions in aircraft is not sufficient to make the decision to eliminate emergency oxygen. In performing such an analysis, many physical and physiological variables must be considered. The Time of Useful Consciousness (TUC) and the time it takes to become unconscious are guidelines that have been used in the past for flight crew members. These criteria are not applicable to the passengers' situation. The analysis delineates and discusses those factors involved in determining a Time of Safe Unconsciousness (TSU) permissible for passengers after cabin decompression. Simply stated, the degree of hazard is directly proportional to the time the passenger is unconscious from lack of oxygen. (Author)

**A70-26512** Threshold value for stimulation of the horizontal semicircular canals. W. J. Oosterveld (Amsterdam, Universiteit, Amsterdam, Netherlands). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 386-389. 41 refs. Research supported by KLM-Royal Dutch Airlines.

An investigation was done in order to examine the oculogyral illusion in subjects during flying stationary and spiral turns. The investigation was performed in jet airplanes (type DC 8 and DC 8-63) of the Royal Dutch Airlines. Flying stationary turns most of the subjects perceived an angular acceleration of 0.3 deg per sec per sec. In spiral turns angular accelerations of very small values were provoked. In 2 out of 5 subjects an oculogyral illusion was provoked by an acceleration of 0.036 deg per sec per sec. This is the lowest value in humans ever described. (Author)

**A70-26513 \*** On the dimensionless parameters associated with heat transport within living tissue. John C. Chato and Avraham Shitzer (Illinois, University, Urbana, Ill.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 390-393. 7 refs. Grant No. NGR-14-005-103.

A biothermal model of living tissue has been studied. This model included both internal heat generation and blood flow effects. Based on analytical considerations, three dimensionless groups which have significant effects on the steady state heat transfer in the living human body emerged. From the scant experimental data available, one of the groups appeared to be constant at 0.2. The results indicated also that at high metabolic heat production rates the maximum temperature within the body would occur in the skeletal muscle at a depth which depended on the blood perfusion rate but was independent of deep body temperature. (Author)

**A70-26514** ECG telemetry within a small, closed chamber. F. C. Carpenter, Jr. (Douglas Aircraft Co., Long Beach, Calif.).

*Aerospace Medicine*, vol. 41, Apr. 1970, p. 402-406. 6 refs.

This article concerns the requirements and problems of an ECG Telemetry System within a small, irregular metal chamber. Theoretical analysis of the chamber is made to provide starting point parameters for development of a successful system. Specifications for the system and results of empirical tests are given. A diversity receiving antenna system for use with two subjects in the chamber is described. Electrode-subject interface problems are discussed. Tests of high and low impedance data channel inputs, and high and low electrode impedance configurations are described. Investigation of this area was primarily for development of best telemetry system requirements; a solution to the input-subject interface problem is not offered. It is suggested that much work remains to be done in this area to improve accuracy, particularly for monitoring under worst-case conditions such as strenuous exercise. (Author)

**A70-26515 \*** Off-vertical rotation - A convenient precise means of exposing the passive human subject to a rotating linear acceleration vector. Ashton Graybiel and Earl F. Miller, II (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 407-410. 12 refs. NASA-supported research.

A rotating chair modified to permit tilting of a subject up to 20 deg from the upright was used to expose 100 normal men to an unusual vestibular stimulus, eliciting manifestations including the clinical picture of motion sickness. Through stepwise increases in angular velocity of the chair, subjects were rotated at 10 deg tilt until they experienced mild motion sickness (a predetermined endpoint) or until a terminal velocity of 25 rpm was reached. Eighty-eight men reached the predetermined endpoint; seven additional men reached it only when the tilt angle was increased to 20 deg; the remaining five men were shown to be highly unsusceptible. The accuracy and flexibility of the method should prove to be useful in ranking persons according to their susceptibility to motion sickness and in studying the symptomatology, including the underlying central nervous system mechanisms. (Author)

**A70-26516** Effects of pneumatic compression on the cardiovascular dynamics in the dog after hemorrhage. Carlos M. Ferrario, George Nadzam, Leonardo A. Fernandez, and W. James Gardner (Cleveland Clinic Foundation; Fairview General Hospital, Cleveland, Ohio). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 411-415. 12 refs.

The effects of G-suit inflation on cardiovascular dynamics were studied in 75 anesthetized dogs; 60 of which were bled (30 ml/kg) and 15 were not. Measurements were made of arterial, right atrial, inferior vena caval and intraperitoneal pressures, hematocrits and plasma volumes. Ascending aortic flows (10 dogs), femoral and carotid flows (3 dogs) were recorded by using chronically and acutely implanted electromagnetic flow-meters, respectively. With bleeding, arterial pressure, stroke volume, central venous pressure and cardiac output decreased, while there was a proportional increase in total peripheral resistance. These changes were reversed by application of a G-suit pressure of 30 mm Hg for one hour. The increase in arterial pressure was associated with an increase in both stroke volume, cardiac output and mean carotid flow. Mean femoral flow decreased, as did peripheral resistance. Circulating plasma volume was not changed. Inferior vena caval and intraperitoneal pressures paralleled G-suit pressures. With deflation, after 60 minutes of inflation, arterial pressure, stroke volume and cardiac output remained significantly above the values determined after bleeding and just before inflation. The results indicate that the effectiveness of circumferential pneumatic pressure is due to increase of circulating blood volume in the area outside the G-suit. (Author)

**A70-26517** Tolerance of rhesus monkeys to graded increase in environmental carbon dioxide - Serial changes in heart rate and cardiac rhythm. Joseph M. Stinson and Joel L. Mattsson (USAF, Aeromedical Research Laboratory, Holloman AFB, N. Mex.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 415-418. 13 refs.

Six unanesthetized rhesus monkeys were exposed to increments of 7.5, 15 or 30% carbon dioxide per hr at ambient pressure (4300 ft elevation), oxygen tension, and temperature in an environmental chamber. An initial increase in heart rate from ambient air to 10% carbon dioxide was followed by a marked decrease in rate to 35-40% carbon dioxide, and finally a slight rise in heart rate to 60% carbon dioxide. Respiratory rate roughly paralleled heart rate. Mean rectal temperature decreased an average of 5 C between room air and 60% carbon dioxide. Animals could be returned slowly (1-2% carbon dioxide/min) to room air after exposure to as much as 60% carbon dioxide with no apparent detrimental effects, and all deaths occurred at carbon dioxide concentrations in excess of 60% with the ECG exhibiting asystolic arrest. These findings indicate that tolerance limits to acute hypercapnia may be greater than previous predictions. (Author)

**A70-26518 \*** Lower body negative pressure as an assay technique for orthostatic tolerance. II - A comparison of the individual response to incremental vs. constant levels of LBNP. Roger A. Wolthuis (Technology, Inc., Houston, Tex.), G. W. Hoffler, and Robert L. Johnson (NASA, Manned Spacecraft Center, Cardiovascular Laboratory, Houston, Tex.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 419-424. Contract No. NAS 9-7675.

Seven male subjects each participated in six incremental (-20-30-40 mm Hg) and six constant level (-40 mm Hg) LBNP experiments. The incremental and constant level LBNP experiments were performed in pairs, with each pair separated by at least a one week interval. The physiologic data were analyzed by subject, measurement and experiment. The individual physiologic responses to -40 mm Hg within each of these two protocols were statistically similar, indicating that the level of pressure rather than duration at pressure is the major determinant of individual response to this type of stress. The use of a slope-intercept and correlation coefficient provided a good data reduction scheme for characterizing the individual response to incremental LBNP. Finally, it is suggested that incremental LBNP offers a more flexible protocol where LBNP is used as a test for changing orthostatic tolerance. (Author)

**A70-26519** Heart rate of training captains engaged in different activities. S. C. Bateman, R. Goldsmith, K. F. Jackson, H. P. Ruffell Smith, and Valerie Sutton Mattocks. *Aerospace Medicine*, vol. 41, Apr. 1970, p. 425-429.

As part of a study of the work of the training captains in a civil airline, an assessment of the differential stress of simulator, base conversion and line training was made using heart rate as an indicator. The heart rate of twelve volunteer training captains flying four different types of aircraft in these three situations were compared with the rates both at rest and in line flying without training. To provide a base line the heart rate of twelve ordinary line captains were also observed during their normal flying duty. The results showed that the overall mean heart rate recorded for training captains on line flying was the same as for the control group. It was also found that their heart rates in line flying, line training and simulator work are very similar and that they are all higher than resting rates. Base training rates are significantly still higher. It was also shown that heart rate was raised by specific stressful conditions. Most commonly this was seen in takeoff and landing and at times when the training captain was demonstrating maneuvers requiring a high degree of skill, or when there was some element of danger. The heart rate also rose during activities such as numerical calculation, the diagnosis and rectification of aircraft technical faults and in rough air. The conclusion was drawn that heart rate was a useful comparative indicator of stress and that base training was an arduous activity. (Author)

**A70-26520** Aftereffects of various alcoholic beverages on positional nystagmus and Coriolis acceleration. R. S. Ryback and P. J. Dowd (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 429-435. 38 refs.

The purpose of this study was to observe the aftereffects of bourbon and vodka on subjective tumbling, and positional and Coriolis nystagmus recorded by electronystagmography. Subjects were pilots, nonflying personnel, and nonflying personnel habituated to Coriolis stimulation. After baseline values were obtained, subjects imbibed their beverage of choice at 2200 hours over a 90-minute period. Reexamination occurred the following two mornings at 0830 hours. Positional alcohol nystagmus (PAN) occurred, but the usual order of PAN I and PAN II was not observed. An increment in Coriolis nystagmus was seen, and it appears that bourbon has a stronger effect than vodka 34 hours after ingestion. The implications of the latter and other findings, such as increased subjective tumbling, unmasking, and alcohol's effect on preexisting positional nystagmus, are discussed. (Author)

**A70-26521** Activity of the nervous system during the let-down, approach and landing - A study of short duration high workload. A. N. Nicholson, R. G. Borland, Helen M. Ferres (RAF, Institute of Aviation Medicine, Farnborough, Hants., England), and L. E. Hill (RAF, Institute of Aviation Medicine, Farnborough, Hants.; British Overseas Airways Corp., London Airport, Hounslow, Middx., England). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 436-446. 14 refs.

Subjective assessment of workload and changes in the rr interval and finger tremor of the pilot have been studied during the let-down, approach and landing of a Boeing 707 aircraft. The observations have been made during thirty-four landings into international airports. Each let-down was assessed for its overall difficulty and with reference to the various factors which influence the work pattern. The rr interval was recorded during the terminal part of the cruise and let-down and the finger tremor was recorded before take-off and within one minute of touch-down. The physiological change in the pilot associated with an uneventful let-down was a mean rr interval between 400 and 450 msec and a finger tremor between 0.3 and 0.8 per msec sq per Hz at the 10 Hz frequency. During let-downs in which poor control was accompanied by inadequate aids and unfavorable meteorological conditions and frequently preceded by a high workload cruise (indicated by a mean rr interval less than 630 msec at top of descent) the mean rr interval at touch-down was less than 400 msec but the finger tremor at 10 Hz remained less than 0.8 per msec sq per Hz. In the event of an unresolved problem persisting or a fresh problem of some magnitude appearing during the approach mean rr intervals of less than 400 msec were accompanied by finger tremors between 0.8 and 1.3 per msec sq per Hz at the 10 Hz frequency. It is considered that mean rr interval around touch-down reflects the workload of the cruise, let-down, approach and landing whereas changes in finger tremor are associated with untoward events during the approach. (Author)

**A70-26522** Some medical aspects in agricultural flights relating to fatigue among agricultural pilots. D. Baruch (Ministry of Transport and Communications, Civil Aviation Administration, Jerusalem, Israel). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 447-450. 8 refs.

A survey was conducted in Israel on 34 agricultural pilots, with the purpose of finding the influence of flights and environment on the pilots. Ten Ground Crew Members were taken as control group. It was found out that as a result of agricultural flights under hard weather conditions there were significant changes in the pilot's body such as loss of weight, increase of body temperature, decrease of eosinophil cells, tendency to decrease of blood sugar level. All these changes in combination with lack of sleep may reduce the alertness of the pilot and may be considered an important factor in aircraft accidents in agricultural flights. (Author)

**A70-26523 \*** Centrifuge as a therapeutic device. R. Pelligra (NASA, Ames Research Center, Medical Services Branch, Moffett Field, Calif.), S. Stein (NASA, Ames Research Center, Medical Office, Moffett Field, Calif.), J. Markham, P. Lippe (NASA, Ames Research Center, Moffett Field; Stanford University, Stanford,

Calif.), J. Noyes (NASA, Ames Research Center, Moffett Field; O'Connor Hospital, San Jose, Calif.), J. Dickson, and K. Skrettingland (NASA, Ames Research Center, Moffett Field, Calif.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 451-455.

A bullet fragment floating freely in the ventricular system of the brain of a 63-year-old male assault victim was moved to a fixed position by exposing him to an increased acceleration environment in the NASA/Ames Research Center's Five-Degree-of-Freedom Centrifuge. The small lead fragment threatening to occlude the Aqueduct of Sylvius migrated to the posterior horn of the left lateral ventricle under the following acceleration profile: 0.39 g/second onset rate to peak 5 g maintained for 20 seconds, then increased at 0.33 g/second to 6 g for 3 seconds. Initial offset rate was 0.8 g/second, and total exposure time approximately 58 seconds. A fresh human brain autopsy specimen, with a bullet fragment implanted in the left ventricle, was exposed to these same conditions. Gross and microscopic pathological examination revealed indentation of the ependymal lining due to the lead fragment which appeared to be wedged in the posterior horn. It was presumed that the bullet fragment in the patient's brain was being held in place by the combined effects of wedging in the posterior horn and gliosis due to disruption of the ependymal lining. Recent pneumoencephalography and tomography studies confirm that approximately 30 to 40 per cent of the body of the bullet fragment is embedded in the postero-lateral wall of the left lateral ventricle. The patient, a known diabetic with arteriosclerotic cardiovascular disease, tolerated the procedure well and is now ambulatory with no apparent neurological deficit. (Author)

**A70-26524**      **Simplified technique for application of dry ECG electrode.** J. T. Saldívar, Jr. (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 41, Apr. 1970, p. 456, 457.

Description of a technique for the application of dry electrodes for electrocardiographic monitoring practicable under the most primitive field conditions. The most attractive feature of the technique is that no elaborate equipment is necessary. It is a technique that can be learned rapidly and used under the most unfavorable conditions, and the materials necessary for electrode application can be safely and easily stored and transported. M.V.E.

**A70-26597**      **The effects of small doses of ionizing radiation.** Harald H. Rossi (Columbia University, New York, N.Y.). *Physics in Medicine and Biology*, vol. 15, Apr. 1970, p. 255-262. 6 refs.

Energy deposition in cells exposed to ionizing radiation occurs through the agency of individual charged particles. At low doses, the number of these particles is of the order of one. One may then expect comparatively simple inactivation dynamics, and, in particular, the relative biological effectiveness (RBE) should become a simple function of the absorbed dose of either of the radiations under comparison. Experimental data on the dose dependence of RBE are limited but the results of three such studies are consistent with the assumption that the dose-effect relation is linear for neutrons of high LET (energies of the order of 1 MeV) and quadratic for X- and gamma-rays. (Author)

**A70-26607**      **Pilot selection and leadership.** Edward Stephenson. *Flight International*, vol. 97, Apr. 2, 1970, p. 555-558.

Discussion of the importance of the qualities of leadership as criteria for selecting pilots. Training recommendations for the training of airline pilots are considered. It is found that the capability as commander of aircraft and crew requires considerable qualities of leadership. Questions of the nature of command are examined and representative command qualities for aircraft commanders are listed. The differing aspects of preparing people for leadership in the Services and in civil flying operations are discussed. G.R.

**A70-26661 \* #**      **Circadian systems. V - The driving oscillation and the temporal sequence of development.** Colin S. Pittendrigh

(Stanford University, Stanford, Calif.) and Steven D. Skopik (Delaware University, Newark, Del.). *National Academy of Sciences, Proceedings*, vol. 65, Mar. 1970, p. 500-507. 11 refs. Contract No. NAS-223.

A circadian oscillation (in the brain) of *Drosophila* spp. acts as a gating device restricting the emergence behavior of the adult to a limited fraction of each 24-hr cycle defined by that oscillator, but the oscillation does not gate intermediate steps of pupal development. Unlike the emergence act, such intermediate events in development occur at fixed times after prepupa formation and are totally independent of the phase of the ongoing oscillator that gates emergence behavior. (Author)

**A70-26662 #**      **Effect of rectangle length on velocity thresholds for real movement.** Barbara Mates (Barnard College, New York, N.Y.) and C. H. Graham (Columbia University, New York, N.Y.). *National Academy of Sciences, Proceedings*, vol. 65, Mar. 1970, p. 516-520. 14 refs. Research supported by Columbia University; PHS Grant No. 8 RO1 EY 00391-02; Contract No. N 0014-67-A-0108-0009.

New data are reported on the influence of size on the velocity threshold for real movement. As the length of a narrow stimulus object increases, width remaining constant, the velocity threshold also increases. These findings are discussed in relation to some psychophysical experiments on contrast and some physiological experiments on motion. (Author)

**A70-26663 #**      **A new approach to electromagnetic blood flow determination by means of catheter in an external magnetic field.** Alexander Kolin (California, University, Los Angeles, Calif.). *National Academy of Sciences, Proceedings*, vol. 65, Mar. 1970, p. 521-527. 12 refs. Research supported by the Cancer Detection Services, Inc.

Maximal reduction in transverse catheter dimension has been achieved for the purpose of creating an intravascular electromagnetic flow sensor capable of percutaneous introduction into the vascular system. The electrodes are mounted on a flexible frame which collapses as it passes through a small branch blood vessel and expands to span the diameter of the main vascular trunk when entering it. Unlike the catheter flow sensors developed previously, which are velometers, i.e., sensors of fluid velocity, the present one is capable of measuring the volume rate of flow in branch blood vessels as well as in the major sections of the vascular tree. The magnetic field is provided by a large air core electromagnet placed externally to the animal or patient. A special circuit utilizing two electrodes and three leads permits reduction of the unwanted quadrature signal to zero. A standard sine wave electromagnetic flow meter channel designed for use with conventional electromagnetic flow transducers is adequate for flow measurements as well as for power supply to the large magnet. Illustrations of the performance of the apparatus in vitro and in vivo are presented. (Author)

**A70-26664**      **Skeletal muscle oxygen tension - Effect of inhaled and topically applied O<sub>2</sub> and CO<sub>2</sub>.** William J. Whalen and Pankajam Nair (St. Vincent Charity Hospital, Cleveland, Ohio). *American Journal of Physiology*, vol. 218, Apr. 1970, p. 973-980. 26 refs. Research supported by the Northeastern Ohio Heart Association; PHS Grants No. HE-11906; No. FR-05631.

Measurement of the tissue oxygen partial pressure in the resting gracilis muscle of a lightly anesthetized cat, using a newly developed oxygen microelectrode which causes little or no tissue damage and does not obstruct blood flow. Overall results indicate that (1) blood flow in capillaries usually fluctuates and is sometimes intermittent, (2) mean tissue oxygen tension is about 6 mm Hg, and (3) the constrictor action of oxygen is, at least partly, on blood vessels several hundred microns upstream from capillaries. T.M.

**A70-26665**      **Biphasic effect of hypoxia on adrenal catecholamine content.** Odd S. Steinsland, Stanley S. Passo, and Gabriel G.

Nahas (Columbia University, New York, N.Y.). *American Journal of Physiology*, vol. 218, Apr. 1970, p. 995-998. 27 refs. Research supported by the Dolores and Bob Hope Gift Fund for the Study of Shock; PHS Grant No. HE-06253; NIH Grant No. GM-09069-07; Grant No. DA-DA-17-67-C-7126.

Experimental determination of the effect of hypoxia on adrenal catecholamine content of guinea pigs and rats after short hypoxic periods of 4 to 12 hr and after more prolonged exposure of up to 60 hr. Exposure to 7.5% oxygen in nitrogen for periods up to 12 hr resulted in a significantly reduced adrenal catecholamine content (-40% after 12 hr). With more prolonged exposure, adrenal catecholamine content increased reaching control levels between 20 to 38 hr after onset of hypoxia. T.M.

**A70-26666 Hematologic responses of mice subjected to continuous hypoxia.** Kenneth C. Mylrea and Peter H. Abbrecht (Michigan, University, Ann Arbor, Mich.). *American Journal of Physiology*, vol. 218, Apr. 1970, p. 1145-1149, 20 refs. NSF Grant No. GB-5874.

Mice were subjected continuously to subatmospheric pressure for periods as long as 33 days. After different durations of exposure, 9 mice were selected at random from an initial group of 125 and measurements made of their weight, hematocrit, blood hemoglobin concentration, red blood cell and reticulocyte counts, and blood volume. Each animal was used for only one set of determinations. Total circulating hemoglobin, total circulating red cell volume, total plasma volume, total blood volume, and the red blood cell indexes were calculated. Data were obtained at air pressures of 510, 440, and 360 mm Hg, which correspond to altitudes of 10,500, 14,500 and 19,000 ft, respectively. At least two runs were made at each pressure. During the first few days' exposure, plasma volume decreased 9, 15, and 19% below control values at pressures of 510, 440, and 360 mm Hg. At the same three pressures, total circulating red cell volume increased to steady-state values 23, 43, and 135% above the control values. Mean corpuscular volume increased at all three pressures with most of the increase occurring during the first few days of exposure. (Author)

**A70-26847 \* New light-induced EPR signal in *Anacystis nidulans*.** E. C. Weaver (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Nature*, vol. 226, Apr. 11, 1970, p. 183, 184. 6 refs.

Preliminary characterization of a hitherto unreported light-induced electron paramagnetic resonance (EPR) signal, called signal III, in *Anacystis nidulans*. This signal can readily be distinguished from two previously reported signals (signals I and II) in plants, present knowledge of which, covering a period of 10 yr, has been summarized by Weaver (1968). Signals I, II, and III were studied by standard EPR techniques. So far, it appears only possible to speculate on the source of the new light-induced EPR signal. F.R.L.

**A70-26893 \* A nonlinear time-varying mathematical analog of the gluco-corticoid control.** Constantine B. Dolkas and Henry A. Leon (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, Jan. 1970, p. 1-10. 29 refs.

Formulation of the basic characteristics contributing to the nonlinear time-varying glucocorticoid control mechanism in 300-gram male rats fasted 18 hours. Intact animal time responses of the plasma levels of corticosterone to intraperitoneally injected doses of 50, 200, and 500 micrograms/kg simulated on an analog computer were compared with the experimental results. Nonlinear time-dependent characteristics of the hypothalamic-hypophyseal complex, previously unobtainable experimentally, were arrived at indirectly through the use of experimental data and simple control theory analysis. Involved compartmental analysis of the complex kinetics for the intraperitoneally injected dose was bypassed by using experimental data and concepts of control mechanisms. The model was found to be compatible with the linear model of Yates. (Author)

**A70-26897 \* Miniature implantable sonomicrometer system.** Robert D. Lee and Harold Sandler (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 28, Jan. 1970, p. 110-112. 9 refs.

Description of an implantable miniature ultrasonic sonomicrometer which has been developed and used for measuring left ventricular dimensions and changes in dimensions during the cardiac cycle. The unit incorporates an rf actuated implantable switch to conserve battery power and prolong a useful life of the unit. The receiver-converter system also contains circuitry to provide output voltages representing nominal cardiac dimensions and a scale factor for the interpretation of recorded signals. M.M.

**A70-26975 Dynamics of adaptive reactions at the cellular level during training of rats to hypoxia - Review of research.** Z. I. Barbashova (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). (*International Biometeorological Congress, 5th, Montreux, Switzerland, Sept. 1-7, 1969.*) *International Journal of Biometeorology*, vol. 13, Dec. 1969, p. 211-217. 5 refs.

Review of investigations of the relationship between the changes of resistance of animals to hypoxia and the dynamics of adaptive reactions at the cellular level during training to hypoxia. Experiments carried out in rats are described. The results show adaptive changes of the tissue energy metabolism occurring during training to hypoxia. A gradual increase in glycolysis and in the activity of glycolytic enzymes of the tissues was observed. Dynamics of the changes in the oxidative metabolism studied at the mitochondrial level are shown. There are also some changes in the blood system such as the production in the bone marrow of erythrocytes possessing some biochemical properties specific for fetal animals. O.H.

**A70-27010 A microscopic method for measurement of particulate contamination.** Robert G. Quick (General Electric Co., Valley Forge, Pa.). *Contamination Control*, vol. 9, Apr. 1970, p. 18, 19, 22-28.

Description of a microscopic method whereby compliance to a cleanliness level as expressed by MIL-STD-1246A can be determined with little effort at any time particulate contamination can be observed by a microscope. The method utilizes a distribution of size and the cumulative total of particles at or above this size as a means of determining the maximum number of particles of any size which could be expected to occur in any area which can be conveniently examined by a microscope. The principle is developed to permit monitoring by use of a size sample which can be expected to have a reasonable number of particles within the area examined. The recommendations are developed for acceptance or rejection of a single sample by use of a minimum acceptance number of one particle to a maximum of 20 particles. This principle eliminates the need to tabulate data and normally will allow acceptance or rejection of a sample by immediate response of the observer. A.B.K.

**A70-27018 \* An indirect determination of the oxygen utilization of the human left ventricle.** Dhanjoo N. Ghista and Harold Sandler (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Biomechanics*, vol. 3, Mar. 1970, p. 161-174. 21 refs.

Description of a new analytic method for determining the oxygen consumption rate of the intact, working human left ventricle (LV) by closed chest measurements. These measurements consist of LV dimensions determined by cineangiocardiology, and LV chamber pressure obtained by means of fluid-filled catheters subsequent to retrograde or transeptal catheterization. The proposed method involves the determination of the cyclic strain energy  $U_s$  of the LV muscle, and the activation energy  $U_a$  due to the change of state of the muscle; the sum of  $U_s$  and  $U_a$  represents the total energy consumption of the intact working heart. The reliability of this method is then tested by applying it to determine the total energy of five subjects studied earlier for their myocardial oxygen consumption rate by a conventional clinical procedure. The results obtained are discussed. O.H.

**A70-27019** The dispersion of indicator in the cardio-pulmonary system. K. H. Norwich and S. Zelin (Toronto, University, Toronto, Canada). *Bulletin of Mathematical Biophysics*, vol. 32, Mar. 1970, p. 25-43. 28 refs. Research supported by the University of Toronto and the Medical Research Council of Canada.

This paper presents a three-parameter model of the mechanism of dispersion of an indicator in the cardio-pulmonary system, based on the postulates that this dispersion can be described by the one-dimensional diffusion equation and that dispersion continues past the sampling site. The model is tested using indicator dilution curves obtained from dogs, and the coefficient of diffusion is thus measured. It is found that this coefficient increases in magnitude non-linearly with increasing blood speed. (Author)

**A70-27020** The effect of distension of the left ventricle of the heart on the length of the individual myocardial fibers. Panagiotis C. Voukydis (Boston University, Boston, Mass.). *Bulletin of Mathematical Biophysics*, vol. 32, Mar. 1970, p. 45-58. 9 refs. NIH Grant No. HE-05680.

Based on the ellipsoid model of the left ventricle and the helicoidal course of the left ventricular myocardial fibers, a theory has been developed for calculating the length of the individual myocardial fibers. Numerical solutions of the final equation show that when the left ventricle is distended, the increase in length of the myocardial fibers is not uniform throughout the thickness of the myocardial wall. It was shown that with increasing dimensions of the left ventricle, the distension of the myocardial fibers becomes smaller as one advances from the endocardium to the middle layer of fibers, whereas it increases as one advances from the middle layer to the epicardial layer. The mechanism by which this effect is brought about as well as its physiological implications are discussed. (Author)

**A70-27021** The gas washout determination under a symmetry assumption. John W. Evans (California, University, La Jolla, Calif.). *Bulletin of Mathematical Biophysics*, vol. 32, Mar. 1970, p. 59-63. 7 refs.

Determination of the nature of the output of an open circuit gas washout test of the lungs making use of the theory of Hilbert-Schmidt operators. The output of test substance is shown to be of the form of an infinite series. It is assumed that the transition from inspiration to expiration has certain symmetry properties with the transition from expiration to inspiration. The hypotheses given are satisfied by the compartmental lung model treated by Evans et al. (1967). A knowledge of the basic theory of Lebesgue integration and of Hilbert spaces as covered for example in Riesz and Sz. Nagy (1955) is assumed. G.R.

**A70-27026** Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. Edited by F. Gubser (Swissair AG, Zurich, Switzerland). Zurich, Swissair AG, 1969. 503 p. In English, German, and French.

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**A70-27027 # Development of a test procedure for the investigation of memory ability (Entwicklung eines Testverfahrens (MEK) zur Untersuchung der Merkfähigkeit).** Helmut Kirsch (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Hamburg, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 12-20. 11 refs. In German.

Discussion of a new method for the investigation of short-time memory on the basis of a model involving the continuous storage and reproduction of information. A test is described in which 40 items, each consisting of two words, letters, numbers, or figures, are presented. At a later time one part of the item is shown again, and the person is required to reproduce the missing part of the item. The reliability of the test is estimated according to a split-half-half method. The results obtained in applications of the test are correlated with data concerning other testing methods. G.R.

**A70-27028 # The intelligent and intellectual applicant for pilot training.** Enid Phyllis Wilson (Australian Institute of Industrial Psychology, Sydney, Australia). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 21-40.

Examination of several clearly ineffective test profiles which have been closely identified with a recurrent type of candidate offering for pilot training. The intelligent applicant possesses the basic mental capacity to assess and respond to involved situations clearly and quickly, has a practical-technical-mechanical ability, has the capacity to learn effectively in both theory and practice, and has mental balance and all-round adjustment, capable of accepting unusual stresses. He displays self-accept-and without egotism. On the other hand, an emerging pattern has grown sufficiently clear to be

predictable as the 'intellectual' applicant for flying training. He can meet the educational requirements in the same way as the 'intelligent' man, but he cannot apply the 'intelligent' approach in a practical flying situation. Even before he realizes it, he has an unrealistic preconception due to preoccupation with the idea of flying rather than on understanding the actuality of it. F.R.L.

**A70-27029 # Selection and training of fighter-pilots in the Royal Netherlands Air Force.** I. F. J. B. Teerink (Royal Netherlands Air Force, Voorburg, Netherlands). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 41-53.

Results of studies of 839 students selected for training as fighter pilots in the Royal Netherlands Air Force over the past ten years. The studies are compared with data of a relatively large number of trained fighter pilots. Work was carried out with a number of parallel groups, on which groups the same intercorrelation and validity studies were carried out. F.R.L.

**A70-27030 # Selection and training of fighter-pilots in the Royal Netherlands Air Force.** II. Jan Martin Ronden (Ministry of Defence, The Hague, Netherlands). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 54-62.

Results of study of elementary flying training in order to achieve a better understanding of the problem and, by doing so, improve pilot selection. Following a general investigation of the subject, it was recommended to start lecturing the instructors on aptitude, stress, fear of flying, assessment, learning, motivation, and rate of learning. Great numbers of flying instructors were consulted, and some modified training methods were proposed and tested. The role of the social sciences in improving training is discussed. F.R.L.

**A70-27031 # Problems of the validation of aircraft pilot ability tests (Probleme der Validierung von Flugzeugfuehrer-Eignungstests).** Harald Witt (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Regensburg, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 63-88. 6 refs. In German.

Discussion of correction methods which make it possible to estimate the test validity even for biased random tests. Test procedures used in the selection of applicants for the career of an aircraft pilot are discussed. It is shown that the decisions regarding the acceptance of the applicants are not objectively made. A random sample is considered for the validity estimation. Criteria for the validation are examined and the reasons for the employment of correction formulas are given. The use of a composite-score process and of a multiple cutoff process is discussed. G.R.

**A70-27032 # The relationship between scores on certain M.M.P.I. scales and success in ab initio pilot training.** Peter J. Macey (College of Air Training, Southampton, England). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 89-101. 12 refs.

Comparison of scores on seven Minnesota Multiphasic Personality Inventory (MMPI)-derived scales considered to be related to anxiety of three groups which were shown in pilot training to have differing levels of flying proficiency. These groups were those which (1) failed the flying grading test, (2) failed to complete the College of Air Training course, and (3) passed the course. The MMPI scales

attempt to measure personality dimensions described as anxiety, tendency to worry, or lack of confidence. Results are cited which fail to support the suggestion that the lower flying proficiency groups would score more highly on the MMPI scales, and that the lower proficiency groups would contain a greater proportion of high scorers on these scales than the successful Passed Course group.

F.R.L.

**A70-27033 # Selection and training of ab initio pilots in Switzerland.** T. Schwarzenbach (Swissair AG, Zurich, Switzerland). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 102-120.

Discussion of the methods of selecting and training ab initio the 40 Swiss pilots needed by Swissair every year, in addition to the 10 pilots engaged from other sources. The Swiss Civil Aviation School, run by Swissair, trains pilots, navigators, flight engineers, and dispatchers. In the pilot selection process, every candidate has to undergo an entry examination and go through different stages of selection. Preselection consists of intelligence and aptitude testing, followed by a more or less standardized interview, administered by a psychologist. In-flight selection consists of basic flight training, Link trainer time, and basic instrument flying. In the main and final selection there are projective techniques, two interviews, and psychiatric exploration. The training syllabi are described. F.R.L.

**A70-27034 # The precision coordination analyzer PCA II and the instrument coordination analyzer ICA (Das Praezisions-Koordinations-Testgeraet PCA II und das Instrumenten-Koordinations-Testgeraet ICA).** F. Gubser (Swissair AG, Zurich, Switzerland). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 121-137. In German.

Discussion of two devices for testing the reactions of aircraft pilot candidates under simulated flight conditions. The precision coordination analyzer described simulates surveillance and control processes occurring during the process of piloting an aircraft. This makes it possible to determine the capacity for learning in pilot candidates concerning the required sensomotoric coordination. The instrument coordination analyzer considered makes it possible to program flight problems and to measure objectively the performance of the persons tested. G.R.

**A70-27035 # Some neglected psychological problems in man machine systems.** Vincent D. Hopkin (RAF, Institut of Aviation Medicine, Farnborough, Hants., England). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 140-154.

Consideration of the proposition that, because most experimental psychologists working on systems problems have thereby specialized in one branch of psychology, some practical problems in such systems are attacked in an unduly restricted way, and others are neglected completely, either because the psychologist does not feel equipped to deal with them, or because he fails to realize that they exist. The application of psychology, the systems approach, automation in systems, operator's preferences, systems as organizations, display evaluation, and the effects of personality are discussed. The effects of boredom and use of skills, and the use of case histories are considered. Aspects of communications, dissociation, programmed learning, age and experience, and effects of equipment faults are evaluated. It is contended that the applied psychologist is the best person to draw attention to the existence of these problems and to initiate work on them. F.R.L.

**A70-27036 # A contribution to the solution of the problem of a reference system for visual indications (Ein Loesungsbeitrag zum**

**Problem des Bezugssystems bei visuellen Anzeigen).** R. Bernotat and K. Schulz-Helbach (Gesellschaft zur Förderung der astrophysikalischen Forschung, Forschungsinstitut für Anthropotechnik, Meckenheim, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 155-176. 6 refs. In German.

Discussion of a study which shows that the guidance errors of pilots at rotations of 90 deg and of 270 deg increase considerably, taking into consideration a method designed to overcome the effect of the rotation. The relative motion of two vehicles in three systems of reference is considered and combined forms of reference systems for two-dimensional indications are discussed. Experiments involving compensatory displays are reported and the effect of rotation on the guidance error as a function of the indication configuration is investigated. A new form of indication involving an additional vector is described for eliminating the rotation effect. G.R.

**A70-27037 # Investigations regarding the quantification of the psychic stress at simulated vehicle guidance tasks (Untersuchungen zur Quantifizierung der psychischen Beanspruchung bei simulierten Fahrzeugfuehrungsaufgaben).** Gerald W. Radl (Gesellschaft zur Förderung der astrophysikalischen Forschung, Forschungsinstitut für Anthropotechnik, Meckenheim, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 177-202. 12 refs. In German.

Development of a method for evaluating quantitatively the degree of the psychic stress involved in the performance of simple and complex tasks related to the control of a vehicle. Tests are reported in which several subjects had to perform a number of tasks of differing complexity. The tasks required the stabilization of an acceleration system and the solution of a number of auxiliary problems. The results obtained show that there are three suitable approaches for the quantification of the psychic stress at simulated vehicle conduction tasks. G.R.

**A70-27038 # Tasks of human engineering in the development of weapons systems (Anthropotechnische Aufgaben bei der Entwicklung von Waffensystemen).** R. Seifert (Messerschmitt-Bölkow-Blohm GmbH, Munich, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 203-227. In German.

Discussion of the tasks which have to be considered in the development of weapons systems taking into consideration the development of an aircraft as an example. Aspects of planning for the training of flying and ground personnel are considered. Differences between human factors and human engineering are examined. Problems of human engineering related to an air conditioning system and a rescue system are discussed. Other tasks considered are concerned with the supply of oxygen and the maintenance of a suitable atmospheric pressure within the aircraft. Investigations with respect to the optimization of systems and procedures are reported. G.R.

**A70-27039 # Experimental investigations regarding the rapid determination of the performance of man as controller and the controllability of systems (Experimentelle Untersuchungen zur schnellen Bestimmung der Leistungsfähigkeit des Menschen als Regler sowie der Steuerbarkeit von Systemen).** Udo Miller (Messerschmitt-Bölkow-Blohm GmbH, Munich, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 228-253. In German.

Investigation of an approach which leads to a quantitative

description of the performance of a man-machine control system while avoiding the difficulties of the transfer theory and the time-consuming processes of the Fourier and correlation analyses. Studies conducted to find methods for describing the dynamic behavior of man as controller within the last 20 years are evaluated. The basic principles of a new approach are described taking into consideration pursuit tracking tasks or compensatory-tracking tasks. It is tried to find easily measurable parameters whose values provide a useful criterion for the performance and the work load with respect to man and which permit to evaluate the maneuverability of a system. Several groups of test persons (pilots and nonpilots) had to perform a number of tasks. The results obtained in these tests are evaluated. G.R.

**A70-27040 # Sound attenuation and speech intelligibility measurements regarding pilot's helmets (Schalldaemm- und sprachverstaendlichkeitsmessungen an Pilotenhelmen).** K. Schmidt (Messerschmitt-Bölkow-Blohm GmbH, Munich, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 84th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 254-282. In German.

Discussion of experiments concerning the protection provided by a pilot's helmet against the noise of the environment and concerning the effect of this noise on speech intelligibility in the communication system between pilot and the outside world. Sound attenuation diagrams were obtained for four helmets in the frequency range from 80 to 10000 Hz. Eight subjects were used in the measurements of sound attenuation. Tests concerning the intelligibility of syllables and words were conducted with two speakers and five listeners at various noise levels. G.R.

**A70-27041 # Psychovegetative and neurovegetative stress syndroms in flying personnel (Psycho- und neurovegetative Belastungssyndrome beim fliegenden Personal).** K. Steininger (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Hamburg, West Germany). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 284-296. 9 refs. In German.

Discussion of some observations of the flying personnel removed prematurely from active service as a result of the psychophysiological complementary diagnostics. Diverse medical reasons for removing flying personnel primarily during the period following their basic aeronautical training are statistically reviewed. It is shown that nearly one half of medically substantiated leavings is to be ascribed to psychovegetative syndroms of the personnel. These syndroms, including both complex psychovegetative syndroms and psychovegetative and neurovegetative organ syndroms, are examined in detail. Several quasiclinical observations are reviewed, and various relationships are considered. The application and results of the complementary diagnostics providing complex psychophysiological personality examination taking into account somatic and psychic correlations, is discussed. O.H.

**A70-27042 # Psychophysical reactions at flying (Psychophysische Reaktionen beim Fliegen).** L. Pircher (Fliegerärztliches Institut, Dübendorf, Switzerland). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 297-306. In German.

Study of psychophysical reactions during flying operations involving 20 pilots and various aircraft types and flight maneuvers. Blood pressure and Korotkoff's sounds for the blood pressure, the EKG derivation for the heart rate, the acceleration within the normal axis of the aircraft and comments of the pilot concerning his activities at the time were recorded. It was found that the arterial blood pressure was higher than normal during the preparatory phase

and during the entire flight including the flight operations without acceleration effects. G.R.

**A70-27043 # Thermal stress and human performance.** M. F. Allnutt (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 307-324. 26 refs.

Study of the effect of the environmental temperature on human performance in activities involving a high mental, and a low physical workload. Previous studies of the effect of thermal stress involving high ambient temperature and raised body temperature are briefly reviewed. Questions of environmental, physiological and behavioral measures are examined. The variables which mitigate or enhance the effects of thermal stress are considered taking into account aspects related to the man, the task, and the environment. G.R.

**A70-27044 # The effect of different flying instructors upon the stress level of pupil pilots.** L. R. C. Haward (Aeromedical International, Chichester, Sussex, England). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 325-332. 15 refs.

Discussion of the individual differences existing between civilian flying instructors in term of their effects upon the stress level of a student pilot. Physiological stress factors which are frequently indicated as a source of flying accidents, are discussed. These factors can be detected by inflight recording of psycho-physiological variables concomitantly with the monitoring of aircraft data, and analyzed subsequently by traditional methods of clinical psychology. The use of this technique in one pupil flying the same type of aircraft, from the same airfield, in turn with each of six different instructors in three different stress situations - i.e., flapless takeoffs and landings, glide approaches, and crosswind take offs and landings to determine the different levels of stress on the student, is described as an example and evaluated. The implications which these findings have for the selection of assistant flying instructors are considered. O.H.

**A70-27045 # Mental blocking in continuous serial performance.** A. F. Sanders and W. Hoogenboom (National Defence Research Organization TNO, Institute for Perception, Soesterberg, Netherlands). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 334-348. 26 refs.

Study of mental blocking referring to the phenomenon of incidental long reaction times occurring with increasing frequency as a function of time-at-work, when subjects perform a continuous serial reaction task. The two existing theories on mental blocking - i.e., the perceptual-selection theory, and the response theory, are explained and critically discussed. An experiment is described to study massed vs spaced practice in a serial reaction task. The data obtained were analyzed and the results are briefly summarized and discussed. They provide information of the average response rate, the frequency of blocks, and the distributions of latencies within 2' periods to enable a more precise analysis of long term performance. The findings of this study represent a new attack on the problem of long term performance and mental fatigue. O.H.

**A70-27046 # On the effects of continuous active work on performance.** A. F. Sanders and W. Hoogenboom (National Defence Research Organization TNO, Institute for Perception, Soesterberg, Netherlands). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 349-380. 21 refs.

Study of the effect of continuous active work on human performance by using methods of massed and spaced practice. A reaction-time experiment is described in which six subjects worked continuously for 30 min in each of nine sessions; during sessions 1-5, six other subjects were on a schedule of 2 min work and 2 min of rest, while for sessions 6-9 the schedule of the second group was the same as that of the first group - i.e., 30 min of continuous work. An analysis was made of the latency distributions for all 2 min periods of work. The comparison between the latency distributions of both groups for sessions 1-5 revealed the following findings: no difference between the three lower deciles; higher latencies for the massed group in deciles 4-9; an increase in latency in the tenth deciles of the massed group which tends to decrease with practice. It was also found that during the sixth session the latency effect at the tenth decile was more pronounced for the spaced group than for the massed group. The findings are discussed in relation to notions on mental blocks, reactive and conditioned inhibition, habituation, and decision load. O.H.

**A70-27047 # The processing of probabilistic information and decision making - A possible approach to problems in air traffic control.** R. A. Edenborough (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 84th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 381-396. 9 refs.

Discussion of the significance of an information-processing standpoint, derived from Bayes' Theorem, for some of the psychological decision-making problems in Air Traffic Control (ATC). The bookbag and poker-chip experiment is discussed and applications to the command and control and air defense system are considered. Approaches useful to Controllers in ATC are analyzed. Arbitrary curves for probability of predicting an aircraft's position correctly, as a function of time since initial sampling of data, for initial sampling of data only, and for periodic sampling are presented. G.R.

**A70-27048 # The prediction of liability to flying accidents.** Alex Cassie (Army Personnel Research Establishment, West Byfleet, Surrey, England). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 84th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 398-406.

Ultimate conclusions of a 14-year study of the reliability of flying accident liability predictions based on aptitude-test performance of pilot-trainee candidates in the selection stage. Records of biographical and test data available at the time of selection were maintained for all entrants to pilot training over a period of seven years and updated with special reference to any flying accidents suffered. This is believed to be the largest study of accident liability in the field of aviation carried out so far. The distribution of accidents within the pilot population conforms almost exactly to the Poisson expectation, which suggests that the accident proneness hypothesis is not tenable. This was confirmed by the almost complete lack of association between selection data and subsequent history. Even with those few associations which were found there was little continuity with any reported in earlier studies in the UK, U.S.A., and South Africa. It is concluded that there is no evidence to support the concept of accident proneness as a permanent and identifiable characteristic of the trained military pilot. M.V.E.

**A70-27049 # The doctor-pilot relationship (La relation médecin-pilote).** J. C. Hadni and M. Mathieu (Ministère des Armées, Clinique de l'Armée de l'Air, Paris, France). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 407-435. 13 refs. In French.

Study of the relationship of the air force doctor to operating

personnel, especially pilots. The motivation of pilots is first examined, followed by study of the motivation of the doctor. In the case of the former it is considered that various fantasies are involved, frequently borrowed from mythological sources. The aircraft, because of its power, represents to the pilot an extension of himself. Air force doctors can be motivated by the desire to be masters of the living, the desire to receive intimate confidences, and to intervene in bodily processes by administration of medication or by surgical operations. Both pilots and doctors are considered to have an imaginary relationship with death. F.R.L.

**A70-27050 # Family structure and intelligence concerning applicants for a preparatory aviator training in Switzerland (Familienstruktur und Intelligenz bei Anwaertern auf die fliegerische Vorschulung in der Schweiz).** J.-J. Hegg (Fliegerärztliches Institut, Dübendorf, Switzerland). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 436-444. In German.

Study of a correlation between the intelligence of applicants for a preparatory aviator training and the number of brothers or sisters of the applicants. It was found that the degree of intelligence shown decreased with the number of brothers and sisters of an applicant. An exception to this result was the intelligence of applicants from one-child families which was found to be equal to the intelligence of persons from families with six children. The significance of these results is evaluated. G.R.

**A70-27051 # Some aspects of the anxiety of pilots.** J. Termøhlen (Militærpsykologisk Tjeneste, Copenhagen, Denmark). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 445-458.

Brief discussion of the aspects of anxiety in pilots from a study of experiences of anxiety investigated by interviewing a number of pilots in the Royal Danish Air Force from 1967 to 1968, after they had completed a special questionnaire. Examples of hypotheses and statements which could be tested in an interview situation are given. In general it was found that the military milieu in different ways, and just like many small pinpricks, may reduce the overall proficiency of a pilot. The hypothesis that the anxiety in many ways can be a stimulating, activating, and motivating aspect in a pilot's relation to his flying, was confirmed. The most prevalent theories of anxiety, and their mutual relations are surveyed. M.M.

**A70-27052 # Experimental study of a projective test of aeronautical adaptation on the theme of an accident (Etude expérimentale d'un test projectif d'adaptation aéronautique sur le thème de l'accident).** R. Gelly, M. Duffault, D. Charasson, and Morvan (Ministère des Armées, Clinique de l'Armée de l'Air, Paris, France). In: Aviation psychological research; Western European Association for Aviation-Psychology, Conference, 8th, Zurich, Switzerland, September 2-5, 1969, Reports. (A70-27026 12-05) Edited by F. Gubser. Zurich, Swissair AG, 1969, p. 459-481. In French.

Results of psychological tests intended to ascertain the reactions of pilots and pupil pilots when exposed to an accident situation. Three photographs of such a situation were presented, and the subjects were asked to describe the story of the accident. The first photo represented a traffic accident; the photo, intentionally blurred, is very dark. The second, somewhat clearer, represented the wreck of an aircraft with a dark sky background with heavy clouds. The third was an entirely bland sheet, and the subject was asked to visualize any kind of an accident. Three groups of subjects were evaluated: adapted pilots, pilots with specific adverse psychological symbols, and pupil pilots. They were asked to assess the probable reasons for the accidents displayed. F.R.L.

**A70-27269 \*** **Shock synthesis of amino acids in simulated primitive environments.** A. Bar-Nun (NASA, Ames Research Center, Mountain View, Calif.; Cornell University, Ithaca, N.Y.), N. Bar-Nun, S. H. Bauer, and Carl Sagan (Cornell University, Ithaca, N.Y.). *Science*, vol. 168, Apr. 24, 1970, p. 470-472. 19 refs. Grant No. NGR-33-010-101; Contract No. AF 49(638)-1448.

Study in which a mixture of gases which roughly simulates the primitive terrestrial atmosphere was subjected to shock heating followed by a rapid thermal quench. Under strictly homogeneous conditions there is a very high efficiency of  $5 \times 10$  to the 10th molecules per erg of shock-injected energy for production of alpha-amino acids. Calculations suggest that rapid quenching bypasses the usual thermochemical barrier. The product of energy flux and efficiency implies the unexpected conclusion that shocks occurring on atmospheric entry of cometary meteors and micro-meteorites and from thunder may have been the principal energy sources for prebiological organic synthesis on the primitive earth.

(Author)

**A70-27271 \*** **'Hypersexuality' and behavioral changes in cats caused by administration of p-chlorophenylalanine.** James Ferguson, Steven Henriksen, Harry Cohen, George Mitchell, Jack Barchas, William Dement (Stanford University, Stanford; U.S. Veterans Administration Hospital, Menlo Park, Calif.). *Science*, vol. 168, Apr. 24, 1970, p. 499-501. 25 refs. NIH Grants No. MH-13860; No. MH-13259; Grant No. NGR-05-020-168.

The behavior of 26 male cats was systematically observed before, during, and after daily administration of the tryptophan hydroxylase inhibitor, p-chlorophenylalanine. These observations established that 'hypersexuality,' increased aggression, and perceptual disorientation are sequelae of the chronic administration of the drug in cats.

(Author)

**A70-27278 #** **Mechanisms of memory (Mekhanizmy pamiaty).** V. V. Dergachev (Moskovskii Meditsinskii Institut, Moscow, USSR). *Prirada*, no. 3, 1970, p. 50-58. 14 refs. In Russian.

Review of modern theories concerning the memory mechanisms of the brain. The subjects discussed specifically include instantaneous, short-term and long-term memories, molecular physiology, molecular mechanisms of memorizing, phylogenetic and ontogenetic memories, and information storage in living systems. Also considered are the processes of protein synthesis linked to memory mechanisms.

V.Z.

**A70-27344 #** **Heterochronism of cophasal cooperative motions of man (Geterokhronizm sinfaznykh sodruzhestvennykh dvizhenii u cheloveka).** I. P. Blokhin (Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Jan. 1970, p. 13-18. 9 refs. In Russian.

Investigation of the capability of executing coordinated cophasal flexor and extensor movements in a group of 10 female and 37 male subjects, covering a total of 800 oscillograms obtained on a special test device. The coordinated symmetrical movements of extremities and fingers and the movements of feet and arms during an acrobatic leap are studied specifically. It is concluded that coordinated movements of human limbs are largely heterochronous when they are arbitrary. More synchronization is found in coordinated movements symmetrical with respect to the vertical symmetry axis than in those symmetrical to the horizontal axis, and also in coordinated symmetrical movements of arm limbs than in such movements of feet.

V.Z.

**A70-27345 #** **Tissular respiration of the brain during hypothermia (Tkanevou dykhanie mozga pri gipotermii).** Iu. S. Aliukhin and M. K. Kalinina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Jan. 1970, p. 19-25. 21 refs. In Russian.

Study of the oxygen consumption by the brains of non-anesthetized rats in hypoxic mixtures and in air at brain tempera-

tures of 37, 27 and 20 deg C. It is found that oxygen requirement of the brain decreases linearly with decreasing temperature at a rate of 5% for each deg. The lowest oxygen pressure level in the cerebral tissues remains close to the normal level during hypothermia even though the oxygen pressure in the blood decreases.

V.Z.

**A70-27346 #** **Latent period of human blinking reflexes in response to stimulation by an air stream (Latentnyi period migatel'nykh reflektsov u cheloveka v otvet na razdrzhenie glaz vozdushnoi struei).** T. L. Khomeriki (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 69, Feb. 1970, p. 16-19. In Russian.

Discussion of experiments in which the blinking reflex of 18 human subjects was recorded by electromyographic techniques. It is found that the magnitude of the latent period of the blinking reflex is independent of the position of the upper and lower lids and the external angle of the eye. Simultaneous stimulation (by an air stream) of both eyes revealed that the latent period on the left and the right is practically the same, while for stimulation of one eye, the latent period is always shorter for the stimulated eye. The latent period is also shorter for stimulation of both closed eyes than for stimulation of both open eyes.

V.P.

**A70-27347 #** **Inhibition of the physiological anticoagulation system by a prolonged sound effect (Ugnetenie fiziologicheskoi protivosvertyvaishchei sistemy pri dilitel'nom vozdeistvii zvuka).** L. V. Mikhailova and A. Sh. Byshevskii (Zaporozhskii Meditsinskii Institut, Zaporozhe, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 69, Feb. 1970, p. 28-32. 6 refs. In Russian.

Investigation of the nature of the appearance and the dynamic of the changes in the level of pro- and anti-coagulants during the early phases of a prolonged sound effect. Experiments performed with 152 rats exposed to a sound level of 94 to 96 db at 2 kHz for 15 min to 5 hr daily during 2, 5, and 10 days showed that the coagulation potential of the blood progressively increases during roughly 30 min, followed by activation of the fibrinolytic system, regardless whether the sound effect is further applied or discontinued. The same phase changes were observed after the sound effect was applied for 2 days. The inhibition of the anticoagulation system observed during previous prolonged applications of sound effects is attributed to exhaustion associated with periodic activation during application of sound.

V.P.

**A70-27468 \*** **Kinetic behavior of electron paramagnetic resonance signal I. II - Comparison of wild type and mutant (ac-206) *Chlamydomonas reinhardtii*.** Ellen C. Weaver (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Plant Physiology*, vol. 44, 1969, p. 1538-1541. 8 refs.

Investigation of the kinetic behavior of the steady-state electron paramagnetic resonance signal I of wild type *Chlamydomonas reinhardtii* by comparison its characteristics with those of a mutant strain (ac-206) which lacks cytochrome 553. The experimental procedure is described, and the results are analyzed. They can be interpreted in terms of signal I being a reflection of cyclic flow in a pathway which does not involve cytochrome 553 in the mutant, whereas in the wild type there is also a contribution of electrons from photosystem II.

O.H.

**A70-27622** **Catecholamine excretion by the healthy adult human.** E. J. Becker and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv*, vol. 316, no. 2, 1970, p. 95-113. 28 refs.

Determination of standard urinary excretion values for the healthy average adult human of both sexes for free adrenaline, noradrenaline, creatinine, and hydroxy-methoxy mandelic acid. The experimental procedure made in 16 men and 11 women is described. The results obtained are summarized and tabulated. For the purpose of comparison with available data resting plasma catecholamine determinations are also included. The values reported agree well with data obtained by Kaerki from bioassay, and were of the same order

of magnitude as those collected by Brunjes using a different version of the trihydroxyindole method. The discrepancies with some other studies are critically reviewed. O.H.

**A70-27623** **Micro-puncture evaluation of the importance of perivascular pH for the arteriolar diameter on the brain surface.** M. Wahl, P. Deetjen, K. Thureau (München, Universität, Munich, West Germany), D. J. Ingvar (Lund, University, Lund, Sweden), and N. A. Lassen (Bispebjerg Hospital, Copenhagen, Denmark). *Pflügers Archiv*, vol. 316, no. 2, 1970, p. 152-163. 24 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Study of the influence of acute changes of pH in the extracellular fluid surrounding a segment of a cerebral cortical arteriole by means of a micropipette technique developed for kidney studies. This technique was used to induce local changes of the bicarbonate concentration of the cerebro-spinal fluid surrounding arterioles on the exposed cerebral cortex of anaesthetized rats and cats. Injection volumes of a few nanoliters caused circumscribed and pronounced changes of the diameter of the arterioles. The local pCO<sub>2</sub> of the arteriolar wall remained practically constant, since it is set by the pCO<sub>2</sub> of the arterial blood and of the cerebral tissue. Hence the microinjections essentially consisted in a local change of the pH of the fluid surrounding a small segment of a cerebral arteriole. Since metabolic changes of the nervous tissue change the periarteriolar pH, it is probable that local pH induced vasomotor changes of the type considered participate in the so-called metabolic regulation of the cerebral blood flow which underlies the local adaptation of the cerebral blood flow to changing functional demands. O.H.

**A70-27624** **Metabolism of the rabbit heart in situ during asphyxia and postasphyxial recovery (Stoffwechsel des Kaninchenherzens in situ während Asphyxie und in der post-asphyktischen Erholung).** W. Isselhard, W. Mäurer, W. Stremmel, J. Krebs, H. Schmitz, H. Neuhof, and A. Esser (Köln, Universität, Cologne, West Germany). *Pflügers Archiv*, vol. 316, no. 2, 1970, p. 164-193. 78 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft.

Study of the tissue levels of substrates and metabolites of the glycolytic pathway and of the adenylic acid-creatine phosphate system in the left ventricular myocardium of rabbits at aerobic control conditions, after asphyxia of 2-5 min duration, after a series of four successive asphyxiations, and during the postasphyxial recovery. The experimental procedure is described, and the results are discussed, tabulated and plotted graphically. O.H.

**A70-27625** **Free fatty acids, glycerol and triglyceride in arterial and femoral venous blood before and after a physical training period of four weeks (Freie Fettsäuren, Glycerin und Triglyceride im arteriellen und femoralvenösen Blut vor und nach einem vierwöchigen körperlichen Training).** J. Keul, E. Doll, and G. Haralambie (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Pflügers Archiv*, vol. 316, no. 2, 1970, p. 194-204. 37 refs. In German. Research supported by the Deutsche Forschungsgemeinschaft and the Kuratorium für sportmedizinische Forschung.

Investigation of the levels of free fatty acids (FFA), glycerol, and triglyceride in arterial and femoral venous blood in young adults (20-30 years) and in men aged 50 to 60 years, in connection with acute exercise and physical training. The experimental procedure is described, and the results are tabulated, plotted graphically and discussed. They demonstrate that after four weeks of training, an increase of the arterial FFA level and an increase of their uptake in the muscles can be observed during exercise. After training, an arterio-venous differences of the FFA are significantly higher during physical work of high intensity. It can be assumed that physical training induces increased lipolysis as well as increased metabolic utilization of the FFA during exertion. The triglyceride level is significantly lower in rest and during exercise after the training period. O.H.

**A70-27653** **Effect of training on total and regional blood**

**flow and metabolism in paddlers.** Gerald A. Klassen, George M. Andrew, and Margaret R. Becklake (Royal Victoria Hospital; McGill University, Montreal, Canada). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 397-406. 50 refs. Research supported by the Medical Research Council of Canada and the John A. Hartford Foundation.

Study of the effects of training on exercise cardiac output and investigation of local blood flow at rest and during exercise and recovery. Physical training of canoe paddlers resulted in a decrease in exercise cardiac output for a given submaximal work load. Resting forearm blood flow was reduced but the exercising limbs blood flow was unchanged after training. It was concluded that the reduced cardiac output was achieved by a reduced blood flow to non-exercising areas. After training there was no change in the forearm energy metabolism as measured by respiratory quotient, glucose utilization, or fatty acid uptake. Lactate production during sustained exercise of the forearm was reduced after training. Potassium and calcium loss from forearm tissues was observed at the onset of exercise which reversed to uptake while the exercise continued. These results are consistent with a closer regulation of blood flow following the training program and with adaptation in muscle. M.V.E.

**A70-27654** **Redistribution of blood flow during sustained high skin temperature in resting man.** Loring B. Rowell, George L. Brengelmann, John R. Blackmon, and John A. Murray (Washington, University, Seattle, Wash.). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 415-420. 31 refs. NIH Grant No. FR-37.

Five supine resting subjects wearing water-perfused suits had skin temperatures controlled at 35 deg C for 30 min then rapidly increased to 40.5 deg C for 40-48 min. Blood temperature (right atrium) reached 39.05-39.44 deg C and cardiac output (CO) (4 men) increased 29, 42, 115, and 125%, primarily by increased heart rate (stroke volume fell slightly). Hepatic blood flow fell 15, 29, 32, and 60%; total peripheral resistance fell similarly, while net splanchnic vascular resistance rose 2-120%. Carbon dioxide tension was maintained nearly constant by voluntary respiratory control. In the fifth subject, changes in both renal and hepatic blood flow were measured (but not CO); they fell 27 and 36%, respectively, while carbon dioxide tension fell 50%. In two men increments in CO greatly exceeded estimates of maximal skin blood flow. Either these estimates are wrong or extracutaneous vasodilation must occur, probably in muscle, since vasodilatation in any other major vascular bed with capacity to receive CO increments is now ruled out. Major changes in distribution of CO are not the result of hypocapnia.

(Author)

**A70-27655** **Physical work capacity in hyperbaric environments and conditions of hyperoxia.** J. E. Taunton, E. W. Banister, T. R. Patrick, P. Oforsagd, and W. R. Duncan (British Columbia, University, Vancouver; Simon Fraser University, Burnaby, British Columbia, Canada). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 421-427. 30 refs. Research supported by the British Columbia Heart Foundation and the Simon Fraser University.

Extension of the observations on respiratory gas exchange, heart rate, arterial acidemia, and hypocapnia, in response to work, into the range of severe exercise while breathing air at 2 ata and oxygen at 2 ata. Adjustments to severe exercise in two subjects during respiration of both air at normal and at 2 ata and oxygen at 2 ata were studied in relation to the above-mentioned functions. Heart rate and exercise hyperpnea in air at 2 ata decreased for the same exercise compared to 1 ata. Oxygen administration at 2 ata reduced these parameters further. Decreased hyperpnea at 2 ata in air or oxygen was accompanied by increased oxygen consumption, highest in calculated values for oxygen breathing. Excess carbon dioxide production relative to oxygen consumed was less in oxygen and air at 2 ata than in air at 1 ata. Arterial acidemia and hypocapnia resulting from exercise were less in air at 2 ata than at 1 ata and even lower in oxygen. Neither subject showed signs of oxygen toxicity even during the severest exercise in oxygen at 2 ata. The impression gained both from physiological data and subjective feelings of the participants was one of improved exercise tolerance in oxygen compared to either

1 ata or 2 ata exercise in air. Absence of untoward effects from severe exercise at 2 ata in oxygen is encouraging, supporting previous suggestions that oxygen breathing might be useful in final stages of decompression in caisson work. M.V.E.

**A70-27656**      **Effect of heat and natural acclimatization to heat on tilt tolerance of men and women.** E. Shvartz and N. Meyerstein (Negev Institute for Arid Zone Research, Beersheba, Israel). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 428-432. 15 refs. Research supported by the Ministry of Education and Culture of Israel.

Eighteen young men and eighteen young women were given a 20-min tilt-table test and a 10-min bicycle ergometer test in a temperate (24 C) and in a hot (40 C) climate in the summer and winter seasons of a semidesert environment. The winter-heat tests resulted in the greatest number of faintings, and in more adverse orthostatic symptoms in comparison with the other tests. The summer-heat tests resulted in only about half of these symptoms. Positive relationships were found between exercise heart rates in heat and orthostatic heart rates in heat, and between exercise and orthostatic heart rates in acclimatized and nonacclimatized subjects. No differences were found between the men's and women's orthostatic reaction to heat and season. These findings suggest that tilt tolerance can effectively represent reaction to heat and heat acclimatization. (Author)

**A70-27657**      **Effects of age and body position on 'airway closure' in man.** P. Leblanc, F. Ruff, and J. Milic-Emili (Royal Victoria Hospital; McGill University, Montreal, Canada). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 448-451. 22 refs. Research supported by the John A. Hartford Foundation and the Medical Research Council of Canada.

The lung volume at which the dependent lung zones cease to ventilate presumably as a result of airway closure (i.e., the closing volume) was measured with Xe 133 in a group of 80 normal subjects, whose ages ranged from 18 to 82 years. Closing volume and subdivisions of lung volume were measured in both sitting and supine positions. Closing volume increased linearly with age. In the seated position, the closing volume exceeded the expiratory reserve volume in subjects older than about 65 years, while in the supine position, as the expiratory reserve volume is markedly reduced, this occurred at about 44 years. Above these two critical ages ventilation to the dependent parts of the lungs is reduced during the normal tidal volume breathing. Thus, in seated subjects older than 65 years and in supine individuals older than 44 years there is significant impairment of ventilation distribution to the dependent lung zones, which necessarily causes impaired gas exchange with the lungs. (Author)

**A70-27658**      **Oxygen deficit-oxygen debt relationships and efficiency of anaerobic work.** Brian J. Whipp (University College, Cardiff, Wales), Charles Seard, and Karlman Wasserman (Harbor General Hospital, Torrance; California, University, Los Angeles, Calif.). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 452-456. 36 refs. NIH Grant No. HE-11907.

Comparison of anaerobic and aerobic oxidation efficiency in the performance of muscular work by determining the total oxygen cost of constant load exercise before and after a steady state in oxygen consumption is achieved. To determine the efficiency of nonsteady-state exercise, three healthy male subjects were exercised at 685 kg-m/min for each of 1-, 2-, 3-, 4-, 5-, 6-, and 10-min periods on a cycle ergometer and the relationship between O<sub>2</sub> debt and O<sub>2</sub> deficit analyzed. The O<sub>2</sub> deficit reached a plateau value at approximately 4 min. The O<sub>2</sub> debt, in contrast, reached a peak value at approximately the 2nd or 3rd min, then decreased to a constant value approximating the O<sub>2</sub> deficit plateau. The ratio, total O<sub>2</sub> cost/work done, was constant except for the exercise studies which lasted less than 4 min, when O<sub>2</sub> debt exceeded O<sub>2</sub> deficit. For exercise studies lasting 4 min and longer, O<sub>2</sub> debt equaled O<sub>2</sub> deficit. It is concluded that (1) O<sub>2</sub> deficit and O<sub>2</sub> debt are equal provided the duration of exercise is sufficiently long for the oxygen consumption to reach a steady state,

(2) O<sub>2</sub> debt exceeds O<sub>2</sub> deficit only for exercise studies terminated before the oxygen consumption reaches a steady state, (3) O<sub>2</sub> debt does not increase after the oxygen consumption reaches a steady state, and (4) efficiency of anaerobic work is as great as aerobic work if the exercise is continued to an oxygen uptake steady state. M.V.E.

**A70-27659**      **Protection by altitude acclimatization against lung damage from exposure to oxygen at 825 mm Hg.** R. W. Brauer, D. E. Parrish, R. O. Way, Philip C. Pratt, and Rita L. Pessotti (Wrightsville Marine Bio-Medical Laboratory, Wilmington; Duke University, Durham, N.C.; U.S. Naval Material Command, Naval Radiological Defense Laboratory, San Francisco, Calif.). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 474-481. 25 refs. Contract No. N 00014-68-C-376.

Study of the effects of exposure of rats to high partial oxygen pressures following altitude acclimatization. Prior acclimatization to hypoxia (air at 510 mb) increases the survival times of Sprague-Dawley rats in 53% O<sub>2</sub>-47% N<sub>2</sub> at partial oxygen pressure of 1100 mb from a mean of 51 plus or minus 3 hr to 188 plus or minus 49 hr. Histopathological and clinical evidence of pulmonary damage under these conditions does not appear until the 6th day of exposure in altitude-acclimatized animals, but toward the end of the second day in nonacclimatized ones. In contrast to lung damage, oxygen convulsions produced by exposure to 7 atm O<sub>2</sub> occur sooner in acclimatized than in control rats. Interposing a sojourn at sea level between the hypoxia acclimatization and the high-O<sub>2</sub> exposure shortens survival time, but after 11, and even after 30 days of deacclimatization, the effect of a prior altitude acclimatization is roughly equivalent to a 20 per cent reduction in partial oxygen pressure during hyperoxic exposure. Hematocrit levels have returned to those of control rats after 11 days. Comparison of the survival time curves for the several altitude-acclimatized and partially deacclimatized groups with those for control animals at varying partial oxygen pressures suggests that more than one mechanism is responsible for a rapidly and a slowly dissipated phase of protection, respectively. The possible nature of these is discussed. M.V.E.

**A70-27660**      **Pressure drop and fluid flow regime of air inspired into the human lung.** Dan E. Olson, Gladys A. Dart, and Giles F. Filley (Colorado, University; Webb-Waring Institute for Medical Research, Denver, Colo.). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 482-494. 30 refs. PHS Grants No. 5-R01-HE-03191; No. 5-T01-HE-05450; Contract .No. DA-49-193-MD-2227.

A theoretical analysis is presented predicting the fluid flow regime and pressure drop of air inspired into the lung. The analysis predicts that the predominant amount of pressure drop occurs in the upper airways, i.e., from the mouth to about the 10th order bronchi. The analysis is for a range of flow rates from 500 to 2,000 cc/sec. The study further predicts the fluid flow regime and fluid velocity profile at each order of branching. The results agree with previous empirical flow regime measurements and measurements of the location of the pressure drop. (Author)

**A70-27661 #**      **Production of gas bubbles in fluids by tribonucleation.** Kenneth G. Ikels (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 28, Apr. 1970, p. 524-527. 14 refs.

This report describes a mechanism, called tribonucleation, for producing gas nuclei by making and breaking contact between solid bodies which are immersed in liquid. A metal ball was rolled inside a glass tube filled with liquid which contains dissolved gas. Formed nuclei may grow to visible bubbles depending on the dissolved gas concentration and pressure applied to the liquid. Unlike other possible mechanisms for forming bubbles, tribonucleation is capable of producing nuclei under relatively mild experimental conditions, such as may be encountered in vivo. The experiments show that viscosity and velocity of separation of surfaces are important determinants of whether or not nuclei will form. (Author)

**A70-27775** Normal electrocardiogram in the presence of severe coronary artery disease. Marco A. Martinez-Rios, Braz C. Bruto Da Costa, Felipe A. Cecena-Seldner, and Goffredo G. Gensini (St. Joseph's Hospital, Syracuse, N.Y.). *American Journal of Cardiology*, vol. 25, Mar. 1970, p. 320-324. 16 refs. Research supported by the Atlas Chemical Industries.

In 480 consecutive coronary arteriograms, we found 21 cases with normal resting electrocardiograms associated with complete or nearly complete occlusion of one or more of the three major coronary branches. Significant collateral circulation was demonstrated in 19 cases. In the other 2 there was evidence of good flow of contrast agent past the narrowed segment. All the patients had angina and 6 had clinical evidence of myocardial infarction six months or more before the arteriogram. No electrocardiographic evidence of necrosis was detected at the time of arteriography in these 6 patients. We believe that the absence of electrocardiographic abnormalities is related to the development of collateral vessels. This collateral network must be capable of either (1) supplying all or most of the affected tissue with blood flow in amounts sufficient to meet their minimal metabolic demands or (2) inducing the shrinkage of the necrotic area and its envelopment by viable myocardium.

(Author)

**A70-27898** Depression of myocardial contractility in rats by free fatty acids during hypoxia. Andrew H. Henderson, Albert S. Most, William W. Parmley, Edmund H. Sonnenblick (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.), and Richard Gorlin (Howard Hughes Medical Institute). *Circulation Research*, vol. 26, Apr. 1970, p. 439-449. 37 refs. Research supported by the American Heart Association; PHS Grant No. 11306-03.

Study of the influence of glucose, linoleate, octanoate and pent-4-enoic acid on mechanical performance under oxygenated, hypoxic and anoxic conditions, using rat papillary muscles. Free fatty acids did not alter mechanical performance under oxygenated conditions. During hypoxia or anoxia, free fatty acids depressed contractility and increased resting force. Glucose improved mechanical performance and modified the depressant effects of the free fatty acids.

M.M.

**A70-27899** Bulbar and suprabulbar control of the cardiovascular autonomic effects during arterial hypoxia in the rabbit. Stephen N. Hunyor, Paul I. Korner (Sydney, University; Royal Prince Alfred Hospital, Sydney, Australia), John B. Uther, and John Shaw. *Circulation Research*, vol. 26, Apr. 1970, p. 491-506. 28 refs. Research supported by the National Heart Foundation of Australia, The Life Insurance Medical Research Fund of Australia and New Zealand, and the National Health and Medical Research Council.

Study of the autonomic effects on heart rate, portal, renal, cutaneous and muscle blood flows during approximately constant severe arterial hypoxia in unanesthetized sham-operated, thalamic and pontine rabbits, 3 hr after operations conducted under halothane anesthesia. Neural and adrenal effects were estimated by comparing the responses of different groups of animals: (1) with all neural effectors intact, (2) after adrenalectomy, (3) after selective, and (4) after complete pharmacological block of neural effector mechanisms. In pontine animals hypoxia greatly increased cardiac sympathetic activity and seemed to evoke a greater release of adrenal catecholamine (epinephrine) than in other preparations, but caused significant neural peripheral sympathetic constrictor effects in only the portal bed. In thalamic animals, hypoxia caused reflex bradycardia, striking neural constrictor effects in the portal, renal and muscle beds, and cutaneous dilatation. There was little evidence of an increase in epinephrine secretion. It is suggested that there is an inhibitory pathway between diencephalon and bulb that limits the release of epinephrine. Sham-operated animals exposed to hypoxia secreted epinephrine which played an important role in the total reflex response; this group had similar cardioinhibitory and cutaneous effects to thalamic animals, but a more rapid onset of portal and renal constriction and a marked increase in muscle blood flow. The sympathetic responses of the different preparations resulted in different rates of metabolic H(+) ion production.

M.M.

**A70-27938** A new boundary method for picture pattern recognition. Marilyn Belson (National Biomedical Research Foundation, Silver Spring, Md.). In: *EASCON '69*; Institute of Electrical and Electronics Engineers, Electronics and Aerospace Systems Convention, Washington, D.C., October 27-29, 1969, Record. (A70-27901 12-07) New York, Institute of Electrical and Electronics Engineers, Inc., 1969, p. 274-279. 7 refs. Research supported by the John A. Hartford Foundation; NIH Grants No. GM-10789; No. GM-10797; No. GM-15192; No. NB-04472.

An IBM 360/44 has been programmed to read a flying-spot scanner (FIDAC, Film Input to Digital Automatic Computer) and analyze the digitized biological pictures. The contours of objects in the digitized pictures are examined to identify points of maximum and/or minimum curvature. The degree of curvature to be recognized can be defined. These definitions are written in tabular form for a specific task and are read as data. The analysis of a chromosome's contour is discussed specifically. From the endpoints and the centromere of the chromosome, measurements are made which make it possible to classify the chromosome with respect to the total cell. Great current interest in chromosomal abnormalities requires large scale studies to provide adequate statistics. The method is also suggested for leaf identification, mapping nerve cells and their dendrites, and blood cell identification.

(Author)

**A70-28024** Facilitated diffusion of oxygen and its possible significance - A review. F. Kreuzer (Nijmegen, University, Nijmegen, Netherlands). *Respiration Physiology*, vol. 9, Apr. 1970, p. 1-30. 92 refs.

Review of experimental evidence for the facilitation of O<sub>2</sub> diffusion in the presence of Hb or Mb. The basic characteristics of facilitated O<sub>2</sub> diffusion point out the diffusive nature of this process and exclude other mechanisms proposed. A review of earlier attempts at a quantitative treatment of facilitated O<sub>2</sub> diffusion shows deficiencies concerning both the premises for the theoretical approach, and the availability of adequate experimental data for the basic parameters. The possible physiological significance of facilitated O<sub>2</sub> diffusion in vivo is discussed, including nonsteady-state conditions as present under most physiological circumstances, with particular reference to the situation concerning Hb in the red cells and concerning Mb in muscle.

M.M.

**A70-28025** Various models for analysis of the absorption of inert gases from gas cavities in the body. Johannes Piiper (Max-Planck-Institut für experimentelle Medizin, Göttingen, West Germany). *Respiration Physiology*, vol. 9, Apr. 1970, p. 74-85.

Theoretical analysis of the absorption of inert gases from tissue gas cavities, using several models involving different patterns of distribution of capillaries and of resistance to diffusion in the walls of the gas cavity. Experimental data previously collected in subcutaneous gas cavities in rats are compared with predictions based on the models.

M.M.

**A70-28035** Evoked potential and psychophysical correlates of changes in stimulus colour and intensity. D. Regan (Keele, University, Keele, Staffs., England). *Vision Research*, vol. 10, Feb. 1970, p. 163-178. 15 refs. Research supported by the Medical Research Council.

The intensities of two superposed beams of different colors were sinusoidally modulated at frequencies near 16 Hz so as to generate an alternating-wavelength stimulus, and used in a joint psychophysical and evoked potential (EP) investigation. The relative phases and modulation depths of the two beams were varied and the conditions for minimum EP amplitude were compared with the conditions for minimum (or zero) subjective flicker. When the relative modulation depths of the beams were varied, the fundamental EP gave (1) no minimum, or (2) a minimum displaced from the subjective minimum or (3) rarely, a minimum coincident with the subjective minimum. This depended on the subject and the electrode position. Cases (1) and (2) could be explained by the findings that the relative phases of the beams for minimum subjective flicker differed considerably (50

-110) from the relative phases for minimum EP, and that the relation between the amplitude of the fundamental component of the EP and stimulus modulation depth was different for different colors. Minimum subjective flicker seems to be related to stimulus intensity, and modulation depth in a different way than is minimum amplitude of the fundamental component of the EP, so that whether the subject sees flicker has no correlation with the minimum in the fundamental EP. (Author)

**A70-28036**      **The influence of age and retinal illumination on the pupillary near reflex.** W. D. Schäfer and R. A. Weale (Institute of Ophthalmology, London, England). *Vision Research*, vol. 10, Feb. 1970, p. 179-191. 29 refs.

Photographic measurements were made of the human pupillary diameter when 12 subjects divided into four age groups viewed a target at different vergences and in two conditions of light adaptation. Systematic and statistically significant age factors were revealed. As the near reflex and the light reflex are antagonistic some attention to the question of retinal illumination is indicated. The results are explained most readily by assuming that the innervation to and/or activity of, the dilating system of the ageing human iris is reduced more quickly than is true of the mechanism of constriction. (Author)

**A70-28037 \***      **Control of eye position in the dark.** Alexander A. Skavenski and Robert M. Steinman (Maryland, University, College Park, Md.). *Vision Research*, vol. 10, Feb. 1970, p. 193-203. 12 refs. NIH Grant No. NB-06361; Grant No. NSG-398.

Two-dimensional eye movements were recorded for long periods in total darkness while 2 Ss attempted to keep their eyes in the primary position or 10 deg arc to the left or right. Effective position control was observed in the absence of a visual error signal (the eye stayed within 2 deg arc of previously defined target positions after more than 2 min in the dark and much closer during briefer periods). Effective position control in the dark did not depend on tactile cues from the conjunctiva, the orientation of the Ss' torsos or a self-selected eye movement pattern. Saccades were used to keep the eye near target position in the dark: low velocity position control (corrective drifts) dropped out soon after the target was removed from view. (Author)

**A70-28038**      **Effectiveness and secondary effects observed on the occasion of air missions of some medications used in the treatment of air sickness (Efficacité et effets secondaires observés à l'occasion de missions aériennes de quelques médicaments utilisés dans le traitement du mal de l'air).** M. Gouars, M. Guillermin (Ministère des Armées, Service de Santé des Armées, Paris, France), and P. Galban. *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 111-114. In French.

Results of four experiments performed on a total of more than 800 subjects for an essentially pragmatic purpose, intended on the one hand to evaluate the antiairsickness effectiveness of various substances, and on the other hand to study the importance of secondary effects of these substances on the behavior of the subjects. The antiairsickness effectiveness was studied in the course of particular air missions involving air transport of troops at very low altitude. The importance of secondary effects on the operational capacity of the transported personnel was evaluated. Low altitude flight was found to be particularly trying, and two-thirds of the subjects were affected by airsickness in some degree. Sleepiness was noted after absorption of some substances, but did not seem to impair the physical capacity of the subjects. F.R.L.

**A70-28039**      **Systematic radiological examination of the spine - Present difficulties in the determination of normality (Examen radiologique systématique du rachis - Difficultés actuelles dans la détermination de la normalité).** R. P. Delahaye, H. Mangin, P. J. Metges (Ministère des Armées, Paris, France), and A. Salvagniac. *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 115-118. 11 refs. In French.

Discussion of systematic radiological studies of the spines of young adults (19 to 22 yr), which form a part of the admission process of aircrew personnel. This exploration has the double purpose of selecting candidates, and of collecting data to compile reference dossiers which would be useful for consultation in case of accidents. The results of the study indicate the necessity of determining what constitutes radiological normality of the spine. F.R.L.

**A70-28040**      **Concerning a syncope during flight - Development, treatment, etiological discussion (A propos d'une syncope en vol - Evolution, traitement, discussion étiologique).** G. Leguay, R. Pannier (Service de Médecine Aéronautique, Hôpital d'Instruction des Armées, Versailles, France), and R. Yout. *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 119, 120. In French.

Clinical observation of a subject who was the victim, at high altitude, of a respiratory syncope with cardiac ineffectiveness, and who was revived in spite of numerous complications. At 7500 m the subject, who had previously felt fatigued and had difficulty with deep breathing, lost consciousness while kneeling at the open door of the aircraft. The doctor accompanying the flight observed that his face was cyanosed and his pulse was undetectable. Upon landing, further complications were observed and energetic methods of treatment were used successfully to overcome them. It is considered that the causes of the syncope were aeroembolism, hypoxia, and spontaneous pneumothorax. F.R.L.

**A70-28041**      **Concerning air transport of auriculoventricular blocks (A propos du transport aérien de blocs auriculo-ventriculaires).** J. J. Prichonnet (Ecole de l'Air, Salon, France) and L. Poggi (Hôpital de la Timone, Marseille, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 121-124. In French.

Results of transporting two elderly female cardiac patients by air from Bastia to Marseille for the purpose of having heart pacemakers installed. In both cases, results were successful. It is considered that air transport of cardiac patients, formerly contraindicated, is now feasible because of the existence of portable apparatus for surveillance and for treatment of cardiac syncopes. Weather and altitude must be taken into account. F.R.L.

**A70-28042**      **Action of altitude in smokers and nonsmokers on an index of cerebral blood flow (Action de l'altitude chez le fumeur et le non fumeur sur un index de débit sanguin cérébral).** J. Demange (Ministère des Armées, Service de Santé des Armées, Paris, France) and A. Auzas. *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 125-127. In French.

Study of the cerebral circulatory reactions of smokers and nonsmokers exposed to the effects of altitude. Two metallic electrodes were applied to the scalp, and the head of the subject was connected to a Wheatstone bridge. The variations of blood volume unbalance the bridge. Measurements were taken at (pressure chamber) altitudes of up to 5000 m. None of the subjects showed gross modifications of their respiratory rhythm. The vasomotor index and the blood flow index was higher in smokers than in nonsmokers, but the cardiac frequency index was substantially identical. F.R.L.

**A70-28043**      **Study of a protection equipment for personnel handling liquid propellants (Etude d'un équipement de protection du personnel manipulant les ergols liquides).** J. Colin and J. Timbal (Ministère des Armées, Service de Santé des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 129-133. In French.

Development of protective clothing for personnel handling toxic and corrosive liquid propellants in the climatic conditions of the Guyana Space Center. Such clothing must protect against spraying of liquids, must be leakproof to toxic gases, must provide thermal

comfort compatible with a normal work load, must have breathing comfort, and should be suitable for rescue work. Major attention is given to the problem of controlling heat. The equipment comprises and outer garment for protection against the propellants, a ventilated undergarment, and a helmet, gloves, and boots. The undergarment is ventilated by convection and conduction, cooling air being distributed over the surface of the body by flat flexible tubes. The equipment appears to be satisfactory from the thermal point of view, since it assures sufficient protection at 40 C. F.R.L.

**A70-28044 Long air voyage after exteriorization of the Wallenberg syndrome (Long voyage aérien après extériorisation du syndrome de Wallenberg).** G. Boudin and E. LaFontaine (Compagnie Nationale Air France, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 134. In French.

Discussion of the case of a subject who suffered a cerebral vascular accident just prior to departure on a long air trip which included 32 landings. In spite of nausea, vomiting, and unsteady gait, he boarded the aircraft. For some time while en route, he was unable to swallow. Later on, he felt better, but the unsteady gait continued, although it was possible later to walk unsupported. Upon his return, he suffered a relapse, with hiccups and double vision. Under medical treatment, improvement was noted, but less rapidly than at first. It is concluded that a long air voyage is not strongly aggravating for a cerebral vascular accident. F.R.L.

**A70-28045 Medicoaeronautical interest in the study of troubles of metabolism of Mg (++) (Intérêt médico-aéronautique de l'étude des troubles du métabolisme du Mg ++).** P. Pesquies, P.-M. Pingannaud, A. Vauzelle, and P. Mases. *Revue de Médecine Aéronautique et Spatiale*, vol. 8, 3rd Quarter, 1969, p. 135-137. 10 refs. In French.

Consideration of the troubles involved in identification of the properties of magnesium, a subject which is of interest since this element, among other mineral ions, is necessary to maintain a suitable physiological level of neuromuscular excitability. The major difficulty lies in methods of quantity determination. Adult magnesium requirements vary between 250 and 500 mg/day, and various troubles which can arise from a greater or lesser quantity are discussed. A recommended method of determining quantity is a complexometric method adapted to the Technicon autoanalyzer. Problems posed by the detection and recording of electromyographic activities are considered. F.R.L.

**A70-28064 # Analysis of observational data obtained by Alouette II. III - Proton cyclotron echoes in the topside ionograms.** Nobuo Matuura, Ryo Nishizaki, and Mikitoshi Nagayama. *Radio Research Laboratories, Journal*, vol. 16, Sept.-Nov. 1969, p. 207-213. 5 refs.

Investigation of the proton cyclotron echoes in topside ionograms obtained from the Alouette II satellite. Echoes having almost constant virtual depths with respect to the swept frequency, and the time delay equal to the proton cyclotron period, were examined. These echoes appear mostly within the frequency range between the plasma frequency and the electron cyclotron frequency on the satellite, though the echoes can sometimes be found even below the electron cyclotron frequency. They may be caused by an ion (proton) cyclotron wave or by a collective ion (proton) cyclotron motion excited by the pulse transmission of the topside sounder. O.H.

**A70-28075 Effects of chronic hypoxia on hematocrit ratios and heart size in the pigeon.** James J. McGrath (Rutgers University, New Brunswick, N.J.). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Apr. 15, 1970, p. 451-455. 8 refs. Army-supported research.

Study of the effects of chronic altitude exposure on heart size and hematocrit ratios in pigeons acclimatized to chronic hypoxia. Tests carried out in adult male homing pigeons exposed to a

simulated altitude of 22,000 feet in a barometric chamber for 30 days are described. The results obtained are summarized, tabulated, and discussed. O.H.

**A70-28105 Physiology of the retina.** A. Cavagioni (Parma, Università, Parma, Italy). In: *Automatic interpretation and classification of images*; NATO, Summer School, Pisa-Tirrenia, Italy, August 26-September 6, 1968, Proceedings. (A70-28101 12-08) Edited by Antonio Grasselli. New York, Academic Press, Inc., 1969, p. 175-185. 17 refs.

Discussion of the transformation of visible radiant energy into a sensory message which takes place in the retina. The transduction of radiant energy into a bioelectrical event and its elaboration and coding into sensory message for higher nervous centers are examined separately. The two basic types of receptors present in the eyes of vertebrates are considered. A diagram is presented showing the fine structure of the cone outer segment of the toad as revealed with osmium tetroxide. Questions of the elaboration and the codification of the signals of the receptors by other retinal elements are investigated. Aspects of optic nerve firing are discussed. G.R.

**A70-28147 Feedback factors in steering and tracking behavior.** Karl U. Smith and Vernon Putz (Wisconsin, University, Madison, Wis.). *Journal of Applied Psychology*, vol. 54, Apr. 1970, p. 176-183. Research supported by the Social and Vocational Rehabilitation Administration and NSF.

Experimental comparison of the two modes of perception and guidance of body movement in relation to the environment (steering) and in relation to movement of environmental targets (stimulus tracking). The comparison was made under controlled conditions in relation to the effects of feedback delay. Steering was degraded as much if not more than stimulus tracking by feedback delays between hand motion and the visual display involved in the different tasks. Steering performance, as in control of vehicles, thus may be seriously affected by feedback delays produced by powered steering and tracking devices and by inertia of action of a vehicle in relation to steering action at different speeds. The results also theoretically clarify the feedback relations between self-produced and stimulus-response patterns of performance and learning. M.M.

**A70-28217 \* # Brain-cell protein synthesis specifically related to learning.** H. Hydén and P. W. Lange (Göteborg Universitet, Göteborg, Sweden). *National Academy of Sciences, Proceedings*, vol. 65, Apr. 15, 1970, p. 898-904. 23 refs. Research supported by the Statens Medicinska Forskningsråd and the Wallenberg Foundation; Grant No. NGR-52-119-001.

Study of the synthesis of certain protein fractions in nerve cells of the hippocampus in rats during transfer of handedness, and investigation of the specific relation of this synthesis to the learning process that transfer represents. Electrophoretic separation of protein was carried out on polyacrylamide gels at the microscale. The investigation encompasses the brain-specific, acidic protein S100 and two protein fractions moving close to the S100 protein during electrophoresis. The protein synthesis was studied during one month of intermittent training of the animals. The temporal link between behavior and an increase in the synthesis of nerve-cell protein indicates that the protein response is specific for the processes occurring in the hippocampus during learning. M.V.E.

**A70-28312 # The role of the antenna properties of the retina in the analysis of visual space (Rol' antenykh svoystv setchatki v analize zritel'nogo prostranstva).** E. P. Shaitor (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Feb. 1970, p. 137-143. 27 refs. In Russian.

Description of a mechanism for estimating distances and sizes of objects which is essential to the visual system for sense projection. It is shown that in neuron processing of the distribution of the activity of directionally sensitive retinal cones information may be obtained about the respective positions of objects in a field of vision, regardless of whether their images are focused or unfocused on the

retina and regardless of the state of accommodation of the eye. Neuron processing of retinal activity is represented in the form of formulas the inferences from which are in good agreement with experimental data obtained in a study of size constancy. A.B.K.

**A70-28313 # Study of the initial periods of muscular activity in trained subjects (Issledovanie nachal'nykh periodov myshechnoi deiatel'nosti u trenirovannykh liudei).** V. V. Mikhailov, V. V. Abrosimov, S. V. Vozniak, S. S. Semashko, and V. B. Sergienko (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Feb. 1970, p. 204-210. 10 refs. In Russian.

Study of the initial period of activity of various muscles of athletes performing exercises on a veloergometer. An increase in the energy cost of the initial period of work in the case of strenuous work immediately following less intense work is observed in comparison with the energy expenditure under steady-state conditions. The electrical activities of 12 muscles of the arms, legs, and torso are compared, as well as the forces applied in turning the pedals (as estimated from a dynamogram) and the oxygen consumption at different times during the work. The possible role of predominance of anaerobic over aerobic reactions, spreading of the excitation in the central nervous system, and the phenomenon of increased energy expenditures during the initial period to overcome the inertia of the mechanical system. The special features of the electromyogram during periods of work with different ratios between aerobic and anaerobic resynthesis of adenosine triphosphate are analyzed. A mechanism explaining the higher energy cost of work requiring variable exertion in comparison with work requiring uniform exertion is refined. A.B.K.

**A70-28314 # Physiological mechanisms controlling the amplitude of voluntary movements in man (O fiziologicheskikh mekhanizmax reguliatsii amplitudy proizvol'nykh dvizhenii cheloveka).** A. A. Asknazii (Leningradskii Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Feb. 1970, p. 211-217. 31 refs. In Russian.

Study involving the reproduction from memory of precise movements on a Zhukovskii kinematometer. In this case the motion of the forearm, the mechanogram of the motion, the instantaneous velocity, the acceleration, and the biopotentials of the biceps and triceps brachii are examined. The importance of a limiter in determining the structure of the movements is shown. It is found that the accuracy of reproducing given angular positions depends not only on the discrimination and recollection of finite amplitudes but also on the degree of perfection of the motion control. A.B.K.

**A70-28315 # A complex investigation of the effect of minute voluntary hyperventilation (Kompleksnoe issledovanie efekta minutnoi proizvol'noi giperventiliatsii).** V. L. Fantalova and O. E. Turchaninova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Feb. 1970, p. 237-245. 27 refs. In Russian.

Study of the effect of minute hyperventilation of the lungs in 25 healthy subjects ranging in age from 16 to 54. It is found that in most cases minute hyperventilation causes an expiratory suppression of respiration. Within 15 to 20 seconds after the start of intensified respiration an increase in the amplitude of the alpha rhythm of the electroencephalogram occurred, as well as an increase in the peripheral blood filling, as determined with the aid of a finger plethysmogram. It is suggested that nonspecific reticular formations of the brain stem participate in the reaction to hyperventilation of the lungs. A.B.K.

**A70-28316 # A pulsed activity converter with output to an analog recorder (Preobrazovatel' impul'snoi aktivnosti s vykhodom na analogovyi registrator).** A. N. Dolotovskii (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*,

vol. 56, Feb. 1970, p. 279-281. In Russian.

Description of a small transistorized device for pulsed activity analysis. With the aid of this device an analog curve of the change in the pulse frequency can be observed. The results of the analysis are recorded on an ink-writing device, where they appear as ordinates showing the number of spikes occurring during a given time interval. An electronic trigger counter is used to obtain the binary codes, which are transformed into a voltage and conveyed in this form to the recording device. A.B.K.

**A70-28317 # An electronic unit for controlling a micro-manipulator with a pacing motor in microelectrode studies (Elektronnyi blok upravleniia mikromanipuliatora s shagovym dvigatelem dlia mikroelektroodnykh issledovani).** G. S. Orduian (Akademiia Nauk Armianskoi SSR, Vychislitel'nyi Tsentr and Institut Fiziologii, Yerevan, Armenian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 56, Feb. 1970, p. 284-288. 5 refs. In Russian.

Description of a complex device for controlling a micromanipulator with a pacing motor during electrophysiological studies involving the implantation of microelectrodes into tissue. The device is manufactured out of standard Razdan-2 computer cells and is adapted to a four-phase pacing motor. The motor rotation is transmitted to the micromanipulator by means of a Cardan transmission. The scale value of one pace is equal to four microns. The device can operate under discrete or continuous conditions. In addition to the main control panel, a separate, remote-controlled panel is provided, which makes it possible to easily control the movement of the microelectrode and to automatically find the neurons in the case of both extracellular and intracellular recording. A.B.K.

**A70-28344 # Influence of sinusoidal vibration at various frequencies on the muscular receptors (Vliianie sinusoidal'noi vibratsii raznoi chastoty na retseptory myshts).** A. S. Mel'ia. *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 56, Dec. 1969, p. 657-660. 6 refs. In Russian.

Experimental study of the effects of vibration on muscular receptor in frog toe muscles. The distal end of the muscle studied was joined to a resinous membrane which was attached to an eccentric shaft of a motor. The motor rpm's controlled vibration frequency while shaft eccentricity governed the amplitude. Records were made of the afferent nerve fiber potentials and vibration parameters. Increased vibration frequency (up to a certain level) results in a reduced number of impulses arising in the muscle within a single cycle of vibration. Continued rise in frequency above the critical level (50 to 60 Hz) results in the failure of receptor discharges to follow each cycle of vibration. T.M.

**A70-28345 # Two phases of the paradoxical stage of sleep (O dvukh fazakh paradoksa'noi stadii sna).** T. N. Oniani, P. P. Mol'nar, and T. L. Naneishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi Soobshcheniia*, vol. 56, Dec. 1969, p. 685-688. 6 refs. In Russian.

Study of the paradoxical stage of sleep in the cat using electroencephalographic investigations of different cortical and sub-cortical brain structures with simultaneous recording of several somatic and vegetative signs. The data show this stage of sleep to be composed of two distinct phases with delta and theta rhythm dominance, respectively. Vegetative and somatic indicators show the presence of emotional experiences in the second (theta) phase but not in the first (delta) phase. T.M.

**A70-28346 # Ultraviolet difference spectra of human gamma-globulin (Ul'traioletovye differentsial'nye spektry gamma-globulina cheloveka).** V. G. Bregadze (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Moscow, USSR; Akademiia Nauk Gruzinskoi SSR, Institut Kibernetiki, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 56, Dec. 1969, p. 689-692. 5 refs. In Russian.

Application of UV difference spectra to study conformation transitions in human gamma-globulin and to separate the conformation transitions of binary and ternary protein structures. Results include the dependence of certain characteristic points of the UV difference spectra of gamma-globulin on the concentration of denaturation agents (pH, urea, and temperature). It is shown that optical density changes can be used to obtain a qualitative indication of the presence and variation of alpha-spirality in gamma globulin.

T.M.

**A70-28347 #** **Angioarchitectonic features of the lentiform nucleus of the human brain (Angioarkhitektonicheskie osobennosti chechevitseobraznogo iadra mozga cheloveka).** T. G. Kurtishvili (Institut Klinicheskoi i Eksperimental'noi Nevrologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 56, Dec. 1969, p. 729-732. In Russian.

Results of measurements of capillary details in the lentiform nucleus region of the brain in adult humans who perished from various causes not associated with pathological changes in the brain. The study involved the overall topographic features of the blood vessels, their diameters, length, and density. Results show that vessels in the putamen are wider and more numerous than in the globus pallidus.

T.M.

**A70-28351 #** **Background and evoked electrical activities of the central formations of the canine visual analyzer during conditioned reflex activity (Fonovaia i vyzvannaia elektricheskaiia aktivnost' tsentral'nykh obrazovaniia zritel'nogo analizatora koshki pri uslovnoreflektornoi deiatel'nosti).** A. B. Kutuev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 34-41. 15 refs. In Russian.

Study of the electrical activity of the visual cortex, subcortical structures and reticular formations in 6 cats with implanted electrodes prior to and during conditioned reflex stimulation by light signals in an experimental assembly of special design. Diagrams are plotted for the correlations between the dispersion of the electrical responses in these regions during the development of a conditioned reflex. The usefulness of dispersion and vector analysis in these studies is pointed out.

V.Z.

**A70-28352 #** **Dynamic interaction between stored and operational memories in apes and monkeys (O dinamicheskom vzaimodeistvii rezervnoi i operativnoi pamiati u vysshikh i nizshikh obez'ian).** L. A. Firsov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 64-70. 25 refs. In Russian.

Study of the dynamic relation between stored memory images and active memory responses in 5 chimpanzee apes, 3 capuchin monkeys and 3 baboon monkeys with conditioned alimentary motor reflexes stimulated by visual signals. It is found that visual images are readily inhibited by conditioned reflexes in capochins and baboons and prevail over conditioned reflexes in chimpanzees.

V.Z.

**A70-28353 #** **Influence of conditioned reflexes on the threshold of the cutaneous analyzer in man (Uslovnoreflektornye vliianiia na porogi kozhnogo analizatora cheloveka).** M. A. Pankratov (Leningradskii Gosudarstvennyi Pedagogicheskii Institut, Leningrad, USSR) and P. M. Pogorelova (Michurinskii Pedagogicheskii Institut, Michurinsk, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 71-77. 33 refs. In Russian.

Discussion of a total of 200 experiments in which vascular conditioned reflexes were developed in a group of male subjects in response to acoustic signals in combination with threshold cutaneous electric stimuli of 100 to 400 Hz, 1000 Hz and 1600 Hz. Lower frequency electrical stimuli led to a faster development of con-

ditioned reflexes than higher frequency stimuli. Selective effects of electrical signals of different frequencies on different structural elements of the cutaneous analyzer are noted.

V.Z.

**A70-28354 #** **Certain specific characteristics of a sensory afterdischarge in the human brain in response to a light stimulus (Nekotorye osobennosti senzornogo poslerazriada mozga cheloveka na svetovoi razdrazhitel').** M. P. Kudinova and M. S. Myslobodskii (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 89-94. 22 refs. In Russian.

Study of the characteristics of a sensory afterdischarge of the human brain in response to light stimuli in a group of 19 male and female subjects during sleep and wakefulness, with their attention concentrated on the experiment or distracted. The results of statistical analysis are given for the latent period, frequency, time of development, and maximum amplitude of afterdischarges.

V.Z.

**A70-28355 #** **Further study of the interrelation between the diffuse thalamic and visual systems (Dal'neishee issledovanie vzaimo-otnosheniia diffuznoi talamicheskoi i zritel'noi sistem).** R. A. Pavlygina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 106-114. 35 refs. In Russian.

Study of the neuron activity during the stimulation of biopotentials by light signals in the cortical motor and visual regions and in the corpus geniculatum laterale of 17 wakeful cats with implanted electrodes. It is found that the secondary response amplitudes of light-stimulated biopotentials are increased in both the visual cortex and the corpus geniculatum laterale when the electrostimulation of the midline nuclei thalamica is combined with light signals.

V.Z.

**A70-28356 #** **Study of the lability of neural processes in humans of different sexes and ages (Issledovanie podvizhnosti nervnykh protsessov u liudei razlichnogo pola i vozrasta).** S. A. Perevedentseva (Kubanskii Meditsinskii Institut, Krasnodar, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 200-202. In Russian.

Study of the latent period of motor reactions and the duration of negative induction in a total of 2354 subjects of both sexes whose age varied from 9 to 90 years. Fast motor reactions in response to an order were four times as frequent in young males as in young females, reaching a maximum in the age group 20 to 29 and subsiding with age to a sharp drop after 60.

V.Z.

**A70-28357 #** **Redistribution of the loudness of an acoustic stimulus in the right and left ear during a binaural interaction (Pereraspredelenie gromkosti zvukovogo stimula v pravom i levom uke pri binaural'nom vzaimodeistvii).** V. M. Kamenkovich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti*, vol. 20, Jan.-Feb. 1970, p. 210-212. In Russian.

Attempt to determine the cause of the lateralization of acoustic signals frequently observed when signals of equal loudness are delivered into both ears simultaneously. A total of 573 determinations of the position of acoustic images in the auditory analyzers of 12 subjects are carried out in the study. The results suggest that sound lateralization is not related to a shift in the monoaural thresholds or to a nonuniform amplification of sound in the right and left ear. It is believed, rather, to be a manifestation of a binaural interaction involving a redistribution of the loudness of monoaural responses to signals.

V.Z.

**A70-28358 # Effect of electromagnetic microwave radiation on the functional state of the myocardium (Vliianie SVCh elektromagnitnogo izlucheniia na funktsional'noe sostoianie miokarda).** N. A. D'iachenko. *Voенno-Meditsinskii Zhurnal*, Feb. 1970, p. 35-37. In Russian.

Study of the functional state of the myocardium in a group of 62 radar operators who were exposed for 3.5 hr daily to a microwave field during work over periods from 2 to 15 years. Variational analysis of polycardiographic recordings is carried out to determine the duration of the cardiac cycle and the phase structure of the systole. Subjective complaints characteristic of an astheno-neurotic condition are indicated in 49 subjects. The changes in the cardiac phase activity observed in some of the subjects are linked to the effects of nervous impulses on the cardiovascular system and in some cases to dystrophic disorders in the myocardium. V.Z.

**A70-28359 # Dynamics of systolic phases under the action of high temperature (Dinamika faz serdechnogo sokrashcheniia pri vozdeistvii vysokoi temperatury).** M. A. Migulina, G. V. Kaliberdin, and V. S. Fomin. *Voенno-Meditsinskii Zhurnal*, Feb. 1970, p. 38-40. 8 refs. In Russian.

Study of the dynamics of systolic phases in a group of 8 healthy male subjects confined in a thermochamber every third day at a temperature of 80 deg C for 50 to 70 min over a period of two weeks, or over a period of 2 months with intermissions of 10 days and 1 hr daily exposures to 50 deg C during the intermission periods. An analysis of polygraphic cardiac phase recordings indicates a slackening of the systolic activity in the myocardium of the subjects. V.Z.

**A70-28360 # X-ray sources in military radio electronic equipment (Istochniki rentgenovskogo izlucheniia v voennoi radioelektronnoi apparature).** E. A. Ermolaev and R. I. Kovach. *Voенno-Meditsinskii Zhurnal*, Feb. 1970, p. 59-62. 7 refs. In Russian.

Review of published papers concerning X-ray bremsstrahlung in electronic equipment used in military installations. Methods of measuring these emissions in various vacuum electronic devices are discussed. Thyratrons and klystron amplifiers are indicated as especially hazardous sources of X-rays. Radiation protection and safety standards during the operation of these and similar devices are also discussed. V.Z.

**A70-28361 # Physiologico-morphological assessment of the effect of accelerations (Fiziologo-morfologicheskaia otsenka deistviiia peregruzok).** V. G. Petrukhin. *Voенno-Meditsinskii Zhurnal*, Feb. 1970, p. 65-68. In Russian.

Discussion of the results of a total of roughly 1000 tests in which the acceleration tolerance of dogs, monkeys, rats, mice and guinea pigs was determined under accelerations in various directions in a centrifuge. A close relation is established between physiological reactions under acceleration and subsequent structural disorders in various organs of the experimental animals. It is found that accelerations in any direction produce only temporary structural shifts if they did not affect physiological functions. Acceleration tolerance is found to be generally higher when the compensatory capacity of the cardiovascular and respiratory systems is higher while the anaerobic glycolysis is less intensive and the oxidation processes in the tissues are strong. V.Z.

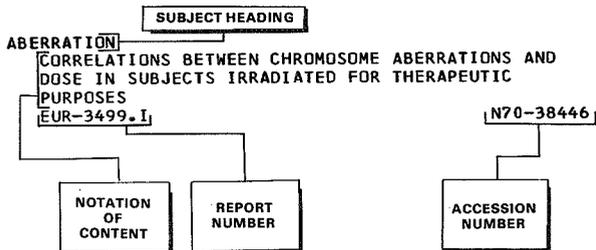
**A70-28362 # Flight surgeon's appraisal of disorders in the automatism, conduction and excitation functions of the heart (Vrachebno-letnaia ekspertiza pri narusheniakh funktsii avtomatizma, provodimosti i vozбудimosti serdtsa).** L. I. Brokhes, N. I. Svarovskii, and N. T. Glebovskaia. *Voенno-Meditsinskii Zhurnal*, Feb. 1970, p. 69-72. 13 refs. In Russian.

Discussion of observations of heart rhythm disorders among individuals from a large group of flying personnel subjected to examinations. Numerical data are given for the occurrence of various

heart rhythm disorders among this group. Synusal bradycardia was the most frequent disorder, followed by synusal arrhythmia. V.Z.

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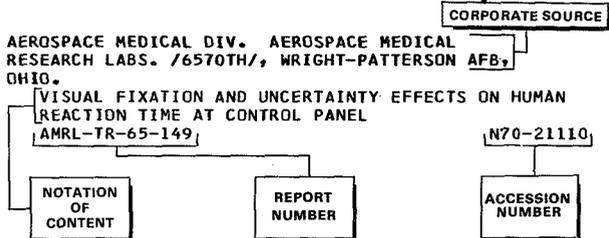


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