

NASA SP-7011 (81)

*N71-12303*

*SP-7011 (81)*

# AEROSPACE MEDICINE AND BIOLOGY

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A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (81)

# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

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**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

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*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.

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Boston Spa, Yorkshire, England.

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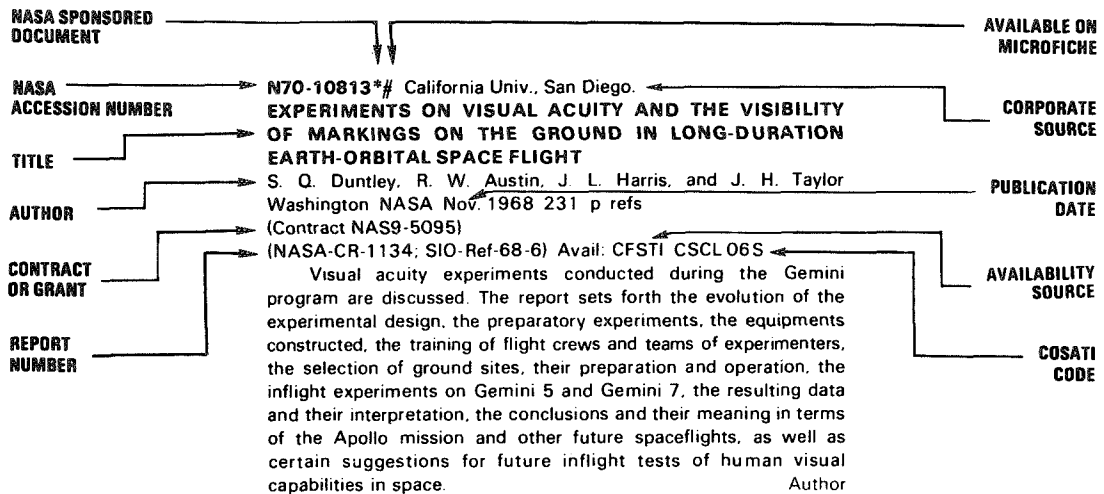
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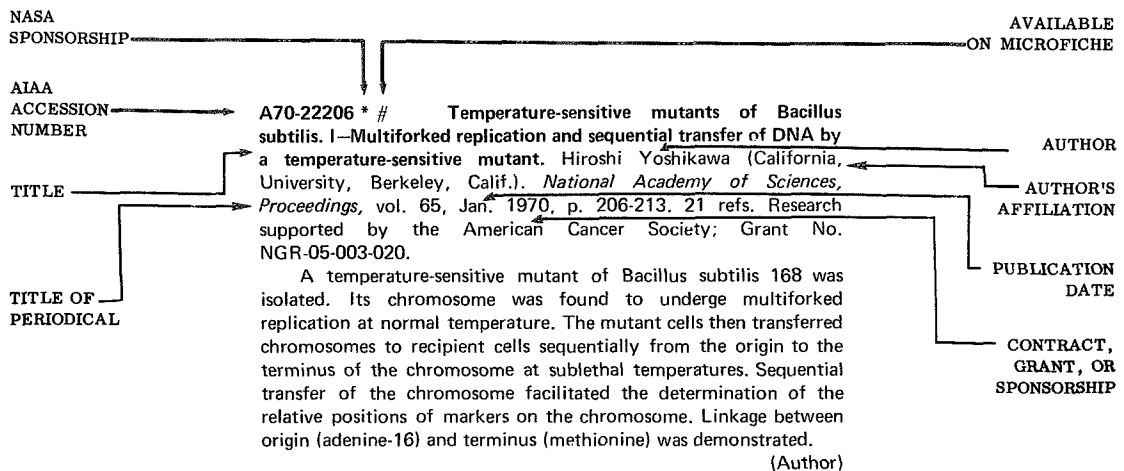
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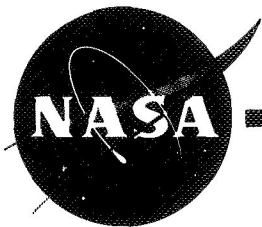
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# AEROSPACE MEDICINE AND BIOLOGY

*a continuing bibliography*

OCTOBER 1970

## STAR ENTRIES

### **VISUAL INSTRUMENTATION Final Report**

Paul Weene 28 Feb. 1970 154 p refs  
(Contract N00014-68-C-0363)  
(AD-704902) Avail: CFSTI CSCL 5/5

The study was performed to investigate the feasibility of utilizing Moire fringe effects (MFE) in instruments intended for human observers. The first phase of the project began with the development of adequate definitions for Moire fringe effects and their components, followed by an attempt to classify Moire effects. An extensive series of pilot studies followed, performed to explore some qualitative and quantitative properties of MFE and to describe limitations to Moire displays. The findings were interpreted in terms of instrument considerations and applications, and resulted in recommendations for the utilization of MFE. Phase II of the study was concerned with the design and construction of instruments incorporating Moire fringe effects and with practical considerations involved in their manufacture. The range potential applications of the MFE phenomena was investigated and several representative instruments were selected. The designs for these instruments were than developed and prototypes constructed. Author (TAB)

### **N70-32023# Lockheed Missiles and Space Co., Sunnyvale, Calif. VISUAL SIGNAL DETECTION AS A FUNCTION OF THE SPATIAL DISTRIBUTION AND THE SIZE OF DISPLAYED ELEMENTS**

B. B. Brandaliss, E. H. Sasaki, S. Seidenstein, and G. L. Kreezer  
15 Apr. 1970 77 p refs  
(Contract N00014-69-C-0204)  
(AD-704497; LMSC/A-969714) Avail: CFSTI CSCL 6/16

The report describes several experiments which investigated the luminance thresholds for signal recognition as a function of the spatial frequency and size of displayed elements on a television monitor. These factors were varied to simulate the perceptual conditions that occur when line scan displays are viewed at slant angles to enhance signal recognition. Several exploratory studies were conducted to determine if viewing the line scan display at a slant angle and if providing a dynamic control of the raster size enhanced signal recognition. Author (TAB)

### **N70-32033\*# Miami Valley Hospital, Dayton, Ohio. Dept. of Research.**

#### **THE EFFECT OF CABIN TEMPERATURE ON THE NUTRITIONAL, BIOCHEMICAL AND PHYSIOLOGICAL PARAMETERS OF MAN IN A LIFE SUPPORT SYSTEMS EVALUATOR**

Bernard J. Katchman, James P. F. Murphy, Carol A. Linder, and  
Vickie R. Must  
(NASA Order R-85; Contract AF 33(657)-11717)  
(NASA-CR-110511; AD-701752; AMRL-TR-67-107) Avail: CFSTI  
CSCL 06K

Four human male subjects were confined for 6 weeks of which 35 consecutive days were spent in a Life Support Systems Evaluator. During this period the environmental temperature in the Evaluator was cycled from 23C to 32C on a weekly schedule. The subjects ate a one-cycle diet of fresh foods that provided 92g protein, 91g fat, 343g carbohydrate, and 2500 kcal of metabolizable energy. The diet was rated 6 on a 9-point scale or like slightly in acceptability. There was a definite decrease in acceptability with time but there was no difference in acceptability at the two temperatures. The diet was sufficient to maintain a 67 kg man without weight loss. Digestibility of food was high; there was no temperature effect. The clinical data, hematology, blood chemistry, blood pressure, oral temperature, and heart rate were all in the normal range. The subjects maintained good health throughout the experiment. Author (TAB)

### **N70-32013# Bolt, Beranek, and Newman, Inc., Cambridge, Mass. APPLICATION OF OPTIMAL CONTROL THEORY TO THE PREDICTION OF HUMAN PERFORMANCE IN A COMPLEX TASK Final Report, Jan. 1968—Jan. 1969**

Sheldon Baron, Jerome I. Elkind, David L. Kleinman, Duncan C.  
Miller, and William H. Levison Mar. 1970 159 p refs  
(Contract F33615-68-C-1192)  
(AD-704562; BBN-1776; AFFDL-TR-69-81) Avail: CFSTI CSCL  
5/10

A procedure is developed for using human response theory and the analytic methods of optimal control theory to analyze a complex manual control task. The central element in the procedures is a model of the human operator that is based on the assumption that well-trained operators perform optimally subject to certain inherent limitations. Recent results in human response theory provide the representation of the humans limitations. Optimal control theory is then used to predict closed-loop human and system performance. The manual control of the longitudinal position of a hovering VTOL vehicle is analyzed using the developed techniques. Author (TAB)

### **N70-32016# California Univ., Los Angeles. School of Public Health.**

#### **EFFECT OF HYPERBARIC OXYGEN-NITROGEN MIXTURES ON MICE Final Technical Report, 1 Mar. 1967—29 Jun. 1969**

Harry Sobel 29 Jun. 1969 9 p refs  
(Contract N00014-67-A-0111-0008)  
(AD-703643) Avail: CFSTI CSCL 6/19

Mice were exposed to compression with 3 atm (rel.) of an air O<sub>2</sub> mixture containing 27% O<sub>2</sub> for 72 hr. They were injected with 1 microcurie of <sup>14</sup>C-lysine at the initiation, 24 and 48 hr after compression was started. The cpm and sp act values of the protein of the carcass were determined. The sp act values were 10, 13, and 14% greater than that of the controls in the three groups. This appeared to be related to reduced food intake rather than any specific effect on nitrogen metabolism. Mice were exposed to 23 cycles each consisting of compression at 45 lb/sq in in an air-oxygen mixture containing 27% oxygen for 72 hr followed by 4 days of recovery. The skin was analyzed for salt-soluble, acid-soluble and insoluble collagen, hyaluronic acid, chondroitin sulfate, and fluorogenic material. Growth was less than that of the controls. There was 25% less salt-soluble collagen and 20% more fluorogenic material but the other values did not differ significantly from that on the basis of size. Acid-soluble collagen, extracted from the skins of newly-weaned mice, was exposed to 150 psi of oxygen for eight weeks. An increase in fluorescence at 360 mu activation/450 mu emission in collagenase digested collagen samples was observed after exposure. Author (TAB)

### **N70-32021# Bio-Dynamics, Inc., Cambridge, Mass. THE APPLICATION OF MOIRE FRINGE EFFECTS TO**

**N70-32057\*#** Agence Tunisienne de Public-Relations, Tunis.  
**THE DIURNAL VARIATION OF METABOLIC PROCESSES AND OF BODY TEMPERATURE UNDER CONDITIONS OF FASTING AND COMPLETE MUSCLE REST [UEBER DIE TAGESSCHWANKUNGEN DES STOFFWECHSELS UND DER KORPERTEMPERATURE IN NUCHTERNAM ZUSTANDE UND VOLLSTANDIGER MUSKELRUHE]**

J. E. Johansson Washington NASA Jul. 1970 74 p refs Transl. into ENGLISH from Skand. Arch. fuer Physiol. (East Germany), v. 8, 1898 p 85-142 Sponsored in part by NASA and NSF (NASA-TT-F-12875; TT-70-58071) Avail: CFSTI CSCL Q6P

Nineteenth century experiments on the metabolism and temperature of resting subjects are described, and critical evaluations are given. Emphasis is placed on exhaled carbon dioxide and the methods used to determine the amounts. The effects of food or fasting, muscular activity, body weight, and length of rest period were investigated. N.E.N.

**N70-32062#** Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

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

William E. Collins and Billy P. Updegraff Oct. 1969 17 p refs (AD-704471; FAA-AM-69-20) Avail: CFSTI CSCL 6/19

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 degrees 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 semicircular canals is suggested as a possible feature of nystagmic habituation. Author (TAB)

**N70-32063#** Federal Aviation Administration, Oklahoma City, Okla. Civil Aeromedical Inst.

**RECOVERY OF MOTOR PERFORMANCE FOLLOWING STARTLE**

Richard I. Thackray and R. Mark Touchstone Oct. 1969 18 p refs (AD-704472; FAA-AM-69-21) Avail: CFSTI CSCL 6/19

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 (TAB)

**N70-32064#** 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 11 p refs

(AD-704470; FAA-AM-69-19) Avail: CFSTI CSCL 6/20

Exposure of general aviation pilots to toxic pesticides has been reported as a possible cause of impairment of flying performance; in some instances it may have produced fatal results. Of particular concern and interest are the organophosphates that are known to be AChE (acetylcholinesterase) inhibitors. It has been generally assumed that 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. Inhibition of AChE thus permits excessive accumulations of ACh which could possibly interfere with memory and/or learning processes. The present study explored the extent to which chronic cholinesterase inhibition in albino rats affects performance in a complex maze situation. The results indicate that disulfoton-exposed rats were capable of performing a maze-running 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-p.p.m. of the poison. At this level an occasional animal had convulsions or severe tremors which temporarily incapacitated the rat. Author (TAB)

**N70-32076#** Joint Publications Research Service, Washington, D.C.

**CERTAIN PROBLEMS IN STUDYING THE ORIENTATION OF BIRDS**

V. D. Illichev 8 Jun. 1970 11 p refs Transl. into ENGLISH from Biol. Nauki (USSR), no. 4, 1970 p 76-82 (JPRS-50681) Avail: CFSTI

A number of general propositions concerning the specific peculiarities of bird orientation, the integrity of orientation as a phenomenon, and the role of mutual contact in orientation are examined. These propositions are considered fundamentally important in a study of the detailed mechanisms of orientation. Author

**N70-32081#** Technische Hogeschool, Delft (Netherlands). Afdeling der Werktuigbouwkunde.

**MAN-MACHINE SYSTEMS GROUP Annual Report, 1969**

A. van Lunteren and H. G. Stassen Apr. 1970 106 p refs (WTHD-21) Avail: CFSTI CSCL 5/8

A study of information exchange within man-machine systems is reported. In particular, the interests were focused on mathematical descriptions of the behavior of a man controlling a technological process. Test set-ups are described along with experimentation conducted, methodology utilized, and results obtained. Various aspects of the study include: (1) A bicycle simulator was developed to study the stabilization process as well as the course following process of a bicycle rider. In addition, the influence of different drugs on the behavior of the human operator were studied. (2) A test set-up was perfected to evaluate the effectiveness of various means of transmitting information to the human operator by tactile stimulation of the skin, and a comparison was made between tactile, visual, and auditive stimulation. (3) A set-up was developed

to study EEG signals of a subject exchanging information with a technical system. Two types of experiments were executed; the first dealing with skin stimulation perception; the second dealing with the brain activities of a subject linked up in a control system. (4) A study on decision problems was initiated. D.L.G.

**N70-32105#** Massachusetts Inst. of Tech., Cambridge. Fluid Mechanics Lab.

**THE DYNAMICS AND FLUID MECHANICS OF THE INTRA-AORTIC BALLOON HEART ASSIST DEVICE**

T. A. McMahon, V. S. Murthy, C. Clark, M. Y. Jaffin, and A. H. Shapiro Dec. 1969 193 p refs (Contract NIH PH-43-67-1114)

(DSR-70446; Publ-69-11) Avail: Issuing Activity

The technique of intra-aortic balloon pumping for assistance to the failing human circulation requires that a limp, gas-filled bag be introduced into the aorta. The bag is caused to inflate and deflate under the action of a pressure source outside the body via a small-bore tube. The volume displacements of blood achieved in this manner are designed to reduce the effort of the failing heart. A mathematical model of the arterial system, called the tapered elastic tube model, is developed consistent with physiologic input impedance measurements. In conjunction with a simple model of the balloon, the pressure-node, flow-source model, any two of the four variables heart pressure, heart flow, balloon pressure and balloon displacement flow may be predicted, given the remaining two. A principal conclusion is that the balloon should be both inflated and deflated during diastole, the period when the heart is not pumping, for maximum benefit to the heart. In experiments in a lumped-element hydraulic model of the arterial system, both the conventional limp balloon and a balloon design including longitudinal mechanical constraints were tested. Experiments simulated trials in both humans and dogs, for both liquid and gas inflation. The beamed balloon was found in every case to overcome a serious problem of limp balloon operation, which is that the balloon inflates to full extent locally and occludes the aorta before it reaches its full displacement volume, causing high heart pressures and poor performance of the device. Author

**N70-32147#** Royal Aircraft Establishment, Farnborough (England). **EFFECTS OF FORMS OF DIET OF DIFFERENT FAT CONTENT ON HUMAN ORGANISMS. 2: ENERGY METABOLISM AND PERFORMANCE ON THE ERGOMETER [AUSWIRKUNGEN VON KOSTFORMEN VERSCHIEDENEN FETTGEHALTES AUF DEN MENSCHLICHEN ORGANISMUS. 2: ENERGIEUMSATZ UND LEISTUNGSFAHIGKEIT AM ERGOMETER]**

A. Berghoff et al Jul. 1969 13 p refs Transl. into ENGLISH from Med. Pharmacol. Exptl. (Basel), v. 12, 1965 p 157-166 (RAE-Lib-Trans-1364) Avail: CFSTI

Energy metabolism and physical performance were tested in two subjects in twenty ergometric examinations over a long period, comparing the locally typical low-fat, high-carbohydrate diet with a high-fat, low-carbohydrate diet. Performance, as measured by pulse rate and maximum oxygen consumption during effort on the ergometer, is higher with a low-fat than with a high-fat diet. Fat is utilized as an energy source to a greater extent with a high-fat than with a low-fat diet. The BMR is lower with a low-fat than with a high-fat diet. The higher performance with a low-fat diet is not dependent upon an increased level of muscular effort. Energy metabolism and performance are adjusted to the level appropriate to a particular diet within a fortnight. For work requiring no ability to concentrate and coordinate (e.g. ergometric performance), a low-fat diet is more apt to improve performance. This does not necessarily mean that the same would be true for work requiring a high concentration and coordinating ability. Author

**N70-32182#** Texas Technological Coll., Lubbock.

**THE EFFECT OF AUDIO-VISUAL ON VIBROTACTILE SIGNAL DETECTABILITY**

Jerry D. Ramsey and Gary D. Luker (Boeing Co., Seattle, Wash.)

(Contract DAAD05-69-C-0102)

(AD-703869) Avail: CFSTI CSCL 6/16

With the design of more sophisticated and complex systems, the human operator is required to perform more tasks and to monitor more displays. Consequently, a greater burden has been placed on the visual and auditory sensory channels. To relieve this burden placed on the eyes and ears, it is suggested that other sensory channels be investigated to process some of the displayed information. Author (TAB)

**N70-32207#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

**GENERATION OF RANDOM SEQUENCES BY HUMAN SUBJECTS: A CRITICAL SURVEY OF LITERATURE**

W. A. Wagenaar [1970] 16 p refs

(IZF-1970-K) Avail: CFSTI

The subjective concept of randomness is used in many areas of psychological research to explain a variety of experimental results. One method of studying randomness is to have Ss generate random series. Unfortunately, few results of the experiments that used this method lend themselves to comparison and synthesis because of the fact that the investigations employed such a variety of experimental conditions and definitions of mathematical randomness. Some suggestions for future research are made. Author

**N70-32212\*#** Techtran Corp., Glen Burnie, Md.

**SIGNALS OF HUMAN OPERATOR STATE**

A. N. Lukyanov et al Washington NASA Jun. 1970 274 p refs Transl. into ENGLISH of the book "Signalny Sostoyaniya Cheloveka Operatora" Moscow, Nauka Press, 1969 p 1-235

(Contract NASw-1695)

(NASA-TT-F-609) Avail: CFSTI CSCL 06D

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**N70-32213\*#** Techtran Corp., Glen Burnie, Md.

**THE HUMAN OPERATOR IN THE CONTROL SYSTEM**

In its Signals of Human Operator State Jun. 1970 p 1-9 refs (See N70-32212 17-05)

Avail: CFSTI CSCL 06D

This chapter presents a broad overview of the problem of reliability of the human operator in the control system. It is pointed out that human operator reliability is maximal only at a certain level of operator stress, and that stress levels either too low or too high result in a decrease of operator reliability and performance. Various methods of analyzing man-machine systems, looking upon the operator as the controlling or the controlled element, are briefly analyzed. Author

**N70-32214\*#** Techtran Corp., Glen Burnie, Md.

**EXPERIMENTAL METHODOLOGY**

*In its* Signals of Human Operator State Jun. 1970 p 10-21  
refs (See N70-32212 17-05)

Avail: CFSTI CSCL 06D

Four series of experiments are described which were undertaken to analyze the influence of emotionality and stress on operator efficiency. The experiments included: (1) reception of a light signal, with the response being to press a button immediately upon receipt of the signal, thereby testing attention stability; (2) selection of an audible signal, consisting of a series of numbers in which the test subject was to recognize when a number was being repeated; (3) search for a visual signal, involving recognition of and counting of certain types of patterns on a pattern filled screen; and (4) electron beam control, in which an electron beam was to be made to match a curve on an oscilloscope by manual control. Author

**N70-32215\*#** Techtran Corp., Glen Burnie, Md.

**SIGNALS OF THE STATE OF ATTENTION**

*In its* Signals of Human Operator State Jun. 1970 p 22-89  
refs (See N70-32212 17-05)

Avail: CFSTI CSCL 06D

Various types of signals of the state of attention are analyzed. The signals analyzed include the alpha rhythm and other electroencephalographic characteristics. The values of a random sequence of readings of the alpha rhythm integrator are subjected to mathematical analysis to determine distribution, confidence limits, etc. Author

**N70-32216\*#** Techtran Corp., Glen Burnie, Md.

**THE ELECTROENCEPHALOGRAM**

*In its* Signals of Human Operator State Jun. 1970 p 90-140  
refs (See N70-32212 17-05)

Avail: CFSTI CSCL 06D

A general analysis of the electroencephalogram is presented. The various rhythms encountered in the electroencephalogram are described and characterized statistically. Variations in the typical electroencephalogram with variations in the state of attention are described. Typically EEG integrator output signal are analyzed mathematically. Author

**N70-32217\*#** Techtran Corp., Glen Burnie, Md.

**FREQUENCY OF HEART CONTRACTIONS**

*In its* Signals of Human Operator State Jun. 1970 p 141-172  
refs (See N70-32212 17-05)

Avail: CFSTI CSCL 06P

The auto correlation functions of cardiac rhythm are analyzed, and it is determined that after a steeply dropping initial sector, this function fluctuates in a complex manner about the abscissa as pulse frequency varies with respiration and emotional state. An electrical analogue for vagus nerve inhibition is presented. Experimental modeling of the influence of emotional stress on cardiac contraction frequency by digital computer is described. Author

**N70-32218\*#** Techtran Corp., Glen Burnie, Md.

**THE SPEECH SIGNAL**

*In its* Signals of Human Operator State Jun. 1970 p 173-215  
refs (See N70-32212 17-05)

Avail: CFSTI CSCL 06D

Experiments indicate that the changes in the spectral conditions of a speech signal are among the most reliable for determination

of the emotional state of a human operator. Experiments performed included modeling human speech under the influence of emotion, which confirm the stable changes in frequency composition, etc. with emotional coloring. Author

**N70-32258#** Institute for Perception RVO-TNO, Soesterberg (Netherlands).

**HUMAN ASPECTS OF SHIP MANOEUVRING AND SIMULATION**

W. A. Wagenaar 1969 10 p

(IZF-1969-26; TDCK-54651) Avail: CFSTI

The maneuverability of a ship is determined by the physical properties of the ship in its environment and the physiological and psychological characteristics of its navigator. The study of maneuverability emphasized the interactional aspect. Human perception, information processing, adaptation, and training are discussed briefly. It is proposed that research and adequate training in this field are only possible if the situation for the man on the bridge is simulated as realistically as possible. Author

**N70-32316#** Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

**INFLUENCE OF GAMMA RAYS ON THE PRODUCTION AT BREAKS IN DNA [HET ONTSTAAN VAN BREUKEN IN DNA ONDER INVLOED VAN GAMMA STRALING]**

G. P. van der Schans 1969 88 p refs In DUTCH; ENGLISH summary

(TDCK-54368) Avail: CFSTI

The average number of breaks per molecule for a population of DNA molecules was measured using the technique of sedimentation through a sucrose gradient in a preparative ultracentrifuge. Formulas are derived for the molecular weight distribution obtained after introducing random breaks in an initially monodisperse population of chain molecules. Quantitative data are presented along with details of methods and materials. It is shown that if random breaks are introduced into DNA molecules by means of gamma irradiation, the average number of breaks per molecule can be calculated from the sedimentation distance corresponding to the maximum of the distribution of broken DNA in the gradient. It is further demonstrated that in the case of indirect action double strand breaks arise from secondary reactions following radical attack on one strand. In this way a single strand break leads to a break in the complementary strand with an efficiency of about 2%. The same mechanism cannot be excluded for direct action. E.M.C.

**N70-32350#** Texas Technological Coll., Lubbock.

**THE EFFECTS OF PRE-TASK ADAPTATION AND AVERSIVE STIMULATION UPON VIGILANCE BEHAVIOR**

Douglas I. Blom and Charles G. Halcomb 11 Mar. 1970 30 p  
refs

(Contract DAAD05-69-C-0102)

(AD-703837) Avail: CFSTI CSCL 5/10

The complex problem of vigilance behavior has provided a sizable literature. Several theoretical models have been advanced to account for experimental findings. A hypothesis based upon aversive stimulation was presented, and data were collected to test the hypothesis. Specifically, the present study was designed to test the effects of pre-task adaptation and aversive stimulation upon the performance of a visual vigilance task. Author (TAB)

**N70-32351#** Texas Technological Univ., Lubbock.

**A STEREOMETRIC SYSTEM FOR MEASURING HUMAN**

**MOTION**

M. A. Ayoub, M. M. Ayoub, and J. D. Ramsey 1970 41 p refs

(Contract DAAD05-69-C-0102)

(AD-703873) Avail: CFSTI CSCL 5/5

The primary objective of the investigation was to develop a system for measuring human motion in three dimensions, utilizing principles and methodology of stereophotogrammetry. The study had two phases. The first included basic theoretical and laboratory investigations of the various parameters which influence the design and construction of a stereometric system. In the second, the system was evaluated during an experimental investigation in which an attempt was made to test its accuracy and adequacy in measuring objects under static and dynamic orientations. In further experimentation, the stereometric system was used to determine the motion characteristics for human subjects under three-dimensional moves.

Author (TAB)

**N70-32352#** Texas Technological Univ., Lubbock. Center of Biotechnology Fatigue and Human Performance.

**MEMORY LOAD AND INFORMATION CODING IN CONCEPT LEARNING**

Nathan R. Denny and T. Garrett 1969 14 p refs Presented at the Western Psychological Assoc. Meeting, Vancouver, Can., 19 Jun. 1969

(Contract DAAD05-69-C-0102)

(AD-703867) Avail: CFSTI CSCL 5/10

An investigation was made of the effects of different methods of solution on solution efficiency and memory error. The three methods used varied the kind of perceptual assistance Ss used. These methods also varied the availability of previously presented stimuli. The three methods of solution for the two rules of inclusive and exclusive disjunction were studied under conditions of temporal stress, with all methods using a 30 second interval between the onsets of successive stimuli. In solving the attribute identification problems, Ss used a method involving the use of either no memory aid, or a cumulative record of S hypothesis notations, or a display allowing them to view the last 10 stimuli between trials.

Author (TAB)

**N70-32360#** St. Louis Univ., Mo. Parks Coll. of Aeronautical Technology.

**A STUDY OF THE EFFECT OF TIME ON THE INSTRUMENT SKILL OF THE PRIVATE AND COMMERCIAL PILOT Final Report**

Leon Z. Seltzer 38 p refs

(Contract DOT FA-69-WA-2202)

(FAA-DS-70-12) Avail: Issuing Activity

This study was performed to determine the effect of time on the instrument skill of non-instrument rated private and commercial pilots. Sixty-six private and commercial pilots who have had their licenses from 6 months to 9 years were used as subjects. Results show that there is an apparent decline in instrument proficiency with time for the private pilot and to a lesser degree for the commercial pilot. This proficiency can be regained. During the project this was accomplished with an average of 2-1/2 hours flight instruction plus 50 minutes ground instruction for the private pilots and 1-1/2 hours flight instruction plus 25 minutes ground instruction for the commercial pilots. The average improvement for private pilots, as a result of flight and ground instruction, was 33% and for the commercial pilot, 29%, over their initial check score.

Author

**N70-32376#** European Atomic Energy Community, Brussels (Belgium).

**PROCEEDINGS OF THE SECOND SYMPOSIUM ON MICRODOSIMETRY**

H. G. Ebert, ed. Jan. 1970 876 p refs Held at Stresa, Italy, 20-24 Oct. 1969

(EUR-4452-d-f-e) Avail: CFSTI HC\$10.00/MF\$0.65

Conference papers are presented on radiation measurements, radiation counters, relative biological effectiveness, and related topics on microdosimetry. For individual titles see N70-32377 through N70-32419.

N.E.N.

**N70-32377#** Medical Research Council, London (England). Experimental Radiopathology Unit.

**MECHANISMS OF LETHAL RADIATION DAMAGE TO CELLS**

Tikvah Alper /in EURATOM Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 5-49 refs (See N70-32376 17-04)

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

Deoxyribonucleic acid is one of two important sites of primary lesion, and the nonnucleic acid target is the site at which radio-sensitization by oxygen occurs. Chemical protection, and sensitization in anoxic conditions, are also probably due to the effects of the agents concerned on the events following energy deposition in the nonnucleic acid site. There is now inferential evidence that cell membranes are the site of type O damage, though there may be subsequent interaction with the lesions following energy deposition in DNA. Observations on the killing of bacteria by neutrons and by particles of defined LET have led to the conclusion that increasing effectiveness, with increasing LET, is attributable to type O damage. It may be that the increase in effectiveness is due to an increase in the probability of interaction of type O and type N events, rather than to an increase in the probability of damage to the membrane itself.

Author

**N70-32378#** Medical Research Council, Harwell (England). Radiobiology Unit.

**THE INTERPRETATION OF SURVIVAL CURVES IN RELATION TO RADIATION QUALITY AND CELLULAR REPAIR MECHANISMS**

G. J. Neary /in EURATOM Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 51-81 refs (See N70-32376 17-04)

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

The log-survival curves of bacteria and yeast have two obvious characteristics: the extent of the shoulder and the ultimate slope of the approximately linear later portion of the curve. There is some evidence that the shoulder and slope are partly determined by different mechanisms of repair. It is necessary to consider the distinction between the primary molecular lesions, the lesions remaining after completion of the swift metionic reactions, and the residual lesions after the intervention of postirradiation repair and bypass mechanisms. The effects of radiation quality and modifying agents such as oxygen appear to be different for these three classes of lesion. These ideas are illustrated with some new experimental data on DNA strand breakage in vitro and on cell killing. Data on the comparative effects of heavy particles and X-rays of low quantum energy show that the influence of radiation quality is complex and no simple index of quality is generally applicable.

Author

**N70-32379#** Radiobiological Inst. TNO, Rijswijk (Netherlands).

**LOCAL ENERGY DENSITY REQUIREMENTS FOR BIOLOGICAL RADIATION DAMAGE AND THEIR MODIFICATION BY ENVIRONMENTAL CONDITIONS**

G. W. Barendsen /in EURATOM Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 83-105 refs (See N70-32376 17-04)

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

Characteristics of relations between the relative biological effectiveness of different ionizing radiations and the spatial distributions of energy dissipation in irradiated cells can be interpreted by the assumption that for the induction of various types of damage in cells, energy absorption is required at local energy densities which must exceed a minimum value. These high local energy densities initiate the chain of events which finally results in the end-point observed. A variety of factors is known to be capable of modifying the effectiveness of a given dose of ionizing radiation for producing biological damage. For radiations which mainly produce very high local energy densities, the effectiveness per unit dose for producing a given biological end-point is less dependent on various environmental conditions than the effectiveness of radiations which deposit most of the energy at low energy densities. The relation between the magnitude of the modification by oxygen and the variation in local energy density requirements is discussed. It is concluded that differences exist, depending on the end-point measured. Author

**N70-32383#** Radiobiological Inst. TNO, Rijswijk (Netherlands).  
**DISTRIBUTION OF ENERGY DEPOSITION BY  
 GAMMA-RAYS AND 15 MEV NEUTRONS IN CYLINDRICAL  
 VOLUMES**

B. Hogeweg and G. W. Barendsen *In EURATOM Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 171-181 refs (See N70-32376 17-04)*

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

Damage induced by ionizing radiations in biological systems is presumably caused by high local energy densities produced in one or more essential cellular structures of as yet unknown size and shape. In order to investigate the extent to which the shape of a structure is an important parameter with respect to the probability of the induction of damage by different radiations, measurements of event size spectra were performed with two cylindrical proportional counters with a central wire for which the ratios of length and diameter were 10 and 2 respectively. Irradiations were carried out with Co-60 gamma rays and 15 MeV neutrons produced by the D-T reaction. At a pressure of 1000 torr and 200 torr of tissue-equivalent gas no differences were observed between the event size distributions measured with the two counters but at a gas pressure of 100 torr significantly more large events were observed with the long counter irradiated with 15 MeV neutrons. At this pressure the diameter of the counter was equivalent to 0.5 micron of tissue. Author

**N70-32384#** Bureau International des Poids et Mesures, Sevres (France).

**DISTRIBUTION OF DEPOSITED ENERGY BY NEUTRONS  
 IN THE INTERIOR OF REVOLVING ELLIPSOIDS  
 [DISTRIBUTION DE L'ENERGIE DEPOSEE PAR DES  
 NEUTRONS A L'INTERIEUR D'ELLIPSOIDES DE  
 REVOLUTION]**

A. Allisy and M. Boutillon *In EURATOM Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 183-192 ref In FRENCH (See N70-32376 17-04)*

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

Calculations were made to determine the penetrating ability of neutrons in tissue equivalent materials. Conditions setup for the calculations required that the ellipsoid be placed in a homogeneous medium and under the influence of neutrons whose influence is uniform and isotropic. Other conditions required that the charged particles be rectilinear trajectories. Only the elastic diffusion of neutrons was considered. Transl. by J.M.C.

**VARIATION OF RBE VALUES AND OER FOR COMPLEX  
 HEAVY PARTICLE SPECTRA**

J. F. Fowler *In EURATOM Proc. of the 2d Symp. on*

*Microdosimetry Jan. 1970 p 193-218 refs (See N70-32376 17-04)*

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

Predictions of relative biological efficiency (RBE) and oxygen enhancement ratio (OER) for beams of densely ionizing radiation, which would be useful for protection purposes and for machine design in radiotherapy, are reviewed. Extrapolation of these factors from limited measured values in certain biological specimens was attempted with moderate success. Some experiments, however, still give unexpected results. Nevertheless, semiquantitative explanations can be offered for the relative constancy of OER with neutron energy (except the high value at 0.42 MeV) and for the discrepancy in results of survival of human kidney cells in track-segment experiments with particles of high LET. One approach was through LET spectra, which are difficult to determine. The more direct approach through Y spectra are discussed. An example of an apparent discrepancy between biological results and expectations based on physical measurements occurred in the finding that the OER for fast neutrons changes significantly with depth in a tissue-equivalent phantom. Here the Y spectra appear to be more reliable than conventional physical methods. Author

**N70-32403#** United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

**THE STOPPING POWER OF LOW ENERGY ELECTRONS  
 IN BIOLOGICAL MATERIALS**

M. Marshall, J. A. B. Gibson, and P. D. Holt *In Euratom Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 529-539 refs (See N70-32376 17-04)*

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

The target theory of Lea has been examined using modern data to determine whether consistent cross sections could be obtained from the inactivation of biological molecules by various radiations. The stopping power for low energy electrons and the rate of primary ionisation, which are required by the theory, are not known. However, when the theory is applied to the inactivation of the enzyme, ribonuclease, a consistent value of the cross section is found for one value of the parameter used to determine the primary ionisation and for one model of the stopping power for low energy electrons. In this work gamma rays, protons, deuterons and alpha particles were used to inactivate the ribonuclease. As much of the effect for heavily ionising radiation is due to delta rays, further experiments on the effect of low energy electrons (produced by low energy characteristic X-rays) are in progress. Preliminary results suggest that the models used are still valid. Author

**N70-32411#** Leeds Univ. (England). Dept. of Medical Physics.

**TRACK STRUCTURE IN RELATION TO TARGET  
 STRUCTURE**

P. R. J. Burch *In EURATOM Proc. of the 2d Symp. on Microdosimetry Jan. 1970 p 685-736 refs (See N70-32376 17-04)*

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

For certain classes of radiobiological change RBE stays independent of LET at low LET but declines at high LET. Accurate data for systems of this kind agree with the hypothesis that biological change results from a single random transfer of energy from the ionizing particle to a target zone. For some other types of damage—notably the induction of chromosome aberrations and the inactivation of the proliferative capacity of mammalian cells—RBE first increases with total LET to reach a maximum at around 100 keV/um and it then falls off at still higher LET. This relationship has been interpreted in terms of a multi-transfer mechanism. Previously, it has been supposed that at least  $n$  ion pairs have to be formed within a track segment  $t$ , and that the distribution of

energy transfers within it is random. It will be argued that this model is unrealistic and that attention needs to be given to the structure of the target. The thermoluminescent yield from LiF exhibits LET-dependence. Author

**N70-32413#** European Atomic Energy Community, Ispra (Italy). Biology Div.

**INTERPRETATION OF RADIOBIOLOGICAL EFFECTS WITH MICRODOSIMETRY**

J. Booz *In its Proc. of the 2d Symp. on Microdosimetry* Jan. 1970 p 737 - 760 refs (See N70-32376 17-04)

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

The paper deals with the relation of survival curves and RBE-values to the spectral distribution of local energy density. Biological threshold and biological variance as well as recovery are taken into account. Using the inhibition of clone formation of human kidney ceels as an example the paper discusses the extrapolation of RBE-values to very low doses and analyses the problem of the smallest target size which can be deduced from the measured RBE-curves. Author

**N70-32414#** Radiobiological Inst. TNO, Rijswijk (Netherlands).

**THE RELATION BETWEEN MOUSE LETHALITY AND ENERGY DEPOSITION BY SECONDARY PARTICLES FROM NEUTRONS AND X-RAYS**

J. J. Broerse, L. M. van Putten and G. W. Barendsen *In EURATOM Proc. of the 2d Symp. on Microdosimetry* Jan. 1970 p 761 - 778 refs (See N70-32376 17-04)

(Contract EURATOM-075-69-1 BION)

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

The absorbed doses of fast neutrons and electromagnetic radiation depend on the atomic composition of the tissue in which energy is deposited. In previous experiments perturbations in secondary particle equilibrium for neutron- and X-irradiations have been measured at interfaces of bone- and soft tissue-equivalent plastic respectively and the results have been related to the RBE of 15 MeV neutrons compared to 300 kV X-rays for the induction of the bone marrow syndrome and the intestinal syndrome in mice. A major uncertainty in the interpretation of these studies arises from the fact that the RBE-LET relations may well differ for different types of cells. In order to evaluate such differences the spleen colony technique has been used to study the proliferation of haemopoietic cells in mice after irradiations with 15 MeV neutrons and 300 kV X-rays. RBE-values for the survival of colony forming units for both in vivo and in vitro irradiations have been compared with the RBE for the bone marrow syndrome. Author

**N70-32415#** Justus Liebig-Universitat, Giessen (West Germany).

**SOME THEORETICAL CONSIDERATIONS CONCERNING ULTRA-HIGH DOSE RATE SURVIVAL EXPERIMENTS**

Juergen Kiefer and Michael Ebert (Christie Hospital) *In EURATOM Proc. of the 2d Symp. on Microdosimetry* Jan. 1970 p 779 - 786 refs (See N70-32376 17-04)

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

Theoretical expectations for specific effects of ultra-high dose rates on cell survival are considered: (1) primary damage to target molecules in the cell may be reduced due to recombination of radicals from different tracks. It is estimated that this effect is not likely to occur below doses of 280 Krad given at dose rates of 10 to the power of 14 rad/sec.; and (2) primary damage may be modified by secondary processes. On the basis of current models it is estimated that this might be seen at doses higher than 500 rad. Since the formation of long-lived secondary or tertiary radicals is essential, the exposure must be long enough to allow the respective reactions to take place. It is concluded, therefore, that there may exist an optimal dose rate where deviations from the effects at conventional dose rates may be found. Author

**N70-32416#** Kernforschungsanlage, Juelich (West Germany).

**MICRODOSIMETRY OF IODINE-125 WITH REFERENCE TO THE AUGER EFFECT**

H. H. Ertl and L. E. Feinendegen *In EURATOM Proc. of the 2d Symp. on Microdosimetry* Jan. 1970 p 787 - 800 refs (See N70-32376 17-04)

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

<sup>125</sup>I elicits the Auger effect. It is widely used as tracer of proteins and DNA (5-iodo-deoxyuridine). Comparing the radiation dosimetry for the case of tritium decay with that of <sup>125</sup>I decay (considering the Auger electron emission), radiation effects from the latter are expected to exceed those from the tritium beta by a factor of approximately 3. First experimental data, however, indicate that <sup>125</sup>I incorporated into DNA of mouse cells in vivo causes additional damage. Since effects from recoil and chemical transmutation are improbable causes for the additional damage observed, secondary effects due to fragmentation of multi-charged molecular ions in consequence of the Auger effect need being invoked for interpretation. Author

**N70-32417#** Gottingen Univ. (West Germany).

**ELECTRON DEGRADATION AND BIOLOGICAL EFFECTS**

B. Markus *In EURATOM Proc. of the 2d Symp. on Microdosimetry* Jan. 1970 p 801 - 812 refs (See N70-32376 17-04)

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

After a short survey of the theoretical state practical ways of experimentally investigating the effect of the energy spectrum of fast electrons on biological reactions are described. Proof depends on suitable dosimetry and the choice of biological subjects and reactions. Criteria which are relatively independent of the dose and show qualitative differences in effect between various types of radiations proved especially suitable. In the experiments carried out with 14.2 MeV electrons the different energy spectra were obtained by varying the irradiation depth. The radiation effects observed were: (1) chromosomal aberrations in the tips of roots of *Allium cepa* (the onion): the relative frequency following irradiation displays a variation with the electron spectrum. It was shown by labelling with H<sup>3</sup>-thymidine that there is differing sensitivity to different electron spectra; and (2) in the various dose ranges the length-wise growth of the primary leaves of *Hordeum* (barley) displayed a stimulation effect. Author

**N70-32418#** Philipps-Universitat, Marburg (West Germany). Inst. fuer Strahlenbiologie und Medizinische Isotopenanwendung.

**DEPTH DEPENDENCE OF LET SPECTRA FOR FAST NEUTRONS IN A HUMAN TRUNK PHANTOM [TIEFENABHAENIGKEIT DER LET-SPEKTREN FUER SCHNELLE NEUTRONEN IN EINEM MENSCHLICHEN RUMPFPHANTOM]**

H. Krueger and E. H. Graul *In EURATOM Proc. of the 2d Symp. on Microdosimetry* Jan. 1970 p 813 - 840 refs In GERMAN; ENGLISH summary (See N70-32376 17-04)

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

The LET spectra at various points in a human trunk phantom filled with tissue-equivalent solution were measured with a tissue-equivalent spherical proportional counter of 1 cm inside diameter. The primary neutron energies were 15 and 3 MeV respectively. The changes in LET with increasing depth within the phantom are given for these neutron energies and discussed, together with the depth/dose curves stemming from these measurements and the depth-dependent changes in the quality factor. Author

**N70-32430#** Armed Forces Radiobiology Research Inst., Bethesda, Md.

**HEMATOPOIETIC RECOVERY IN IRRADIATED DOGS**

S. J. Baum and D. E. Wyant Feb. 1970 30 p refs

(AD-703273; AFRI-SR-70-2) Avail: CFSTI CSCL 6/18

## N70-32440

The objectives of this study were to measure hematological recovery responses in the sublethally irradiated dog exposed to 150 rads of X-rays; and, furthermore, to compare these effects with those observed in animals irradiated with 150 rads of mixed gamma-neutron radiation. Finally, measurements of hematological recovery capabilities were to be obtained in previously irradiated dogs subjected to subsequent identical exposures after 3-month intervals. Author (TAB)

**N70-32440#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### **AN EXPERIMENTAL INVESTIGATION OF THE DEPENDENCE OF THE PROBABILITY OF IMAGE RECOGNITION**

N. W. Krasilnikov et al 5 Mar. 1970 8 p Transl. into ENGLISH from Tekhnika Kino i Televideniya (Moscow), no. 2, 1969 p 53-54 (AD-704766; FTD-MT-24-347-69) Avail: CFSTI CSCL 5/5

Outlined are the results of experimental dependence investigation of the probability of the correct image identification, transmitted by the system, from the number of images included into the initial category. TAB

**N70-32473\*#** Applied Electrochemistry, Inc., Mountain View, Calif. **DEVELOPMENT OF A CO<sub>2</sub>-H<sub>2</sub>O SOLID OXIDE ELECTROLYTE ELECTROLYSIS SYSTEM** Annual Report J. Weissbart and W. H. Smart May 1970 104 p refs (Contract NAS2-4843) (NASA-CR-73464; AR-2) Avail: CFSTI CSCL 06K

Development of an aerospace life support system for oxygen production from CO<sub>2</sub> proceeded successfully from the 12-ampere to the 127-ampere level during this program period. The system consisting of a 127-ampere three-module CO<sub>2</sub>-H<sub>2</sub>O solid oxide electrolyte electrolyzer at 880 C and CO-disproportionation reactor at 556 C was tested and operated continuously beyond 250 hours. The unit generated oxygen at a rate of 481 ml/min with a faradaic current efficiency near 100% and an average CO<sub>2</sub> content of only 2.4%. The CO<sub>2</sub> was converted in the electrolyzer to 53% CO, and one-third of this CO was disproportionated in the reactor to carbon and CO<sub>2</sub>. Each module, rated at 48 amperes and operated at 42 amperes at a current density of 175 mA/sq cm, contained twelve cells arranged as six two-cell drums. Author

**N70-32482#** School of Aerospace Medicine, Brooks AFB, Tex. **A PORTABLE, SELF-POWERED SYSTEM FOR RAPID DETERMINATION OF BLOOD pH AND HEMATOCRIT, AND LEVELS OF SODIUM, POTASSIUM, AND CHLORIDE** Final Report, Dec. 1966 - May 1969

Marion J. Stansell and Shelby J. Stansell Dec. 1969 39 p refs (AD-705169; SAM-TR-69-78) Avail: CFSTI CSCL 6/12

A rapid, reliable, and accurate system has been developed for measuring blood hematocrit, blood pH, plasma chloride, plasma sodium, and plasma potassium levels during aeromedical evacuation operations. This analytic system, which has been subjected to extensive laboratory tests, is not only compact, portable, completely self-contained, and battery operated, but uses only small quantities of sample. With this assembly, the entire analytic operation from blood collection to final readout can be accomplished in 7 min. Validation testing indicates: (a) excellent electronic and temperature stability; (b) freedom from extraneous electrical interference; (c) a procedural coefficient of variation of less than 1% for measurements of pH and levels of sodium and chloride, near 1.4% for determination of hematocrit, and near 3% for the measurement of potassium; (d) agreement within 2% with established reference methods; and (e) six months of daily operations without debilitating malfunction. The system is of potential value in aeromedical

evacuation as well as in emergency field hospitals, hospital wards, and any other areas requiring a system which is portable and independent of gas supplies and external electric power.

Author (TAB)

**N70-32483#** Naval Postgraduate School, Monterey, Calif. **COMPUTERIZED SURVIVOR SEARCH PLANNING**

Joseph Henry Discenza (M.S. Thesis) Jun. 1969 117 p refs (AD-704781) Avail: CFSTI CSCL 6/7

A computer program is presented which solves the search planning problem for survivors at sea. The program is designed to utilize weather data. An investigation is also made into the search criteria used by the United States Coast Guard in its planning procedures. Guidelines are given for the use of the square search and the Sector search. Author (TAB)

**N70-32513#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### **APPLICATION OF A LEARNING RECOGNITION SYSTEM FOR THE SEPARATION OF AN UNKNOWN SIGNAL FROM NOISE**

A. Kh. Gelig et al 12 Mar. 1970 12 p refs Transl. into ENGLISH from Vychislitel'naya Tekhn. i Vopr. Programirovaniya (USSR), v. 7, no. 5, 1968 p 95-100 (AD-705156; FTD-HT-23-80-70) Avail: CFSTI CSCL 6/4

An experiment in the detection of a signal (with its form not given in advance) in the presence of great noise with the aid of a learning recognition system (L-optimal recognition system) is described. Pictures composed of a random accumulation of points appear on a 10 x 10 cm screen. The number of points varies from 20 to 40. Each picture belongs to one of two classes. The picture belonging to the first class contains a signal in the form of a rhomb of eight points. The dimensions of the rhomb in all pictures of the first class are the same, only their locations and orientations change. The pictures of the second class are not rhombs and imitate the noise without a signal. The figures of the first class imitate the signals in the presence of such a great noise that when the form of the signal is submitted to a man he makes a 5 percent error in recognizing it when the time of recognition is limited to 2-3 sec. During the experiment the form and the character of the signal is not submitted to the recognition system or to a man, and only the pictures of both classes (instruction sequence), indicating to which class they belong are shown. TAB

**N70-32514#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

### **COMPARATIVE CHARACTERISTIC OF SOME OF THE DEVICES USED TO DETERMINE THE MICROBIAL CONTAMINATION OF THE AIR**

G. N. Ishchenko et al 16 Mar. 1970 9 p Transl. into ENGLISH from Med. Zh. Uzb. (Uzbek SSR), no. 6, 1962 p 16-18 (AD-705164; FTD-HT-23-144-70) Avail: CFSTI CSCL 6/13

The article deals with a comparative study between Krotov apparatus and plate culture methods of determining microbial contamination of air. The air tested was that of schools and universities before and after classes. The results have been tabulated and comparison made. Author (TAB)

**N70-32522\*#** National Aeronautics and Space Administration, Washington, D.C.

### **QUARANTINE SCHEMES FOR MANNED LUNAR MISSIONS** [1969] 13 p

(NASA-TM-X-64319) Avail: CFSTI CSCL 06F

The fundamental quarantine and sample release plans for manned lunar missions are presented. The scheme does not contain



all possible finite technical details about quarantine test methods and containment provisions, but it provides the necessary framework for action and substantive methods for satisfying the quarantine requirements. It is impossible in any set of quarantine plans to anticipate every eventuality. Therefore, it is necessary that the schemes include a contingency provision that gives adequate opportunity to provide requirements and suggestions for situations not covered in the formal plans. In spite of efforts being made to assure aseptic collection and return of lunar samples, there is no certainty of the complete absence of earth microbial contaminants. And certainly, the potential of earth contaminants in returned lunar samples will be significantly greater after the first Apollo mission.

Author

**N70-32526#** School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

**DAILY TOTAL-BODY EXPOSURES OF PRIMATES TO PROTON-, X-, OR GAMMA RADIATION: THE HEMATOLOGIC RESPONSE** Final Report, Aug. 1967—Aug. 1969

David Sturrock, Edwin R. Ballinger, and Joseph E. Traynor Feb. 1970 70 p refs

(AD-705147; SAM-TR-70-1) Avail: CFSTI CSCL 6/18

In the course of space exploration, man may be exposed to relatively small but significant daily doses of high-energy proton radiation from solar flares. These doses might not be high enough to produce symptoms, but could produce changes in the number of peripheral blood cells. Rhesus monkeys were exposed in groups to daily, pulsed doses of 3-, 5-, 8-, 10-, 15-, or 20 rads from 150-Mev protons. Other groups were similarly exposed to pulsed 300-kvp X-rays. Still others were exposed continuously to cobalt-60 gamma radiation for a total dosage within 22 hours of 5-, 10-, 15-, or 20 rads. Assuming that the ratio of the dynamics of the changes in the peripheral blood counts from pulsed proton exposures (Pp) to those from pulsed X-rays (Px) would be the same as the ratio of the dynamics of the changes in the peripheral blood counts from continuous proton exposures (Cp) to those from continuous gamma exposures (Cg) (i.e.,  $Pp:Px = Cp:Cg$ ), the unknown (Cp) could be deduced. Results suggest that the ratio Pp:Px is exceedingly close to unity, and that the ratio of Pp (or Px): Cg is between 1.5 and 1.6 to 1. Consequently, the effect of continuous proton exposure within these daily dose increments can be predicted.

Author (TAB)

**N70-32527\*#** Minnesota Univ., Minneapolis. Space Science Center.

**ENVIRONMENTAL MICROBIOLOGY AS RELATED TO PLANETARY QUARANTINE** Progress Report, 1 Dec. 1967—31 May 1968

Jun. 1968 43 p refs

(Grant NGR-24-005-063)

(NASA-CR-97542) Avail: CFSTI CSCL 06M

A compilation of reports is presented describing research activity in the area of environmental microbiology as related to planetary quarantine. The reports include the following headings: (1) space hardware assay methodology; (2) die-off of microbial contamination; (3) effects of heat fixing and equilibration on *B. subtilis* var. *niger* spores; (4) methodology of measuring internal contamination of spacecraft hardware; (5) detection of low levels of microbial contamination on surfaces by chemical or bacteriological approaches; and (6) studies of attributes of mated surfaces that affect the heat destruction of microorganisms located in these areas.

D.L.G.

**N70-32534#** National Bureau of Standards, Boulder, Colo. Electromagnetics Div.

**QUANTIFYING HAZARDOUS MICROWAVE FIELDS:**

## ANALYSIS

Paul F. Wacker Apr. 1970 23 p refs  
(NBS-TN-391) Avail: SOD\$0.30

The major hazard from microwave and lower frequency radiation is believed to arise from dielectric heating of body tissues, and the heating of an isotropic medium is proportional to the sum of the squares of the absolute values of the electric field components. Hence, electric field energy density is proposed for a radiation hazard standard. Analytical limitations of various types of probes are considered and the advantages of a spherically-symmetric probe of lossy dielectric are discussed. For a rather general spherically-symmetric probe in an arbitrary field, both exact and approximate treatments are given for the calibration constant with full correction for the perturbation of the field by the probe. Conditions for a constant factor are also given.

Author

**N70-32550** National Lending Library for Science and Technology, Boston Spa (England).

**EQUIPMENT AND MATERIALS FOR THE TROPICS: DEVELOPMENT OF METHODS OF PROTECTION OF TRANSPARENT OPTICAL COMPONENTS FROM MOULD GROWTHS**

A. I. Sviridova et al Jan. 1970 7 p refs Transl. into ENGLISH from Opt. Mekh. Prom. (Leningrad), No. 4, 1957 p 61—63 (NLL-RRE-Trans-258-(8036.625)) Avail: Natl. Lending Library, Boston Spa, Engl.: 1 NLL photocopy coupon

The protection from mold attack of transparent optical components of instruments used in the tropics was studied using methoxyethyl mercury acetate at various temperatures and relative humidities. It was found that mold did not grow for 9 to 11 months on glass surface treated with a solution of this acetate, and the presence of a hydrophobic silicon film does not prevent the fungicidal action.

F.O.S.

**N70-32555#** Technical Communications Corp., Los Angeles, Calif.

**TOP-MAN X: A MANAGEMENT SIMULATION FOR INSTRUCTION IN TOTAL PROGRAMMING AND THE BASE ENGINEER AUTOMATED MANAGEMENT SYSTEM (BEAMS)** Final Report, Sep. 1967—Sep. 1969

Joel M. Kibbee, Leon Vickman, Ellen M. Dent, Luis F. Dominguez (AFSC, Wright-Patterson AFB, Ohio), and Arthur T. Stellmach (AFSC, Wright-Patterson AFB, Ohio) Wright-Patterson AFB, Ohio AFSC 26 Sep. 1969 62 p refs  
(Contract F33615-68-C-1076)

(AD-704892; SFN-2643; AFHRL-TR-69-20) Avail: CFSTI CSCL 5/9

TOP-MAN-X, a management game is used to assist in the instruction of USAF personnel in Total Programming. Total Programming is a USAF developed set of concepts and procedures for the optimum allocation of resources to the operation and maintenance of real property facilities on an Air Force base. TOP-MAN-X is a manual suitcase management game. The report includes a short introduction to Total Programming, a discussion of TOP-MAN-X and the various steps in its development, and concludes with some remarks on the automation of both TOP-MAN-X and Total Programming.

Author (TAB)

**N70-32573#** Joint Publications Research Service, Washington, D.C.

**CHARACTERISTICS OF BIOLOGICAL NOISE PROPAGATION IN SHALLOW WATER REGIONS OF THE BLACK SEA**

Ye. V. Shishkova 9 Jun. 1970 9 p refs Transl. into ENGLISH from Rybn. Khozy. (Moscow), 1969 No. 9, p 37—39; no. 10, p 37—38

(JPRS-50691) Avail: CFSTI

The development of a biological noise direction method to hydroacoustically locate large, solitary fish was studied in the shallow waters of the Black Sea. Conclusions are: (1) The proper selection of receiving systems depths has a significant effect on the effectiveness of its operation. (2) At short ranges (100 to 200 meters) the maximum sound pressure occurs at the level of the source, beyond this distance, it shifts to the center of the water layer, regardless of the source depth. (3) The decrease in sound pressure occurs according to the cylindrical law. Graphs showing sound pressure as a function of range, depth, and temperature are included. F.O.S.

**N70-32594\*#** Matrix Corp., Alexandria, Va. Human Factors Div.  
**SELECTION OF SYSTEMS TO PERFORM  
 EXTRAVEHICULAR ACTIVITIES, MAN AND MANIPULATOR.  
 VOLUME 1: PERFORMANCE EFFECTIVENESS  
 EVALUATION SCHEME (PEEVS) PART A: INSTRUCTIONS**  
 Kenneth M. Mallory, Jr., Edward L. Saenger, and Thomas B. Malone 27 Apr. 1970 25 p refs  
 (Contract NAS8-24384)  
 (NASA-CR-102762) Avail: CFSTI CSCL 06K

The procedures for identifying free space activity systems are outlined. These steps are identification of EVA function and activity system, selection of system performance effectiveness and cost measures, identification of system with required capabilities and costs, and testing of system selection sensitivity to assumption and missing data. For Part B see N70-31892. Author

**N70-32595\*#** Matrix Corp., Alexandria, Va.  
**SELECTION OF SYSTEMS TO PERFORM  
 EXTRAVEHICULAR ACTIVITIES, MAN AND MANIPULATOR.  
 VOLUME 1: PERFORMANCE EFFECTIVENESS  
 EVALUATION SCHEME (PEEVS). PART C: WORKSHEETS**  
 Kenneth M. Mallory, Jr., Edward L. Saenger, and Thomas B. Malone 27 Apr. 1970 27 p refs  
 (Contract NAS8-24384)  
 (NASA-CR-102764) Avail: CFSTI CSCL 06B

The worksheets provide a worked, although hypothetical, example of the PEEVS procedure. Some shortcuts are taken to reduce redundancy. Author

**N70-32596\*#** Matrix Corp., Alexandria, Va. Human Factors Div.  
**SELECTION OF SYSTEMS TO PERFORM  
 EXTRAVEHICULAR ACTIVITIES, MAN AND MANIPULATOR.  
 VOLUME 2: Final Report**  
 Edward L. Saenger, Thomas B. Malone, and Kenneth M. Mallory, Jr. 9 Apr. 1970 186 p refs  
 (Contract NAS8-24384)  
 (NASA-CR-102765) Avail: CFSTI CSCL 06B

The EVA problem is described, and the EVA functions are listed with associated task and performance requirements. The currently available methods for satisfying these requirements are discussed. Task, performance, and equipment requirements and capabilities are presented for manual EVA and for remote manipulator systems. Tradeoff and workbook methodologies are also discussed. Author

**N70-32621#** 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 7 p ref

(AD-703631; FAA-AM-69-9) Avail: CFSTI CSCL 6/15

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 had been 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 (TAB)

**N70-32649#** Naval Postgraduate School, Monterey, Calif.  
**EFFECT OF COLOR ON VISUAL VELOCITY ESTIMATION**  
 Larry Allen Backus (M.S. Thesis) Oct. 1969 23 p refs  
 (AD-704076) Avail: CFSTI CSCL 5/10

The study reports an investigation of the effects caused by the color of a moving light source on the ability of subjects to estimate the velocity of that light source. The variable used for comparison was travel time estimated over fixed distances. The study also provides an investigation into possible differences in the travel time estimate between an experienced and an inexperienced group of subjects. The experiment varied the color of the light source, the distance over which the estimation was made, and the velocity of the light source presented to the subjects. Results showed that the color had no significant effect on the ability of the subjects to estimate travel time and, therefore, velocity. The results also showed that no significant difference existed between the groups of subjects tested. Author (TAB)

**N70-32661#** Naval Postgraduate School, Monterey, Calif.  
**THE EFFECT OF REFERENCE SIGNALS IN A VISUAL VIGILANCE TASK**  
 Daniel Lewis Criswell (M.S. Thesis) Oct. 1969 31 p refs  
 (AD-704077) Avail: CFSTI CSCL 5/10

The effect of reference signals on performance in a visual vigilance task was studied under three conditions. Reference signals were presented on the same display as the real signals. In condition 1 (control), no reference signals were displayed. Subjects could demand reference signals whenever they wished in condition 2 (demand reference). Reference signals were programmed at arbitrary times during the experiment in condition 3 (programmed reference). Author (TAB)

**N70-32740#** Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.  
**THE INHALATION OF RADIOACTIVE SUBSTANCES. PART 3: URANIUM AND THORIUM (A LITERARY REVIEW)**  
 F. Gensicke et al [1969] 21 p refs Transl. into ENGLISH from German report SZS-3/69  
 (Contract AT(29-2)-1013)  
 (LF-tr-1) Avail: CFSTI

On the basis of 128 references a brief summary is given of the metabolic behavior of uranium and thorium after inhalation. Elimination is considered in particular. Author (NSA)

**N70-32752\*#** Webb Associates, Yellow Springs, Ohio.  
**AUTOMATIC CONTROLLERS FOR THE APOLLO LCG Final Report**  
 Samuel J. Troutman, Jr. and Paul Webb Jun. 1970 62 p refs  
 (Contract NAS9-9778)

(NASA-CR-108540) Avail: CFSTI CSCL 06K

Automatic controllers were developed for laboratory tests of the liquid cooling garment in the Apollo full pressure suit. The three types of controller options, the nature of the diverter valve, modifications made to the Apollo LCG, and the general features of the test coverall are described. Operating procedures and the results of performance tests are presented. Construction and design details of each of four modified suits are given as appendices. R.B.

**N70-32756#** Lockheed Missiles and Space Co., Sunnyvale, Calif.  
**PRELIMINARY PLANNING STUDY FOR RESCUE OF DISTRESSED SUBMERSIBLES Final Technical Report**

2 May 1969 207 p refs

(Contract DOT-C6-93019-A)

(AD-705175; LMSC-D023780-1) Avail: CFSTI CSCL 13/10

The basic objective of the study was to provide the U. S. Coast Guard with preliminary technical data and program planning information necessary to define the development of an initial distressed submersible rescue capability and the costs associated with that development. The final study output is this summary report in which system concept descriptions are provided and data on estimated costs supplied. Author (TAB)

**N70-32757#** Lockheed Missiles and Space Co., Sunnyvale, Calif.  
**STUDY OF METHODS AND DEVICES FOR LOCATING SMALL DISTRESSED SUBMERSIBLES Final Technical Report**

V. N. Thomas, D. P. Germeraad, R. Andris, J. Bentkowsky, J. Brophy et al Feb. 1970 235 p refs

(Contract DDT-CG-93019-A)

(AD-705167; LMSC-D052449) Avail: CFSTI CSCL 6/7

The task of locating a cooperative submarine, equipped with locator aids, is compared to that of locating a noncooperative submarine. It is shown that, if a cooperative search can be undertaken, the search and location operation is not the critical time segment of the rescue mission. If a noncooperative search must be undertaken, search and location becomes the critical time element. The most useful locator aid is found to be the underwater telephone, with which all submersibles are equipped. A generalized mathematical treatment is given, where the characteristics of the search equipment, the search vehicle, and the environment are treated in parametric form, along with the uncertainty in the location of the distressed submersible (DISSUB). Parametric analysis is applied to obtain realistic performance predictions. For the cooperative search, results are presented in the form of location time vs. range to the distressed submersible. For the noncooperative search, the results are presented in the form of curves of time to locate vs. probability of success. TAB

**N70-32785#** Naval Medical Research Inst., Bethesda, Md.  
**EVALUATION OF A DIVER'S THERMONUCLEAR SWIMSUIT HEATER SYSTEM Naval Medical Research Report**

John F. Tauber, John S. P. Rawlins, and Kenneth R. Bondi 18 Feb. 1970 19 p refs

(AD-705064; Rept-3) Avail: CFSTI CSCL 6/17

The present state of the thermonuclear (i.e., radioisotope heat source) diver heating system is discussed and the results of the only dive to date using this system are reported. The inlet and outlet temperatures of the system are recorded together with the time-course of skin and rectal temperatures. It is concluded that the system in its present state is incapable of maintaining thermal balance in a diver at depth, and its use under SEALAB III conditions would entail a grave risk of hypothermia. Author (TAB)

**N70-32789#** Oregon State Univ., Corvallis.

**MICROORGANISM STUDY: BACTERIAL ISOLANTS FROM HARSH ENVIRONMENTS Final Report**

W. B. Bollen and Karen M. Byers Kemper 22 May 1970 10 p Prepared for JPL

(Contracts NAS7-100; JPL-950783)

(NASA-CR-110558) Avail: CFSTI CSCL 06M

Identification data on soil isolants are tabulated. Source regions include the Antarctic, Alaska, Sahara Desert, Hilgard soils, California Desert, Chile, Hawaii, Little Lake, Oregon, Wyoming, Mexico, and Arizona. E.C.

**N70-32855#** Cornell Aeronautical Lab., Inc., Buffalo, N.Y.

**A STUDY OF RELATIONSHIPS BETWEEN AIRCRAFT SYSTEM PERFORMANCE AND PILOT RATINGS**

W. C. Schultz, F. D. Newell, and R. F. Whitbeck Washington NASA Jul. 1970 62 p ref

(Contract NAS1-8765)

(NASA-CR-1643; Rept-1H-2748-B-1) Avail: CFSTI CSCL 05E

The results are presented of an experiment to determine the possible relationships that may exist between analytical performance predictors and pilot evaluation data for a complete pilot task. The task chosen was to fly an ILS approach from outer marker to middle marker. Results of the experiment indicate that: (1) Glide slope rms error score does not correlate with pilot rating for the ILS task. (2) There is no apparent linear combination of rms error scores that correlates with pilot rating for the ILS task. (3) The analyses of variance of glide slope rms error do not indicate that this measure is as sensitive as pilot rating. (4) Pilots frequently give a lower rating because of relatively poorer performance as they approach the middle marker. (5) Pilot rating is not readily apparent from records of glide slope error. D.L.G.

**N70-32861#** Woods Hole Oceanographic Institution, Mass.

**STRUCTURAL MOLECULAR BIOLOGY OF PHOSPHATES, PART 1**

Johann Matheja and Egon T. Degens Jan. 1970 110 p refs

Avail: CFSTI

Four types of epitaxial growth processes are considered which can lead to formation of distinct structures and organic polymers. Boundary and surface phenomena of such processes are relevant to the study of mineralization processes in biological systems, prebiotic events leading to the origin of macromolecules, and operation principles in the genetic and metabolic apparatus. The tests show that the phosphate is a polyvalent anion and follows four structural formation principles which are additive in nature, but independent from each other. Because of the flexible building pattern governed mainly by ionic forces, it is concluded that phosphate units play an essential part in biocrystallographical structures in living systems. All four of the given structural formation principles can be observed as acting units in biochemical reactions. See also N70-32862. Author

**N70-32862#** Woods Hole Oceanographic Institution, Mass.

**THE ROLE OF PHOSPHATES IN CELLULAR SYSTEMS, PART 2**

Johann Matheja and Egon T. Degens Jan. 1970 113 p refs

Avail: CFSTI

Phosphorus is shown to have a distinct molecular relation to the common biogenic elements and PO<sub>4</sub> units are shown to represent forces which introduce a crystallographical order at the molecular level in the cell. The structural composition and functional role of the biophosphates in cellular systems are discussed. The structure of water is discussed to formulate the dynamics of a cell. See also N70-32861. Author

**N70-32885**

**N70-32885\*#** McDonnell-Douglas Astronautics Co., St. Louis, Mo. Aerospace Medicine Dept.

**DEVELOPMENT AND TEST OF FLEXIBLE FILM COUPON STRIPS FOR USE AS A SAMPLING TECHNIQUE** Bimonthly Progress Report

C. Aldridge 10 Nov. 1968 29 p refs  
(Contract NAS8-21443)

(NASA-CR-110764; BMPR-2) Avail: CFSTI CSCL 06M

The flexible film coupon method was compared with the stainless steel coupon method to improve the methodology for determining hardware microbiological contamination in clean room environments. The flexible film coupon assay technique is shown to be equal to or superior to the stainless steel method in tests with aerobic microorganisms. Under given conditions the flexible film coupon is useful as an adjunct to or can replace the stainless steel coupon.

R.B.

**N70-32898\*#** Research Triangle Inst., Durham, N.C.

**NASA BIOMEDICAL APPLICATION TEAM PROGRAM: APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE** Semiannual Report, Sep. 1969 - Mar. 1970

Mar. 1970 230 p refs  
(Contract NASw-1950)

(NASA-CR-110645) Avail: CFSTI CSCL 06E

Details are given on the objectives and methodology of the Biomedical Application Team (BATeam) of scientists and engineers who act as an information and technology interface between NASA and individuals, institutions, and agencies involved in biomedical research and clinical medicine. Summary data are provided on the technology transfers, the problems investigated by the BATeam, and computer information searches. Among the significant transfers of technology reported is a new material for heart pacemaker electrodes developed from space antenna research, and use of computer correlation techniques in cardiovascular research.

Author

**N70-32900\*#** Naval Aerospace Medical Inst., Pensacola, Fla. **COMPARISON OF FIVE LEVELS OF MOTION SICKNESS SEVERITY AS THE BASIS FOR GRADING SUSCEPTIBILITY**

Earl F. Miller, II and Ashton Graybiel 13 Feb. 1970 21 p refs  
(NASA Order T-81633; NASA Order R-93)

(NASA-CR-110761; NAMI-1098) Avail: CFSTI CSCL 06S

The motion sickness susceptibility of 275 healthy male subjects was measured quantitatively by a standardized laboratory procedure using a Stille rotational chair. The results, in terms of velocity of the chair and the number of active head movements, were combined into a single numerical score that represented the total stressor stimulus sustained in reaching, in turn, each of five specific criteria for diagnosing the severity of motion sickness; viz, frank sickness (FS), severe malaise (M III), moderate malaise (M IIA and M IIB), and mild malaise (M I). The stressor value (E factor) of a single head movement at each test rpm was adjusted to yield an equivalent susceptibility score (Coriolis Sickness Susceptibility Index, or CSSI) independent of the endpoint selected. Close agreement among the CSSI scores obtained at each endpoint was found in intercorrelations, test-retest reliability coefficients, and frequency distributions, which reflected the orderliness and stability in the appearance, ramification, and intensification of the acute symptomatology evoked in progressing from M I to FS. The endpoint M IIA appeared, however, to yield the best balance between subject acceptability and test confidence and was used without exception to calibrate the motion sickness susceptibility of 250 additional subjects.

Author

**N70-33015#** Rutgers Univ., New Brunswick, N.J. Dept. of Physiology.

**CEREBRAL BLOOD FLOW DURING HYPERTHERMIA** Annual Progress Report, 1 Dec. 1968 - 31 Dec. 1969

Harry M. Frankel Jan. 1970 52 p refs

(Contract DA-49-193-MD-2423)

(AD-704357) Avail: CFSTI CSCL 6/16

The objective of this study is to determine at what elevated body temperature cerebral blood flow is adequate to meet the metabolic requirements of brain tissue. This report consists of a group of three papers titled: (1) Cerebrovascular Response During Progressive Hyperthermia in Dogs, (2) Cerebral Oxygenation and Metabolism During Progressive Hyperthermia, and (3) Cerebrovascular Response to CO<sub>2</sub> in the Hyperthermic Dog.

Author (TAB)

**N70-33041#** 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 13 p refs

(AD-703633; FAA-AM-69-14) Avail: CFSTI CSCL 5/10

Nine subjects were tested on a battery of tasks involving monitoring (simple reaction time, choice reaction time, and meter monitoring), two-dimensional compensatory tracking, and mental arithmetic. Three workloads were presented--monitoring plus tracking, monitoring plus arithmetic, and monitoring plus tracking plus 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 RMS error in the vertical dimension. Nonsignificant ( $1.0 > P > .05$ ) 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 (TAB)

**N70-33065\*#** National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

**RF RADIATION HAZARDS TO SPACE STATION PERSONNEL**

R. A. Inman 20 May 1970 13 p refs

(NASA-TM-X-64523) Avail: CFSTI CSCL 06S

Although there is controversy concerning possible effects of exposure to microwave radiation, some harmful effects have been proven, such as formation of cataracts in the eyes. The proven effects alone justify precautions to insure that personnel are not exposed to harmful levels of RF radiation. Calculation of typical values of RF power density in the vicinity of space station antennas are included in this document. More definite calculations can be made when the system configurations have been more completely defined. However, the values calculated demonstrate that the currently accepted safe limits of RF radiation can be exceeded easily in the near field of high gain antennas on the space station. Personnel working in the field of these antennas should be protected from overexposure to this radiation.

Author

**N70-33102\*#** Library of Congress, Washington, D.C.

**SOVIET SPACE BIOLOGY AND MEDICINE**

David Wood and Elena Fortunatow Washington NASA Jul. 1970 402 p refs

(NASA Order W-12999)

(NASA-CR-1578) Avail: CFSTI CSCL 06B

A review of U.S.S.R. literature on space biology and medicine is presented. It consists of a commentary and 327 abstracts

(divided into 12 topical sections), plus five additional references based on Soviet literature from October 1967 to February 1969. Reference numbers in the commentary cite the consecutively numbered abstracts or the additional references. Author

**N70-33113\*#** Oak Ridge National Lab., Tenn. Biology Div.  
**BIOLOGY DIVISION NEUROSPORA EXPERIMENT P-1037**  
**Final Report**

Mar. 1970 31 p refs  
 (NASA Order W-12-792(04); NASA Order W-12-792(08))  
 (NASA-CR-73466; ORNL-TM-2912) Avail: CFSTI CSCL 06M

Successful experiments using Neurospora as the test organism were performed on two different space flights, the Gemini 11 mission and the Biosatellite 2 mission. In both experiments a study was made of the genetic effects of space flight alone and space flight in combination with known doses of radiation. On the Biosatellite 2 mission a Sr-85 gamma ray source was used; on the Gemini 11 mission a P-32 beta ray source was used. In both experiments a genetically marked two-component heterokaryon was used, heterozygous for two different genes that control sequential steps in purine biosynthesis. This strain was used to study radiation-induced inactivation of heterokaryotic conidia as well as radiation-induced gene mutation at two specific loci. In both experiments a range of radiation exposures were given, so that a comparison could be made between flight and ground-control dose-response curves rather than between flight and ground-control effects of some single exposure. In the Biosatellite 2 experiment, Neurospora conidia were tested while collected on the surface of millipore filters; in the Gemini 11 experiment they were tested both while collected on the surface of millipore filters and while in a colloidal suspension of agar. Author

**N70-33116#** Lockheed Missiles and Space Co., Palo Alto, Calif.  
**PROBLEMS OF THE DYNAMICS OF SHELLS OF BLOOD CARRYING VESSELS**

A. S. Volmir et al [1970] 7 p refs Transl. into ENGLISH from Mekhan. Polimerov (USSR), No. 2, 1970 p 373-379  
 Avail: National Translation Center, John Crerar Library, Chicago, Ill. 60616

Problems of the dynamic behavior of blood-carrying vessels are considered as deformable shells through which viscous fluids flow. A multilayer elastic shell in which an active, muscular layer is separated out is assumed as the model. Problems are discussed which can be solved by using the model. Author

**N70-33184\*#** Techtran Corp., Glen Burnie, Md.  
**MAN IN SPACE [CHELOVEK V KOSMOSE]**

G. Titov Washington NASA Jul. 1970 9 p ref Transl. into ENGLISH from Aviats. i Kosmonavt. (Moscow), no. 10, Oct. 1969 p 4-6  
 (Contract NASw-2037)  
 (NASA-TT-F-12948) Avail: CFSTI CSCL 05H

Flier-cosmonaut answers readers' questions on the subject of the man and machine problem in cosmonautics and what is the role played by man in the piloting of space ships supplied with advanced complex automation facilities. Author

**N70-33191#** Atomic Weapons Test Safety Committee (Australia).  
**STRONTIUM-90 IN THE AUSTRALIAN ENVIRONMENT DURING 1968**

W. J. Gibbs, W. K. Matthews (UKAEA, Capenhurst), J. R. Moroney, D. J. Stevens, and E. W. Titterton 1969 28 p refs  
 (NP-18100) Avail: AEC Depository Libraries

An Australia-wide survey of Sr-90 in global fallout was done, especially with reference to the passage of Sr-90 through

food chains to human bone tissue. Results are presented for 1968, during which year the French exploded two nuclear devices in the megaton range in the South Pacific. The mean deposit of Sr-90 with rain and as dry fallout was the lowest for any year since monitoring began in 1958. Fallout from tests in Polynesia contributed significant fraction of the total Sr-90 deposit towards the end of 1968. The mean ratio of Sr-90/Ca in total diet for the year continued its downward trend. Results confirm that fallout over Australia from all nuclear weapons tests up to 1968 constitutes no significant hazard to the health of the Australian population now or in the future. NSA

**N70-33204\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**RESEARCH ON LONG TERM BIOLOGICAL ISOLATION OF PRIMATES AND MICE, VOLUME 1 Final Report, 7 Jan. 1969 - 7 Jan. 1970**

Myron H. Bengson and T. D. Luckey (Missouri Univ.) 1970 160 p refs  
 (Contract NAS9-9000)  
 (NASA-CR-108548) Avail: CFSTI CSCL 06S

Classic Rhesus monkeys (*Macaca mulatta*) and a commercial monkey diet were used in the first part of the experiment and gnotobiotic mice and a comminuted Apollo diet were used in the second part. After six months of bio-isolation in a gnotobiotic isolator, the number of intestinal microflora of *Macaca mulatta* shifted. *Escherichia coli* dropped in numbers, while in control animals the shift was much slower or did not occur at all. Indigeneous *Lactobacilli* began to disappear while other microorganisms increased in number. The results indicate that deleterious changes in the immunity mechanisms, potential pathogen runaway, and loss of the benefits of a protective mixture of microflora may occur during prolonged space flight. Similar results were noted in experiments with mice. R.B.

**N70-33205\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**RESEARCH ON LONG TERM BIOLOGICAL ISOLATION OF PRIMATES AND MICE. VOLUME 2: APPENDICES**

Myron H. Bengson and T. D. Luckey [1970] 131 p refs  
 (Contract NAS9-9000)  
 (NASA-CR-108549) Avail: CFSTI CSCL 06S

Photographic and tabular data are presented on biological isolation experiments with monkeys and mice. The data include hematology, diet preparation, microbiological information, and operating procedures for conducting the experiments. R.B.

**N70-33206\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**RESEARCH ON LONG TERM BIOLOGICAL ISOLATION OF PRIMATES AND MICE. VOLUME 3: STANDING OPERATING PROCEDURES FOR PRIMATE ISOLATION STUDY APPENDIX J Final Report**

M. H. Bengson and T. D. Luckey [1970] 116 p  
 (Contract NAS9-9000)  
 (NASA-CR-108550) Avail: CFSTI CSCL 06S

Operating guidelines are presented for use in biological isolation experiments with primates. The checklists and procedural guidelines were written to direct the performance of routine procedures and guidelines are included for future experimentation. Author

**N70-33207\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**RESEARCH ON LONG TERM BIOLOGICAL ISOLATION**

**OF PRIMATES AND MICE. VOLUME 4: THE LITERATURE SEARCH, APPENDIX M Final Report**

M. H. Bengson and T. D. Luckey [1970] 129 p refs  
(Contract NAS9-9000)

(NASA-CR-108551) Avail: CFSTI CSCL 06S

The results of a literature search for the effects of microflora on host organisms, with emphasis on intestinal microflora, are presented. The bibliography was used in research on the long term effects of biological isolation on primates and mice. R.B.

**N70-33271#** Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

**TESTS OF WATER-FILLED CAPSULE IN PRONE POSITION Letter Report**

R. F. Gray and M. G. Webb 13 Apr. 1959 10 p refs  
(AD-704863; MA-5) Avail: CFSTI CSCL 6/17

The Aviation Medical Acceleration Laboratory (AMAL) G-capsule is a device to protect humans against the body distortion effects of high acceleration forces. It is a nonexpandable container designed to resist the outward expansion of the subjects body and positive pressure is used in his respiratory system to keep the body expanded against these external supports. The purpose of this support system is to protect the pilot against the distorting effects of acceleration which could be harmful. The principle new feature of this protective system is the use of pressure in the respiratory system to oppose distortion. TAB

**N70-33285\*** National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

**SURVIVAL COUCH Patent**

Maxime A. Faget, William M. Bland, Jr., and Jack C. Heberlig, inventors (to NASA) Issued 12 Jun. 1962 (Filed 18 Sep. 1959) 4 p Cl. 5-345

(NASA-Case-XLA-00118; US-Patent-3, 038, 175; US-Patent-Appl-SN-840983) Avail: US Patent Office CSCL 06G

A protective couch for aircraft occupants subjected to a 3-g or 4-g force or for spacecraft crews is described. The couch consists of a sheet of lightweight, rigid Fiberglas having individualized recesses conforming to the lateral and posterior contour of a specific occupant, and a posterior layer of crushable cellular honeycomb shock absorbing material. N.E.N.

**N70-33328#** Joint Publications Research Service, Washington, D.C.

**THE HABITABILITY OF ATOMIC SUBMARINES**

A. Konychev 13 Jul. 1970 10 p ref Transl. into ENGLISH from Tekhn. i Vooruzheniye (USSR), no. 5, 1967 p 44 - 47 (JPRS-50927) Avail: CFSTI

It is shown that prolonged confinement of human subjects in isolated compartments leads to the formation of carbon monoxide and carbon dioxide. The admissible minimum oxygen concentration is 17% and the maximum carbon dioxide concentration is 1%. Carbon dioxide can be eliminated through chemical absorption by a filter of potassium salt of nitromethylalanine, and carbon monoxide is eliminated catalytic by oxydation into CO<sub>2</sub>. Oxygen is regenerated by electrolysis of a sulfate solution or by biological one-cell algae systems. G.G.

**N70-33342\*#** Systems Technology, Inc., Hawthorne, Calif.

**RESEARCH ON DISPLAY SCANNING, SAMPLING, AND RECONSTRUCTION USING SEPARATE MAIN AND SECONDARY TRACKING TASKS**

R. W. Allen, W. F. Clement, and H. R. Jex Washington NASA Jul. 1970 126 p refs

(Contract NAS2-3746)

(NASA-CR-1569; TR-170-2) Avail: CFSTI CSCL 05H

Theoretical models and corroborative experimental data are presented on the human operator's scanning behavior and tracking performance while simultaneously controlling two closed-loop tasks using separate displays. These results form a basis for estimating and correlating human performance and scanning workload in multidisplay piloting tasks. It is shown that the pilot's average scanning, sampling and reconstruction behavior can be accurately modeled by an adjustable quasi-linear describing function, plus an injected "scanning remnant" (observation noise) having wideband properties. Two likely mental processes for reconstruction of an estimated signal from the finite-dwell, almost-periodic samples are analyzed: a "switched gain" model and a "reconstruction-hold" model. The experimental data from this experiment favor the former. A theoretical model for the sampling remnant is given, which has the form of first-order-filtered noise; it depends on the displayed signal variance, sampling frequency, fixation dwell time and sampling frequency variations. The experimental remnant data fit this model well, and thereby provide good correlations between theoretical and experimental tracking performance measures. Author

**N70-33359#** Commissariat a l'Energie Atomique, La Hague (France).

**EXPERIMENTAL AND IN SITU CONTAMINATIONS OF AQUATIC ENVIRONMENT BY RU 106**

J. Ancellin and P. Bovard 1969 8 p refs In FRENCH Presented at the 4th Intern. Colloq. on Med. Oceanography, Naples, 2-5 Oct. 1969

(CEA-Conf-1464; Conf-691031-1) Avail: AEC Depository Libraries

Experimental contaminations of algae and marine invertebrates with soluble or insoluble Ru106 showed that the former leads to concentration factors lower than the latter (by a factor of five up to 10). The high values obtained for the concentration factors in the natural environment where the radioactive wastes are disposed can often be compared to those obtained experimentally. Author (NSA)

**N70-33379#** Joint Publications Research Service, Washington, D.C.

**ORIENTATION OF BIRDS**

A. B. Kistiakovskiy et al 18 Jun. 1970 9 p refs Transl. into ENGLISH from Priroda (Moscow), no. 1, Jan. 1970 p 56 - 61 (JPRS-50767) Avail: CFSTI

Radiolocation observations of birds during variable weather conditions are presented; boundaries were also determined for orientation capabilities. Homing speeds during clear and overcast weather are compared. Studies are continuing on the homing mechanism of birds in planetariums and in the field. J.A.M.

**N70-33424#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**BLOOD ALCOHOL CONCENTRATIONS AS AFFECTED BY COMBINATIONS OF ALCOHOLIC BEVERAGE DOSAGES AND ALTITUDES**

E. Arnold Higgins, John A. Vaughan, and Gordon E. Funkhouser Apr. 1970 11 p refs

(AM-70-5) Avail: CFSTI

Blood alcohol levels in man were established at 12,000 ft. with and without supplemental oxygen and at 20,000 ft. with supplemental oxygen. At 2.50ml. of 100 proof bourbon/kg. body weight, subjects exhibited a lower blood alcohol level at 12,000 ft. without supplemental oxygen than at 20,000 ft. with supplemental oxygen. A difference in blood alcohol levels was not seen with

1.25 ml. of 100 proof bourbon/kg. body weight. It was established that dehydration effects alone could not account for these findings. The effect of breathing a normal oxygen mixture could not be ascertained with the data collected. An increased motility of the gastro intestinal tract and the increased motility attributable to the lowered barometric pressure could increase the absorption rate of the alcohol at 20,000 ft. with the high dose, thereby contributing to higher blood alcohol levels. Author

**N70-33472#** Comitato Nazionale per l'Energia Nucleare, Rome (Italy).

**ON THE RADIATION AVERAGE DOSE ABSORBED BY TRUCK DRIVERS IN ITALY**

C. Faloci and A. Susanna 10 Apr. 1970 42 p refs Presented at the 15th Natl. Conf. of the Ital. Health Phys. and Radiation Protect. Assoc., Cagliari, Italy, 29 Sep. - 3 Oct. 1969 Submitted for publication

(RT/PROT(70)7) Avail: CFSTI

A study was conducted for the purpose of estimating the average dose absorbed by truck drivers in the years 1967 and 1968. In the course of the study a statistical survey was also made on the shipments of radioactive materials which took place in Italy in the said period, determining the distribution frequency on the radionuclides most commonly used for therapeutical, diagnostic, industrial and research purposes. In conducting the survey, constant attention was given to the objective of identifying the protection problems connected with the shipping activities. Comparisons of road and air traffic shipments of different types of radioisotope packages are given. Conclusions are drawn concerning the number of imports and exports by air traffic of these radioisotope packages. Author

**N70-33480#** Flying Personnel Research Committee, London (England).

**THE BLUR ZONE**

T. C. D. Whiteside (RAF Inst. of Aviation Med., Farnborough, Engl.) and G. D. Samuel Nov. 1969 7 p refs

(FPRC/1293) Avail: CFSTI

It is shown that if a dimensionless particle is moving through a three-dimensional field, the parts of the field which have a common angular velocity relative to the particle lie on the surface of a toroid described about the particle. The practical implication to the low flying aviator is that the objects observed on the ground increase beyond a certain threshold of visibility or dynamic visual acuity whenever they enter into the toroid, whose projection on the ground causes zones of blurring in which the ground objects cannot be seen with sufficient clarity because they are moving past too quickly. Author

**N70-33486#** Dayton Univ., Ohio. Research Inst.

**BIOMAGNETIC RESPONSE OF SIMPLE BIOLOGICAL SYSTEMS AND THE IMPLICATIONS FOR LONG DURATION SPACE MISSIONS Technical Report, Apr. - Dec. 1965**

John L. Cashin, Jr. and George C. Mohr (AMRL) Wright-Patterson AFB, Ohio AMRL Jan. 1970 19 p refs Presented at the 37th meeting of the Aerospace Medical Assoc., Las Vegas, Nev., Apr. 1966

(Contract AF 33(615)-2821)

(AD-705648; AMRL-TR-68-32) Avail: CFSTI CSCL 6/3

Several space age technological developments employ powerful magnetic fields in a manner that can subject the human operator to intense levels of magnetic exposure. Examples include magnetic forming tools, magnetic shielding, magnetohydrodynamic propulsion systems, and various magnetic containment devices. Reports in the literature have implied that rapidly metabolizing tissues may be

affected by intense, inhomogeneous magnetic fields. To investigate this hypothesis, two ideal biological systems were exposed to fields of approximately 4,000 oersted intensity and gradients of 500 to 2,000 oersteds per cm. The oxygen uptake rate of fresh guinea pig kidney brie enriched with succinate was measured by Warburg manometry for magnetically exposed and control samples. The difference between uptakes was statistically evaluated using a sequential t-test. In a second experiment, the growth rate of E. coli was measured for exposed and control cultures, employing the viable plate count technique. The sequential t-test was again used. The results indicated that the magnetic exposure had no significant effect on either biologic system. Author (TAB)

**N70-33521#** Michigan Univ., Ann Arbor. Human Performance Center.

**MONITORING EYE MOVEMENTS DURING THE LEARNING OF PAIRED-ASSOCIATE LISTS**

P. D. Mc Cormack Mar. 1970 89 p refs

(Contract AF 49(638)-1736; Grant NRC APA-78)

(AD-705646; TR-20; AFOSR-70-1083TR, REPT-08773-57-T)

Avail: CFSTI CSCL 5/10

Eye movements were monitored during the learning of paired associates in each of 14 studies. The fixation, eye movement and learning data were all generally compatible with a two-stage conceptualization of paired-associate learning, as well as with the notion of stimulus encoding. The first stage, that of response consolidation, appears to be brief, and may be interfered with under certain sets of conditions. A theoretical model is presented which stresses the importance of the role of short-term memory during the acquisition of paired-associate lists. Author (TAB)

**N70-33592#** Flying Personnel Research Committee, London (England).

**A STUDY OF THREE AIR VENTILATED GARMENTS USING CONVENTIONAL AND REVERSED FLOW AIR SUPPLIES**

J. Morrison (RAF Inst. of Aviation Med., Farnborough, Engl.) Nov. 1969 13 p refs

(FPRC/Memo-249) Avail: CFSTI

Two flying clothing assemblies, the air ventilated suit Mk 2A, and the combined partial pressure, anti-G and AVS Mk 2P suit, were investigated with conventional and reversed flow air supplies using four subjects in a hot environment such that heat loss could only occur by evaporation of sweat. There is no significant difference in the oral temperatures, ear temperatures, heart rate and sweat losses of subjects when the two ventilating air supplies are at the same flow rate, temperature, and humidity. The air ventilated aircrew coverall was also investigated under similar conditions but it was not possible to produce adequate reversed air supplies because of collapse of the PVC ducting around the metal spacers. Author

**N70-33622#** Naval Postgraduate School, Monterey, Calif.

**THE EFFECTS OF SLEEP LOSS AND DEMANDING WORK/REST CYCLES: AN ANALYSIS OF THE TRADITIONAL NAVY WATCH SYSTEM AND A PROPOSED ALTERNATIVE**

William Charles Stolgitis (M.S. Thesis) Oct. 1969 29 p refs

(AD-706027) Avail: CFSTI CSCL 6/19

An analysis of the traditional Navy watch system and a proposed alternative is presented. Current research on sleep deprivation and the effects of demanding work/rest schedules is documented and discussed as a basis for key assumptions in the analysis. Methodology is also presented for determining the relative ability of the two schedules to meet the assumed minimum sleep requirements. The results favor the alternate schedule as efficient

for allocating available time resources to meet established sleep requirements. Author (TAB)

**N70-33627#** Navy Experimental Diving Unit, Washington, D.C.  
**TABLES FOR CONVERTING OXYGEN PERCENTS TO PARTIAL PRESSURES**

Robert Jenner and Robert Biersner Apr. 1970 58 p refs  
 (AD-706039; NEDU-RR-1-70) Avail: CFSTI CSCL 6/11

The report includes a set of tables to be used primarily by diving activities for rapid determination of oxygen partial pressures from known depths and oxygen percents. The procedures and computer techniques used to generate these tables are also described. Author (TAB)

**N70-33631#** United Kingdom Atomic Energy Authority, Harwell (England). Health and Safety Branch.

**RADIOTHERMOLUMINESCENT DOSIMETRY Report of a Panel of the UKAEA Health Physics Coordinating Committee**  
 W. N. Saxby and D. F. White, eds. Jan. 1970 20 p refs  
 (AHSB(RP)R-95) Avail: AEC Depository Libraries

The Health Physics Coordinating Committee of the UKAEA set up a panel on radiothermoluminescent dosimetry in 1966. An edited version of the report and recommendations made by the panel to the HPCC in December, 1968, as amended by the latter Committee is presented. It deals with current work and progress in the United Kingdom in the field of radiothermoluminescent dosimetry (TLD), with the capabilities and applications of TLD, with current and future research and development work and with the rationalization of equipment and procedures. The Panel membership represented almost all those UK bodies actively involved in TLD work in radiological protection, and constituted a useful discussion group for the exchange of information in this field. Author (NSA)

**N70-33662#** Joint Publications Research Service, Washington, D.C.

**TREATMENT OF WATER WITH POTASSIUM PERMANGANATE TO REMOVE TASTES AND ODORS**

S. I. Dobrushina et al. *In its Soviet Res. in Sanit. and Noise Meas.* 11 Jun. 1970 p 6-10  
 Avail: CFSTI

Water treatment tests are examined using activated carbon and potassium permanganate to remove tastes and odors from water. A physiochemical analysis of the Desna River was completed, along with dosage determination of potassium permanganate. Test results show that KMnO<sub>4</sub> removed tastes and odors quite effectively and that it is economical in costs. J.A.M.

**N70-33693#** Sperry Gyroscope Co., Great Neck, N.Y.

**RESEARCH IN VISUAL PERCEPTION FOR CARRIER LANDING. SUPPLEMENT 1, PART 2: RESPONSE MATRIX ANALYSIS BY COMPUTER Final Report, 1964-1969**

Theodore Gold and Robert F. Perry Dec. 1969 427 p refs  
 Prepared for Navy  
 (Contract Nonr-4081(00))  
 (AD-706038; SGD-5265-0327-Suppl-1-Pt-2) Avail: CFSTI CSCL 5/10

The supplement to Report No. SGD-5265-0327, AD-706 036, contains the printout data provided by the Univac 1108 high-speed, digital computer in the analyses of stimulus-response data using normal response distribution techniques. Both glide slope and aim point studies are included, and the data are described. Author (TAB)

**N70-33696#** Naval Submarine Medical Center, Groton, Conn. Medical Research Lab.

**THE EFFECTS OF ORAL ADMINISTRATION OF MAGNESIUM OXIDE ON RENAL CALCIUM EXCRETION IN CREW MEMBERS DURING A SUBMARINE PATROL**

Clayton T. Drake 28 Oct. 1969 11 p refs  
 (AD-705391; SMRL-MR-601) Avail: CFSTI CSCL 6/15

In order to learn the effects of orally administered magnesium oxide on the excretion of urinary calcium and phosphorus, a study was undertaken on a group of forty submariners while on a routine patrol. Half of the group received daily dosages of magnesium oxide, while the other half served as controls. Twenty-four-hour specimens were collected from these subjects three days after submergence, and again a few days before return to port. Urine specimens were examined microscopically, then measured for calcium, phosphorus and routine factors. No specimen examined was found to contain bacteria, or white blood cells, nor was there any alteration in the routine chemistries. Total urinary calcium excretion in the control group fell from a mean of 178 mg in prepatrol tests to 135 mg post-patrol, while the group ingesting magnesium oxide exhibited a sample mean of 162 mg in the post-patrol tests. These figures show a significantly different mean value (p < 0.05). These results, if substantiated by further studies, would argue strongly for the prophylactic use of magnesium for protection against the formation of urinary calculi. Author (TAB)

**N70-33777\*#** National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

**MANNED OPERATIONS FOR THE APOLLO LUNAR MODULE IN A SIMULATED SPACE ENVIRONMENT**

O. L. Pearson and P. R. Gauthier (Boeing Co.) Washington Jun. 1970 34 p refs  
 (NASA-TN-D-5760; MSC-S-225) Avail: CFSTI CSCL 051

A series of tests was conducted in a simulated space environment to confirm the satisfactory performance of the Apollo lunar module in a thermal vacuum environment and to verify crew operating procedures in a thermal vacuum environment. Because of mission simulation requirements, the spacecraft was manned only during specific time periods of the test. The crewmen were required to perform ingress/egress while in thermal vacuum conditions. The ingress/egress sequences were based on sequential transfer of the test crewmen from the chamber manlock to the chamber and then into the spacecraft by a stairway which was 13.5 feet high and at an angle of 63 deg with the horizontal. To perform the ingress/egress sequences safely, the following systems and equipment were developed and qualified: specialized gas-connector assemblies, restraint assemblies, gas and electrical umbilicals, and an open-loop environmental control system. The lunar module test article program presented the first large-scale test of the practical application of the extensive safety practices that were adopted by the National Aeronautics and Space Administration. The tests were successfully completed without compromising safety or delaying the planned Apollo launch schedule. Author

**N70-33779\*#** Barry Wright Corp., Watertown, Mass.

**INVESTIGATION OF THE VIBRATION ISOLATION OF COMMERCIAL JET TRANSPORT PILOTS DURING TURBULENT AIR PENETRATION**

Dale W. Schubert, Jerome S. Pepi, and Frank E. Roman  
 Washington NASA Jul. 1970 129 p refs  
 (Contract NAS1-8060)

(NASA-CR-1560) Avail: CFSTI CSCL 05E

The results of an analytical and experimental investigation of the configuration of an electrohydraulic pilot seat isolation system which would provide commercial jet transport pilots with maximum protection from the dynamic response of the aircraft during turbulent air penetration are presented. A literature survey



was conducted into the effects of vibration on the visual and motor performance of seated human subjects (based on equal excitation of the subject and his controls) and the vibration levels encountered at the cockpit of present and future commercial jet transport aircraft during the penetration of turbulence. It was determined that active vibration isolation of the pilot was required in the vertical direction with a resonant frequency of nominally 2 Hz, a resonant transmissibility of less than 2, and better than 70 percent isolation at 4.5 Hz. Author

**N70-33793\*#** Whirlpool Corp., St. Joseph, Mich. Life Support Systems Group.

**INFLIGHT URINE VOLUME DETERMINATION Final Report**

William Thomas 10 Apr. 1970 32 p refs

(Contract NAS9-10528)

(NASA-CR-108497) Avail: CFSTI CSCL 06P

The feasibility, functionality, and problem areas involved in using lithium and cesium as tracers for urine volume determinations are investigated. Experiments were performed to determine the presence of lithium or cesium in urine, and the possible interference of urine with the analysis of the tracers. The rates of dispersion of the tracer salts in urine, the possible retention of the tracer by the urine collection bag materials, and the overall accuracy and functionality of the method are also determined. E.M.C.

**N70-33809#** Embry-Riddle Aeronautical Inst., Daytona Beach, Fla.

**DEVELOP AN OBJECTIVE FLIGHT TEST FOR THE CERTIFICATION OF A PRIVATE PILOT Final Report, Jun. 1969 - Apr. 1970**

Frank G. Forrest May 1970 135 p refs

(Contract DOT-FA-69-WA-2167)

(DS-70-17) Avail: Issuing Activity

An FAA test program is described which has a format similar to a computer program. The test program contains statements to guide the examiner in measuring performance of the applicant. Test items are designed to obtain data on the state of development of the applicant's aptitudes in retention-recall, judgment-planning-problem solving, perceptual-motor coordination, and habit as pertains to the function of an airplane pilot. These aspects of human behavior were selected because they appear to be the best criteria to determine the probability that the applicant, if awarded the private pilot certificate, would operate properly and safely. It is contemplated that the test will be computer scored. The test Form P was administered to a sample of 15 newly certified private pilots. Performance scores on the experimental test compared with subjective ratings given for the actual pilot certification test produced a Pearson product-moment correlation coefficient of .499. The sample profile revealed that lack of division of attention and collision avoidance procedural habits were the sample member's weakest areas. Judgment-planning-problem solving were their strongest.

Author

**N70-33835\*#** National Aeronautics and Space Administration, Washington, D.C.

**AEROSPACE FOOD TECHNOLOGY**

1970 215 p refs Proc. of the Conf. held at St. Petersburg, Fla., 15 - 17 Apr. 1969

(NASA-SP-202) Avail: CFSTI CSCL 06H

Operational experience and advanced technological developments are combined in evaluating the problems in improving the nutritional aspects for future manned space missions. The initial Apollo feeding system is expanded to include spoon feeding, improved packaging and storage, and new food preparation methods and handling equipment. For individual titles, see N70-33836 through N70-33863.

**N70-33836\*#** National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

**THE APOLLO FOOD PROGRAM**

Malcolm Smith *In its* Aerospace Food Technol. 1970 p 5 13 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

Extensive changes are proposed for the initial Apollo food system since a number of deficiencies were apparent in the baseline food program that led to inadequate food consumption and metabolic imbalance in astronauts. Main improvements constitute: (1) reduced time and effort for meal preparation; (2) purification and better flavoring of the water for reconstituting dehydrated foods; (3) eradication of functional failures in rehydratable food packages; (4) more appealing systems of foods and packaging; and (5) reduction of in-flight illness and anorexia. Less emphasis should be placed upon dietary manipulation whereas systematic improvement of foods, packaging, and crew training should be undertaken to cater to the psychophysiology of eating. G.G.

**N70-33837\*#** School of Aerospace Medicine, Brooks AFB, Tex.

**MANNED ORBITING LABORATORY FEEDING SYSTEM REQUIREMENTS**

Jerry L. Welbourn *In* NASA, Washington Aerospace Food Technol. 1970 p 15 - 19 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

Discussed are feeding requirements for the manned orbiting laboratory by considering the particular type of mission, spacecraft design and engineering, and the restrictions imposed on the feeding system during space travel. Nutrient allowances for aerospace rations are developed from metabolic requirements for man under stress of space travel and are shown in table form; also prescribed are *microbiological standards for the MOL feeding system assembly*. Outlined are requirements for food packaging and safety. G.G.

**N70-33838\*#** School of Aerospace Medicine, Brooks AFB, Tex.

**QUANTIFYING AND IMPROVING MANNED ORBITING LABORATORY FOOD**

Robert L. Flentge *In* NASA, Washington Aerospace Food Technol. 1970 p 21 - 29 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The objectives of this effort are to: (1) standardize the format and the content of all space-food documents; (2) establish realistic end-product requirements and quality assurance provisions, and (3) reflect technological improvements in food production documents. Also considered are human factors criteria, food stability in adverse environmental conditions, and nutritional compositions to arrive at an improved Mol feeding system. A list of 54 space food items is included. G.G.

**N70-33839\*#** School of Aerospace Medicine, Brooks AFB, Tex.

**EVALUATION OF SPACE FEEDING SYSTEMS**

J. E. Vanderveen *In* NASA, Washington Aerospace Food Technol. 1970 p 31 36 refs (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The objectives of this evaluation were to identify any deficiencies in the expanded Gemini/Apollo systems, to perform a functional verification for 30 days, and to develop new criteria for future space feeding systems. The evaluation was divided into four areas: (1) life-support evaluation, which included studies of the nutritional value afforded by the food; (2) food acceptance and preference evaluation, which included the rating of individual foods, measurement of food consumption, and the psychological benefits provided; (3) systems interface, which included study of efficient use of weight and volume allowances, the reliability of systems components, the timeline production of metabolic, food, and

packaging waste, and the potential for environmental contamination; and (4) human factors, which included simplicity, ease of handling, and safety. Author

**N70-33840\*#** School of Aerospace Medicine, Brooks AFB, Tex.  
**DEVELOPMENT OF NEW CONCEPTS FOR THE FEEDING SYSTEM FOR THE USAF MANNED ORBITING LABORATORY**

Frederic F. Doppelt *In* NASA, Washington Aerospace Food Technol. 1970 p 37-41 (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

An improved prototype space food system was developed from the original Gemini/Apollo feeding system that allows for spoon feeding during 30 day MOL missions. Evaluation of the spoon feeding concept during zero-G flight test runs confirmed the feasibility of this method and the system was successfully incorporated into wetpack dinners on Apollo 8 and Apollo 9. A complete systems engineering analysis led to redesign of the MOL feeding system and incorporation of spoon feeding methods besides several other improvements in packaging, time minimization, waste storage, etc. G.G.

**N70-33841\*#** Whirlpool Corp., St. Joseph, Mich.  
**SYSTEMS ANALYSIS OF MANNED ORBITING LABORATORY FEEDING SYSTEM**

Norman G. Roth *In* NASA, Washington Aerospace Food Technol. 1970 p 43-55 (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

Presented is the systems analysis approach that led to an improvement in the overall feeding system for the Manned Orbital Laboratory Program. Packaging and food-shape inefficiencies in the MOL baseline system were eliminated and an interface chart for a typical rehydratable food package and its constraints developed. This chart was then utilized to evaluate the nutritional and dietic aspects of the food as well as the optimum utilization of the available stowage place. G.G.

**N70-33842\*#** National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.  
**APOLLO APPLICATIONS PROGRAM REQUIREMENTS**

Paul C. Rambaut *In its* Aerospace Food Technol. 1970 p 57-60 (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

The requirements for the AAP feeding system are effected by its two primary objectives of: (1) the experiment on habitability; and (2) medical data collection. The food must be sufficiently well defined so that nutrient intake can be derived from minimal inflight data recorded during the experiment. Food flavor, texture, appearance, and packaging will be designed so that complete consumption is obtained because this is the governing criterion for the nutritional and experimental requirements of the AAP flight feeding system. G.G.

**N70-33843\*#** Naval Medical Research Lab., New London, Conn. Submarine Medical Research Lab.  
**OPERATIONAL-EXPERIENCE FOOD SERVICE ON NUCLEAR SUBMARINES**

J. D. Bloom *In* NASA, Washington Aerospace Food Technol. 1970 p 63 (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

Guidelines provide the Navy with recipe service, the use of ration dense foods is encouraged. Particular attention is given to sanitary food preparation to prevent prolonged standing of creamed items and to assure sufficient core cooking of poultry to eliminate bacterial contamination. Refrigeration facilities utilize neon since leaks of refrigerants are potential sources of halogenated hydrocarbon air contamination in enclosed environments. G.G.

**N70-33844\*#** Naval Medical Research Lab., New London, Conn. Submarine Medical Research Lab.

**PSYCHOLOGICAL EFFECTS OF SUBSTANTIAL AND APPETIZING MENUS FOR SUBMARINE PERSONNEL**

Charles F. Gell *In* NASA, Washington Aerospace Food Technol. 1970 p 65-71 refs (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

Psychological studies on eating habits and diets of submarine personnel establish the importance of supplying abundant and appetizing food on prolonged cruises. Critical attitudes can arise if the food degenerates from its quality. Ingestion of food aboard a submarine does not pose any problems if between meal snacking remains normal. It is concluded that until NASA is capable of engineering a rotating spaceship which can provide moderate G loading in its outer periphery, feeding in space will be satisfactory because of the disadvantages that the weightless state imposes on the eating process for the astronauts. G.G.

**N70-33845\*#** General Electric Co., Philadelphia, Pa.  
**TEKTITE 1 FOOD DEVELOPMENTS**

R. W. Scarlata *In* NASA, Washington Aerospace Food Technol. 1970 p 73-77 refs (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

The food selection and preparation are described briefly. Pressure cooking was eliminated because of complexity of the fixture. Frying food was eliminated because animal fats break down into CO and acrolein. The food selected included TV dinners and other frozen food, canned food, and some fresh and freshly cooked food sent down by the dumb waiter. Pre-prepared meals were considered poor; individually prepared meals were good. If Tektite were redesigned, the following changes would be recommended: add a fast potato baker, toaster, and waffle iron; develop recipes designed to turn canned and frozen foods into more appetizing meals; monitor the temperature of food shipments better; and provide a food expert to develop a food subsystem. It was also noted that eating was the major entertainment. N.E.N.

**N70-33846\*#** Navy Subsistence Office, Washington, D.C.  
**FOOD PLANS FOR SEALAB 3**

Louella C. Peterson *In* NASA, Washington Aerospace Food Technol. 1970 p 79-85 (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

The food selection and preparation problems and plans are described. Freeze-dehydrated entrees were considered good from the standpoints of taste, stowage, stability, and preparation but were rejected because of the small piece size and similarity in appearance. The helium atmosphere ruled out fresh egg cookery and microwave ovens. Infrared ovens are used to heat frozen foods. Frankfurters, cooked ham, frozen fried chicken, and frozen hamburger heated in buns were investigated as changes from a frozen meat-in-gravy monotony. A 6-day menu cycle was planned, and fresh bread, pretrimmed fresh produce will be furnished every 4 days. N.E.N.

**N70-33847\*#** Army Natick Labs., Mass.  
**ADVANTAGES, PROBLEMS, AND EXPERIENCES OF IRRADIATED FOODS**

Edward S. Josephson *In* NASA, Washington Aerospace Food Technol. 1970 p 87-100 refs (See N70-33835 18-05)  
 Avail: CFSTI CSCL 06H

Irradiation as a means of food preservation is discussed. Among the advantages mentioned are the following: spoilage organisms and pathogens are killed; sprouting in tubers is disrupted; shelf life of meats, vegetables and fruits is increased; food undergoes minimal changes in texture, flavor, odor, and color; and

foods retain nutritive value. The main problem area is identified as proof of wholesomeness convincing to health authorities, and packaging is considered a lesser problem. It is felt that irradiated foods will become commonplace because of their generally excellent quality. N.E.N.

**N70-33848\*#** Cornell Univ., Ithaca, N.Y.

**AIRLINE VERSUS SPACE FEEDING**

Paul A. Buck *In* NASA, Washington Aerospace Food Technol. 1970 p 105 - 108 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

Ideas for space feeding by comparing airline and aerospace feeding systems are introduced. Use of the metric system to divide the astronaut's day, primarily in relation to his eating schedule, is discussed. Author

**N70-33849\*#** Pan American World Airways, Inc., New York.

**PAN AMERICAN WORLD AIRWAYS: PRESENT AND FUTURE PLANS**

J. P. Treadwell *In* NASA, Washington Aerospace Food Technol. 1970 p 109 - 111 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The logistics of feeding passengers in the 707 and 747 aircraft are described. The problems of weight, space, and disposability are outlined. Food variety, demand food service, and ease of preparation are also mentioned. N.E.N.

**N70-33850\*#** Japan Air Lines Co., Ltd., Tokyo.

**JAPAN AIR LINES: PRESENT AND FUTURE PLANS**

Toshimitsu Ikegami *In* NASA, Washington Aerospace Food Technol. 1970 p 112 - 114 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The primary motivating force behind the food planning service is identified as a taste of food of the native land. The problem of serving food to passengers from all parts of the world is discussed, and the modifications taken in attempting to please the various palates or to give a choice are mentioned. N.E.N.

**N70-33851\*#** Pillsbury Mills, Inc., Minneapolis, Minn.

**FOOD DEVELOPMENT AND EXPERIENCES**

Robert M. Weiss *In* NASA, Washington Aerospace Food Technol. 1970 p 117 - 119 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

Research in developing compressed food is described. Food bars were made in a variety of flavors, from hard brittle to soft plastic and from smooth to chunky texture, in fruit, vegetable, meat-analog, and confection areas. The bars can have up to 5.75 Kcal/g, retain vitamin viability, and are low cost and stable. Protein-encapsulated vegetable oil serves as a base for the food. Work in developing primate pellets to be dispensed from a mechanical feeder is also mentioned. N.E.N.

**N70-33852\*#** Swift and Co., Chicago, Ill.

**MEAT-TYPE-FOOD DEVELOPMENT AND EXPERIENCES**

R. L. Pavey *In* NASA, Washington Aerospace Food Technol. p 121 - 123 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The problems arising from the variabilities of fat, water, and nutritional contents in meats are described, and the development of bite size pieces of meat and sandwiches is discussed. Bite size

pieces are cut from a frozen, moulded bar. A process for producing textured beef and chicken which provides a binding characteristic to reduce shredding is mentioned. Areas for improving space flight food are identified as increasing spice levels, spoon and bowl feeding, and using intermediate moisture or moisture mimetic agent foods. N.E.N.

**N70-33853\*#** General Foods Corp., White Plains, N.Y.

**GENERAL FOODS CORPORATION PRODUCT DEVELOPMENT AS RELATED TO AEROSPACE FOOD PROBLEMS**

Ben F. Buchanan *In* NASA, Washington Aerospace Food Technol. 1970 p 125 - 129 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

Developments in shelf-stable processed foods are described. Recent trends in rehydrable foods, intermediate moisture products, and moisture mimetic products are discussed. Additives which simulate moistness are listed, and an emulsion formulation is given for introducing the mimetic composition into compressed or freeze dehydrated good bars. It was found that the acceptability of dehydrated food was increased by the addition of moisture mimetic foods. N.E.N.

**N70-33854\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**FOOD SYNTHESIS BY PHYSICOCHEMICAL METHODS**

Jacob Shapira *In* its Aerospace Food Technol. 1970 p 133 - 140 refs (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The selection of pure nutrients and synthesis of foods for a manned planetary space flight are discussed. The composition of diets and the catabolism of food are given. The syntheses of formaldehyde from carbon dioxide and hydrogen, of glycerol from formaldehyde, and of formose sugars from formaldehyde are outlined. N.E.N.

**N70-33855\*#** California Univ., Berkeley.

**BIOLOGICAL FOODS**

Doris Howes Calloway *In* NASA, Washington Aerospace Food Technol. 1970 p 141 - 144 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The composition of biomasses is discussed with respect to their usefulness as food in spacecraft. The problem requires determination of the relationship between the composition of the product and the nutritional needs of the crew, and also detection of the presence of substances that have no nutritional value, but that do have physiological effects. Studies show that consumption of crude biomasses is limited to the function of providing protein to accompany a chemically regenerated or onboard diet high in fat or carbohydrate. R.B.

**N70-33856\*#** Technology, Inc., Dayton, Ohio.

**LONG-TERM SPACE MISSION REQUIREMENTS**

Clayton S. Huber *In* NASA, Washington Aerospace Food Technol. 1970 p 145 - 149 refs (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The possibilities of long-term space missions beyond the Apollo Applications Program are discussed. It is noted that no definite programs have been implemented, although considerable effort has been expended during initial planning stages. Three concepts of space exploration, including earth orbit, lunar, and planetary programs, are discussed individually. Possible feeding systems for each type of mission are considered. R.B.

## N70-33857

N70-33857\*# Army Natick Labs., Mass.

### US ARMY FOOD RESEARCH AND DEVELOPMENT PROGRAM

Herbert A. Hollender *In* NASA, Washington Aerospace Food Technol. 1970 p 151-163 (See N70-33835 18-05) refs  
Avail: CFSTI

Different techniques of preserving food for military rations are discussed. The methods include freeze-drying and flex canning. Reconstitution techniques developed for space flight foods were applied to developing suitable rations for field use. R.B.

N70-33858\*# Giessen Univ. (West Germany).

### WERNER SELL EQUIPMENT DEVELOPMENT

Werner Sell *In* NASA, Washington Aerospace Food Technol. 1970 p 169-170 (See N70-33835 18-05)  
Avail: CFSTI CSCL 06H

A high temperature oven with fast-circulated hot air is described. The oven is compact and reduces thawing and cooking time compared to regular ovens, and is proposed as suitable equipment for spacecraft. R.B.

N70-33859\*# Litton Systems, Inc., Minneapolis, Minn. Atherton Div.

### AIRBORNE MICROWAVE OVEN DEVELOPMENT

Calvin Hagberg and David Graff *In* NASA, Washington Aerospace Food Technol. 1970 p 171-174 (See N70-33835 18-05)  
Avail: CFSTI CSCL 06H

The techniques of preparing food with microwave ovens are discussed. The background of microwave ovens developed for use in aircraft is examined and the current state of the art is presented. R.B.

N70-33860\*# Raytheon Co., Lexington, Mass.

### DESIGN CONSIDERATIONS FOR MICROWAVE HEATING OF SPACE FOOD

William Stone *In* NASA, Washington Aerospace Food Technol. 1970 p 175-176 (See N70-33835 18-05)  
Avail: CFSTI CSCL 06H

Reliability, weight, and size, as well as power supplies, are discussed as prime requirements in designing microwave heating units for food preparation in spacecraft. It is concluded that a light-weight unit suitable for spacecraft is within current industrial capabilities. R.B.

N70-33861\*# Minnesota Mining and Mfg. Co., St. Paul, Minn.

### INTEGRAL HEATING EQUIPMENT DEVELOPMENT

John M. Mahlum *In* NASA, Washington Aerospace Food Technol. 1970 p 177-181 (See N70-33835 18-05)  
Avail: CFSTI CSCL 06H

Laboratory and performance tests of integral heating units are reported. The heating is accomplished from a resistive coating applied to a surface area, and heat is delivered directly to the food being prepared with better than 90% efficiency. The various components of the heating unit are described and possible applications are discussed. R.B.

N70-33862\*# Boeing Co., Seattle, Wash.

### BOEING 747 LOWER LOBE GALLEY SYSTEM INTEGRATION

C. V. Lindow *In* NASA, Washington Aerospace Food Technol.

1970 p 183-191 (See N70-33835 18-05)

Avail: CFSTI CSCL 06H

The Boeing 747 lower lobe galley and its function to store prepared meals and beverages and to enable trained personnel to present them to passengers are discussed. Diagrams are given to illustrate how the system is integrated and the advantages and disadvantages of the system to the airline are cited. R.B.

N70-33863\*# Lockheed-California Co., Burbank.

### FOOD SYSTEM INTEGRATION RESPONSIBILITIES OF AIRFRAME MANUFACTURERS

L. W. King *In* NASA, Washington Aerospace Food Technol. 1970 p 193-202 (See N70-33835 18-05)  
Avail: CFSTI CSCL 06H

The design of a galley system and its integration into the aircraft are discussed with respect to the joint responsibility of the airframe manufacturer and the air carrier. The design characteristics include defining the objectives of the system, developing equipment performance and aircraft support requirements, describing the elements of the airborne system, and specifying the details of the interface between the aircraft and the ground equipment and facilities. The galley system of the Lockheed L-1011 is given as an example. R.B.

N70-33878\*# Scripta Technica, Inc., Washington, D.C.

### EXPERIMENTAL RESEARCH ON HUMANS IN A STATE OF HYPOTHERMIA RESULTING FROM BEING CONFINED TO A LIFE RAFT ON THE OPEN SEA [RICHERCHE SPERIMENTALI SULL'UOMO IN IPOTERMIA DA PERMANENZA SU MEZZI DI SALVATAGGIO IN MARE]

P. Rota *NASA* Apr. 1970 24 p refs Transl. into ENGLISH from Riv. Med. Aeronaut. Spaz. (Italy), v. 32, Apr.-Jun. 1969 p 215-230

(Contract NASw-1964)

(NASA-TT-F-12885) Avail: CFSTI CSCL 06S

Physiological parameters (tympenic and superficial temperatures, heart rate, oxygen intake) were recorded in subjects donning water soaked flight suits, in low temperature and high ventilation environment. On the basis of recorded physiological data and of calculated ones (mean body temperature, thermic balance), thermal conditions and thermo-regulatory responses are studied. Considerations are presented on importance of these conditions in survival. Author

N70-33884# Naval Submarine Medical Center, Groton, Conn. Medical Research Lab.

### PERFORMANCE EFFECTS OF INCREASED AMBIENT PRESSURE. 2: HELIUM-OXYGEN SATURATION AND EXCURSION DIVE TO A SIMULATED DEPTH OF 1100 FEET Interim Report

James W. Parker 10 Sep. 1969 21 p refs

(AD-705389; SMRL-596) Avail: CFSTI CSCL 6/19

Two experienced, commercial divers were administered a simple addition test, a letter cancellation test, a geometric forms test and a choice reaction time test (RATER) at selected intervals before, during and after a simulated, helium-oxygen dive in a pressure chamber complex to a saturated depth of 800 feet with excursion dives to 1000, 1050 and 1100 feet. The compression rate was 3.5 per minute. Few, if any decrements in performance on any of the measures were noted. In fact, in some instances, slight improvements were found which cannot be attributed to learning or practice effort. Most changes were postulated as being due to motivational factors. Future plans for continued validation of the performance measures used are present. Author (TAB)

**N70-33907\*#** Baylor Univ., Houston, Tex. Coll. of Medicine.  
**DEVELOPMENT OF A PROTOTYPE ONBOARD EEG ANALYSIS SYSTEM**

James D. Frost, Jr. 30 Apr. 1970 147 p refs  
 (Contract NAS9-9418)  
 (NASA-CR-108508) Avail: CFSTI CSCL 06B

Details are presented on the design and preliminary operational tests of a laboratory prototype system for acquisition and automatic analysis of electroencephalographic and electro-oculographic signals. The system also provides an output display indicative of the subject's level of consciousness. The components are described, and results from tests on crew members of Tektite 1 and the submersible vehicle Ben Franklin are discussed. The effects of simulated spacecraft noise on sleep were studied, and it was felt that the noise did not cause a significant disruption of sleep. Alpha wavelength analyses are also mentioned. N.E.N.

**N70-33914#** Oak Ridge National Lab., Tenn. Mathematics Div.  
**THE SIMULATION, FITTING, AND TESTING OF A STOCHASTIC CELLULAR PROLIFERATION MODEL**

David G. Hoel and Toby J. Mitchell Feb. 1970 29 p refs  
 (Contract W-7405-eng-26)  
 (ORNL-TM-2811) Avail: CFSTI

A stochastic model for the growth of a cell population is proposed, and is studied by means of simulations on a digital computer. This model considers each generation time to be the sum of two successive random time intervals. The first, which depends on the population size, is the time from birth until the cell is committed to divide. The second is the time from commitment to divide until division itself. In order to fit this model to experimental data, repeated computer simulations are performed and the distance between the data and the simulated trials is studied. By viewing the expectation of this distance as a response surface over the parameter space of the model, standard response surface methods may be used to optimize the fit. Monte Carlo procedures for testing the goodness-of-fit of these models are proposed and carried out. Author

**N70-33915#** Politecnico di Torino (Italy). Ist. di Fisica Tecnica.  
**ON METHODS FOR GENERATING MONODISPERSED AEROSOLS [SUI METODI PER LA GENERAZIONE DI AEROSOL MONDISPERSO]**

C. Boffa Sep. 1968 18 p refs In ITALIAN  
 (PT-IFT-378; IFT-10) Avail: CFSTI

Various techniques for producing aerosols are examined for the possibility of generating reproducible monodispersions of particles, with dimensions on the order of a few hundredths of a micron, for use in studying atmospheric pollution. It is shown that the best method for producing this type aerosol is by obtaining the particles by electric arc between two metallic electrodes. Transl. by F.O.S.

**N70-33930#** Joint Publications Research Service, Washington, D.C.  
**SIGNIFICANCE OF VISUAL INFORMATION IN FORMING SPATIAL PERCEPTION IN WEIGHTLESSNESS**

L. A. Kitayev-Smyk 24 Jul. 1970 8 p refs Transl. into ENGLISH from Vop. Psikhologii (USSR), no. 2, 1970 p 155-159  
 (JPRS-51025) Avail: CFSTI

In-flight experiments to investigate the correlation of afferent impulses in man in the process of forming spatial concepts in weightlessness are discussed. Subjects were tested strapped in a seat with eyes open, strapped in the seat with eyes blindfolded, floating in air with eyes open, and floating in air with eyes blindfolded. The nature of spatial perception was also tested by

having the subjects walk on an adhesive strip located on the ceiling of the aircraft cabin. Results confirm the hypothesis that space perception during short exposures to weightlessness is formed by visual information about the stability of the surroundings and by graviceptor information about the disappearance of resistance. In the absence of sight information, the graviceptor information gave the illusion of falling, while with sight the subjects felt they were upside down. The walking experiment results agreed with earlier findings that skin and muscle sensations play an important role in weightlessness with vision left intact. N.E.N.

**N70-33941\*#** Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Applied Science Div.  
**THE DEVELOPMENT OF TWO CLOSELY CONTROLLED HUMIDITY SYSTEMS**

Daniel M. Garst and Kermit F. Lindell Jun. 1970 17 p ref  
 (NASA Order W-12853)  
 (NASA-CR-109869; SC-RR-70-409) Avail: CFSTI CSCL 06M

Accurately controlled humidity systems were needed to study the effect of relative humidity on the dry heat and thermoradiation inactivation of microorganisms. Two different systems were developed which provided the degree of control needed. The components and operation of the systems, as well as some of the factors considered in their design are described. Author

**N70-33943#** Sperry Rand Corp., Great Neck, N.Y. Gyroscope Div.

**RESEARCH IN VISUAL PERCEPTION FOR CARRIER LANDING. SUPPLEMENT 1, PART 1: RESPONSE MATRIX ANALYSIS BY COMPUTER Final Report, 1964-1969**

Theodore Gold and Robert F. Perry Dec. 1969 354 p  
 (Contract Nonr-4081(00))

(AD-706037; SGD-5265-0327-Suppl-1-Pt-1) Avail: CFSTI CSCL 5/10

The supplement to Report No. SGD-5265-0327, AD-706036 contains the printout data provided by the Univac 1108 high-speed digital computer in the analyses of the stimulus-response matrices involving correlation techniques. The printouts include both raw and reduced data and should be useful for future reference. Author (TAB)

**N70-33948#** Pennsylvania Univ., Philadelphia. Office of Engineering Research.

**AN INTERACTIVE EXPERIMENT IN CHEMICAL SUBSTRUCTURE SEARCH USING THE MCC TOPOLOGICAL SCREEN SYSTEM**

Richard Haber and David Lefkowitz Nov. 1969 55 p refs  
 (Contract NSF C-547)

(PB-189470) Avail: CFSTI CSCL 05B

A particular kind of real time interaction that can take place between a chemist and a computer based chemical substructure search system is discussed. The system is basically capable of retrieving structures as registry number references in response to a set of fragments expressed in Boolean (logical) relationships. Beyond this, however, the system can enter into a stylized dialogue with the chemist in which fragments that may indicate close structural relationships to those in the original inquiry are displayed, whereupon he has the opportunity to examine and select those that may expand upon or modify his original inquiry. Author (USGRDR)

**N70-33956#** Missouri Botanical Garden, St. Louis.  
**LIGHT AND TEMPERATURE DEPENDENCE OF PHOTOSYNTHESIS Final Report, 1 Nov. 1968 14 Feb. 1970**

David M. Gates 24 Feb. 1970 5 p  
(Contract N00014-69-C-0048)  
(AD-705516; MBG-ONR-001) Avail: CFSTI CSCL 6/1

A very brief report on a theoretical model for photosynthesis is given. It combines the resistance network used in transpiration studies with a simplified biochemical approach describing the uptake of CO<sub>2</sub> at the chloroplasts. This model was combined with the energy budget approach to leaf energy balance. The photosynthesis model has been refined to include photorespiration, thereby making it more widely applicable. Author (TAB)

**N70-33971#** Honeywell, Inc., Minneapolis, Minn. Systems and Research Center.

**EFFECTS OF VARYING LEVELS OF AUTOPILOT ASSISTANCE AND WORKLOAD ON PILOT PERFORMANCE IN THE HELICOPTER FORMATION FLIGHT MODE Final Technical Report, Dec. 1967 - Apr. 1968**

Paul A. Anderson and Myrna L. Toivanen Mar. 1970 244 p refs  
(Contract N00014-66-C-0362)  
(AD-706001; Rept-12543-FR4; JANAIR-680610) Avail: CFSTI CSCL 5/5

The objective of the study was to evaluate pilot performance in manual IFR formation flight with varying levels of autopilot assistance and pilot workload. The study was conducted for a conventional helicopter, i.e., the UH-1 Iroquois, and an advanced vehicle, the AH-56 Cheyenne. Man-in-the-loop simulations of these vehicles were conducted to evaluate pilot performance under six levels of autopilot assistance, ranging in sophistication from the free vehicle to outer loop hold modes in heading and altitude, and under three levels of pilot workload, consisting of a forced-pace, secondary concomitant task. Results of the study, within the constraints imposed by the simulation, indicated that increasing the level of autopilot assistance resulted in a less demanding task for the pilot and provided greater system stability. This was borne out in terms of both quantitative performance data and pilot opinion. However, position errors were not consistently reduced beyond the levels obtained during manual flight control modes where the highly quickened display was used. Only at the highest workload level tested did autopilot assistance serve to reduce the position errors from what was experienced under the manual control conditions. Author (TAB)

**N70-33975#** School of Aerospace Medicine, Brooks AFB, Tex.  
**EFFECT OF HYPOBARIC ENVIRONMENTS ON THE SUSCEPTIBILITY OF MICE TO BACTERIAL TOXINS Progress Report, Jan. - May 1969**

William G. Glenn Apr. 1970 17 p refs  
(AD-705907; SAM-TR-70-18) Avail: CFSTI CSCL 6/20

Two toxin-producing bacteria, *Staphylococcus* spp. and *Salmonella enteritidis*, affect man and other animals. *Staphylococci* produce enterotoxin of the B type (SEB) that is responsible for food poisoning. *S. enteritidis* produces a lipopolysaccharide (LPS) that is both pyrogenic and toxic for humans. SEB and LPS together act as synergists in mice. Neither toxin, separately, is markedly lethal. Injected in sequence, they cause substantial lethality. Twenty-one experiments were conducted at 27,000 ft. simulated altitude with varying gaseous environments and temporal sequences of SEB- and LPS injections in mice. These studies established that hypobaric environments decreased the susceptibility of mice to the lethal effects of the SEB-LPS combination when the animals remained at altitude. This was true whether the mice were acclimatized or not and regardless of the gaseous composition. Greatest resistance or least susceptibility to toxins was demonstrated at 27,000 ft. simulated altitude with 50% O<sub>2</sub>-50% N<sub>2</sub>. TAB

**N70-33983\*#** Ohio State Univ., Columbus. Dept. of Physiology.  
**BIOLOGICAL EFFECTS OF PROLONGED EXPOSURE OF ANIMALS TO UNUSUAL GASEOUS ENVIRONMENTS Semiannual Report, 1 Sep. 1969 - 28 Feb. 1970**

Harold S. Weiss 28 Feb. 1970 5 p  
(Grant NGR-36-008-004)  
(NASA-CR-108426; Rept-15) Avail: CFSTI CSCL 06C

A table representing lung and body weight changes in rats exposed for 10 to 20 days to 74% O<sub>2</sub> at one atmosphere, with and without inert gas diluents is presented. Results indicate effects on the lungs is a fairly specific response to both O<sub>2</sub> and He and helium has some moderating effect on pulmonary oxygen toxicity. E.M.C.

**N70-33986\*#** J & J Marine Diving Co., Inc., Pasadena, Tex.  
**PREDICTING THE POSSIBILITY OF DECOMPRESSION SICKNESS, OR BENDS, IN MANNED ORBITAL FLIGHTS**

Peter O. Edel 10 May 1968 33 p refs  
(NASA Order T-72681; NASA Order T-74400)  
(NASA-CR-108446) Avail: CFSTI CSCL 06S

Astronauts undergoing decompression to orbital cabin pressure are subjected to the dissolution of gases from their bodily tissues in proportion to the decrease in partial pressure of these gases, thus incurring the possible consequence of decompression sickness. In calculating a safe level of supersaturation of inert gas--in this instance, nitrogen--in the bodily tissue, techniques used in diving table computations were adapted for use in similar computations of pressure changes occurring in orbital flight. From these computations, the following hypothesis was developed: in order to prevent the occurrence of bends in orbital flight, the ratio of nitrogen partial pressure (within those bodily tissues having the slowest elimination rate) to the ambient pressure should not exceed 1.5:1. Graphs are herein submitted that predict a safe decompression rate according to the degree of nitrogen elimination that has been achieved. Author

**N70-33987\*#** J & J Marine Diving Co., Inc., Pasadena, Tex. Research Dept.

**DECOMPRESSION RISKS IN SUCCESSIVE HYPERBARIC-HYPOBARIC EXPOSURES**

Peter O. Edel 28 Mar. 1969 34 p refs  
(NASA Order T-77650)  
(NASA-CR-108445) Avail: CFSTI CSCL 06S

As part of their training program, astronauts are required to carry out no-decompression dives at the bottom of a tank filled with 40 feet fresh water at the Marshall Space Flight Center while wearing pressure suits inflated to 3.5 psi above ambient pressure. These dives may be repeated twice daily for approximately five consecutive days. According to accepted techniques for calculating decompression tables, a diving schedule of two hours in the morning and two hours in the afternoon separated by a three hour surface interval does not incur a significant probability of decompression sickness. A similar work schedule can be safely followed on the second and successive days if a minimum surface interval of 16 hours separates the workdays. Calculations further indicate that these astronauts could safely fly home without incurring decompression sickness if the maximum aircraft cabin pressure is maintained at the equivalent of 10,000 feet altitude, with a given diving profile schedule which is suggested. Author

**N70-33999#** Federal Aviation Administration, Oklahoma City, Okla. Office of Aviation Medicine.

**EFFECTS OF AN ORGANOPHOSPHORUS PESTICIDE ON REPRODUCTION IN THE RAT**

Leonard C. Ryan, Boyd R. Endecott, Gerald D. Hanneman, and Paul W. Smith Jan. 1970 6 p refs  
(AM-70-3) Avail: CFSTI

Chronic poisoning with the organophosphorus pesticide disulfoton at a dosage level of 10 ppm in the diet has been found to have an adverse effect on reproduction in rats. The primary effect is a reduction in the number of pregnancies and occurs equally in matings between poisoned males and control females and between control males and poisoned females. Reduction of cholinesterase activity is greater and symptoms of poisoning more severe in poisoned females. Brain cholinesterase activity is reduced in the offspring of poisoned females. Author

**N70-34000#** Oklahoma Univ., Oklahoma City. Dept. of Physiology and Biophysics.

**QUANTITATIVE EVALUATION OF OPTICALLY INDUCED DISORIENTATION**

M. Herbert Brecher and Gerhard A. Brecher FAA Jan. 1970 6 p refs  
(Contract FA-67-AC-2699-1)  
(AM-70-2) Avail: CFSTI

The purpose of this study was to establish quantitatively and systematically the association between the speed of movement of an optical environment and the extent of disorientation experienced by an individual viewing this environment. The degree of disorientation was determined by measuring the angle by which an individual deviates from a straight path when he walks back and forth within a rotating optokinetic drum. The correlation between the speed of the moving optical environment and the amount of disorientation indicates that greater disorientation occurs when the optical environment moves faster. It appears that at faster movements of the optokinetic drum, the subjects become increasingly more cognizant of their disorientation and attempt to compensate for it. At velocities of less than 20 radians/min. most subjects are disoriented in their motor activity without being aware of it. Author

**N70-34021\*#** Hawaii Univ., Honolulu. Dept. of Botany.

**ROLE OF GRAVITATIONAL STRESS IN LAND PLANT EVOLUTION: THE GRAVITATIONAL FACTOR IN LIGNIFICATION, PART 1 Semiannual Report**

S. M. Siegel Jun. 1970 43 p refs /ts Botan. Sci. Paper No. 19  
(Grant NGR-012-001-053)  
(NASA-CR-109873) Avail: CFSTI CSCL 06C

The role of silicon in the chemo-mechanical properties of plants is supported by this investigation which includes effects of silicate on plant growth and the toxicity of germanate and GeO<sub>2</sub>. Experiments proved that germanium does inhibit germination and later growth of barley and wheat and retards silicon metabolism. Shoot and root growth in oven crystals and vermiculite were reduced in the absence of silicon and the leaves showed wilting, withering, reduced chlorophyll, and necrotic spotting. It is concluded that only plants requiring silicon are sensitive to germanium and germanium inhibition can be reversed by additions of silicon. E.M.C.

**N70-34036#** National Air Pollution Control Administration, Arlington, Va.

**CONTROL TECHNIQUES FOR HYDROCARBON AND ORGANIC SOLVENT EMISSIONS FROM STATIONARY SOURCES**

Mar. 1970 114 p refs  
(PB-190266; NAPCA-Pub-AP-68) Avail: SOD \$1.00 CSCL 13B

The effects of hydrocarbon and organic solvent emissions are of two types, direct and indirect. Direct effects are caused by the original, unaltered emissions, and indirect effects are caused by substances formed by photochemical reactions of the original emissions with other substances in the atmosphere. Information is presented on techniques for the control of organic emissions from stationary sources. Sources of hydrocarbon emissions include petroleum refining, gasoline distribution and marketing, chemical manufacturing, coal coking, fuel burning, waste disposal, and food processing. Sources of organic solvent emissions include manufacture and application of protective coatings, manufacture of rubber and plastic products, degreasing and cleaning of metal parts, dry cleaning operations, printing, and manufacture of chemicals. USGRDR

**N70-34038#** School of Aerospace Medicine, Brooks AFB, Tex.  
**WHOLE BODY IRRADIATION EFFECT RELATED TO CANINE TREADMILL PERFORMANCE DECREMENT AN ANNOTATED BIBLIOGRAPHY Final Report, Sep. 1969 Feb. 1970**

J. W. Watters, C. H. Bennett, and R. F. Hudson Apr. 1970 14 p refs  
(AD-705976; SAM-TR-70-22) Avail: CFSTI CSCL 6/18

This bibliography was prepared from a search of the literature for the years 1958 through 1968 as part of a study to determine the effects of radiation on canine locomotion. The paper contains a compilation of 15 titles and abstracts on canine performance decrement following high doses of radiation. The following reference sources were used: Biological Abstracts, Excerpta Medica, Index Medicus, and Nuclear Science Abstracts. Author (TAB)

**N70-34043#** Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

**RECOGNITION SYSTEMS WITH AN INFINITE PLANE RETINA**

A. Kh. Gelig 19 Mar. 1970 24 p refs Transl. into ENGLISH from Vychislitel'naya Tekhn. i Vopr. Programirovaniya (USSR), v. 7, no. 5, 1968 p 80-94  
(AD-705750; FTD-MT-24-456-69) Avail: CFSTI CSCL 6/4

The learning recognition system proposed by V. A. Yakubovich is analyzed. It is shown how the elements and the instruction sequence must be organized so that learning algorithms are simplified. TAB

**N70-34056#** National Air Pollution Control Administration, Arlington, Va.

**CONTROL TECHNIQUES FOR NITROGEN OXIDE EMISSIONS FROM STATIONARY SOURCES**

Mar. 1970 115 p refs  
(PB-190265; NAPCA-Pub-AP-67) Avail: SOD \$1.00 CSCL 13B

The role of nitrogen oxides in air pollution is reviewed. A discussion is presented on combustion control techniques to remove nitrogen oxides from exhaust gases. Also reported are the various methods to remove nitrogen oxides from industrial waste gases. USGRDR

**N70-34065\*#** Univ. of Southern Calif., Los Angeles. Dept. of Physiology.

**A LOW POWER BLOOD FLOW TRANSMITTER. TRANSMISSION OF CARDIOVASCULAR RESPONSE TO WEIGHTLESSNESS Progress Report, 1 Mar. 31 May 1970**

John P. Meehan, R. Rader, J. Henriksen, and L. Casados 15 Jun. 1970 20 p  
(Contract NSR-05-018-087)  
(NASA-CR-109872) Avail: CFSTI CSCL 06B

Pressures, flows, and dimensions characterize cardiovascular dynamics. An implantable system sensing these three parameters was designed for use on the Apollo Applications Program to determine cardiovascular responses of sub-human primates to long term weightlessness. Continuing research on the system is reported. Major efforts were directed toward evaluating and testing blood flow circuitry. A dog was implanted to evaluate the flow probe and circuitry. The flow probe was implanted on the terminal aorta and allowed to heal for several days; then the connector was exposed and connected to an external instrument package. In addition, an implantable unit for use on a large primate was fabricated and readied for implant. A systems description of the instrumentation is presented which includes a complete analysis of the approach.  
D.L.G.

**N70-34070#** National Center for Air Pollution Control, Durham, N.C.

#### **HANDBOOK OF AIR POLLUTION**

James P. Sheehy, William C. Achinger, and Regina A. Simon 1969 231 p refs  
(PB-190247; PHS-PUB-999-AP-44) Avail: SOD \$2.25 CSCL 13B

Individuals working in the air pollution field often need access to data concerning the characteristics and behavior of air, gases and particles, and the chemistry of atmosphere pollutants, and to data of a general nature such as mathematics and common conversion factors. At present, to have access to all this information, the individual needs a wide variety of reference books. The Air Pollution Handbook was designed to consolidate the applicable portions of these numerous references into a single, easily accessible source. The primary consideration for inclusion in the handbook is that the information be unlikely to change. This, then, excludes experimental results and data on air quality, even though these may be quite useful. The one exception to this general rule is the section on medical aspects. The experimental data that is included here is widely accepted in the field of biological experimentation.  
Author (USGRDR)

**N70-34074\*#** Translation Consultants, Ltd., Arlington, Va.  
**RELATIONSHIP BETWEEN THE RENIN-ANGIOTENSIN SYSTEM AND THE beta-ADRENERGIC RECEIVERS IN THE THIRST MECHANISM [RELACION ENTRE EL SISTEMA RENINA-ANGIOTENSINA Y LOS RECEPTORES beta-ADRENERGICOS EN EL MECANISMO DE LA SED]**  
L. A. Fernandez Washington NASA Aug. 1970 3 p Transl. into ENGLISH from Medicina (Argentina), v. 29, no. 6, 1969 p 435-436  
(Contract NASw-2038)  
(NASA-TT-F-13186) Avail: CFSTI CSCL 06C

Results of experiments on the effects of renin and angiotensin administrations on the thirst mechanisms of rats are reported. In one experiment the controls were left intact whereas the test animals were nephrectomized. In another experiment the test animals were kept under arterial hypertension. It is postulated, that the renin and angiotensin increase the ingestion of water, which is controlled by central renal factors. Other results are presented.  
Author

**N70-34085#** National Air Pollution Control Administration, Arlington, Va.  
**AIR QUALITY CRITERIA FOR PHOTOCHEMICAL**

#### **OXIDANTS**

Mar. 1970 202 p refs  
(PB-190262; NAPCA-Pub-AP-63) Avail: SOD \$1.75; CFSTI (MF only) CSCL 13B

The document focuses on photochemical oxidants as they are found in the ambient air. The presence of photochemical oxidants in the ambient air is then considered in relation to: (1) effects on vegetation; (2) effects on materials; (3) toxicological studies of effects on animals and man; and (4) epidemiological studies. The literature has been reviewed thoroughly for information related to the development of criteria, and the document not only summarizes the current scientific knowledge of photochemical air pollution, but also attempts to point up the major deficiencies in that knowledge and the presently recognized needs for further research.  
Author (USGRDR)

**N70-34086#** Texas Technological Univ., Lubbock. Center of Biotechnology, Fatigue, and Human Performance.

#### **PERFORMANCE, RECOVERY, AND MAN-MACHINE EFFECTIVENESS Semiannual Progress Report, 1 Sep. 1969 28 Feb. 1970**

Richard A. Dudek 6 Apr. 1970 27 p  
(Contract DAAD05-69-C-0102; Proj. Themis)  
(AD-705467) Avail: CFSTI CSCL 5/10

The purpose of the program is the generation of basic data concerning human performance and recovery within several work systems settings under conditions of varied environments, task demands motivational levels, and nutritional factors. Further to generate from this basic data the solution to real problems and recommended procedures for mans operation under varying conditions of the work system, e.g., work-facilitating period combinations for various task types, durations of tasks, environments, etc., determination of mans ability to participate in continuous military operations, procedures, and methods for improved team operations, optimal work-rest schedules for crews of vehicles creating a vibrational environment, etc.  
Author (TAB)

**N70-34169\*#** National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

#### **EVALUATION OF THE CREW: COMMAND MODULE POSTLANDING INTERFACE**

Harold J. Clancey 7 Jul. 1969 35 p refs Program Apollo Working Paper No. 1348  
(NASA-TM-X-64318) Avail: CFSTI CSCL 05H

Three separate test series were used to evaluate the postlanding interface between the crew and the command module: (1) postlanding-systems qualification tests, (2) water-egress-procedures developmental tests, and (3) flight-crew water-egress training. These tests permitted investigation of all crew and command module postlanding-interface areas which included systems, crew equipment, storage, and egress. Crew capability to detect uprighting system failures and in most cases, to take remedial action was demonstrated. Crew reposition, to effect a spacecraft uprighting, was shown to be safe and effective. Further testing is indicated to determine the reasons for uprighting compressor noise-level changes and to determine the desirability of maintaining only the lower noise level during uprighting for reasons of crew comfort.  
Author

**N70-34195\*#** General Electric Co., Philadelphia, Pa.  
**ASTRONAUT ZERO GRAVITY PERFORMANCE EVALUATION PROGRAM. VOLUME 1: SUMMARY TECHNICAL REPORT Final Study Report**



[1969] 93 p refs

(Contract NAS9-8640)

(NASA-CR-108569) Avail: CFSTI CSCL 05E

The program encompassed: (1) The definition and preliminary design of experiment M508 (EVA and IVA hardware evaluation, concerned with astronaut worksite performance evaluation). (2) The construction of two prototype models of the M508 task panel to verify design concepts, develop manufacturing procedures, and collect simulated astronaut worksite performance data. (3) The conduct of experiment M508 using various ground based zero-gravity simulation modes. (4) The collection of additional data on man's force emission capability to establish 1-g and zero-g baselines. (5) The preparation and publication of a handbook of human engineering design data for reduced gravity conditions. The experimental program involved an evaluation of the major facets of astronaut performance while restricted to a limited worksite area. The program involved evaluation of the efforts required to install and enter different restraint concepts, remove panels and covers associated with gaining access to a work area, performance of specific tasks designed to evaluate the interactions between basic psychomotor behaviors, and the parameters of the EVA/IVA, zero-gravity environment and equipment. Author

**N70-34199#** Allied Research Associates, Inc., Concord, Mass.  
**BIBLIOGRAPHY ON BIOLOGICAL EFFECTS OF RADIO-FREQUENCY ELECTROMAGNETIC FIELDS (WITH SPECIAL ANALYTICAL AIDS), VOLUME 2 Final Report, 1 Aug. 1968 31 Jul. 1969**

Janet Healer and Robert Smiley Dec. 1969 135 p refs

(Contract DADA 17-69-C-9021)

(AD-704712; ARA-9G61-F-Vol-2) Avail: CFSTI CSCL 6/18

The report presents an extensive bibliography with special analytical aids for foreign and domestic journal articles, books, and reports dealing with the subject of biological effects of radio-frequency electromagnetic fields, particularly for microwave fields. Author (TAB)

**N70-34215#** National Air Pollution Control Administration, Cincinnati, Ohio.

**TOBACCO, A SENSITIVE MONITOR FOR PHOTOCHEMICAL AIR POLLUTION**

Walter W. Heck, Frank L. Fox, C. Stafford Brandt, and John A. Dunning Jun. 1969 25 p refs

(PB-190257; AP-55) Avail: SOD \$0.25; CFSTI CSCL 13B

The development of a technique by which the sensitive tobacco variety Bel W3 is used as a monitor for photochemical air pollution is discussed. The technique uses the plant as an indicator of the oxidant complex in both urban and rural areas. Two pilot studies that were conducted over a 3-year period during the development of the monitoring technique are included in the discussion. Attention is given to an explanation of the proper procedures for planting, transplanting, fertilizing, and caring for mature plants. The methods used in determining and recording injury to plant leaves is included; the studies showed almost daily injury to monitoring plants. Author (USGRDR)

**N70-34220#** Joint Publications Research Service, Washington, D.C.

**ENGINEERING PSYCHOLOGY AND CONTROL SYSTEMS**

O. A. Konopkin 29 Jun. 1970 6 p Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 1, 5 Jan. 1970 p 131-134

(JPRS-50843) Avail: CFSTI

Engineering psychology and the importance of psychophysiological characteristics of the human operator are discussed. In designing operator stations, attention is often focused

only on some anthropological data, individual characteristics of the functioning of the sense organs, and general artistic requirements for the designing of equipment and interiors. The value of individual engineering-psychological measures is often diminished by the fact that they are not always executed in the best way possible because they are not based on a serious psychological analysis of the operator's total activity in a given control system. Author

**N70-34221#** Joint Publications Research Service, Washington, D.C.

**MATHEMATICAL MODEL OF SIMPLEST HYDROECOLOGICAL SYSTEM**

V. V. Menshutkin et al 18 Jun. 1970 10 p refs Transl. into ENGLISH from *Gidrobiologicheskii Zh.* (Moscow), no. 2, 1970 p 28-35

(JPRS-50770) Avail: CFSTI

Mathematical models of hydroecological systems are presented. Mathematical modeling of populations of water animals and of whole ecological systems is a necessary and essential stage on the path toward solving the complex problem of managing natural water resources. Author

**N70-34231\*#** National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

**A REVIEW OF THE BIOLOGICAL EFFECTS OF VERY LOW MAGNETIC FIELDS**

Charles C. Conley Washington Aug. 1970 26 p refs

(NASA-TN-D-5902; A-3415) Avail: CFSTI CSCL 06S

The first studies of the effects upon living organisms of exposure to magnetic fields lower than that of the Earth were made within the present decade. In this review, ten of these are tabulated according to the taxonomic classification of the organism studied. Also included in the tabulation are eleven studies of the effects of fields in the geomagnetic range. Reports of studies of very low magnetic field effects were not found for fungi, echinoderms, amphibians or subhuman primates; specific studies of musculo-skeletal functions have not been reported, nor do ultrastructural techniques appear to have been applied to the study of very low magnetic field effects. A useful body of information should include such studies. Nonetheless, some well controlled experiments reviewed herein appear to have established that certain lower invertebrates, protozoans, and plants are indeed sensitive to the vector of the ambient magnetic field in the geomagnetic range, and that in nearly null magnetic fields, the growth, reproductive, aging, behavioral and phagocytic functions of some species are affected. Two studies of very low magnetic field effects are described in detail, these show a reduced cyto-enzyme synthesis rate in vivo in mice, but no reaction rate change in vitro. Author

**N70-34232#** Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.

**PROBABILITY GATE STATISTICS Progress Report**

James N. Cronholm 3 Feb. 1970 9 p ref

(AD-705556; USAMRL-847) Avail: CFSTI CSCL 5/10

A probability gate presents a fixed but controllable transmission probability  $p$  to pulses arriving at its input. This report describes some statistical properties of the transformation imposed by a gate on the input distribution of interpulse intervals. The output distribution of interpulse intervals is derived in terms of the input density and  $p$ . A simple relation is shown to hold between the moment generating functions, and the first four output moments are derived in terms of the input moments and  $p$ . Certain restrictions

on the kinds of obtainable output distributions are discussed. In particular, a condition is established which specifies when the output density is a replica of the input distribution. Author (TAB)

**N70-34244\*#** National Aeronautics and Space Administration, Washington, D.C.

**AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography with Indexes**

Jun. 1970 140 p refs  
(NASA-SP-7011(77)) Avail: CFSTI CSCL 06E

A continuing bibliography is presented which provides a convenient compilation of references for medical and biological scientists. The subject coverage concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival life support systems, exobiology, and personnel factors receive appropriate attention. Author

**N70-34256#** California Univ., Los Angeles.  
**ELECTROENCEPHALOGRAPHIC AND OTHER  
PHYSIOLOGICAL INDICATORS OF SHORT TERM STRESS  
Final Technical Report**

W. Ross Adey and Jan Berkhout 11 May 1970 16 p refs  
(Contract N00014-69-A-0200-4020)  
(AD-705615) Avail: CFSTI CSCL 5/10

A study was undertaken to analyze the relationship of EEG data from the point of view of detecting stress, associated with interrogation, directly from patterning of EEG parameters, and to re-evaluate previously described findings where heart rate and pulse volume alterations coincided with question presentation during actual interrogations. Author (TAB)

**N70-34288#** School of Aerospace Medicine, Brooks AFB, Tex.  
**MANUFACTURING REQUIREMENTS OF FOOD FOR  
AEROSPACE FEEDING**

Robert L. Flentge and Ronald L. Bustead May 1970 239 p refs  
(AD-705603; SAM-TR-70-23) Avail: CFSTI CSCL 6/8

Manufacturing requirement documents were written which describe the food processing and packaging technology used in space feeding systems. These documents combine information contained in the original Space Food Prototype Production Guides with additions and modifications developed through food testing and manufacturing experience. They were designed to provide complete and systematic descriptions concerning the production environment, equipment, raw ingredients, processing and packaging procedures, and end item specifications used in the manufacture of space foods. These documents include cross references to microbiological requirements, food prototypes, quality assurance provisions and food coatings and coating methods. The use of these manufacturing requirement documents in space food production has essentially eliminated a requirement for granting specifications waivers for flight foods. Author (TAB)

**N70-34301#** National Air Pollution Control Administration, Arlington, Va.

**CONTROL TECHNIQUES FOR CARBON MONOXIDE  
EMISSIONS FROM STATIONARY SOURCES**

Mar. 1970 72 p refs  
(AD-190263; NAPCA-Pub-AP-65) Avail: SOD \$0.70 CSCL 13/2

The document was prepared to summarize current information on sources of carbon monoxide (CO) emissions, methods of control, and costs and cost-effectiveness of controls. The control techniques described represent a broad spectrum of information from many engineering and other technical fields. The devices, methods, and principles were developed and used over many years, and much experience was gained in their application. They are recommended as the techniques generally applicable to the broad range of CO emission control problems. Many agricultural, commercial, industrial, and municipal processes and activities that generate CO are described individually. Author (USGRDR)

**N70-34303#** National Air Pollution Control Administration, Arlington, Va.

**CONTROL TECHNIQUES FOR CARBON MONOXIDE,  
NITROGEN OXIDE, AND HYDROCARBON EMISSIONS FROM  
MOBILE SOURCES**

Mar. 1970 132 p refs  
(PB-190264; NAPCA-Pub-AP-66) Avail: SOD \$1.25 CSCL 13B

The predominant source of carbon monoxide (CO), nitrogen oxide (NO sub x), and hydrocarbon (HC) from mobile combustion sources is the exhaust gas from gasoline-fueled engines. The principal mobile sources that generate CO, NO sub x, and HC emissions are described individually. Various techniques to control such emissions from these sources are reviewed. Technical considerations of the more prominent and feasible design modifications, alternative power sources, fuel modifications, auxiliary devices, and alternative transportation modes are presented. Sections on source evaluation, equipment costs, cost effectiveness analysis, and current research and development also are included. Pertinent references are presented at the end of each section. Author (USGRDR)

**N70-34316#** National Air Pollution Control Administration, Arlington, Va.

**AIR QUALITY CRITERIA FOR CARBON MONOXIDE**

Mar. 1970 179 p refs  
(PB-190261; NAPCA-Pub-AP-62) Avail: SOD \$1.50 CSCL 13B

Carbon monoxide (CO) is focused on as it is found in the ambient air; therefore, literature on extremely high levels of CO was not extensively cited. The occurrence, properties, and fate of atmospheric CO and principles of formation and control are reviewed followed by a discussion of estimation of CO emissions and measurement of atmospheric CO. The effects of CO are considered in relation to vegetation, toxicological studies on animals and man, and epidemiological studies. The scientific literature was generally reviewed through March 1969, with additional sources for reports as recent as January 1970. The literature was reviewed thoroughly for information related to the development of criteria. The current scientific knowledge of CO air pollution and attempts to point up the major deficiencies in that knowledge and the presently recognized needs for further research are summarized. Author (USGRDR)

**N70-34327\*#** Little (Arthur D.), Inc., Cambridge, Mass.  
**STUDY OF LONG TERM ATMOSPHERIC TRACE  
CONTAMINANT MONITORING AND CONTROL Final Report**

Philip L. Levins and James E. Oberholtzer 24 May 1970 91 p refs

(Contract NAS9-10434)  
(NASA-CR-108507; C-72206) Avail: CFSTI CSCL 06K

This report describes the findings and recommendations resulting from a study of a baseline environmental/thermal control and life support subsystem for controlling trace contaminants in a spacecraft atmosphere. Instruments and techniques for measuring the atmospheric trace contaminants are surveyed, and improved methods of presenting contaminant monitor information to the crew are considered. Author

**N70-34330#** National Air Pollution Control Administration, Arlington, Va.  
**AIR POLLUTION TRANSLATIONS: A BIBLIOGRAPHY WITH ABSTRACTS, VOLUME 1**  
 May 1969 173 p refs  
 (PB-190258; NAPCA-Pub-AP-56) Avail: SOD \$1.75; CFSTI CSCL 13B

Contents: General; Emission sources; Atmospheric interaction; Measurement methods; Control methods; Effects human health; Effects plants and livestock; Effects materials; Effects economic; Air quality measurements; Legal and administrative aspects; Standards and criteria; Basic science and technology; Author index; Language index; Subject index. USGRDR

**N70-34349\*#** National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.  
**MISSION TRAINING PROGRAM FOR THE FOURTH MANNED APOLLO MISSION**  
 Robert C. Kohler 15 Feb. 1969 56 p refs  
 (NASA-TM-X-64320; MSC-CF-D-69-17) Avail: CFSTI CSCL 051

The training program developed in this document is specifically tailored for the recycle of the Apollo 7 Back-up Crew. Approximately 1000 hours of training are planned and with judicious usage of the allocated time of seven months the training requirements can be fulfilled. The time available for training prior to launch necessitates a degree of specialization heretofore not an important factor. With minimal previous lunar module experience, the Crew Commander and the Lunar Module pilot shall concentrate most of their efforts towards attaining proficiency in all aspects of Lunar Module activity. Conversely, the Command Module pilot shall develop his skills in the Command Module, assuming primary flight responsibility for all major activities such as TLC, LOI, TEI, Entry, the exception being the launch phase. Training requirements are predicated on a lunar landing dress rehearsal mission (i.e. simulation of the lunar landing mission in lunar orbit), utilizing the Apollo Saturn 505 Launch Vehicle, Command Service Module 106 and Lunar Module 4. Author

**N70-34369#** Human Engineering Labs., Aberdeen Proving Ground, Md.  
**FP-50 FLIGHT DISPLAY EFFECTS ON VISION Technical Note, Feb. 1970**  
 Harry R. Stowell, David J. Florip, and Robert W. Bauer Mar. 1970 29 p refs  
 (AD-705595; HEL-TN-2-70) Avail: CFSTI CSCL 5/5

The FP-50 flight display unit is designed to provide a visual display of aircraft attitude and certain tactical information to the pilot. A cathode ray tube (CRT) is used to display the information. It was anticipated the FP-50 display lighting in the cockpit would affect the pilots outside visual performance during night flight. The report summarizes both photometric measures and human factors experiments on the FP-50 with pilot subjects. Results indicated that the white light of the display had negligible effects on dark adaptation and visual acuity when operated at suitable low-level brightness for night flight. It was discovered, however, filters enhanced contrast of the display by three or four times at these low luminances. Author (TAB)

**N70-34391#** Texas Christian Univ., Fort Worth. Inst. for the Study of Cognitive Systems.

**PARAMETERS OF HUMAN PATTERN PERCEPTION Semiannual Progress Report, 18 Sep. 1969 - 18 Mar. 1970**  
 Selby H. Evans 18 Apr. 1970 24 p refs  
 (Contract DAAD05-68-C-0176; Proj. Themis)  
 (AD-705466; SAPR-5) Avail: CFSTI CSCL 5/10

The report is the fifth semi-annual progress report on a research program titled Parameters of Human Pattern Perception. Empirical development during this period has included: (1) Exploration of feature selection processes through sequential presentation paradigms and specification of statistical principles influencing these processes. (2) Elaboration of the schema plus correction hypothesis, along with a general methodology for studying visual pattern storage. (3) Investigation of the effects of extra-stimulus information (context) on pattern recognition performance. Progress on theoretical development has included elaboration of a general pattern recognition model, specification of a feature selection mechanism, and exploration of the utility of multivariate models. Author (TAB)

**N70-34398\*#** General Electric Co., Philadelphia. Re-entry and Environmental Systems Div.

**IDENTIFICATION OF A RECURRING BACTERIAL CONTAMINANT IN A SPACECRAFT WATERING SYSTEM**  
 Armond J. Bryce 11 Aug. 1970 6 p Presented at 9th Ann. Tech. Meeting of the Am. Assoc. for Contamination Control, Anaheim, Calif., Apr. 1970  
 (Contract NAS2-1900)  
 (NASA-CR-73431) Avail: CFSTI CSCL 06M

The recurring bacterial contaminant found in the biosatellite water system was identified as *Ps. boropolis*. The nature of the organism precluded its control without the employment of strict sterile procedures or chemical agents throughout the spacecraft manufacture and test cycle. Additional treatment of the water system by halogenation or other means would be required to control the contaminating organism. Author

**N70-34401\*#** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**A STUDY OF ASEPTIC MAINTENANCE BY PRESSURIZATION**  
 J. M. Staughton 1 Mar. 1968 69 p  
 (Contract NAS1-7166)  
 (NASA-CR-66548) Avail: CFSTI CSCL 06M

A theoretical analysis of the characteristics of gas flow through microscopic holes in thin membranes demonstrated that a pressure differential across a membrane separating two quiescent gas chambers should prevent migration of microorganisms through a single microscopic hole against that pressure gradient. Preliminary experimental verification of the theoretical analysis was obtained for holes ranging from 19 to 228 microns in diameter in .012 and .030 inch thick membranes of polypropylene and aluminum. Spores of *Bacillus subtilis* var. *niger* were presented by gravity to the hole from an aerosol above the membrane, and were captured in the event of passage through the hole on agar medium in a tube located directly below. Forty-nine tests with pressure differentials ranging from 0.25 inches to 5.0 inches of water resulted in total exclusion of microorganisms from the detection medium. However, experimental conditions producing turbulence or high flow rates in either the aerosol or detection chambers resulted in penetration of spores against pressure differentials of 0.5 and 5.0 inches of water by mechanisms not yet explained. No differences could be detected in the exclusion or penetration of microorganisms as a result of the variables involved. Author

N70-34441\*# National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.

**TWO-GAS ENVIRONMENTAL CONTROL FOR THE APOLLO COMMAND MODULE**

W. E. Ellis 12 Jul. 1967 129 p refs Program Apollo Working Paper No. 1321

(NASA-TM-X-64337) Avail: CFSTI CSCL 06K

A two-gas atmospheric control system applicable to the Apollo Applications Program was designed and developed. The hardware is configured to integrate into the Apollo Command Module but is not flight qualified. The system selection, design, hardware status, and test results are described. Author

N70-34516\*# National Aeronautics and Space Administration, Washington, D.C.

**AIR ACCIDENTS OVER THE SEA AND SURVIVAL AT SEA [FLUGUNFAELLE UEBER SEE UND UEBERLEBEN AUF SEE]**

A. Wentrup et al Aug. 1970 12 p Transl. into ENGLISH from Wehrdienst und Gesundheit (West Germany), v. 16, 1968 p 33-40

(NASA-TT-F-13182) Avail: CFSTI CSCL 06G

The possibilities of survival at sea following an air accident, based primarily on medical and technical consideration are discussed. A survey of existing rescue devices, particularly life-jackets, is presented. The principal dangers resulting from air accidents over sea, including death of drowning, supercooling, thirst, hunger, and physical exhaustion, are discussed in detail and appropriate measures for their prevention are suggested. Author

N70-34518\*# National Aeronautics and Space Administration, Washington, D.C.

**THE PROBLEM OF THE DISTRIBUTION OF INTELLIGENT LIFE IN THE UNIVERSE**

V. I. Serdobolskiy Aug. 1970 13 p refs Transl. into ENGLISH from the book 'Problema Rasprostraneniya Razumnoy Zhizni vo Vselennoy' Moscow, Nauka, 1968 p 145-154

(NASA-TT-F-13179) Avail: CFSTI CSCL 06C

The hypothesis of the existence of numerous civilizations in the universe is subjected to critical analysis. A discussion of the discrepancy between the extremely fast rate at which civilization develops on our planet and the lack of any signs of intelligent activity in the universe leads to the conclusion that the hypothesis according to which there exist numerous independently developing civilizations is at best doubtful. Author

N70-34552# National Air Pollution Control Administration, Washington, D.C.

**AIR QUALITY CRITERIA FOR SULFUR OXIDES**

Jan. 1969 186 p refs

(PB-190252; AP-50) Avail: SOD \$1.50; CFSTI CSCL 13B

The document focuses on the sulfur oxides commonly found in the atmosphere-sulfur dioxide, sulfur trioxide, their acids, and the salts of their acids. Further, the document considers the effects of the sulfur oxides in conjunction with other pollutant classes, especially particulate matter, where important synergistic effects are observed. The chemical and physical characteristics of the sulfur oxides are reviewed and the various analytical methods for measuring them in the atmosphere are considered. Also discussed are the effects of the sulfur oxides on visibility, vegetation, and materials. The toxicological effects of sulfur oxides on animals and on man are considered. Author (USGRDR)

N70-34553# National Air Pollution Control Administration, Washington, D.C.

**AIR QUALITY CRITERIA FOR PARTICULATE MATTER**

Jan. 1969 219 p refs

(PB-190251; AP-49) Avail: SOD \$1.75; CFSTI CSCL 13B

Air quality criteria are an expression of the scientific knowledge of the relationship between various concentrations of pollutants in the air and their adverse effects on man and his environment. They are issued to assist the States in developing air quality standards. Air quality criteria are descriptive; that is, they describe the effects that have been observed to occur when the ambient air level of a pollutant has reached or exceeded specific figures for a specific time period. In developing criteria, many factors have to be considered. The chemical and physical characteristics of the pollutants and the techniques available for measuring these characteristics must be considered, along with exposure time, relative humidity, and other conditions of the environment. The criteria must consider the contribution of all such variables to the effects of air pollution on human health, agriculture, materials, visibility, and climate. USGRDR

N70-34573# National Air Pollution Control Administration, Washington, D.C.

**AIR QUALITY CRITERIA FOR HYDROCARBONS**

Mar. 1970 118 p refs

(PB-190489) Avail: SOD \$1.25 CSCL 13B

The document focuses on gas-phase hydrocarbons and certain of their oxidation products, particularly aldehydes, that are associated with the manifestations of photochemical air pollution. Particulate hydrocarbons, and more specifically polynuclear hydrocarbons, are not treated in the document. It is important to recognize that the criteria for hydrocarbons rest almost entirely on their role as precursors of other compounds formed in the atmospheric photochemical system and not upon the direct effects of the hydrocarbons themselves. The publication reviews the chemical and physical characteristics of hydrocarbons and their degradation products, especially aldehydes, and considers the basic analytical methods used for measuring the atmospheric content of these compounds. Author (USGRDR)

N70-34647# National Air Pollution Control Administration, Washington, D.C.

**CONTROL TECHNIQUES FOR PARTICULATE AIR POLLUTANTS**

Jan. 1969 241 p refs

(PB-190253; AP-51) Avail: SOD \$1.75; CFSTI CSCL 13B

Particulate material found in ambient air originates from both stationary and mobile sources. Of the 11.5 million tons of particulate pollution produced by industrial, commercial, and domestic sources in 1966, 6 million tons were emitted from industrial sources, including industrial fuel burning; 5 million tons from power generation, incineration, and space heating; and 0.5 million tons from mobile sources. The following techniques are in use for controlling the source or reducing the effects of particulate pollution: Gas cleaning; Source relocation; Fuel substitution; Process changes; Good operating practice; Source shutdown; Dispersion.

N70-34656\*# National Aeronautics and Space Administration, Washington, D.C.

**THE PERIODIC MOVEMENTS OF THE PRIMARY LEAVES OF CANAVALLIA ENSIFORMIS [DE PERIODIEKE BEWEGINGEN VAN DE PRIMAIRE BLADEREN BIJ CANAVALLIA ENSIFORMIS]**

Gerrit Brouwer Aug. 1970 106 p refs Transl. into ENGLISH from Ph.D. Thesis, 1926 120 p

(NASA-TT-F-13089) Avail: CFSTI CSCL 06C

Periodic movements of the primary leaves of the jackbean (*Canavalia ensiformis*) are investigated. After a discussion of previous investigations in this field, personal investigations are described. Included in the experiments are tests involving normal curves, artificial and covered leaf blades, cut leaves, submerged leaves, and leaves with removed nodes, as well as tests employing differing periods of constant and alternating light and darkness. The hypothesis that an unknown factor in the atmosphere affects the nodes of plants, which induce turgor changes causing periodic movements in the leaves is presented and defended. Results of clinostat tests are examined, and main conclusions are summarized.  
Author

**N70-34670#** National Air Pollution Control Administration, Washington, D.C.

**CONTROL TECHNIQUES FOR SULFUR OXIDE AIR POLLUTANTS**

Jan. 1969 144 p refs

(PB-190254; AP-52) Avail: SOD \$1.25; CFSTI CSCL 13B

The document reports the major sources of sulfur oxide air pollution, and discusses the control techniques for fuel combustion processes, industrial processes, and dispersion from stacks as found in many industries.  
USGRDR

**N70-34637#** Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

**TO THE USAEC DIVISION OF BIOLOGY AND MEDICINE. VOLUME 2: PHYSICAL SCIENCES. PART 3: INSTRUMENTATION**

B. P. Hildebrand Mar. 1970 16 p refs

(Contract AT(45-1)-1830)

(BNWL-1307-Vol-2-Pt-3) Avail: CFSTI

Experimental and computational studies of the X-ray-to-alpha ratios for plutonium isotopic mixtures are briefly outlined. The development of surface-contoured diodes for plutonium determination in wounds is discussed, and the development of a phoswich detector for the lung counting of plutonium is described. Also, the development of a surface-barrier detector for radon monitoring in small-animal exposure chambers is summarized.  
NSA

**N70-34725\*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

**MANUALLY ACTUATED HEAT PUMP Patent Application**

William D. Hutchinson, inventor (to NASA) Filed 22 Oct. 1969 18 p

(Contract NAS7-100)

(NASA-Case-NPO-10677; US-Patent-Appl-SN-868530) Avail: CFSTI CSCL 13A

The heat pump utilizes the reversible process of the so-called Joule effect in rubber for generating heat energy in selectively heating and cooling a given atmospheric medium. The heat pump includes a pair of substantially disc-shaped webs, independently mounted in parallel planes for rotation in an abaxial relationship. By employing the novel concept of manually elongating and contracting elastomeric materials in a given ambient atmosphere, a highly efficient, economical and readily available heat pump is provided for use in selectively heating or cooling environmental atmospheres.  
NASA

**N70-34754#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**PROCEEDINGS OF THE ANNUAL CONFERENCE ON ATMOSPHERIC CONTAMINATION IN CONFINED SPACES**

(4th)

Dec. 1968 411 p refs

(AD-855001; AMRL-TR-68-175) Avail: CFSTI CSCL 6/11

This report is a compilation of the papers presented and the Proceedings of the 4th Conference on Atmospheric Contamination in Confined Spaces, sponsored by the Aerospace Medical Research Laboratories and held in Dayton, Ohio on 10, 11, and 12 September 1968. Major technical areas discussed included toxicological evaluation of atmospheres and contaminants, histopathological evidences of toxicity, evaluation of cabin materials, instruments and detection, and life support systems.  
Author (TAB)

**N70-34761\*#** Scientific Translation Service, Santa Barbara, Calif.

**ON THE PREVENTIVE MEASURES AGAINST FIRE AND BLAST HAZARDS IN THE ENVIRONMENT OF HIGH CONCENTRATION OF OXYGEN. ACCIDENTS IN THE PURE OXYGEN LOW-PRESSURE CHAMBER AT SAM AND LATER COUNTERMEASURES**

H. Ikegami Washington NASA Aug. 1970 7 p refs Transl. into ENGLISH from Rept. of the Japan Air Self-Defense Force, Aeromed. Lab. (Japan), v. 10, Jun. 1969 p 48-50

(Contract NASw-2035)

(NASA-TT-F-13165) Avail: CFSTI CSCL 13L

A description is given of measures taken against the occurrence of fire and blast accidents in the chamber of high oxygen concentration at the School of Aerospace Medicine at Brooks Air Force Base, Texas. The measures adopted were aimed at the removal of ignitability, the elimination of combustibles, and the installation of ignition, smoke and overheating detectors, as well as fire extinguishers.  
Author

**N70-34770#** Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

**PLUTONIUM INHALATION STUDIES A Series of Lectures Given in Japan in 1969 at the Invitation of the Japanese Atomic Energy Commission**

W. J. Bair Feb. 1970 284 p refs Lectures presented at Chiba, Japan, 15 Feb. - 23 Mar. 1969

(Contract AT(45-1)-1830)

(BNWL-1221) Avail: CFSTI

Equipment and procedures used for Pu inhalation studies in beagle dogs are described. The dynamics of plutonium retention, distribution, and excretion following inhalation were determined by administering more than 200 beagles three plutonium compounds. Results were obtained in a series of tests clearly illustrating the important influence of chemical and physical properties of the inhaled plutonium aerosol dispersing throughout the body. Further experiments are also reviewed including: (1) particles of Pu(238)O<sub>2</sub> as large as 50 micrometers dispersed in air and inhaled by beagles; (2) plutonium particles phagocytized rapidly in rats, about 60 minutes following inhalation or intraperitoneal injection of Pu(239)O<sub>2</sub>; and (3) the use of vivo counting for Pu-238, Pu-239, Pu-240, and Am-241 measurements. It was found that the inhaled plutonium in dogs was manifested principally in three tissues: lung, tracheobronchial lymph nodes, and circulating lymphocytes.  
J.A.M.



## IAA ENTRIES

**A70-34468 \* #** **Modeling the nonlinear behavior of arteries.** S. C. Ling (Catholic University of America, Washington, D.C.). *American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 3rd, Los Angeles, Calif., June 29-July 1, 1970, Paper 70-789.* 7 p. 9 refs. Members, \$1.00; nonmembers, \$1.50. NIH Grant No. HE-12083-02; Grant No. NGL-09-005-067.

A better understanding of the mechanics of blood flow is achieved through detailed study of the flow profiles both in vivo and in model arteries of known characteristics. Through these controlled studies it is found that the large nonlinear distention characteristics of the vascular wall is an important parameter which should be properly accounted for in future treatment of blood flow. An analytical expression valid for large deformation of elastic tube is presented. First order approximation of the artery can be made with an isotropic rubber tube, while full simulation can be obtained through a composite tube of rubber and corrugated nylon fibers. (Author)

**A70-34469 #** **Fluid dynamics in the upper pulmonary airways.** R. M. Schreck and L. F. Mockros (Northwestern University, Evanston, Ill.). *American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 3rd, Los Angeles, Calif., June 29-July 1, 1970, Paper 70-788.* 7 p. 7 refs. Members, \$1.00; nonmembers, \$1.50. NIH Grants No. GM-15418; No GM-00874.

Velocity profiles were measured in laminar and turbulent flow through plastic conduit bifurcations similar to those in the upper respiratory tree using a constant temperature hot-wire anemometer. Profile development distal to the bifurcation varies with bifurcation geometry, velocity profile proximal to the bifurcation, and the Reynolds number. The developing profiles are described in terms of a set of distribution moments. Latex casts of actual lungs indicate that these phenomena may be used by the airways to direct faster moving inspired air to gas exchange units deeper in the lung at low respiratory flow rates, but that at high flow rates turbulence tends to equalize the distribution. (Author)

**A70-34470 \* #** **The fluid mechanics of thrombus formation.** M. Monsler, W. Morton, and R. Weiss (Avco Everett Research Laboratory, Everett, Mass.). *American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 3rd, Los Angeles, Calif., June 29-July 1, 1970, Paper 70-787.* 15 p. 15 refs. Members, \$1.00; nonmembers, \$1.50. Contract No. NASw-1894.

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

**A70-34471 \* #** **Unsteady entrance flows in elastic tubes with application to the vascular system.** Norman R. Kuchar (General Electric Co., Philadelphia, Pa.) and Simon Ostrach (Case-Western-Reserve University, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 3rd, Los Angeles, Calif., June 29-July 1, 1970, Paper 70-786.* 12 p. 17 refs. Members, \$1.00; nonmembers, \$1.50. Grant No. NGR-36-003-088.

Flow development effects in the large arteries are investigated analytically using a mathematical model of pulsatile, viscous flow in a semiinfinite, thick-walled elastic tube. A coupled set of differential equations and boundary conditions for the fluid and tube motions, containing approximations valid for the large arteries, is solved using Fourier series and Laplace transform techniques. Results include fluid velocity and pressure distributions and tube wall displacements and stresses. It is found that flow development depends primarily on the Reynolds number and the unsteadiness parameter with wall elasticity of secondary importance. The development length is comparable to the lengths of many arteries, and within the development region wall shear stresses are high. Thus, flow development effects can be important in the large arteries. (Author)

**A70-34472 #** **Pulmonary blood flow with special reference to the influence of the space environment.** John B. West (California, University, La Jolla, Calif.). *American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 3rd, Los Angeles, Calif., June 29-July 1, 1970, Paper 70-785.* 5 p. 5 refs. Members, \$1.00; nonmembers, \$1.50.

Measurements with radioactive gases have shown that blood flow decreases from the bottom to the top of the upright human lung reaching low values at the apex. This uneven distribution of blood flow is caused by the hydrostatic gradient of pressure within the pulmonary blood vessels. When normal subjects are accelerated on a centrifuge, the inequality of blood flow becomes more marked, and it is predicted that in the weightless state the distribution of pulmonary blood flow will become uniform. The uneven distribution of blood flow under normal conditions causes some impairment of gas exchange in the lung, and during acceleration this may become severe. There is reason to believe that in the weightless state the efficiency of the lung for gas exchange may be optimal. (Author)

**A70-34576** **Thoracic impedance gradient with respect to breathing.** Aida S. Khalafalla, S. P. Stackhouse (Honeywell, Inc., St. Paul, Minn.), and O. H. Schmitt (Minnesota, University, Minneapolis, Minn.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, July 1970, p. 191-198. 11 refs.

The transthoracic mutual-impedance responses to lung ventilation were measured for 37 normal subjects with 14 orthogonal lead systems. Spatial intravariability resulted from small errors in electrode placement on the thoracic surface. Temporal intravariability was determined by repeating the measurements for one subject on five consecutive days. Insignificant correlation coefficients were obtained between impedance sensitivity to lung ventilation and either age, height, weight, or chest-to-back distance of the subject. Intra- and intersubject variability were found to be of the same size for a given lead system. While the significant spatial intervariability can be easily correlated with local resistance changes due to lung volume shifts, the intersubject variability did not lend itself to correlation with subject somatotype variables. (Author)

**A70-34577** **The thermal-chemical damage in biological material under laser irradiation.** Chia-Lun Hu and Frank S. Barnes (Colorado, University, Boulder, Colo.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, July 1970, p. 220-229. 9 refs.

A mathematical model for thermal-chemical damage to biological materials excited by laser irradiation is described. The chemical rate equations for protein denaturation are used to predict radii of damage for cases where the input-laser-energy distribution results in the uniform heating of a small sphere or a disk. These rate equations are limited to a single-hit process. Experimental checks on this model are presented for ruby-laser irradiation of small carbon particles in egg albumin and for CO<sub>2</sub> laser surface heating of egg albumin. (Author)

**A70-34578** Automated measurement of the internal surface area of the human lung. Martin D. Levine, William M. Thurlbeck (McGill University, Montreal, Canada), and Michael L. Reisch (Itek Corp., Lexington, Mass.). *IEEE Transactions on Bio-Medical Engineering*, vol. BME-17, July 1970, p. 254-262. 7 refs. Medical Research Council of Canada Grant No. MA-3236.

This paper presents a technique whereby emphysema can be objectively graded by means of computerized image processing. Emphysema is a common disease affecting human lungs and is characterized by enlargement and destruction of the gas-exchanging portion of the lung, namely alveolar air sacs. This destruction of alveoli results in loss of alveolar surface area. Automation of lung surface-area measurements is accomplished through the digitization of the sections of lung tissue and computerized image-processing techniques. An off-line video data-acquisition system was designed for this purpose. Image-processing algorithms are discussed in the context of the measurement problem. In particular, two mapping operations are used which together prove especially effective for discriminating alveolar septa from background 'noise.' The mapped images, therefore, lend themselves to simplified analysis which the computer can perform. Finally, two lungs are processed using the computerized method, and the results are compared statistically to the corresponding data produced by humans. The results are shown to be sufficiently accurate to warrant more extensive lung-tissue analysis by computer. (Author)

**A70-34591** Influence of rapid changes of position on variations of heart rate (Influence des changements rapides de position sur les variations de fréquence cardiaque). M. Rogowsky, S. Degre, R. Messin, P. Vandermoten, and H. Denolin (Hôpital Universitaire St. Pierre, Brussels, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 28, no. 3, 1970, p. 162-172. 40 refs. In French. CECA-supported research.

Study of heart rate changes and oxygen consumption in relation to body position. It was found that for work requiring a low energy expenditure which is accompanied by a moderate increase of the heart rate there is a significant decrease of the heart rate in a crouching position. This position is accompanied by a moderate but significant increase in the consumption of oxygen. The linear relationship regarding the ratio of heart rate and oxygen consumption observed for more intense efforts does, therefore, not apply for light work. G.R.

**A70-34592** A study on training effect on strength per unit cross-sectional area of muscle by means of ultrasonic measurement. Michio Ikai and Tetsuo Fukunaga (Tokyo, University, Tokyo, Japan). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 28, no. 3, 1970, p. 173-180. 11 refs.

Study of the effect of training on the human arm flexor using ultrasonic photography in tests involving five healthy males. It was found that muscle training of 100 days increased the maximum strength by 91.7% and the cross-sectional area of the muscle by 23.0%. It is pointed out that the increase of maximum strength was

associated with an increase in cross-sectional area and an increase in strength per unit cross-sectional area. G.R.

**A70-34593** Oxygen consumption and circulation during acute changes of the arterial pH (Sauerstoffverbrauch und Kreislauf bei akuten Änderungen des arteriellen pH). W. Usinger and P. Spaich (Max-Planck-Gesellschaft zur Förderung der Wissenschaften, William G. Kerckhoff Institut, Bad Nauheim, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 28, no. 3, 1970, p. 181-192. 23 refs. In German.

The effect of changes in arterial pH on circulation and oxygen consumption was studied in 13 artificially ventilated dogs anesthetized with Pernoxton. pH changes were induced by variation of the arterial pCO<sub>2</sub> or by infusion of NaHCO<sub>3</sub> or NH<sub>4</sub>Cl. The oxygen consumption increased together with the arterial pH in experiments with respiratory as well as in experiments with nonrespiratory alteration of the acid base status. The change in oxygen consumption was not caused by changes in the mechanical work performed by the left ventricle. The effect of pH on the systemic circulation was dependent on the manner in which the acid base status was changed: in experiments with respiratory acidosis heart rate, cardiac output and arteriovenous oxygen difference were positively correlated with the arterial pH. In experiments with nonrespiratory changes of the acid base status only the arterial blood pressure was affected by the pH. (Author)

**A70-34594** Oxygen uptake capacity during a four-week training period (Die Sauerstoffaufnahmekapazität im Verlauf eines vierwöchigen körperlichen Trainings). H. Roskamm, G. Schultze-Werninghaus, F. Landry, L. Samek, P. Harnasch, and H. Reindell (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 28, no. 3, 1970, p. 197-208. 27 refs. In German.

Study of six healthy men aged 22 to 35 years who were trained daily except Sundays by a stepwise increased bicycle ergometer exercise. Oxygen uptake, ventilation, and heart rate during a 6-min period of 100 watts and during maximum exercise were measured daily. Acid base values 3 min after exercise were measured two times a week. The oxygen uptake increased by 14.9% after four weeks of training, while ventilation increased by 17.5%. Maximum heart rate decreased by 3.2%; pH measured 3 min after exercise by 0.09 units. The results indicate that a daily training using a stepwise increased load up to the maximum increases aerobic and anaerobic capacity. All training effects showed a linear increase during the four-week training period. (Author)

**A70-34595** Venous tone and blood flow in skin vessels during intermittent forced inspiration or expiration (Venentonus und Durchblutung in Hautgefässen bei intermittierend forcierter Inspiration oder Expiration). K.-W. Mai, J. Meyer (Münster, Universität, Münster, West Germany), and E. Witzleb (Kiel, Neue Universität, Kiel, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 28, no. 3, 1970, p. 239-246. 14 refs. In German.

The effects of intermittent forced inspirations or expirations (1500 ml every 10 sec but otherwise spontaneous respiration) on the venous tone of skin vessels of the forearm, the skin blood flow of the finger and the peripheral venous pressure were investigated on 13 healthy subjects. With forced inspirations the venous tone at first markedly increased and then it returned slowly to its previous values. With forced expirations the venous tone showed smaller increases and reached the previous level faster. The skin blood flow of the finger decreased with forced inspirations more distinctly than with



forced expirations and returned to its resting level nearly simultaneously with the venous tone. The peripheral venous pressure rose with forced inspirations or expirations and rapidly reached a new level. In most cases the values were higher with forced inspirations than with forced expirations. It is suggested that the vasomotor reactions of the capacity and resistance vessels are caused by pressure or volume changes of the lungs or of the thorax, respectively, which provoke qualitatively similar effects in both types of vessels. (Author)

**A70-34605**      **Stimulus intensity and reaction time - Evaluation of a decision-theory model.** Harry G. Murray (Illinois, University, Urbana, Ill.). *Journal of Experimental Psychology*, vol. 84, June 1970, p. 383-391. 23 refs. National Research Council of Canada Grant No. APA-261; PHS Grant No. MH-08033.

To evaluate a decision-theory model of stimulus intensity effects, separate groups of 18 Ss were given simple reaction time (RT) trials to three tone intensities under one of nine treatment conditions. All groups showed an inverse relation between RT and stimulus intensity. Regular presentation of stimuli (involving repetition of intensity levels within 81-trial blocks) yielded a smaller intensity effect than irregular presentation, but neither 9-trial regular presentation nor trial-to-trial forewarning of intensity levels produced attenuation of the intensity effect. Under conditions of irregular presentation, both mean RT and the magnitude of the intensity effect were decreased by monetary reward or by a high proportion of soft tones in the stimulus series, and were increased by the presence of blank trials or by a preponderance of loud tones. Also, RT on a given trial was an increasing function of the previous-trial stimulus intensity, and certain properties of intraindividual RT distributions varied systematically with stimulus intensity and/or incentive conditions. Most of these findings are predicted by the decision-theory model but not by alternative theories of stimulus intensity effects. (Author)

**A70-34606**      **Correction of tracking errors without sensory feedback.** Joseph R. Higgins (Stanford University, Stanford, Calif.) and Ronald W. Angel (Stanford University; Veterans Administration Hospital, Palo Alto, Calif.). *Journal of Experimental Psychology*, vol. 84, June 1970, p. 412-416. 7 refs.

Eleven Ss were tested on a pursuit tracking test, and the error correction time (ECT) was determined for each incorrect response. The same technique of measurement was used to determine the mean proprioceptive reaction time (PRT) for each S. In every case, the mean ECT was less than the mean PRT. The results suggest that errors can be amended by a central mechanism which operates more rapidly than sensory feedback. (Author)

**A70-34700 \***      **Origin and development of optical activity of organic compounds on the primordial earth.** Kaoru Harada (Miami University, Coral Gables, Fla.). *Naturwissenschaften*, vol. 57, 1970, p. 114-119. 49 refs. Grant No. NGR-10-007-052.

Discussion of the origin of optically active organic compounds taking into consideration a slight energetic difference between D- and L-alpha-amino acids. The existence and function of optically active organic compounds in nature is considered and a definition of the 'origin of optical activity' is attempted. Dissymmetric crystals and preferential crystallization are discussed and aspects of the dissymmetric nature of matter are examined. The important role of an asymmetric catalyst for the development of optical activity is shown. G.R.

**A70-34751 #**      **Zero-gravity testing of a waste management system.** Bert Cooper and J. V. Wagner (Fairchild Hiller Corp., Republic Aviation Div., Farmingdale, N.Y.). *International Astronautical Federation, Congress, 20th, Mar del Plata, Argentina, Oct. 5-10, 1969, Paper*. 24 p.

Description of the zero-gravity flight test program that was conducted to evaluate the design concept of accomplishing waste collection by an airflow technique in a zero-gravity environment. The waste management system to be evaluated was required to collect, inactivate by a vacuum drying process, and store the urine, feces, emergency diarrheal disorders, vomitus and debris generated throughout the mission of the space vehicle. The system also incorporates provisions for volumetric determination of each micturition of each crew member as well as a crewman personal hygiene cleaner. The flight test program in a KC-135 aircraft verified the most critical parameters of waste collection, liquid/gas separation and volume determination. By varying the airflows for collection, and through use of a specially designed waste dispenser, test data were accumulated during the 20-30 seconds of zero gravity achieved in each parabolic trajectory. These data permitted evaluation of the test configurations so that comparative conclusions could be obtained in arriving at a final design for the actual space vehicle. M.V.E.

**A70-34794 \***      **Radiation model of man for analyses of future space missions.** Paul G. Kase and Lois M. Ryan (Martin Marietta Corp., Denver, Colo.). *American Astronautical Society, Annual Meeting, 16th, Anaheim, Calif., June 8-10, 1970, Paper AAS 70-054*. 39 p. 18 refs. NASA-supported research; Contract No. AF 29(601)-69-C-0052.

Discussion of the development of a detailed, computerized, radiation-shielding model of the human body, taking into consideration examples relating the model to the planning of future space missions. The model has two configurations (standing and seated), and more than 2200 individual geometric shapes are used to depict the external conformation, skeleton, and principal organs. The exterior dimensions are those of the 50th-percentile Air Force man, the skeleton and organs were scaled to conform from life-size models. Some parts of the body are insensitive to radiation when compared to other parts, and in marginal situations it is necessary to compare the radiation doses at several points to identify the limiting dose. The extensive detail of this model fulfills this need. G.R.

**A70-34796**      **Tektite program safety planning.** John B. Tenney, Jr. (General Electric Co., Re-Entry and Environmental Systems Div., Philadelphia, Pa.). *American Astronautical Society, Annual Meeting, 16th, Anaheim, Calif., June 8-10, 1970, Paper AAS 70-053*. 31 p. 6 refs.

The purpose of this paper is to outline the approach to program safety planning involved in the Tektite II program. This paper will deal primarily with the requirements for a 50-foot ambient pressure habitat used to support 5 occupants under saturation diving conditions for periods from 2 weeks to 30 days. The habitat located on the bottom of Lameshur Bay, St. John, Virgin Islands, is currently being used as a laboratory for a wide range of marine science and human behavioral experiments. Ten separate scientific and technical teams will occupy the habitat. Techniques for assuring safety both in the hardware and during the operational phases of the program will be identified. (Author)

**A70-34803**      **Habitability - A space station form in relationship to man.** Fred Toerge and Charles A. O'Donnell (Raymond Loewy/William Snaith, Inc., New York, N.Y.). *American Astronautical Society, Annual Meeting, 16th, Anaheim, Calif., June 8-10, 1970, Paper AAS 70-032*. 11 p.

Study of space station habitability, which poses a uniquely different set of problems to man in terms of an altered confined environment, sense of alienation, and imposed stresses. The specific concerns are with those factors of habitability that man will interact with and respond to, and the criteria that these factors represent a singular and not a dual aspect of design that must be solved in unity. Several of these factors are discussed relevant to their effect on the well-being and operational effectiveness of the crew. Examples of how these factors influence the design of crew quarters and the facilities for hygiene and dining are presented. F.R.L.

**A70-34848 \*** **Mesenteric vasoactivity associated with eating and digestion in the conscious dog.** Stephen F. Vatner (California, University, San Diego, Calif.), Dean Franklin (Scripps Clinic and Research Foundation, La Jolla, Calif.), and R. L. Van Citters (Washington, University, Seattle, Wash.). *American Journal of Physiology*, vol. 219, July 1970, p. 170-174. 23 refs. NASA-supported research; NIH Grants No. HE-08337; No. HE-05147-13; No. HE-07293; No. HE-08433.

The effects of eating and digestion on mesenteric blood flow, arterial pressure, and aortic blood flow were studied in intact, unanesthetized dogs. Anticipation and ingestion of food were characterized by transient increases in cardiac output (63%), heart rate (78%), and aortic blood pressure (31%), whereas mesenteric flow initially and transiently decreased by an average of 10%. Cardiac output, blood pressure, and heart rate returned to control levels after 10-30 min and remained there. Mesenteric blood flow began to increase within 5-15 min of presentation of food. It reached a maximum (from 115 to 300% of control) within 30-90 min after eating and gradually returned to control levels within 3-7 hr. The mesenteric vasodilatation was prevented by cholinergic blockade, but was not blocked by alpha- or beta-adrenergic blockade or bilateral thoracic vagotomy. An attenuated response was observed after food was presented to fasted, muzzled dogs that could see and smell it, but could not eat it. Treadmill exercise caused mesenteric resistance to increase equal amounts, both in the preprandial control period and at 30 min after eating, during the period of mesenteric vasodilatation, but did not modify mesenteric flow in either case.

(Author)

**A70-34859** **Early evolutionary vectorcardiographic signs of right ventricular hypertrophy.** A. Benchimol and Stephen Tio (Good Samaritan Hospital, Phoenix, Ariz.). *American Heart Journal*, vol. 80, July 1970, p. 19-33. 25 refs. Research supported by the Arizona Heart Association.

Results of a study undertaken in order to determine (1) the time when involuntary signs of right ventricular hypertrophy take place, with the hope that it may clarify the role of the hemodynamic findings in explaining the signs of ventricular hypertrophy, and (2) to compare the value of the electrocardiogram with the vectorcardiogram as a means of detecting changes suggesting involution of right ventricle hypertrophy. Twenty-five patients with well-documented electrocardiographic signs of right ventricular hypertrophy were studied. It was found that the most important parameters to define the decrease in the signs of right ventricular hypertrophy were: (1) in severe right ventricular hypertrophy where a late large secondary rightward vector was present, early involuntary changes showed an increase in the left maximum QRS deflection vector, and (2) in less severe right ventricular hypertrophy with no late large secondary rightward vector, early involuntary changes showed a tendency to decrease in the magnitude of maximum QRS deflection vector.

F.R.L.

**A70-34860** **Coxsackie B myopericarditis in adults.** W. G. Smith. *American Heart Journal*, vol. 80, July 1970, p. 34-46. 31 refs.

Study of the viral causes of heart disease, with a table showing the many viruses which are now known to affect the heart. A series of 42 adult patients with myocarditis believed to be due to Coxsackie B virus infections is reported. It is suggested that Coxsackie heart disease should be considered in 'idiopathic myocarditis' with or without pericarditis, unexplained ('rheumatic') valve lesions, cardiomyopathy of obscure origin, disorders of rhythm and conduction, unexplained cardiographic changes, and in some patients with congenital heart lesions. A high index of suspicion is helpful, and virus tests should be employed more widely to try to make a definite diagnosis.

F.R.L.

**A70-34925** **Biochemical predestination.** D. E. Kenyon (San Francisco State College, San Francisco, Calif.) and Gary Steinman (Pennsylvania State University, College Park, Pa.). New York, McGraw-Hill Book Co., 1969. 315 p. 390 refs. \$12.50.

This book contains a comprehensive essay of experimental approaches to the problem of the origin of life with a critical analysis of the underlying assumptions upon which the current studies are based. Among the topics covered are the nature of the origin of the life problem, the antiquity of terrestrial life, the synthesis of biomonomers, dehydration condensation and polymerization, and the development of morphological complexity and dynamic organization. Special attention is given to radioactive isotopes as geological clocks, to the evolution of the atmosphere, and to peptide synthesis. Further discussed are primitive metabolic processes, morphogenicity in colloidal systems, and the emergence of order in probiogenesis. The book is addressed to undergraduate students and advanced investigators with an interest in this problem.

V.Z.

**A70-34951 #** **The experimental design of a mobile pressure suit.** A. S. Iberall (General Technical Services, Inc., Upper Darby, Pa.). (*American Society of Mechanical Engineers, Winter Annual Meeting, Los Angeles, Calif., Nov. 16-20, 1969, Paper 69-WA/Aut-22.*) *ASME, Transactions, Series D - Journal of Basic Engineering*, vol. 92, June 1970, p. 251-264. Navy-USAF-supported research.

Determination of the efficacy of utilizing the lines of nonextension, characteristic to human skin, to provide natural mobility and minimal ballooning in full-pressure suits. The investigation program involved (1) mapping of the lines of nonextension; (2) testing whether string elements of high elastic modulus, a connected network, could be laid along the lines of nonextension without any constraint to mobility; (3) obtaining a highly mobile pressure-retaining layer to be constrained by the net; and (4) constructing an entire pressure-retaining garment system that makes use of all necessary layers and string elements in a completely connected netted covering for the body with minimal constraint to mobility up to 5 psi.

Z.W.

**A70-35126 #** **Changes in the behavior of peripheral arterial pulse following exposure to accelerations (Modificazioni del comportamento del polso arterioso periferico dopo esposizione ad accelerazioni).** F. Rossanigo (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) and E. Busnengo. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 3-9. 16 refs. In Italian.

Investigation, by means of the piezographic technique, of the behavior of the peripheral arterial pulse in 20 young, clinically healthy persons subjected to a human centrifuge at plus Gz-type acceleration along the longitudinal axis of the body and at intensities of 2 and 3 Gs. The results obtained confirmed the good functional adaptation ability of the peripheral arterial system in young, healthy youths to an accelerative stimulus of the type and intensity used.

M.M.

**A70-35127 #** **Stimulation of the vestibular apparatus with 'square wave' accelerations and validity of Ewald's laws (Sulla stimolazione dell'apparato vestibolare con accelerazioni ad 'onda quadra' e sulla validità delle leggi di Ewald).** R. Caporale and L. Bianco. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 10-23. In Italian.

Development and application of a method of labyrinthine stimulation known as the 'square wave' method, using the Stille-Werner chair. This method makes it possible to bring about a stimulating condition in which the angular velocity has a triangular-wave time variation, while the angular acceleration has a 'square wave' variation. According to the authors, this method, by imparting to the ampullar crests of the semicircular canals a periodic motion of sinusoidal type, offers the possibility of maintaining under a continuous stimulating action the pair of semicircular canals lying on the plane of rotation. By observing the variation of the nystagmographic responses during the action of the 'square wave' accelerations, it was possible to note a discrepancy between what is called Ewald's second law and the direction of the nystagmus. In the light of the results obtained, a hypothesis is advanced that the behavior of the ocular nystagmus is not the expression of the direction of the endolymphatic currents of the horizontal semicircular canals but is correlatable with the angular deviation of the kinocilia of the canals themselves.

A.B.K.

Bianco. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 24-39. In Italian.

Study of the phenomena occurring in the vestibular apparatus when a subject far from the axis of rotation is subjected to an accelerated or decelerated rotatory movement. The dynamic problems connected with the study of complex accelerations are considered from a physical and mathematical point of view. In addition, an experimental contribution is made to the problem of complex accelerations by the use of the Stille-Werner rotatory chair and an electronystagmographic study. During the application of the complex acceleration the length of the nystagmus does not vary significantly with variation of the distance from the axis of rotation. The number of jerks in the accelerative phase is systematically lower than the number in the decelerative phase. When the subject is placed on axis, the ordinates of the time diagram of the angular velocity of the slow phase are higher in acceleration than the ordinates of the diagram in deceleration. This difference decreases with an increase in the distance from the axis of rotation, and the curve corresponding to the accelerative phase drops, moving much closer to the curve for the decelerative phase. This is particularly noticeable in the case of the peak points of the diagrams. The variations noted are also discussed in the light of present knowledge regarding the vestibular habit. A.B.K.

**A70-35129 #** **Airsickness - Frequency, pathogenesis, and prevention in the light of present knowledge (Il mal d'aria - Frequenza, patogenesi, prevenzione alla luce delle attuali conoscenze).** R. Caporale. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 40-56. In Italian.

Results of a survey carried out by means of a questionnaire regarding airsickness in a group of 975 pilots including Air Force pilots and civilians with different classes of licenses. Of the 975 pilots, 260 replied that they had suffered from airsickness. Numerous data were taken into consideration, including symptoms felt, age, flight hours, type of aircraft, type of flight, etc. The pathogenetic mechanism of airsickness is discussed in the light of present knowledge regarding vestibular physiology, and it is stressed that it does not seem possible to select cadets solely on the basis of rotatory vestibular tests. In order to reduce the frequency of airsickness in cadets, training with special machines (slow rotation chamber, human centrifuge, Stille chair) is suggested, as well as an investigation of the possibility of habituation to complex polysensorial, labyrinthine, and extralabyrinthine stimuli in variable mutual relations. A.B.K.

**A70-35130 #** **Intrapulmonary distribution of gases inhaled during positive and transverse accelerations (La distribuzione intrapolmonare dei gas ispirati nel corso di accelerazioni positive e trasverse).** F. Rossanigo (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy) and G. Janigro. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 57-69. 18 refs. In Italian.

Investigation of the variation of the intrapulmonary distribution of gases inhaled by nine subjects exposed to +3 Gz and five subjects exposed to +3 Gx, using the technique of examining an individual oxygen breath proposed by Fowler et al. An attempt is made to determine quantitatively the negative effect (manifesting itself in pulmonary activity) of the modifications induced in the lungs by the inertial forces developed during aerobatics. An augmentation of the percentage increase of nitrogen in the alveolar air exhaled by seven of the nine subjects exposed to positive accelerations and by three of the five subjects exposed to transverse accelerations is noted. This augmentation is more evident at +3 Gx, but in neither case is it statistically significant. It is concluded that, at least at the G values to which the subjects were exposed, the influence of positive and transverse accelerations on the respiratory functions of normal subjects appears slight. A.B.K.

**A70-35131 #** **Contribution to knowledge of the effects of drugs on animals subjected to accelerations in a centrifuge (Contributo alla conoscenza degli effetti di sostanze farmacologiche in animali sottoposti ad accelerazioni in centrifuga).** G. Meineri and G. Janigro. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 70-77. 7 refs. In Italian.

Study of the variations in the resistance to accelerations on the part of rabbits treated with centrophenoquine in doses of 7 mg/kg administered parenterally in a single solution. These animals were subjected to +3 Gz in a centrifuge. The period of resistance was taken to be the time elapsing between the beginning of the test (the G value being reached in 5 sec) and the moment that signs of imminent cardiocirculatory collapse appeared. This was shown by a decrease in the heart rate and by other morphological elements revealed by an application of the electrocardiogram for a few seconds every 15 seconds in D sub 111. The resistance time is found to have been reduced in animals treated with centrophenoquine (an average of 5.50 min) with respect to the controls (an average of 6.42 min). This reduction, equal to 14.3%, is at the limits of statistical significance. However, on the basis of these data and certain considerations regarding the trend of the heart rate (which in the animals treated was higher than that of the controls, but fell sooner into bradycardia), it is concluded that centrophenoquine, in the dosage and forms of administration studied, does not only not display protective capabilities in the rabbit with regard to accelerations, but actually impairs the rabbit's resistance to them. A.B.K.

**A70-35132 #** **Effects of single decelerations of great intensity but very brief duration (impacts) on experimental animals (Effetti delle decelerazioni uniche di notevole intensità ma di brevissima durata /impatti/ in animali da esperimento).** G. Paolucci. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 78-87. In Italian.

Study of the effects of brief but very intense decelerations on mice and rats. Considerable resistance on the part of these animals to such decelerations, in particular, transverse decelerations, is noted. Beyond a certain number of G, the animals treated were found to have injuries which were in proportion to the intensity of the inertial forces and were localized predominantly in the organs affected by these forces. A marked increase in certain enzymatic activities of the serum in proportion to the organic damage (and therefore in proportion to the G number) was also noted. A.B.K.

**A70-35133 #** **Effects of repeated moderate decelerations of very brief duration on experimental animals (Effetti delle decelerazioni ripetute di modesta entità e di brevissima durata in animali da esperimento).** G. Paolucci. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 88-99. In Italian.

Study of the effects of moderate but repeated decelerations on mice and rats. It is found that such decelerations, when they do not cause immediate macroscopic organic damage, are still capable of producing, over a period of time, fibrotic changes in the liver of some animals which are similar to a cirrhosis picture. To explain these alterations, the existence of an autoimmunizing process is hypothesized. A.B.K.

**A70-35134 #** **Variations in the response to accelerations in dehydrated animals (Variazione della risposta alle accelerazioni in animali disidratati).** P. Rota. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 100-106. 10 refs. In Italian.

Study of the resistance to acceleration in rabbits before and after dehydration produced by reducing the water content of the food given them over a period of 48 hours. Before and after this period the rabbits were subjected to acceleration in a centrifuge, of +3 Gz intensity, continued until a persistent asystole, revealed electrocardiographically, was reached. The experiments carried out demonstrated, in most of the animals, a reduced resistance after

dehydration, manifested by the shorter time of exposure to acceleration necessary for the asystole to arise. A.B.K.

**A70-35135 #** Experimental study of the resistance to acceleration and the psychomotor behavior of humans under emergency flight conditions. I - Variations of the resistance to accelerations and the psychomotor behavior of humans after remaining in a clinostatic position for a limited period of time. II - Resistance to accelerations and psychomotor behavior of humans during exposure to high temperatures, with and without a preceding period in a clinostatic position (Studio sperimentale sulla sopportazione delle accelerazioni e sul comportamento psicomotorio dell'uomo, in condizioni di volo su allarme. I - Variazioni della resistenza alle accelerazioni e del comportamento psicomotorio dell'uomo, dopo permanenza in posizione clinostatica per un periodo limitato di tempo. II - Resistenza alle accelerazioni e comportamento psicomotorio dell'uomo durante esposizione a temperatura elevata, con e senza precedente permanenza in posizione clinostatica). P. Rota. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 107-125. 13 refs. In Italian.

Study of the variation of the resistance to accelerations (evaluated by the shrinking of the field of vision with respect to green) and the psychomotor efficiency (by measuring the reaction times with complex visual stimuli) in humans before and after +3 and +4 Gz accelerations in a centrifuge at an ambient temperature of 19 C. The tests were performed twice, with the subjects allowed to rest for three hours in between the two runs. The tests, which reproduced certain conditions characteristic of flight maneuvers for an emergency departure, revealed a deterioration of the psychomotor efficiency during exposure to accelerations, although no distinct difference was noted either with respect to psychomotor efficiency or resistance to accelerations in the tests carried out prior to and following rest periods. It is noted that the shrinking of the visual field as a result of acceleration is not preceded by variations in psychomotor efficiency. A deterioration of the psychomotor efficiency as a result of a combination of high temperature and acceleration is also noted, as well as a certain reduction in the resistance to accelerative stress due to the temperature increase, either by itself or in conjunction with a preceding rest period. A.B.K.

**A70-35136 #** Variations of the accelerative field in a number of common games (Variazioni del campo accelerativo in alcuni svaghi comuni). A. Scano (Aeronautica Militare, Direzione di Sanità, Italy). *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 133-139. In Italian.

Experimental investigation in which the plus and minus Gz accelerations connected with the motion of vehicles characteristic of amusement parks, such as switchback cars and cabins of the various revolving and oscillating attractions, were recorded by means of a one-component accelerograph. The tracings showed extreme values of duration not exceeding one second, with variations of up to over 60 G/sec, alternating with different positive G periods of 2 to 3 seconds each. The rare occurrence of motion sickness under the described conditions is discussed. M.M.

**A70-35137 #** Angular accelerations, hypoxia and parotid secretion (Accelerazioni angolari, ipossia e secrezione parotidea). R. Caporale and A. Blarmino. *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 140-158. 59 refs. In Italian.

Description of an experimentally refined device for sampling parotid secretion, by duplicating and modifying the drawing technique previously studied by Carlson and Crittenden, later by Shannon, and more recently by Warren, Shannon, Ware and Leverett. With this drawing technique, which was adapted to every individual subject examined, it was possible to study some chemical and physico-chemical constants of the parotid secretion under normal and special conditions in pilots in flight, competing athletes, as well as subjects exposed to angular accelerations and hypoxia in the decompression chamber. M.M.

**A70-35138 #** Adaptation to night vision in homogeneous groups of multiengine aircraft pilots and nonpilots (L'adattamento alla visione notturna in gruppi omogenei di piloti di velivoli plurimotori e di non piloti). A. Scano and E. Menghetti (Aeronautica Militare, Direzione di Sanità, Italy). *Rivista di Medicina Aeronautica e Spaziale*, vol. 33, Jan.-Mar. 1970, p. 168-174. In Italian.

Study of the light sensitivity of 65 healthy subjects (35 military pilots and 30 nonpilots) representing a homogeneous group from the point of view of age and living conditions. Using the Goldmann-Weekers adaptometer, it is found that pilots show a higher degree of adaptation to night vision, which is regarded as statistically significant although it is actually of small magnitude. A.B.K.

**A70-35150** Electrophysiological evidence for binocular disparity detectors in human visual system. Adriana Fiorentini and Lamberto Maffei (CNR, Laboratorio di Neurofisiologia, Pisa, Italy). *Science*, vol. 169, July 10, 1970, p. 208, 209. 9 refs.

Evoked potentials have been recorded from humans in response to two moving gratings presented stereoscopically to both eyes. The amplitude of the evoked potential is greater when the two gratings have slightly different spatial frequencies, which produces an apparent inclination of the binocularly fused image. The amplitude of the response is correlated with the degree of the perceived inclination. (Author)

**A70-35186 \*** Problems in the measurement of tissue respiration with the oxygen electrode. M. E. LeFevre (Brookhaven National Laboratory, Upton, N.Y.), H. R. Wyssbrod, and W. A. Brodsky (New York, City University, New York, N.Y.). *BioScience*, vol. 20, July 1, 1970, p. 761-764. 12 refs. NASA-AEC-supported research; NIH Grants No. AM-13037; No. AM-13953; NSF Grant No. GB-7764.

Description of experiments in which a membrane-covered oxygen electrode (Clark, 1956) was used in the measurement of respiration in isolated tissues. Electrode deterioration and diffusion artifacts are discussed as factors affecting the accuracy of the measurement of oxygen consumption by this technique. Suggestions are given to enhance the accuracy of the results. V.Z.

**A70-35200 \*** Hemodynamic response to dopamine in experimental myocardial infarction. Bruce U. Wintroub, John S. Schroeder, Marianne Schroll, Sheryllyn L. Robison, and Donald C. Harrison (Stanford University, Palo Alto, Calif.). *American Journal of Physiology*, vol. 217, Dec. 1969, p. 1716-1720. 15 refs. Research supported by the American Heart Association; NIH Grants No. HE-09058; No. HE-5709; No. HE-05866; Grant No. NGL-05-020-305.

Study of myocardial infarction produced in 17 dogs by ligation of the posterior branch of the circumflex and ligation of the left anterior descending coronary artery. The resulting myocardial infarction produced a decrease in cardiac output, left ventricular dp/dt, and increase in left atrial pressure, with an abnormal response to a volume-load infusion. Nine dogs died of ventricular fibrillation. In the surviving eight, hemodynamic responses to 8 micrograms/kg per min dopamine infusion were compared before and after infarction. Following infarction, dopamine decreased left atrial mean pressure 7.4 plus or minus 1.7 mm Hg and systemic vascular resistance by 27.3 plus or minus 2%. The cardiac output was increased by 35.5 plus or minus 4.9%, left ventricular dp/dt by 89 plus or minus 10%, and stroke volume by 43.3 plus or minus 7.5%, while heart rate and arterial pressure were not altered significantly. Dopamine appears to be an effective agent for reversing the abnormal hemodynamics following experimental myocardial infarction. (Author)

**A70-35319**      **On the biological effect of fission neutrons on epithelial cells of the cornea and intestine.** V. M. Mastriukova and A. D. Strzhizhovskii. In: International Symposium on Space Technology and Science, 8th, Tokyo, Japan, August 25-30, 1969, Proceedings. (A70-35201 17-30) Edited by Akira Takano. Tokyo, AGNE Publishing, Inc., 1969, p. 1173-1182. 7 refs.

Study of mitotic activity and aberrant mitoses frequency in the cells of corneal and duodenal epithelium of mice irradiated by fast fission neutrons. It was found that single neutron exposure results in a suppression of corneal and intestinal mitotic activity with its subsequent recovery. The relative biological efficiency coefficient value of neutrons in relation to Co60 gamma-rays estimated according to the duration of mitotic delay ranged between 2.7 and 3.3. It is pointed out that the mean existence time of gamma-rays and neutron induced chromosome aberrations is practically independent of radiation type and dose in the investigated exposure range. G.R.

**A70-35320**      **Calculation of algae cultivator for life support system.** B. G. Kovrov, V. N. Belianin, and A. A. Shtohl (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). In: International Symposium on Space Technology and Science, 8th, Tokyo, Japan, August 25-30, 1969, Proceedings. (A70-35201 17-30) Edited by Akira Takano. Tokyo, AGNE Publishing, Inc., 1969, p. 1183-1187.

For algae cultivator calculation the mathematic model of chlorella culture growth offered earlier by the authors is utilized. The mathematic model is applied for calculation of cultivator with cylindrical lamps plunged into culture. The obtained equations permit to find optimum parameters of cultivator construction: lamp dimensions and power, distances between them and concentration of algae cells in culture. The results of calculation show that the power of lamps in cultivator should be not more than 4 kw to provide one astronaut with oxygen. (Author)

**A70-35321**      **Method and technique of wheat continuous culture as a link of life support system.** G. M. Lisovskii, B. G. Kovrov, I. A. Terskov, and I. I. Gitelzon (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). In: International Symposium on Space Technology and Science, 8th, Tokyo, Japan, August 25-30, 1969, Proceedings. (A70-35201 17-30) Edited by Akira Takano. Tokyo, AGNE Publishing, Inc., 1969, p. 1189-1192.

The method of wheat culture continuous subirrigation is investigated. Plants are grown without substrate. During the process of cultivation the distances between plants are changed from 5250 units/sq m to 1120 units/sq m to satisfy the requirements of plants consumption. In the experiment at permanent illumination, the harvest consisted 45 g/sq m of dry biomass, including 15 g of grain per 24 hours. During that time, the oxygen excretion was 50 g/sq m. Some quantity of components needed for plants consumption was added into culture medium once per 24 hours. The medium quantity for 4,5 sq m sowing area was 65 l. The absence of substrates which are usually applied in hydroponics decreases the phytotron weight. The results of investigation ensure the hope that the described method of high plants cultivation may be utilized in life support system of space ships. (Author)

**A70-35322**      **Unidirectional response of statoreceptors to vibration - A mean for artificial gravity in space flight.** Torquato Gualierotti (Milano, Università; CNR, Milan, Italy). In: International Symposium on Space Technology and Science, 8th, Tokyo, Japan, August 25-30, 1969, Proceedings. (A70-35201 17-30) Edited by Akira Takano. Tokyo, AGNE Publishing, Inc., 1969, p. 1193-1200. 10 refs.

Study of the effect of vibration, ranging from 2/sec to 600/sec, on all three components of the vestibule, namely the statoreceptors, the vibroreceptors, and the unit responding to a change of rotational

speed. It was found that a vibratory stimulus is excitatory to statoreceptors of the inner ear in their limited receptor angle only and to vibroreceptors in all directions. The stimulus does not affect the receptors of the semicircular canal below intensities which are supramaximal for the two other kinds of vestibular units. It is suggested that an equivalent to an artificial gravity might be obtained through a small vibrator applying the appropriate vibratory stimulus to the astronaut's head in one direction only. G.R.

**A70-35325 \***      **Assessment of the synergistic relationship between serum calcium and digitalis.** Gaeton T. Nola, Steven Pope, and Donald C. Harrison (Stanford University, Palo Alto, Calif.). *American Heart Journal*, vol. 79, Apr. 1970, p. 499-507. 18 refs. Research supported by the American Heart Association; NIH Grants No. HE-09058; No. HE-5709; No. HE-05866; Grant No. NGL-05-020-305.

Study of the interrelationship of calcium and digitalis concerning the excitability of the heart in intact dogs. The relationship of moderately high and of very high levels of serum calcium to the enhanced sensitivity to the toxic arrhythmic effects of digitalis glycosides is studied. It is shown that with serum calcium levels greater than 15 mEq. per liter, digitalis toxic arrhythmias can be produced with significantly lower doses of acetylstrophanthidin than those needed at lower and normal calcium levels. Under the combined conditions of hypercalcemia and digitalis, increases in arterial blood pressure caused by digitalis are greater, while digitalis-induced elevations of serum potassium and duration of toxicity to acetylstrophanthidin are not significantly different from control values. G.R.

**A70-35326**      **Aerospace Medical Association, Annual Scientific Meeting, 41st, St. Louis, Mo., April 27-30, 1970, Preprints of Scientific Program.** Washington, D.C., Aerospace Medical Association, 1970. 253 p. Members, \$7.00; nonmembers, \$10.00.

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Pensacola, Fla.), R. S. Kennedy, and J. R. Provost (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.), p. 85, 86.

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Effects of oxygen exposure on the production of surfactant phospholipids in the rabbit lung. W. H. Riesen, A. M. Gross, and H. J. O'Neill (IIT Research Institute, Chicago, Ill.), p. 112, 113.

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A progress report on the naval aviators' speech discrimination test. J. W. Greene (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.), p. 127, 128.

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Motion sickness in USAF flying personnel. R. S. Ryback, D. E. Rudd, G. J. Matz, and C. L. Jennings (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), p. 152, 153.

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Ejection and survival equipment.

Reliability of in-flight escape systems and survival equipments in U.S. Navy ejections - Successful and unsuccessful. E. V. Rice and F. H. Austin, Jr. (U.S. Navy, Naval Safety Center, Norfolk, Va.), p. 160, 161.

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The effect of intermittent exposure to 3% CO<sub>2</sub> on respiration, acid-base balance and CO<sub>2</sub> stores. K. E. Schaefer, A. A. Messier, and J. H. Dougherty, Jr. (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, Conn.), p. 185.

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Inert gas effects on the respiration of tissues from normal and nitrogen free animals. M. Grimard and H. S. Weiss (Ohio State University, Columbus, Ohio), p. 188, 189.

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Center, Moffett Field, Calif.), p. 190, 191.

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A review of naval accidents involving cockpit checklist. M. W. Brownley, F. A. Radcliffe, and F. H. Austin, Jr. (U.S. Navy, Naval Safety Center, Norfolk, Va.), p. 192, 193.

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Left ventricular performance during acute hypoxia. H. H. Erickson, E. L. Fitzpatrick, and H. L. Stone (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), p. 196, 197.

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Effect of inert gases on survival after decompression to a near-vacuum. J. P. Cooke and R. Miranda (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), p. 202, 203.

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Animal restraint - Application in space (weightless) environment. R. R. Burton and J. R. Beljan (California, University, Davis, Calif.), p. 204, 205.

Cold water protection for aircrew personnel using a heated water source. D. N. DeSimone and L. J. SantaMaria (U.S. Naval Material Command, Warminster, Pa.), p. 206, 207.

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Screening naval aviators for jet carrier replacement air group training. G. M. Rickus (Bendix Corp., Southfield, Mich.) and R. F. Reinhardt (U.S. Navy, Washington, D.C.), p. 208, 209.

The application of a flight background questionnaire and a college background questionnaire as noncognitive measures for the selection of student naval aviators. R. M. Bale and R. K. Ambler (U.S. Naval Aviation Medical Center, Pensacola, Fla.), p. 210, 211.

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Illusions of pitch induced by centripetal acceleration. J. W. Wolfe and R. L. Cramer (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), p. 212, 213.

Lateralization of hearing loss and vestibular nystagmus in test pilots. A. Bruner (Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.) and T. W. Norris (Lovelace Clinic, Albuquerque, N. Mex.), p. 214, 215.

Behavioral sciences.

Heart-rate patterns during transition training of private pilots. C. R. Crane, J. K. Abbott, and P. W. Smith (FAA, Oklahoma City, Okla.), p. 216, 217.

A scientist in the cockpit - The case history and analysis of a UFO sighting. H. Wichman (California State College, San Bernardino, Calif.), p. 218, 219.

Neurotic syndromes in aviation medicine. C. J. Blanc and E. Lafontaine (Compagnie Nationale Air France, Paris, France), p. 220, 221.

Life science investigations during the thirty-day Gulf Stream Drift Mission of the Grumman PX-15 (Ben Franklin) submersible. C. J. Phillips, R. J. Del Vecchio, C. P. Seitz, and A. Goldman (Grumman Aerospace Corp., Bethpage, N.Y.), p. 222, 223.

Aircrew selection and effectiveness.

A survey of the medical causes of rejection of applicants for the BEA/BOAC sponsored ab-initio pilot training scheme. R. M. Barnes (Air Corporations Joint Medical Service), p. 224, 225.

Statistical data on waivers granted to airline flight crew



members. J. Lavernhe and E. Lafontaine (Compagnie Nationale Air France, Paris, France), p. 226, 227.

Personality factors of new airline pilots. J. F. Cullen, C. R. Harper, and G. J. Kidera (United Air Lines, Inc., Denver, Colo.), p. 228, 229.

The sleepy pilot - A method to measure ability to maintain alertness. R. E. Yoss, E. T. Carter, W. E. Evans, and N. J. Moyer (Mayo Clinic and Mayo Foundation, Rochester, Minn.), p. 230, 231.

#### Biological rhythms.

Visual changes accompanying circadian rhythm desynchronization during circumnavigation of the earth - A preliminary report. J. G. Daubs, p. 232, 233.

The influence of photoperiod on food and water intake in rats. E. L. Besch (Kansas State University, Manhattan, Kan.), p. 234, 235. Read by title, p. 237-243.

**A70-35332**      **Comparison of tympanic membrane and deep body temperatures in man.** Ethan R. Nadel and Steven M. Horvath (California, University, Santa Barbara, Calif.). *Life Sciences, Part I - Physiology and Pharmacology*, vol. 9, Aug. 1, 1970, p. 869-875. 14 refs. Grant No. AF AFOSR 69-1653; Contract No. Nonr-4222(07).

Tympanic membrane temperature has been widely utilized as an absolute measure of deep body temperature in man, although the validity of this concept has come under question. Since hypothalamic temperature has been conceded as the regulated temperature in homiotherms, the site of measurement of the approximation of this temperature should be independent of ambient temperature. Therefore, comparisons of tympanic and rectal temperature (the most widely used approximation of deep body temperature) during steady states were made over a range of ambient environments. It was anticipated that this procedure would reveal any systematic difference in these measures. (Author)

**A70-35351 #**      **Experiments in the application of prophylactics against radiation injuries under simulated prolonged space flight conditions (Opyt primeneniia sredstv profilaktiki pro obluichenii, imitiruiushchem radiatsionnoe porazhenie v usloviakh dlitel'nogo kosmicheskogo poleta).** V. D. Rogozkin, M. F. Sbitneva, G. A. Shapiro, N. I. Gvozdeva, T. M. Zukhbaia, E. S. Zubenkova, V. A. Zueva, and T. E. Burkovskaia. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 20-24. 10 refs. In Russian.

Discussion of one-year observations of radiation effects in a group of 54 dogs exposed to chronic gamma radiation doses of 75 rem/year with additional solar-flare-simulating doses of 50 rem given 3 times during the year to a total of 225 rem/year. Adenosine triphosphate or amitetravit (a combination of vitamins C, P, B1, and B6 with tryptophan and histidine) were given to the dogs as medication. A normalizing effect of these preparations on hemopoiesis is established in radiation-exposed dogs. V.Z.

**A70-35353 #**      **Effect of the temperature of the ambient medium on the stability of an organism to increasing hypoxia and hypercapnia in nitrogen-oxygen and helium-oxygen gas media (Vliianie temperatury okruzhaiushchei sredy na ustoiichivost' organizma k narastoiushchei gipoksii i giperkapnii v azoto-kislородnoi i gelio-kislородnoi gazovykh smesiakh).** P. A. Gul'tiaev and V. M. Osipov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 28-31. 8 refs. In Russian.

Investigation of the effect of ambient temperature variations on the tolerance of white mice and rats exposed to increasing hypoxia, asphyxia and hypercapnia in nitrogen-oxygen and helium-oxygen atmospheres. The highest tolerance to asphyxia and 'pure' hypercapnia is observed at about 20 deg C in both media. The advantages of a helium-oxygen mixture over a nitrogen-oxygen mixture as a spaceship and space suit atmosphere are pointed out. V.Z.

**A70-35354 #**      **Dependence of the occurrence of respiratory medulla-oblongata neuron rhythmic volley activity on the carbon dioxide tension in arterial blood (Zavisimost' vozniknoveniia ritmicheskoi zalpovoi aktivnosti dykhatel'nykh neuronov prodolgovatogo mozga ot napriazheniia uglekisloty v arterial'noi krovi).** A. M. Kulik and L. N. Kondrat'eva. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 31-36. 16 refs. In Russian.

Application of microelectrode and stereotaxic techniques to a study of the pulsed activity of inspiratory and expiratory neurons of the medulla oblongata in anesthetized cats under acute hypercapnia and hypocapnia. Suppression of the volley activity of the respiratory neurons up to the point of complete arrest of the generation of pulses was observed in experimental cats when the partial carbon dioxide pressure in the arterial blood decreased to 15 mm. V.Z.

**A70-35355 #**      **Study of Chlorella population productivity dynamics under steady and transient modes of reactor operation (Issledovanie dinamiki produktivnosti populatsii Khlorelly v stacionarnykh i perekhodnykh rezhimakh raboty reaktora).** V. I. Savkin and G. I. Meleshko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 36-41. In Russian.

Study of Chlorella population reproduction rates at steady and variable illumination intensity levels. The characteristics of the autocorrelation function of the productivity of a Chlorella cultivation unit are determined by statistical analysis of Chlorella reproduction rates at various illumination intensity levels. V.Z.

**A70-35356 #**      **Investigation of the fractional composition of proteins in skeletal muscles during hypokinesia (Izuchenie fraktsionnogo sostava belkov skeletnoi muskulatury pri gipokinezii).** N. P. Mikhaleva, I. I. Ivanov, I. V. Fedorov, and E. M. Amdii. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 42-45. 10 refs. In Russian.

Discussion of changes in the fractional composition of skeletal muscle proteins observed in white rats subjected to 15, 22 and 30-day hypokinesia. A statistically reliable decrease in actomyosin protein contents and an increase in T-protein fraction and stroma protein fraction contents are established in the rats after all these periods of hypokinesia. Changes in muscle water contents after hypokinesia are also described. V.Z.

**A70-35357 #**      **Morphological changes in osseous and muscular tissues under conditions of hypokinesia (O morfologicheskikh izmeneniakh kostnoi i myshechnoi tkani v usloviakh gipokinezii).** G. P. Bykov and V. P. Smirnov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 46-51. 11 refs. In Russian.

Study of the osseous and muscular tissues of rats and rabbits whose motion was restricted by confinement in small cages, or whose extremities were immobilized by plastering. Also examined are biopsies taken from muscles of patients suffering from myasthenia. It is found that plastering and myasthenia lead to the atrophy of bones and muscles, while caging causes mild morphological changes in osseous and muscular tissues. V.Z.

**A70-35358 #**      **Effect of aldosterone on hemodynamics in dogs under conditions of restricted motor activity (Vliianie aldosterona na gemodinamiku v usloviakh ogranicheniia dvigatel'noi aktivnosti sobak).** M. G. Kolpakov, V. P. Tarasevich, and A. L. Markel'. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 52-56. 19 refs. In Russian.

Investigation of hemodynamics in 32 dogs kept in small cages for 12 days without medication and then for another 6 days with daily injections of 100 mu g/kg of aldosterone. The cardiac index, the minute volume, the blood circulation mass and the vascular tonus were lower in experimental dogs than in control dogs. A marked stimulation of cardiac activity was observed after aldosterone injections. V.Z.

**A70-35359 # RNA and protein synthesis activation in the cerebrum and the enhancement of memory resistivity to the effects of extraordinary stimuli by high-altitude-hypoxia training (Aktivatsiia sinteza RNK i belka v golovnom mozgu i povyshenie rezistentnosti pamiatii k deistviu chrezvychainykh razdrzhitelii pod vliianiem trenirovki k vysotnoi gipoksii).** F. Z. Meerson, R. I. Kruglikov, A. Z. Meerson, M. Ia. Maizelis, and E. M. Leikina. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 56-59. In Russian.

Demonstration that the RNA and protein synthesis rates and the RNA concentration in the cerebrum of rats are increased by exposures to high altitude hypoxia. The 40-day pressure chamber experiments were conducted on rats under pressures gradually decreased to simulate altitudes of 2000, 3000, 4000, 5000, 6000, and 7500 m. Measurements by a technique proposed by Essman and Alpern (1964) showed that the persistence of the memory reaction to electroshock was higher in experimental rats than in control rats. V.Z.

**A70-35360 # Effect of acute hypoxia on the rates of absorption and assimilation of glycine radioactive carbon in organs and tissues (Vliianie ostroi gipoksii na skorost' vsasyvaniia i vklucheniia v organy i tkani radiougleroda gliitsina).** K. V. Smirnov, O. I. Babkina, N. A. Agadzhanian, and A. V. Sergienko. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 59-65. 16 refs. In Russian.

Investigation of the absorption of C14-tagged glycine in gastrointestinal tract, the distribution of C14 in organs and tissues, and the discharge of C14, in rats subjected to acute hypoxia. The inhibiting effect of acute hypoxia on the evacuator function of the stomach and on the absorption and assimilation rates of tagged glycine is noted. The diverse effects of hypoxia on C14 discharge in experimental rats are also discussed. V.Z.

**A70-35361 # Some results of medical studies performed during the flights of the Soiuz 6, Soiuz 7, and Soiuz 8 spacecraft (Nekotorye rezul'taty meditsinskikh issledovaniia, vypolnennykh vo vremia poletov kosmicheskikh korablii 'Soiuz-6,' 'Soiuz-7,' i 'Soiuz-8').** E. I. Vorob'ev, Iu. G. Nefedov, L. I. Kakurin, A. D. Egorov, and I. B. Svistunov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 65-73. In Russian.

Discussion of the physiological reactions of Soiuz 6, 7, and 8 crew members during group flights, pointing out their good physical shape and performance. Changes observed in the physiological reactions of the astronauts, notably during the execution of maneuvers, are described. Also noted are the changes in the reaction of their cardiovascular and respiratory systems to submaximum physical stresses after flights. V.Z.

**A70-35362 # Unexpected information as a factor affecting psychologically the activity of an operator in conditions of isolation (Neozhidannaia informatsiia kak faktor psikhologicheskogo vozdeistviia na deiatel'nost' operatora v usloviakh izoliatsii).** O. N. Kuznetsov. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 74-78. 8 refs. In Russian.

Analysis of the responses of human operators to sudden unforeseen information delivered to them during the performance of assigned routine activity in prolonged solitary isolation. A relation is established between the effects of such information on the performance of human operators and their will power and other psychological and mental characteristics. V.Z.

**A70-35363 # Effect of reduced barometric pressure on the elimination of gaseous and volatile metabolic products in man with insulating gear (Vliianie ponizhennogo barometricheskogo davleniia na eliminatsiiu gazoobraznykh i letuchikh produktov metabolizma u cheloveka, nakhodiashchegosia v izoliruiushchem snariazhenii).** S. M. Gorodinskii, A. V. Sedov, A. N. Mazin, G. A. Gaziev, A. P.

Kleptsova, and L. I. Zhukova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 78-82. 16 refs. In Russian.

Pressure chamber study of metabolite discharge in a group of 8 men wearing oxygen-supplied rubberized suits and subjected to reduced pressures of 308 and 198 mm Hg. The discharge rates of amines, ammonia, phenol, acetone and hydrogen sulfide were higher under reduced pressures than under normal pressure, while the discharge rates of carbon monoxide, carbon dioxide, and hydrocarbons remained unchanged. V.Z.

**A70-35364 # Some characteristics of water-salt metabolism in humans after exposures to transverse accelerations (Nekotorye pokazateli vodno-solevogo obmena u liudei posle vozdeistviia pope-rechno napravlennykh uskoreniia).** G. I. Kozrevskaia, A. I. Grigor'ev, and Iu. S. Kolaskova. *Kosmicheskaiia Biologiia i Meditsina*, vol. 4, Mar.-Apr. 1970, p. 82-85. 10 refs. In Russian.

Study of water-salt metabolism in a group of 21 subjects exposed to breast-to-back accelerations at 4 to 8, or 4 to 14 g. Increased water diuresis and chlorine and potassium excretion were observed after accelerations, while sodium excretion remained basically unchanged. Normalization of diuresis and chlorine excretion was observed by the 3rd day following the exposure, while the increased potassium excretion persisted longer. V.Z.

**A70-35365 # Application of ultrasonic cardiolocation in bioradiotelemetry (Primenenie ul'trazvukovoi kardioloatsii v dinamicheskoi bioradiotelemetrii).** A. N. Kozlov. *Kosmicheskaiia Biologiia i Meditsina* vol. 4, Mar.-Apr. 1970, p. 87-90. 6 refs. In Russian.

Description of equipment and techniques for remote automatic recording of the cardiac activity of human operators during the performance of their professional activity. The technique applies ultrasonic searchless Doppler cardiography for obtaining continuous remote cardiograms at distances up to 15 m from the subject. A block diagram is given for a dynamic TV system using this technique. V.Z.

**A70-35420 Blood glucose and plasma insulin in response to maximal exercise and glucose infusion.** L. Hermansen, E. D. R. Pruetz, J. B. Osnes (Institute of Work Physiology, Oslo, Norway), and F. A. Giere. *Journal of Applied Physiology*, vol. 29, July 1970, p. 13-16. 13 refs.

Blood glucose and plasma immunoreactive insulin (IRI) concentrations were investigated before, during, and after intermittent maximal exercise of short duration and before and after glucose infusion in five young subjects, two females and three males. Blood glucose concentrations were found to increase during exercise from an average of 82.6 at rest to 170.7 mg/100 ml of blood after the last (fifth) work bout. Plasma IRI concentration increased from an average of 13 to 48 microU/ml during exercise. The peak insulin values were reached 10 min later than the peak glucose values. Blood glucose concentration increased on the average from 79.2 to 172.3 mg/100 ml of blood after glucose infusion. The corresponding increase in plasma IRI was from 19 (resting value) to 54 microU/ml (peak value). There was, however, in this case no time lag between peak glucose and insulin values. With this exception, the insulin response to increased blood glucose caused by maximal exercise or by glucose infusion, revealed no obvious difference. (Author)

**A70-35421 \* Ovine physiological responses to elevated ambient carbon dioxide.** W. H. Hoover, P. J. Young, M. S. Sawyer, and W. P. Apgar (Maine, University, Orono, Me.). *Journal of Applied Physiology*, vol. 29, July 1970, p. 32-35. 15 refs. Grant No. NSG-338.

Cardiac rate, respiration rate, hematocrit, number of red blood cells per cubic millimeter, and blood hemoglobin concentration were determined on sheep exposed both abruptly and gradually to 2, 4, 8,

12, and 16% CO<sub>2</sub> in air. In the abrupt exposures, the CO<sub>2</sub> concentration was brought to the desired level within 2 hr, and maintained for 7 days. In the gradual exposures, the CO<sub>2</sub> level was increased slowly over a 3-day period, and maintained at the desired level for 7 subsequent days. Increased CO<sub>2</sub> levels resulted in statistically significant increases in all parameters measured. No significant differences between the effects of rapid and slow onset of CO<sub>2</sub> were noted for cardiac rate, respiratory rate, hematocrit, or blood hemoglobin level. The difference in rate of onset of exposure did result in differences in the numbers of erythrocytes per cubic millimeter of blood. (Author)

**A70-35422** Effect of a cooling hood on physiological responses to work in a hot environment. Esar Shvartz (Negev Institute for Arid Zone Research, Beersheba, Israel). *Journal of Applied Physiology*, vol. 29, July 1970, p. 36-39. 8 refs.

Six healthy young men completed 2 hr of three work-heat tests (50 C, 20% relative humidity, 5 km/hr) in the following experimental conditions: no cooling, wearing a cooling hood, and wearing the hood and a suit covering the torso, arms and thighs. The hood and suit consisted of 11 and 40 m of tubing, respectively, sewn into cotton cloth. Cool water was circulated through the tubes, with inlet temperatures determined by subjective comfort established at 7.5 deg C for the hood and 9.9 deg C for the hood and suit, the latter condition requiring larger flow rates. Cooling with both hood and suit markedly reduced heat strain (final mean heart rate and rectal temperature, and total weight loss were 104 beats/min, 37.4 deg C, and 0.99 kg, respectively). Cooling with the hood only resulted in a final mean heart rate and rectal temperature of 127 beats/min and 37.9 deg C, while total weight loss was 1.81 kg. The hood alone reduced oral and forehead temperatures more than rectal and skin temperatures. It was concluded that cooling the head and neck is more effective and efficient than cooling other parts of the body. (Author)

**A70-35423** Heat of evaporation of sweat. J. W. Snellen, D. Mitchell, and C. H. Wyndham (Chamber of Mines of South Africa, Johannesburg, Republic of South Africa). *Journal of Applied Physiology*, vol. 29, July 1970, p. 40-44. 12 refs.

A subject was exposed for 90 min to all combinations of five different air temperatures and five different dew-point temperatures in a human calorimeter. With this calorimeter a continuous record of the sensible heat exchange and the evaporation rate can be made while the metabolic heat production is measured with Douglas bags and gas analysis. When the man was in temperature and caloric equilibrium (in the last 0.5 hr) it was possible to make a direct measurement of the heat required to evaporate 1 g sweat. The caloric equivalent of 1 g sweat was found to be 43.3 (W.min)/g (0.620 kcal/g). This figure was independent of the prevailing air temperature or humidity. The reason why this value is about 7% higher than that for water is not yet evident. (Author)

**A70-35424** Relation between maximum oxygen intake and body temperature in hot humid air conditions. C. H. Wyndham, N. B. Strydom, A. J. van Rensburg, A. J. S. Benade, and A. J. Heyns (Chamber of Mines of South Africa, Johannesburg, Republic of South Africa). *Journal of Applied Physiology*, vol. 29, July 1970, p. 45-50. 18 refs.

Six men were conditioned to a step-climbing routine, followed by maximum oxygen intake determinations on a treadmill. They then worked for 4 hr at the step-climbing routine at a wet body temperature of 32.3 deg C (saturated) and low air movement. Relating 4th-hr rectal temperatures to % maximum oxygen intake showed that the higher the percentage of maximum used, the higher was the 4th-hr rectal temperature. The men were then acclimatized for 12 days to identical conditions. Measurements of maximum oxygen intake showed no significant change from preacclimatization values. A similar close relationship was observed between the 4th-hr rectal temperature and % maximum oxygen intake. In the accli-

matized state the six men were also studied at 50% maximum oxygen intake. Fourth-hour rectal temperature showed a close relationship with % maximum oxygen intake, the residual variance being only 0.288. The plots of 4th-hr rectal temperature against O<sub>2</sub> consumption, however, showed wide but consistent differences between individuals in rectal temperature responses, which are probably due, in part, to differences between them in maximum oxygen intake (or to some other body size parameter which is closely associated with maximum oxygen intake). (Author)

**A70-35425** Urinary excretion of vanillylmandelic and homovanillic acids in mountain climbing. J. Wolf, V. Dolezal, and J. Luxa (Karlova Universita; Institute of Aviation Medicine, Prague, Czechoslovakia). *Journal of Applied Physiology*, vol. 29, July 1970, p. 51-53. 13 refs.

Czechoslovak members of the International Pamir Expedition to Lenin's Peak (7,134 m) were observed for changes in 'circulation index' and for vanillylmandelic and homovanillic acids in urine after climbing to various elevations. The circulatory functions responded with rapidity while the organism as a whole had not yet reached optimum acclimatization. During the final ascent the circulatory system had already reached its top efficiency, and the ascent to beyond 7 km was possible only due to maximal activation of the sympathoadrenal system at that time. (Author)

**A70-35426** Effect of ambient temperature on venous reactivity to hydrostatic stress. P. D. Newberry (Canadian Forces Institute of Environmental Medicine, Toronto, Canada). *Journal of Applied Physiology*, vol. 29, July 1970, p. 54-57. 18 refs.

A mercury-in-rubber strain gauge was used to record limb volume in relation to venous congesting cuff pressure, of the forearm in five adult male subjects. The percent change in volume resulting from an increase in venous congesting cuff pressure from 0 to 30 mm Hg was used as an index of venous compliance. The effects of temperature (between 16 and 30 deg C), changes of posture and of lower body negative pressure of 20 mm Hg on the index of compliance were recorded. In the horizontal position the mean index of compliance was 3.4% at an ambient temperature of 23 deg C. This did not change with increasing temperature, but as previously reported by others, the index of compliance decreased at lower temperatures to 2.1% at 16.7 deg C. On adopting a 45 deg head-up tilt with lower body negative pressure (of 20 mm Hg) the index of compliance decreased considerably (to a mean of 2.4%) at an ambient temperature of 23 deg C. However, at both higher and lower temperatures the change of compliance was much smaller. These results suggest that ambient temperature has a considerable influence on both the resting compliance, as has been previously reported by others, and also on the reactivity of the capacitance vessels in response to hydrostatic stress. (Author)

**A70-35427** Diffusing capacity of the lung in Caucasians native to 3,100 m. Arthur C. DeGraff, Jr., Robert F. Grover, Robert L. Johnson, Jr., James W. Hammond, Jr., and John M. Miller (Texas University, Dallas, Tex.; Colorado University, Denver, Colo.). *Journal of Applied Physiology*, vol. 29, July 1970, p. 71-76. 32 refs. PHS Grants No. HE-07744; No. HE-06296; No. HE-08728; Contract No. AF 41(609)-2691.

This study has shown that young persons residing at high altitude have higher apparent diffusing capacity for CO than their sea-level counterparts as a result of both increase in membrane diffusing capacity and lung capillary volume. The rate of loss of diffusing capacity with age is no greater than normal. (Author)

**A70-35428** Cardiac output during submaximal and maximal treadmill and bicycle exercise. Björn Ekblom (Gymnastik- och Idrottshögskolan, Stockholm, Sweden), Bengt Saltin (Institute of Work Physiology, Oslo, Norway), and Lars Hermansen. *Journal of*

*Applied Physiology*, vol. 29, July 1970, p. 82-86. 12 refs. Research supported by the Bank of Sweden, the Swedish National Association against Heart and Chest Diseases, and the Swedish Sport Federation.

Oxygen uptake and cardiac output were measured in 13 male subjects, age 19-34 years, during submaximal and maximal treadmill and bicycle exercise. Oxygen uptake and cardiac output were higher during maximal uphill running than during maximal bicycle exercise, 0.26 and 1.6 liters/min, respectively. Both differences were statistically significant. Maximal heart rate was 187 and 185 beats/min for the treadmill and bicycle, respectively. At a given submaximal oxygen uptake the mean value for heart rate was 6-10 beats/min higher on the bicycle than on the treadmill, whereas cardiac output was the same for the two types of exercise. Consequently, the stroke volume was higher during both submaximal and maximal treadmill running than during bicycle exercise. The difference was approximately 5%. (Author)

**A70-35429**      **Glucose-free fatty acid interactions in the working heart.** M. F. Crass, III, E. S. McCaskill, and J. C. Shipp (Florida, University, Gainesville, Fla.). *Journal of Applied Physiology*, vol. 29, July 1970, p. 87-91. 30 refs. PHS Grants No. AM-4829; No. AM-5444.

Working hearts developing increased ventricular pressures and 'nonworking' hearts (Langendorff) were perfused for 1 hr with bicarbonate buffer containing 5 mm glucose-U-C14 in the presence or absence of: (1) varying concentrations of palmitate, and (2) albumin free of fatty acids. Glucose uptake and oxidation and glycogenolysis were increased with a physiologic work increment. In this setting, maximal reduction of glucose uptake (71%) and glycogenolysis was observed with 0.5 mm palmitate. Glucose oxidation was reduced 80% with 0.5 mm but a maximal inhibition of 95% was observed with 1.0 mm palmitate. Fatty acid-free albumin (3 g/100 ml) produced a small reduction in glucose uptake and oxidation, but did not inhibit glycogenolysis. Glyceride content decreased by 50% in hearts perfused for 1 hr; this was not influenced by pressure development. No net reduction in glycerides was observed with palmitate (plus glucose) present. Of glucose label in heart lipids, over 90% was in phospholipids. Thus, with pressure development and substrate concentrations characteristic of the in vivo state, palmitate inhibited glucose metabolism at multiple sites. (Author)

**A70-35430**      **Spinal reflex activity during acute hypoxia in normal and chronic altitude-exposed cats.** Robert W. Piwonka and Charles D. Barnes (Indiana University, Bloomington, Ind.). *Journal of Applied Physiology*, vol. 29, July 1970, p. 96-102. 14 refs. PHS Grant No. NB-05949; Contract No. AF 44(620)-68-C-0014.

Spinal reflex activity of cats placed for 3-5 weeks in a simulated altitude of 18,000 ft was compared with that of sea-level cats before, during, and after brief exposures to hypoxia. In the sea-level group the monosynaptic reflex amplitude was initially depressed and then enhanced during respiration with 0% O<sub>2</sub>. Similar but quantitatively smaller changes occurred when breathing O<sub>2</sub> concentrations of 1.1, 1.7, and 2.0%. In the altitude group both the reflex depression and subsequent enhancement were significantly smaller than corresponding events in the sea-level group. Single-unit recording of spinal interneurons during exposure to hypoxia in the sea-level group generally demonstrated increased activity followed by a marked decreased activity in a pattern temporally related to those changes of sea-level monosynaptic reflex amplitude. In the altitude group such changes in interneuron unit activity were seldom observed. Other spinal reflex interactions were studied in response to the above hypoxic mixtures: of particular note is that segmentally evoked reflex inhibition was significantly less affected by hypoxia in the altitude group than in the sea-level group. (Author)

**A70-35431**      **Application of impedance cardiography to study of postural stress.** J. J. Smith, J. E. Bush, V. T. Wiedmeier, and F. E. Tristani (Marquette School of Medicine, Inc.; Marquette

University; Wood Veterans Administration Hospital, Milwaukee, Wis.). *Journal of Applied Physiology*, vol. 29, July 1970, p. 133-137. 17 refs.

A comparison was made of 35 simultaneous determinations of cardiac output in eight normal subjects using the Minnesota Impedance Cardiograph method and ordinary dye techniques. The correlation coefficient (r) for the stroke volume values was +0.87 and for cardiac output was +0.83. When corrections were made using the respective impedance-dye ratios for individual subjects, the r value for stroke volume measurements between the two methods was +0.96 suggesting that the impedance method may better serve as a relative than as an absolute measure of cardiac output. During a 70 deg head-up tilt in normal subjects there were increases in mean heart rate (about 35%), diastolic blood pressure (15 mm), and mean total peripheral resistance (40%), and decreases in stroke volume (40%) and cardiac output (18%); these changes were similar to those previously reported with other methods. The results indicate that although the impedance cardiograph has considerable potential for the assessment of human circulation, further study and evaluation of the method is required. (Author)

**A70-35471**      **Thromboembolism - A manifestation of the response of blood to injury.** J. F. Mustard (McMaster University, Hamilton, Ontario, Canada) and M. A. Packham (Toronto, University, Toronto, Canada). (*American Heart Association, Scientific Sessions, International Lecture, 3rd, Dallas, Tex., Nov. 14, 1969.*) *Circulation*, vol. 42, July 1970, p. 1-21. 139 refs.

Review of some recent evidence related to blood platelets in thromboembolic disease. Thromboembolism may be considered as one of the manifestations of the response of blood to injury. Other manifestations of this include hemostasis, increased vessel permeability, and vasculitis; disturbances of the microcirculation may lead to tissue injury and organ dysfunction. The factors that can initiate these changes by stimulation of platelets are exposure of subendothelial tissue (collagen, basement membrane) and intravascular stimuli such as antigen-antibody complexes, viruses, bacteria, and endotoxin. These stimuli have a number of effects on the blood; the interaction of the platelets with the above stimuli leads to the release of platelet constituents including ADP; the ADP causes the platelets to adhere to each other; the aggregated platelets cause acceleration of clotting; this and changes in blood flow promote the formation of fibrin around the platelet aggregates. Some of the stimuli such as collagen and antigen-antibody complexes also activate blood coagulation through factor XII; some of the materials released from these platelets affect the vessel wall. The initial platelet mass is transformed to a fibrin mass. There are compounds that inhibit the platelet release reaction, platelet aggregation, and blood coagulation and activate the fibrinolytic mechanism. It appears that by selective use of these compounds, improvements can be realized in the management of all aspects of thromboembolic disease related to vascular and intravascular stimuli. M.V.E.

**A70-35472**      **Ultrasound cardiography in single ventricle and the hypoplastic left and right heart syndromes.** Elliot Chesler, Hymie S. Joffe, Romeo Vecht, Walter Beck, and Velva Schrire (Groote Schuur Hospital, Cape Town, Republic of South Africa). *Circulation*, vol. 42, July 1970, p. 123-129. 25 refs. Research supported by the South African Medical Research Council, the Cape Town City Council, and the Harry Crossley Foundation.

Seven cases of single ventricle, six cases of hypoplasia of the right heart (tricuspid atresia), and one case of hypoplasia of the left heart were investigated with reflected ultrasound. In hypoplasia of the right heart there was abnormal anterior movement of the mitral valve; in hypoplasia of the left heart, abnormal anterior movement of the tricuspid valve, and in single ventricle, similar movement of the anterior component of a single valve. In one case of single ventricle, two separate valves were identified at different depths. In none of the cases could a ventricular septum separating two ventricular cavities be identified. Ultrasound cardiography may be particularly

useful as a non-invasive preliminary investigation of infants with congenital heart disease. Failure to demonstrate a ventricular septum combined with the presence of a single atrioventricular valve moving abnormally far anteriorly may be an expression of marked hypoplasia of the left or right ventricles or an anatomically single ventricle with one valve. (Author)

**A70-35473**      **Continuous murmur due to the combination of rheumatic mitral stenosis and a rare type of anomalous pulmonary venous drainage.** B. L. Halpern, G. C. Murray, C. R. Conti, J. O. Humphries, and V. L. Gott (Johns Hopkins University, Baltimore, Md.). *Circulation*, vol. 42, July 1970, p. 165-170. 25 refs. PHS Grant No. HE-05584.

A patient is described in whom a continuous murmur was caused by the combination of rheumatic mitral stenosis and a rare form of partial anomalous pulmonary venous drainage. In this case, the left superior pulmonary vein drained into the left atrium and also into a large anomalous vein which then drained to the right atrium via the innominate vein and superior vena cava. At surgery, mitral commissurotomy and then ligation of the anomalous vein were performed with a good result; the continuous murmur was no longer audible after operation. The embryology, physiology, auscultatory findings and surgical consideration are discussed. (Author)

**A70-35539**      **Biological aspects of transport.** D. C. Mikulecky (New York, State University, Buffalo, N.Y.). In: *Transport phenomena in fluids.* (A70-35528 17-12) Edited by H. J. M. Hanley. New York, Marcel Dekker, Inc., 1969, p. 433-494. 29 refs.

Consideration of the biological aspects of transport processes in living systems with the emphasis on the applicability of a physical approach to these phenomena. Special attention is given to the application of nonequilibrium thermodynamics to biological systems, and to transport processes in chemical reactions and biological functions. The stationary state coupling between a reaction and a flow, transport by chemical association, active transport, and nonsteady state processes represented by excitation in an axon membrane are considered. Electrical events occurring in a squid giant axon and in a Hodgkin-Huxley axon are discussed in detail. V.Z.

**A70-35562 #**      **Effect of atropine on circulatory responses to lower body negative pressure and vasodepressor syncope.** Raymond H. Murray (Indiana University, Indianapolis, Ind.) and Spencer Shropshire (Indiana University, Indianapolis, Ind.; USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *Aerospace Medicine*, vol. 41, July 1970, p. 717-722. 34 refs. Contract No. AF 33(616)-8378.

Description of a study undertaken to test the hypothesis that therapeutic doses of atropine can alter circulatory responses to a diminished effective blood volume and vasodepressor syncope induced by the application of graded degrees of negative pressure applied to the lower body. It is demonstrated that atropine has no clearcut effect on the hemodynamic response to lower body negative pressure and the vasodepressor syncope except for higher heart rate levels. T.M.

**A70-35563 #**      **Oral temperature in relation to inflight work/rest schedules.** D. A. Harris, H. B. Hale, B. O. Hartman, and J. A. Martinez (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; USAF, Office of the Command Surgeon, Scott AFB, Ill.). *Aerospace Medicine*, vol. 41, July 1970, p. 723-727. 20 refs.

Six experimental flying missions (each of 54 hours' duration) were flown in a C-141 aircraft. Two crews took turns flying the aircraft during each mission. The same two crews flew all six missions. In three of the missions the work/rest schedule was 4/4 hours; in the remaining missions it was 16/16 hours. Oral temperatures of 9 of the crewmembers (2 aircraft commanders, 2 co-pilots, 2 flight engineers, 2 navigators and 1 loadmaster) were measured at

4-hour intervals during the flight periods and also during 54-hour postflight periods, with the testing schedule standardized with respect to time of day. The oral temperature rhythm during flight periods, although remaining entrained to the time at the home base, was lower in amplitude than that during postflight periods ( $P$  is less than .01). The 4/4 work/rest schedule had more depressant influence on oral temperature than the 16/16 schedule ( $P$  is less than .005). Crew position was found to be a factor contributing to oral temperature variability ( $P$  is less than .05). The individuals occupying key positions had the lowest oral temperatures during flight periods as well as during postflight periods. (Author)

**A70-35564**      **Auditory processing for speech intelligibility improvement.** Jerry V. Tobias (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 41, July 1970, p. 728-733. 21 refs.

Study of optimal loudspeaker arrangements in aircraft crew compartments from the viewpoint of stimulating the auditory system in such a way that it will create the effect of an improved SNR with unchanged signal or noise intensities. Tests show that one solution to the problem of losing the meaning of messages transmitted to fliers who do not use any ear covering is to install pairs of loudspeakers, symmetrically, approximately equidistant from the pilot's head toward the front or rear, with one speaker's leads wired in reverse to the others so that phase inversion is automatic. The use of two speakers also allows a higher receiver gain setting without overdriving the loudspeakers to produce distortion. Although this approach is not as beneficial and satisfactory as the headset, it would improve reception for aviators who prefer to leave their ears uncovered. T.M.

**A70-35565**      **Effects of prototype space diet on the bacterial fecal flora of humans.** Joseph T. Cordaro, Raymond A. Madson, and Richard E. Krieg (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 41, July 1970, p. 734-737. 7 refs.

Prototype space foods and feces from eight male subjects were analyzed to determine changes in the bacterial content during test flights in a space chamber simulator. Throughout the study, the bacterial content of all space food remained within the recommended specifications. Both the diet and environment affected the bacterial content of the feces, but since the alterations were within the range of the normal values, no problems of clinical significance are expected. (Author)

**A70-35566**      **Pressor response to epinephrine in hyperbaric atmospheres.** Delbert E. Evans and Leon J. Greenbaum, Jr. (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md.). (*Federation of American Societies for Experimental Biology, Annual Meeting, Atlantic City, N.J., Apr. 15-20, 1968.*) *Aerospace Medicine*, vol. 41, July 1970, p. 738-740.

Description of experiments designed to investigate the possibility that the pressor response to sympathomimetic drugs might be altered if, when pressurized, an animal underwent a change in sympathetic tone. Results of tests performed with cats indicated that the pressor response to I.V. epinephrine at 200 psig is not significantly different from an identical injection given at sea level pressure either before or after pressurization. T.M.

**A70-35567**      **Aviation pathology in general aviation.** T. C. Brown and J. C. Lane (Department of Civil Aviation, Aviation Medicine Branch, Melbourne, Australia). (*Joint Committee of Aviation Pathology, Symposium, Scientific Session, 7th, Halton and Farnborough, England, Oct. 13-16, 1969.*) *Aerospace Medicine*, vol. 41, July 1970, p. 748-753. 6 refs.

Autopsies as part of the data collection for crash injury studies, began in Australia in 1951. Since 1962 autopsies have been held on all victims of general aviation fatal accidents as an essential part of

accident investigation. Pathologists with a forensic science background have been appointed as aviation pathologists. The programme has been of value in detecting pilot incapacity, in providing evidence of accident sequence, in providing the basis for modifications in existing aircraft and in suggesting design requirements. Alcohol, but not carbon monoxide, has been found associated with some fatal accidents. As virtually all Australian accidents are investigated, and since the investigation includes the recording of details of injuries in injury-producing accidents and autopsies in fatal accidents, the resulting data represent an unbiased record of the in-use performance, including the crash protection performance, of general aviation aircraft. (Author)

**A70-35568 Interpretation of carboxyhaemoglobin found at post mortem in victims of aircraft accidents.** D. J. Blackmore (RAF, Institute of Pathology and Tropical Medicine, Halton, Bucks., England). *Aerospace Medicine*, vol. 41, July 1970, p. 757-759.

The problems of the interpretation of carboxyhaemoglobin saturation as determined on blood taken at post mortem are discussed with relation to errors in methodology; the normal range; endogenous production of carbon monoxide; range of carboxyhaemoglobin saturation following inhalation of the products of combustion and the differentiation between carboxyhaemoglobin subsequent to inhalation of fire and tobacco smoking. Measurement of the carbon monoxide content of a specimen by gas chromatography and comparison with the total haemoglobin content as determined by atomic absorption spectrophotometry and spectrophotometry is the method of choice. Using this technique a carboxyhaemoglobin saturation in excess of 8% is outside the range observed in accident victims not associated with fire. Anomalies can occur in which low carboxyhaemoglobin saturations are observed following inhalation of fire as deduced from pathological and anatomical findings. Carbon monoxide is produced sporadically in stored blood specimens, although at 40 C none was produced in 21 days following deliberate contamination of samples. Staining erythrocytes for the presence of carboxyhaemoglobin has proved a useful adjunct in the assessment of time between inhalation of carbon monoxide and death. (Author)

**A70-35569 Toxicological findings in aircraft accident investigation.** Paul W. Smith, Delbert J. Laceyfield, and Charles R. Crane (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aerospace Medicine*, vol. 41, July 1970, p. 760-762. 7 refs.

Toxicological findings in 202 pilot-fatalities resulting from 202 accidents in general aviation aircraft are summarized. Methods used in examination of specimens for drugs and toxic agents are described. Potent therapeutic agents were detected in 7 instances, an incidence of 3.5%. Blood ethanol levels in excess of .050% (50 mg percent) were found in 28 of the 202 cases (13.9 percent). Only the latter category is included in this report. (Author)

**A70-35570 In-flight coronary occlusions - A short series of cases.** F. O. Hemming (Department of National Health and Welfare, Ottawa, Canada). *Aerospace Medicine*, vol. 41, July 1970, p. 773-775. 10 refs.

The suggestion that present medical scrutiny of aircrew is highly effective in eliminating overt coronary artery diseases is examined in the light of six cases of inflight death. The need for full autopsies on all aircrew fatalities is mentioned and the question of the Double Masters ECG is considered relevant to the F.A.A. proposals to amend Parts 61 and 67 of the Federal Aviation Regulations. The absence of a significant medical history and the existence of normal ECG records in the fatalities described raises the question of the efficacy of current screening methods. The necessity for aeromedical involvement in aircrew autopsies is stressed as is awareness of the danger of inadequate autopsies. (Author)

**A70-35571 Occurrence and significance of myocarditis in trauma.** P. J. Stevens and K. E. Underwood Ground (RAF, Institute of Pathology, Halton, Bucks., England). *Aerospace Medicine*, vol. 41, July 1970, p. 776-780. 20 refs.

The literature on isolated focal myocarditis is reviewed with regard to its incidence and potential for causing sudden collapse and death in apparently healthy individuals. Six cases of the condition among 263 pilots killed in aircraft accidents are reported, but in no case was it considered to be connected with the causes of their accidents. The difficulties in the diagnosis and assessment of the significance of myocarditis with respect to accident causation is discussed. An incidental myocarditis was not found in 93 non-pilot aircrew killed in the same aircraft accidents. However, a control series of 61 hearts from apparently healthy males aged between 18 and 50 years, who had died from trauma in circumstances which precluded the accidents having been caused by the deceaseds' sudden incapacitation, were examined. This study indicated that the incidence of asymptomatic focal myocarditis in British males aged 18 to 50 years may be as high as 5 percent. (Author)

**A70-35572 Passenger tie-down failure - Injuries and accident reconstruction.** J. K. Mason (RAF, Institute of Pathology, Halton, Bucks., England). *Aerospace Medicine*, vol. 41, July 1970, p. 781-785.

The paper examines the benefits of comparing injury patterns in different accidents as an aid to the deductive reconstruction of obscure cases. It is only possible to do this if there is a centralized unit responsible for the medical investigation of fatal aircraft accidents. Four disasters involving commercial passenger aircraft are outlined. Utilizing one accident which was particularly well observed, a pattern of injuries was derived for the low speed, high sink rate type of accident. Another accident of the relatively high speed ground impact type provided a different pattern and both these were applied to two further accidents of rather more obscure type. The paper outlines those pathological findings which are most useful in this type of investigation and emphasises the importance of correlating these with the findings in the safety equipment. It is concluded that comparative accident investigation may give most valuable information as to the sequence of the accident and efficiency of passenger tie-down. However, diagnostic patterns can only be established if as many passengers as possible are examined at autopsy and the importance of including the cabin staff is stressed. (Author)

**A70-35573 Who was at the aircraft's controls when the fatal accident occurred.** S. Krefft (Bundesministerium der Verteidigung, Luftwaffe, Flugmedizinisches Institut, Fürstenfeldbruck, West Germany). *Aerospace Medicine*, vol. 41, July 1970, p. 785-789. 10 refs.

The mechanics of injuries inflicted by control elements in the accident process are examined. The jolt at the point of impact inflicts characteristic injuries on the pilot's tissues through controls held by the pilot. Corresponding marks may be found on his clothes and on the operating levers. Injuries due to handle-gripping and contact-injury patterns, sustained by the pilot upon impact of aircraft and subsequent gyrations may lead to the following reconstructive conclusions: the whereabouts of the subject in the aircraft, who controlled the aircraft, possibly, which handles the pilot operated with which hand at the time of accident. The problems are analyzed and the pathognomonic findings are discussed. (Author)

**A70-35574 Diagnostic patterns of injury and death in USAF aviation accidents.** S. O. Smelsey (USAF, Directorate of Aerospace Safety, Norton AFB, Calif.). *Aerospace Medicine*, vol. 41, July 1970, p. 790-793.

The author reviews the injury experience incurred in 432 major aircraft accidents in the USAF for CY 1967 and 1968, involving

1,901 individuals. Types of injuries and causes of fatalities are included and evaluated as to causative agents. A comparison was made with a previous report to determine if there had been a change in injury and fatality patterns. It was concluded that there has been a change. There was a considerable reduction in the number of major aircraft accidents, as well as the number of individuals receiving fatal or major injuries. A noteworthy observation was that the incidence of deaths and injuries due to fire and/or associated complications had increased. This change was due to the increased proportion of jet aircraft in the aircraft inventory of the USAF. A higher percentage of accidents involving jet aircraft resulted in fire than in those accidents involving reciprocating engine aircraft. (Author)

**A70-35575** **Misleading injury patterns.** Robert S. Rhodes (U.S. Armed Forces Institute of Pathology, Washington, D.C.). (*Joint Committee of Aviation Pathology, Symposium, Scientific Session, 7th, Halton and Farnborough, England, Oct. 13-16, 1969.*) *Aerospace Medicine*, vol. 41, July 1970, p. 794-797. 19 refs.

Description of certain selected medical cases which illustrate the possibility for misinterpretation of injuries resulting from aircraft accidents. They include examples of classical injury patterns ignored; artifacts; or clues overlooked, misinterpreted, or not exhaustively investigated. Many of the injuries mentioned can result from other types of accidents and are not solely related to aircraft accidents.

T.M.

**A70-35576** **Analysis of injuries incurred during emergency ejection/extraction combat and noncombat.** Robert H. Shannon (USAF, Directorate of Aerospace Safety, Norton AFB, Calif.). (Survival and Flight Equipment Association, National Flight Safety, Survival and Personal Equipment Symposium, 7th, Las Vegas, Nev., October 27-30, 1969, Proceedings. Volume 2, p. 546-558.) *Aerospace Medicine*, vol. 41, July 1970, p. 798-803.

Study of combat and noncombat ejection/extraction fatalities and major injuries to USAF crewmen during 1967 and 1968. The primary ejection fatality injury type was multiple extreme, the largest single cause of death being ejection at low level with a high sink rate and adverse attitude. Fractures accounted for the majority of the major nonfatal injuries received. The success of ejection resulting from combat losses is significantly higher than noncombat ejections. The recently implemented combat reporting system in the USAF provides a valuable data source concerning the performance of life support systems in the combat environment. F.R.L.

**A70-35577** **Long term effects of ejecting from aircraft.** L. MacKenzie Crooks (RAF, London, England). *Aerospace Medicine*, vol. 41, July 1970, p. 803, 804.

An enquiry to determine the late effects of ejection from aircraft. Seventy patients were examined most of them more than ten years after ejection. The incidence of fractures was high. The incidence of disability appeared negligible. The incidence of fractures was higher than surveys made immediately after ejection. Radiological changes of cervical spondylosis showed a very high incidence but clinically these were symptom free. (Author)

**A70-35578** **Incidence and pathogenesis of fractures of the lumbar transverse processes in air crashes.** H. J. Barrie (Toronto East General and Orthopaedic Hospital, Toronto, Canada) and N. Hodson-Walker (Toronto East General and Orthopaedic Hospital, Toronto, Canada; Birmingham University Hospital, Edgbaston, England). *Aerospace Medicine*, vol. 41, July 1970, p. 805-808. 15 refs.

In 44 autopsies on subjects of air crashes, fractures of the transverse processes of the lumbar vertebrae were found 18 times (41%). There was no predilection for any individual transverse process. In the few cases having unilateral fractures, the impact had occurred on the opposite side. There was no correlation with tears of the renal artery which had occurred in 50% of the autopsy material. The fractures in the upper four vertebrae were ascribed to a combination of reflex contraction of Quadratus Lumborum and distractive forces acting in a lateral or rotatory direction. Fracture of the fifth transverse process might be related to sacroiliac failure.

(Author)

**A70-35579** **Safety significance of aircraft accident post mortem findings.** P. V. Siegel, S. R. Mohler, and A. Cierebiej (FAA, Washington, D.C.). *Aerospace Medicine*, vol. 41, July 1970, p. 808-814.

A review of post mortem examinations obtained in 1968 of pilot victims of general aviation aircraft accidents reveals that 51% of the pilot victims were studied by pathologists. The post mortem examination population above was taken from 687 pilot fatalities in general aviation accidents occurring within the United States in 1968. The percentage 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)

**A70-35606 \*** **An automatic sleep analyzer.** James D. Frost, Jr. (Baylor University, Houston, Tex.). *Electroencephalography and Clinical Neurophysiology*, vol. 29, July 1970, p. 88-92. 15 refs. PHS Grant No. HE-05435; Grant No. NGR-44-003-025; Contract No. NAS 9-9418.

Description of a small, portable, special-purpose device which accomplishes automatic on-line evaluation and graphing of a subject's sleep status. The instrument performs EEG analysis as an amplitude-weighted, dominant-frequency meter to define stages awake through stage 4 sleep and also considers EOG information to permit detection of the REM state. The method described is based on criteria similar to those considered by the electroencephalographer as proposed by Dement and Kleitman (1957). G.R.

**A70-35609 #** **Effects of electrical current applied to cochlear partition on discharges in individual auditory-nerve fibers. I, II.** Teruzo Konishi, Donald C. Teas, and Joel S. Wernick (Florida, University, Gainesville, Fla.). *Acoustical Society of America, Journal*, vol. 47, June 1970, pt. 2, p. 1519-1537. 23 refs. NIH-supported research.

Study of the effects of electrical polarization applied to the cochlear partition on discharges in individual auditory nerve fibers in guinea pigs. Direct current is introduced in the basal turn across the organ of Corti. Its effects on the impulse discharges of the primary auditory fibers are measured during systematic variation of the electrical and acoustic parameters. It appears that electrical polarization modifies the resting current through the hair cells and also the excitability of the initial segment of the afferent auditory fibers. The report also describes temporal patterns of discharges of single nerve fibers recorded by a microelectrode in the modiolus in response to short-term (5 sec) dc and ac stimulation delivered across scala media in the basal turn of the guinea pig's cochlea. These electrical stimuli produce increases or decreases in discharge rates but do not show adaptation effects when the current is moderate. When the electric stimulation is added to acoustic stimulation, the intensity function at best frequency is shifted laterally, with the direction of the shift depending on current polarity. T.M.

**A70-35610 #** **Monaural detection and filtering.** B. E. Mulligan and M. Elrod (Georgia, University, Athens, Ga.). *Acoustical Society of America, Journal*, vol. 47, June 1970, pt. 2, p. 1548-1556. 39 refs. Research supported by the University of Georgia and NIH.

Parametric study of monaural detection of sinusoidal signals in noise, from the viewpoint of extending earlier work on prediction. The amplitude model is found to be compatible with empirical psychometric functions, human receiver operating characteristics, and the results of a narrow band noise experiment. Through an interpretation of the amplitude model in terms of filter bandwidth, an attempt is made to understand further the process of auditory filtering. Bandwidth is shown to vary as a function of both signal frequency and SNR. T.M.

**A70-35625 \*** Pituitary serotonin content - Effects of melatonin or deprivation of water. R. S. Piezzi and R. J. Wurtman (MIT, Cambridge, Mass.). *Science*, vol. 169, July 17, 1970, p. 285, 286. 11 refs. NIH Grant No. AM-11237; Grant No. NGR-22-009-272.

Relatively high concentrations of serotonin are found in the three regions of the rat pituitary gland. Administration of melatonin causes a selective increase in the serotonin concentration of the pars intermedia; deprivation of water for 5 days causes a selective decrease in the serotonin concentrations of the neural lobe and pars distalis. (Author)

**A70-35645 \* #** Apollo 4 and 6 radiation analysis. Timothy T. White and Alva C. Hardy (NASA, Manned Spacecraft Center, Houston, Tex.). (*American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 7th, New York, N.Y., Jan. 20-22, 1969, Paper 69-17.*) *Journal of Spacecraft and Rockets*, vol. 7, July 1970, p. 785-788. 10 refs.

Analysis of radiation measurements inside the Apollo 4 and 6 command modules while passing through the most intense portions of the trapped radiation belts. Measurements of the integrated radiation dose behind shields of 0.015 and 0.9 in. of aluminum were made inside the command modules on both missions. Dose-rate measurements behind similar shielding were obtained in the Apollo 6 command module during the ascent to apogee. Dose calculations were made with Manned Spacecraft Center computer codes, using analytical shielding descriptions, models of the radiation environment, and radiation-transport data. The calculated mission doses were within a factor of 2.5 of the measured doses, with better agreement in the calculations for the more thinly shielded sensors. The differences between the calculated and measured doses were, for the most part, attributed to errors in the model environment. The analysis of the Apollo 4 and 6 data indicated that dose calculations for manned lunar missions which pass through the more intense portion of the trapped radiation belt are reliable and that the expected doses are well below the planning operational dose limits set by NASA. (Author)

**A70-35647 \* #** Solar flare radiation protection requirements for passive and active shields. Francis W. French (Avco Everett Research Laboratory, Everett, Mass.). (*American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 7th, New York, N.Y., Jan. 20-22, 1969, Paper 69-15.*) *Journal of Spacecraft and Rockets*, vol. 7, July 1970, p. 794-800. 16 refs. Contract No. NAS 8-21392.

Investigation of the degree of protection from solar flare radiations required by astronauts on interplanetary flights, taking into account protection provided by passive means (bulk shielding), and active means (plasma radiation shielding). Anticipated solar flare radiation environments postulated in several recent studies are examined and found to fall into two general categories. Radiobiological tolerance criteria based on early skin- and blood-forming organ responses are discussed. Several approaches to selecting a mission radiation exposure criterion are considered, and example criteria are suggested for illustrative purposes. Curves are presented of dose vs shield thickness and plasma radiation shield voltage, with the probability of exceeding a given dose as a parameter. These curves are used to obtain requirements for the two types of shielding. Results are compared on several bases. (Author)

**A70-35676 #** Certain techniques of studying memory and the purpose of psycho-physiological selection (O nekotorykh metodicheskikh priemakh issledovaniia pamiati v tseliakh psikhofiziologicheskogo otbora). V. M. Mishurin. *Voenna-Meditsinskii Zhurnal*, Apr. 1970, p. 75-77. In Russian.

Discussion of psycho-physiological tests in which a special programmed device, Memory, was used to evaluate the rate, steadiness, and accuracy of the memorizing process and sensorimotor reactions of a group of 300 subjects to light signals delivered in 50-signal cycles at frequencies of 20, 40, 50, 60, or 70 cycles a minute. Statistical analysis of the test results allows a reliable division of the subjects into a high-rating group and a fair-rating group. The number of errors and omissions was below 100 in 83.6% of subjects in the first group and in 11.4% of subjects in the second group. A relation between the results of these tests and the professional performance of aircraft mechanics is noted. V.Z.

**A70-35677 #** Certain problems of physiological acoustics in aviation medicine (Nekotorye voprosy fiziologicheskoi akustiki v aviatsionnoi meditsine). I. Ia. Borshchevskii. *Voenna-Meditsinskii Zhurnal*, Apr. 1970, p. 78-80. In Russian.

General discussion of the etiopathogenesis of the auditory disorders observed in flying personnel and aircraft engineers as a result of systematic exposure to acoustic stresses. The difficulties encountered in attempts to develop effective prophylactic measures to prevent or reduce these disorders in the auditory analyzer are indicated. The scarcity of studies in this field is noted. The immediate tasks of aviation medicine are seen in more intensive studies of advanced aircraft acoustic characteristics and harmful effects of the associated acoustic stimuli on hearing, and in developing adequate protection of the auditory analyzer from aircraft noise. V.Z.

**A70-35724 \* #** Luminance requirements for hue perception and identification, for a range of exposure durations. Mary M. Connors (NASA, Ames Research Center, Moffett Field, Calif.). *Optical Society of America, Journal*, vol. 60, July 1970, p. 958-965. 21 refs.

Study of the effect of exposure duration on the luminances required to reach absolute, detection, chromatic, and correct-hue thresholds. Dominant wavelengths 642, 584, 521, and 468 nm were investigated by the method of constant stimuli, with 64.5- and 2.5-min-diam stimulus sizes, for a series of nine exposure durations ranging from 5 to 1413 msec. The results show that, for the small stimulus at brief durations, the luminance-exposure-time relationship approaches Bloch's law for the absolute, detection-, and chromatic-threshold functions. For the corresponding correct-hue function, and for all thresholds, brief durations, large stimulus, the slope of the function relating luminance to exposure duration is less than that predicted by Bloch's law. The results are discussed in terms of the relative action time among hues and the threshold-tritanopia hypothesis. G.R.

**A70-35761** Biological and physical dosimetry after a radiation accident. G. W. Dolphin, Dawn Bolton (U.K. Atomic Energy Authority, Radiological Protection Div., Harwell, Berks., England), D. L. O. Humphreys, D. L. Speight, and G. N. Stradling (Queen Elizabeth Hospital, Birmingham, England). *Nature*, vol. 227, July 11, 1970, p. 165. 5 refs.

Comparison of the radiation dose estimates made by biological and physical methods after a radiation accident. The biological method involved counting chromosome aberrations in cultured peripheral blood lymphocytes, and the physical method was based on a reconstruction of the accident. For the conditions of this accident a reasonable agreement was obtained between the two methods, which adds to the growing confidence in the use of chromosome aberration counting for dose assessment in radiation accidents. Z.W.

**A70-35762** Electrophoretic mobility of tumour cells exposed to ultrasound and ionizing radiation. M. H. Repacholi (Guy's Hospital Medical School, London, England). *Nature*, vol. 227, July 11, 1970, p. 166, 167. 11 refs.

Study of the effect of a combined ultrasonic and ionizing radiation on the electrophoretic mobility of tumor cells extracted from albino mice. It is found that exposure of tumor cells to ultrasound and X rays (1000 rad) reduced the electrophoretic mobility by almost 30%, whereas ultrasonic radiation alone causes a 16% reduction. A hypothesis for explaining this phenomenon is presented. Z.W.

**A70-35877** The amplitude probability densities of normal and abnormal electrocardiograms. George E. Burch, James Cronvich, N. P. DePasquale, and David Ahlgren (Tulane University; Louisiana, Charity Hospital, New Orleans, La.). *American Journal of Cardiology*, vol. 26, July 1970, p. 61-71. Research supported by the Rudolph Matas Memorial Fund for the Kate Prewitt Hess Laboratory and the Rowell A. Billups Fund for Research in Heart Disease; PHS Grant No. HE-06769.



The amplitude probability density (APD) of the standard limb leads of 229 normal people and patients with heart disease was studied. The pattern for normal subjects is defined briefly, and the changes associated with various types of heart disease are illustrated and described. The normal pattern is readily recognized on inspection so that the abnormal, in turn, is easy to detect. Examples are shown of amplitude probability density recordings in cases of myocardial infarction and diffuse scarring. The recordings in cardiomyopathies, hypertrophic subaortic stenosis, congenital defects, bundle branch block and other disease states are discussed and illustrated. The subtle changes in depolarization and repolarization with age were readily detected in the amplitude probability density tracing. This type of recording is particularly useful in displaying high frequency phenomena and other changes in both depolarization and repolarization processes. (Author)

**A70-35878**      **Multistage electrocardiographic exercise tests - Principles and clinical applications.** Alberto N. Golabarg, John F. Moran, and Leon Resnekov (Chicago, University, Chicago, Ill.). *American Journal of Cardiology*, vol. 26, July 1970, p. 84-92. 59 refs. Research supported by the American Medical Association Education and Research Foundation and the Chicago Heart Association; PHS Grant No. HE-5793-02.

Multistage electrocardiographic exercise testing and the physiological basis for this form of cardiovascular stress are discussed. When performed in the proper manner, the technique is safe and is a sensitive measure of cardiovascular performance. In addition, it is useful in the serial evaluation of patients and in the assessment of the effects of drugs, therapeutic regimens and the results of surgical intervention. Its use in diagnosing latent coronary arterial disease in 'healthy' individuals is still unknown based on the results of 140 normal subjects studied, in 14 per cent of whom abnormal S-T segment changes developed. The test is 'noninvasive' and therefore easily repeatable and is an invaluable aid in the management of patients with heart disease. (Author)

**A70-35896**      **Rod and cone contributions to the human early receptor potential.** E. Bruce Goldstein (Harvard University, Cambridge, Mass.) and Eliot L. Berson (Massachusetts Eye and Ear Infirmary and Children's Hospital Medical Center, Boston, Mass.). *Vision Research*, vol. 10, Mar. 1970, p. 207-218. 35 refs. NSF-supported research; NIH Grants No. NB-05691; No. SO 1-FR-05482-06.

Experimental investigation of the relative contributions of rods and cones to the human early receptor potential (ERP) by recording the ERP from normal subjects and subjects with loss of rod and/or cone function caused by hereditary retinal defects. The ERP amplitudes of subjects with retinal defects are found to be decreased compared to the normals. The response amplitudes of subjects with retinal defects indicate that the rods account for 20-40% of the normal human ERP, while the cones account for the remainder of the response. O.H.

**A70-35897**      **Stimulus alternation and low level response.** John C. Armington, Robert Marsetta, and Amy M. L. Schick (Northeastern University, Boston, Mass.). *Vision Research*, vol. 10, Mar. 1970, p. 227-236. 20 refs. PHS Grant No. NB-07529.

Study of the conditions under which scotopic responses might be obtained by the stimulus alternation method. Red and blue stimuli of matched photopic luminance were used to elicit the electroretinogram and the visually evoked cortical potential. The method of stimulus alternation was used to present stimuli to the central part of the retina and two peripheral areas. The results indicate that the method of stimulus alternation yields photopic responses under most conditions, but that scotopic responses can be obtained at the retina when conditions are appropriate. O.H.

**A70-35898**      **Adaptation of visual contrast sensitivity to specific temporal frequencies.** Robert Allen Smith, Jr. (MIT, Cambridge, Mass.). *Vision Research*, vol. 10, Mar. 1970, p. 275-279.

Investigation of the existence and properties of adaptation of visual contrast sensitivity to temporal frequencies in subjects exposed to sinusoidal grating of high modulation. The possibility of an adaptive effect with specific temporal frequencies was examined experimentally. The experimental results are plotted graphically and

discussed. The existence of such an effect is demonstrated, and different aspects of this phenomenon are considered. O.H.

**A70-35900 \***      **Some properties of the ADP-ATP exchange reaction in turtle bladder microsomes.** Adil E. Shamoo, Dominick E. Gentile (Mount Sinai Medical and Graduate Schools, New York, N.Y.), and William A. Brodsky (New York, City University, New York, N.Y.). *Biochimica et Biophysica Acta*, vol. 203, 1970, p. 495-505. 12 refs. PHS-supported research; NSF Grant No. GB-7764; Grant No. NGR-18-002-015.

Experimental investigation of the catalyzed exchange reaction between ADP and ATP in turtle bladder microsomes to determine whether this reaction is an integral part of the system involving intermediate complex formation and hydrolysis. Chromatographic measurements of the rate of conversion of ADP to ATP in the presence of the microsomal proteins via the catalyzed exchange reaction were carried out. It is shown that ADP is phosphorylated by a high energy phosphoprotein, and that this reaction, as well as those of enzyme substrate complexing and overall hydrolysis, is highly dependent upon the concentration of Mg(2+), Na(+), and K(+) in the ionic environment. O.H.

**A70-35913**      **Difficulties in limiting danger zones for personnel around radar antennas (Difficultés à circonscrire les zones dangereuses pour le personnel autour des aériens radars).** L. Miro (Ministère des Armées, Services Techniques, Paris, France), G. Deltour (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France), A. Pfister (NATO, AGARD, Brussels, Belgium), and R. Kaiser (CNRS, Centre de Recherches Nucléaires de Strasbourg, Strasbourg, Bas-Rhin, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 7, 8. In French.

Discussion of the dangerous effects of radar beams on personnel, and of means of protecting them. Various syndromes caused by radar beams are enumerated, some of which are irreversible. The U.S. has established certain exposure time limits and intensities of radiation beyond which individuals must not be subjected. The USSR imposes much more stringent limits. It is suggested that dangerous areas should be demarcated by beacons, and all persons authorized to enter them should be fully instructed. The case is complicated by the possible conjunction of beams when two or more radars are operating together in the same area. F.R.L.

**A70-35914**      **Hypoglycemia and airsickness (Hypoglycémie et mal l'air).** R. Pannier and G. Leguay (Hôpital Militaire Dominique Larrey, Versailles, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 9, 10, 7 refs. In French.

Study of the possibility that hypoglycemia is, occasionally, the cause of discomfort or loss of consciousness in flight. However, it appears that moderate hypoglycemia, without chronic clinical signs, incapable in itself of causing discomfort, can reinforce the injurious effects of hypoxia and acceleration. Hypoglycemia due to a large sugar intake may show itself in symptoms of air sickness. F.R.L.

**A70-35915**      **Cardiac flow (by electric plethysmography) in men subjected to plus 3 G accelerations of long duration (Débit cardiaque /par plethysmographie électrique/ chez l'homme soumis à des accélérations de longue durée plus 3 Gz).** Jean Demange. *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 11-13. 5 refs. In French.

Study of the circulatory reactions of human subjects who underwent accelerations of plus 3 G for periods of 20 to 120 min, with or without an anti-g suit. An electric plethysmograph with four electrodes made it possible to measure the variations of stroke volume. The subjects were seated, and the acceleration was longitudinal. In the case of therapeutic use of the centrifuge, it appears that the anti-g suit should not be used, because the pressures applied to the abdomen became very disagreeable after about 10 min. F.R.L.

**A70-35916**      **Wolff-Parkinson and White syndrome and its applicability to aircrew (Syndrome de Wolff-Parkinson et White et aptitude au personnel navigant).** J. C. Richart, R. Carre, J. Salvagniac, and F. Plas. *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 15-17. 17 refs. In French.

Results of a number of observations obtained from a group of young adults believed to be in good health, with study of the Wolff-Parkinson and White syndrome from the point of view of aeromedical appraisal. The syndrome is purely electrical in the absence of attacks of paroxysmal tachycardia. In France, candidates with this anomaly are considered unsuitable for aircrew duties because of the risk of paroxysmal tachycardia, the possibility of the existence of cardiopathies sometimes difficult to diagnose, and the risk of sudden death. F.R.L.

**A70-35917 Renal lithiasis in aircrew (Lithiase rénale dans le personnel navigant).** A. Didier, G. Legay, and R. Pannier. *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 18-21. 14 refs. In French.

Attempt to define, on the one hand, the relationships existing between urinary lithiasis and aeronautical activity and, on the other hand, the aeromedical procedure concerning this affection. It appears to be, under certain conditions, more frequent among aircrewmembers than in the general population. Aircrewmembers tend to eat rich foods, and the prophylaxis is to educate them to absorb more fluids, and to improve thermal comfort. F.R.L.

**A70-35918 Troubles of aeronautical adaptation and electronystagmographic anomalies (Troubles de l'adaptation aéronautique et anomalies électroystagmographiques).** L. Tabusse, H. Arnoux (Ministère des Armées, Service de Santé des Armées, Paris, France), and R. Bertoni (Ministère des Armées, Hôpitaux des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 23-27. In French.

Consideration of observed medicopsychological and labyrinthine exploration of aircrew candidates. Thirteen observations of aircrewmembers were made. With two exceptions (a qualified pilot and a flight engineer) the subjects were student pilots who had learning difficulties. The labyrinthine exploration was practiced according to the electronystagmographic recording technique of the swinging chair. F.R.L.

**A70-35919 The behavior of the equilibrium apparatus among acrobatic pilots (Le comportement de l'appareil d'équilibre chez les pilotes d'acrobatie aérienne).** R. Bertoni (Ministère des Armées, Hôpitaux des Armées, Paris, France) and G. Bremond (Aix-Marseille, Université, Marseille, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 29-31. In French.

Discussion of 'vestibular' training for aircrewmembers, with a presentation of labyrinth studies of 12 acrobatic pilots. Their training was identical, and they are considered to be a representative sample of squadron pilots. The labyrinth reactions were varied, but polymorphism was the rule. It is recommended that crews take enough fluids (one liter for six hours of flight). F.R.L.

**A70-35920 Aeroatelectosis and pneumothorax in a fighter pilot (Aéroatélectasie et pneumothorax chez un pilote de chasse).** R. Pannier, G. Legay, and A. Didier (Hôpital Militaire Dominique Larrey, Versailles, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 9, 1st Quarter, 1970, p. 32, 33. 12 refs. In French.

Interpretations of the observations made on a fighter pilot who demonstrated chest pains immediately after flight. In theory, a number of aeronautical factors are considered which might cause a pneumothorax in flight, such as lowered barometric pressure, accelerations, explosive decompression, and respiration at above-atmospheric pressures. In practice, only sudden decompression is recognized as a cause of pneumothorax. F.R.L.

**A70-35939 Safe instrumentation for physiological research in the hyperbaric environment.** R. W. Hamilton, Jr., T. D.

Langley, and V. A. Dorr (Ocean Systems, Inc., Tarrytown, N.Y.). *New York Academy of Sciences, Transactions, Series 2*, vol. 32, Apr. 1970, p. 458-470. 9 refs.

Outline of the special aspects of the environment of a hyperbaric chamber as related to instrumentation. The factors involved are pressure, isolation, atmosphere, electricity, and fire. Of particular significance is the fact that there are many interactions involved, e.g., minimum decompression time calls for breathing high oxygen concentrations, and this increases the fire hazard. F.R.L.

**A70-35940 Modeling adaptation in human semicircular canal response to rotation.** Laurence R. Young and Charles M. Oman (MIT, Cambridge, Mass.). *New York Academy of Sciences, Transactions, Series 2*, vol. 32, Apr. 1970, p. 489-494. 10 refs.

Improvement of the mathematical model for the semicircular canals by modeling the effects of short-term adaptation. The model can account for deviations from overdamped second-order response in a consistent way. It was developed to fit average response data from a number of sources, and allows a reinterpretation of the results from classical experiments on nystagmus and subjective response. The model has been checked against the data of a number of other investigators, and the results have been generally consistent, although exact values of the adaptation time constants vary over a small range. F.R.L.

**A70-35983 # Bird problems at Hong Kong airport.** J. D. Romer (Urban Services Department, Hong Kong). In: National Research Council, World Conference on Bird Hazards to Aircraft, Queen's University, Kingston, Ontario, Canada, September 2-5, 1969, Proceedings. (A70-35976 18-02) Ottawa, National Research Council, 1970, p. 77, 79-86. 6 refs.

The single runway at Hong Kong airport is built partly on a promontory which extends some 6,800 ft into Kowloon Bay. Reported bird strikes on known aircraft at this international airport between August, 1964, and December, 1968, totalled twenty-four. Actual numbers of strikes are not known but are undoubtedly greater than the numbers reported. Only a single species of bird is regarded as presenting a serious hazard to aircraft at Hong Kong airport. This is *Milvus migrans lineatus* (Gray), the black-eared Kite, numbers of which congregate (resting and flying) on and around the end of the runway promontory, mostly during winter. It is believed that these birds are attracted to the promontory partly by reason of its open nature and partly by the presence of food at the surface of the sea nearby. By means of an ecological survey it is hoped to establish whether or not the latter is a significant factor. (Author)

**A70-35990 # Methods of ecological research on airfields.** J. Hild (Bundesministerium der Verteidigung, Luftwaffe, Porz-Wahn, West Germany). In: National Research Council, World Conference on Bird Hazards to Aircraft, Queen's University, Kingston, Ontario, Canada, September 2-5, 1969, Proceedings. (A70-35976 18-02) Ottawa, National Research Council, 1970, p. 135, 137-142.

Ecological investigations are the prerequisite for special provisions for scaring birds from airfields. These investigations should cover the ornithological, animal, vegetational, ground, hydrological and climatological conditions. Qualitative and quantitative investigations of birds should be carried out by visual and radar observations; the method depends on the size and on the physiognomic state of the airfield. The general animal life is important for the appearance of birds which eat animals; in a similar way conclusions can be drawn on the appearance of some grassland and wood-birds from the vegetational state. Investigations of vegetation should follow sociological methods; moreover, they should inform about the ground/soil and hydrological conditions in the airfield. Research of relationships between weather situation/meteorological parameters and bird appearance seems important for bird movement prediction. All ecological investigations should include the surroundings, too, and the results of all investigations should be consolidated in a biotopical map. (Author)

**A70-35992 # Bird dispersal techniques and their use in Britain.** E. N. Wright (Ministry of Agriculture, Fisheries and Food Infestation Control Laboratory, Guildford, Surrey, England). In: National Research Council, World Conference on Bird Hazards to Aircraft, Queen's University, Kingston, Ontario, Canada, September 2-5, 1969, Proceedings. (A70-35976 18-02) Ottawa, National Research Council, 1970, p. 207, 209-214. 11 refs.

Evaluation of the potentials of various bird dispersal systems currently in use or under study in Britain. Techniques that interfere with the neurophysiological systems of birds are currently only in the research stage, and their applications to practical problems of bird management are largely untried. By contrast, there are now many years of research and development experience in the use of bioacoustic signals to scare birds. The RAF has adopted such a system for regular use on airfields in Britain and Europe. This system, known as Sappho, comprises a tapedeck, amplifier, and loudspeaker suitable for mounting on a vehicle. The latest version has a power output of 30 W and an overall frequency range of 500-15,000 Hz (plus or minus 3 dB). Good clearances of birds were obtained experimentally with this equipment. T.M.

**A70-35993 # Microwaves - A potential solution to the bird hazard problem in aviation.** J. A. Tanner, S. J. Davie (National Research Council, Div. of Mechanical Engineering, Ottawa, Canada), C. Romero-Sierra, and F. Villa (Queen's University, Kingston, Ontario, Canada). In: National Research Council, World Conference on Bird Hazards to Aircraft, Queen's University, Kingston, Ontario, Canada, September 2-5, 1969, Proceedings. (A70-35976 18-02) Ottawa, National Research Council, 1970, p. 215, 217-221. 8 refs. Research supported by the Canadian Wildlife Service and the Associate Committee on Bird Hazards to Aircraft; National Research Council Grant No. 2467.

Description of experiments concerned with the behavioral and electrophysiological effects of high-power microwave radiation on birds as a possible bird dispersal measure at airports. Behavioral studies concerned the determination of recognizable patterns in bird escape reactions, feeding behavior, and avoidance reactions in flight. Electrophysiological studies involved the effects of microwaves on EEG and electromyographical responses. T.M.

**A70-36076 Biocybernetics (Biologicheskaja kibernetika).** Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970. 240 p. In Russian.

#### Contents:

Certain problems of the distribution of functions between man and computer (Nekotorye voprosy raspredeleniia funktsii mezhdou chelovekom i vychislitel'noi mashinnoi). V. I. Branovitskii, A. M. Dovgiallo, and E. I. Mashbits, p. 6-15. 16 refs. (See A70-36077 18-05)

Certain analogs between the behavioral structures of biological and engineering systems (Nekotorye analogii mezhdou strukturami povedeniia biologicheskikh i tekhnicheskikh sistem). M. G. Gaaze-Rapoport and D. A. Pospelov, p. 24-30. 26 refs. (See A70-36078 18-05)

Interrelations between man and computer as an example of a human operator/automaton system (Vzaimootnosheniia cheloveka i vychislitel'noi mashiny kak primer sistemy 'chelovek-avtomat'). D. A. Pospelov, V. A. Fedin, and N. I. Chelnokov, p. 86-90. (See A70-36079 18-05)

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Transformation of continuous functions with the aid of artificial neutron networks (Preobrazovanie nepreryvnykh funktsii s pomoshch'iu iskusstvennykh neironnykh setei). P. I. Chinaev, K. A. Ivanov-Muromskii, A. D. Riabinin, G. V. Tsepkov, A. M. Shkvar, and A. I. Shevchenko, p. 186-195. 21 refs. (See A70-36081 18-05)

An algorithm governing inertia and irradiation of human vision

(Ob algoritme, lezhashchem v osnove inertsi i irradiatsii chelovecheskogo zreniia). Iu. P. Shabanov-Kushnarenko, p. 195-201. (See A70-36082 18-04)

Multichannel time marker generator for a system which assembles, transforms, and processes physiological data (Mnogokanal'nyi generator metok vremeni sistemy sbora, preobrazovaniia i obrabotki fiziologicheskoi informatsii). G. V. Tseplov, p. 227-233. 6 refs. (See A70-36083 18-05)

**A70-36077 # Certain problems of the distribution of functions between man and computer (Nekotorye voprosy raspredeleniia funktsii mezhdou chelovekom i vychislitel'noi mashinnoi).** V. I. Branovitskii, A. M. Dovgiallo, and E. I. Mashbits. In: Biocybernetics (Biologicheskaja kibernetika). (A70-36076 18-05) Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 6-15. 16 refs. In Russian.

Discussion of the main questions related to the use of computer techniques in the solution of problems involving mass utilization of computers. An analysis is made of the main functions of computer users, in order to ascertain which of these functions can be automated and to determine the minimum level of preparation which a user must possess to carry on an effective dialog with the computer. It is suggested that the teaching of the ability to solve problems on a computer be carried out in two stages - namely, the teaching of the basic principles in a relatively narrow group of problems using programmed teaching aids and simple teaching machines, and, later, teaching with a computer in a broadened input language involving a wider group of highly diversified problems. A.B.K.

**A70-36078 # Certain analogs between the behavioral structures of biological and engineering systems (Nekotorye analogii mezhdou strukturami povedeniia biologicheskikh i tekhnicheskikh sistem).** M. G. Gaaze-Rapoport and D. A. Pospelov. In: Biocybernetics (Biologicheskaja kibernetika). (A70-36076 18-05) Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 24-30. 26 refs. In Russian.

Consideration of the requirements for constructing engineering systems possessing behavioral elements of certain biological objects. A comparative phylogenetic study is made of the various behavioral structures of living organisms and engineering systems. The various stages in the development of systems realizing semiotic behavior are outlined, particular attention being given to the development of a class of discrete situation networks called gyromats. A detailed description is given of a gyromat represented in the form of a multilevel structure of a classification model and a number of special units which process the data at various levels of the model and transform the data. A.B.K.

**A70-36079 # Interrelations between man and computer as an example of a human operator/automaton system (Vzaimootnosheniia cheloveka i vychislitel'noi mashiny kak primer sistemy 'chelovek-avtomat').** D. A. Pospelov, V. A. Fedin, and N. I. Chelnokov. In: Biocybernetics (Biologicheskaja kibernetika). (A70-36076 18-05) Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 86-90. In Russian.

Study of the interrelation between a human operator at the console of a computer and the computer being operated by him. The results obtained in a study of the work of a human operator at a computer console are reviewed, noting the sources of his errors. An analysis is made of the effectiveness of replacing a programmer working at a console by a special operator who does nothing but realize ready-made programs on the computer. A.B.K.

**A70-36080 # Self-regulation of the heart (Samoregulatsiia serdtsa).** M. M. Amosov, V. A. Lishchuk, and B. L. Palets. In: Biocybernetics (Biologicheskaja kibernetika). (A70-36076 18-05)

Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 116-133. 14 refs. In Russian.

Construction of a mathematical model of self-regulation of the left ventricle. Agreement between the main dependences characterizing the pumping function of the ventricle is shown on the basis of an analysis of this model. A transfer function is obtained, and a law of self-regulation of the pumping function of the ventricle is formulated. A.B.K.

**A70-36081 # Transformation of continuous functions with the aid of artificial neuron networks (Preobrazovanie nepreryvnykh funktsii s pomoshch'iu iskusstvennykh neironnykh setei).** P. I. Chinaev, K. A. Ivanov-Muromskii, A. D. Riabinin, G. V. Tsepkov, A. M. Shkvar, and A. I. Shevchenko. In: Biocybernetics (Biologicheskai kibernetika). (A70-36076 18-05) Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 186-195. 21 refs. In Russian.

Study and analysis of electrophysiological data concerning the excitability of nerve tissue. The reaction of nerve tissue to stimuli of simple shape is described, as well as types of reactions which ensure coding of informative features of a time function. The results of simulating these reactions with the aid of artificial neuron networks are presented, as well as a number of oscillograms which confirm the resemblance between the reactions to the input signals of artificial networks and their biological prototypes. Functional schemes consisting of networks of neuron-like elements which isolate and code informative components of a time function are considered. The possibility of using such networks as devices for achieving discretization of continuous signals is noted. A.B.K.

**A70-36082 # An algorithm governing inertia and irradiation of human vision (Ob algoritme, lezhashchem v osnove inertsii i irradiatsii chelovecheskogo zreniia).** Iu. P. Shabanov-Kushnarenko. In: Biocybernetics (Biologicheskai kibernetika). (A70-36076 18-05) Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 195-201. In Russian.

Determination of the general form of an algorithm governing inertia and irradiation of human vision and satisfying Talbot's law. Talbot's law is generalized to the case of visual pictures the brightness of which varies in time arbitrarily rather than periodically. A theorem concerning the types of algorithms which satisfy the generalized Talbot's law is stated and proved. A generalized formulation of Talbot's law is obtained for the case of visual pictures which vary arbitrarily not only in time but also in the field of vision, and also for the case where the radiation varies not only with respect to brightness but also with respect to spectral composition. A.B.K.

**A70-36083 # Multichannel time marker generator for a system which assembles, transforms, and processes physiological data (Mnogokanal'nyi generator metok vremeni sistemy sbora, preobrazovaniia i obrabotki fiziologicheskoi informatsii).** G. V. Tseplov. In: Biocybernetics (Biologicheskai kibernetika). (A70-36076 18-05) Edited by N. S. Kulakovskaia. Kiev, Naukova Dumka (Kibernetika i Vychislitel'naia Tekhnika, No. 4), 1970, p. 227-233. 6 refs. In Russian.

Description of a device which makes it possible to synthesize a time network. The generator possesses seven separate channels which put out pulses of rectangular shape, the repetition rate of these pulses varying from 10 kHz to 0.01 Hz. The circuit realization is based on the use of commutator dekatrons serving as frequency dividers with a variable division factor. The device is an integral part of a biological data-measuring system and is designed for the synchronization of electronic equipment used in neurophysiological investigations. A.B.K.

**A70-36184 # Influence of optokinetic and vestibular effects on the reliability of the human operator in aircraft control systems (Vliianie optokineticheskikh i vestibuliarnykh vozdeistvii na nadezhnost' cheloveka-operatora v sistemakh upravleniia letatel'nykh apparatami).** Iu. I. Kirilenko, V. K. Filosofov, and V. S. Fomin. *Kosmicheskii Issledovaniia*, vol. 8, May-June 1970, p. 476-478. 6 refs. In Russian.

Laboratory investigation of the influence of prolonged threshold and above threshold excitations of the vestibular and visual analysors on the performance characteristics of a human operator as a link of an aircraft control system. Programmed angular positive and negative acceleration was used for excitation of the vestibular analyzor. The optokinetic analyzor was excited by means of light streaks moving across a screen at a speed of 160 streaks per minute. The obtained correlation coefficients and operator response times are tabulated. The reliability loss and restoration laws derived are found to be in excellent agreement with the physiological indices obtained from the same tests. V.P.

**A70-36210 The advantages of HUD.** *Journal of Air Traffic Control*, vol. 12, July 1970, p. 19-22.

Discussion of the advantages of head-up display (HUD) systems which transfer flight data from the conventional location on the instrument panel to a more convenient position superimposed in the pilot's forward view. Initial development work with the HUD is briefly considered. Work which is to lead to a production HUD for commercial airline application is discussed. The testing of two different combiners is described. It is pointed out that HUD can be used in all flight sequences - climb, cruise, approach, and landing - in the same manner as the flight director, in good weather and bad. G.R.

**A70-36226 Experimental evaluation of heat stress indices.** Jack E. Peterson (Michigan, University, Ann Arbor, Mich.). *American Industrial Hygiene Association Journal*, vol. 31, May-June 1970, p. 305-317. 19 refs.

Four subjects were exposed to overlapping combinations of environmental heat stress parameters. Each experiment consisted of a 45-minute ride on a bicycle ergometer set to obtain the desired metabolic rate. Measurements were made of fifteen physiological parameters near the end of each experiment. Seven indices of heat stress based on each of three sets of heat transfer coefficients were calculated from environmental parameters, and twenty-nine measures of response were calculated from physiological parameters. The stress indices were statistically and graphically correlated with each other and with the measures of response. If results on four subjects are valid for the working population, at least three of the studied stress indices are necessary to adequately evaluate the probable response of man to his thermal environment. (Author)

**A70-36227 Odor threshold levels for UDMH and NO2.** Donald W. Rumsey and Ramon P. Cesta (Pan American World Airways, Inc., Aerospace Services Div., Cape Kennedy, Fla.). *American Industrial Hygiene Association Journal*, vol. 31, May-June 1970, p. 339-342. 12 refs.

The odor threshold levels for UDMH and NO2 have been generally quoted at 6 to 14 parts per million (ppm) for UDMH and 5 ppm for NO2. The value for UDMH is twelve to twenty-eight times the threshold limit value. Seven years of field experience by personnel of this section have indicated that the actual odor thresholds are considerably below these values. Since odor threshold levels are used by safety and operating personnel at Cape Kennedy as an indication of exposure, it was considered appropriate to evaluate this field experience. On the basis of these data and the results of some controlled studies, it was concluded that the actual odor thresholds are 0.5 ppm or less for NO2 and less than 0.3 ppm for UDMH. (Author)

**A70-36228 Health surveillance of microwave hazards.** Charles H. Powell (Missouri, University, Columbia, Mo.) and Vernon E. Rose (U.S. Public Health Service, Bureau of Occupational Safety and Health, Cincinnati, Ohio). *American Industrial Hygiene Association Journal*, vol. 31, May-June 1970, p. 358-361. 6 refs.

Summary of criteria for surveillance of microwave hazards, with presentation of survey techniques utilized in state and local governments. Concurrent with the growing industrial use of electronic equipment that emits electromagnetic energy in the microwave region is the development of data on the biological effects of this form of radiant energy and the establishment of exposure criteria. Of equal importance in protecting the health of exposed persons is the evaluation, by qualified occupational health personnel, of the electronic equipment as it is used in the workplace by reliable and accepted environmental health techniques. Standardization of survey techniques is suggested, and recommendations are presented regarding future activities in establishments where persons may be potentially exposed to microwaves from ovens and other commercial and industrial sources of energy. F.R.L.

**A70-36317 Monotony and work.** D. R. Davies (Leicester, University, Leicester, England). *Science Journal*, vol. 6, Aug. 1970, p. 26-31.

Discussion of various factors affecting performance in monotonous work situations. Tasks which call for continuous concentration over long periods of time are generally not easy to carry out. Because attention is constantly focused on one or at best two sources of information the task becomes extremely monotonous. Interruptions like coffee breaks may help to prevent loss of efficiency by raising the level of arousal. The task of a radar operator is a typical example of vigilance in a monotonous situation, where signals have to be detected from a mass of noise. Studying how people behave in vigilance situations should suggest how to improve their performance. F.R.L.

**A70-36517 \* Habituation and dishabituation in the absence of a central nervous system.** Bertram Peretz (Kentucky, University, Lexington, Ky.). *Science*, vol. 169, July 24, 1970, p. 379-381. 15 refs. NIH Grant No. NB-07071; Grant No. NGR-05-002-031.

Observation of habituation and dishabituation in a semi-intact *Aplysia* preparation in which the central nervous system is removed. The amplitude of withdrawal responses in the gill decreases in proportion to the rate of water drops applied (one drop per 0.5 min to one drop per 2.5 min at 15°C). The effects of habituation last for at least 2 hours. A dishabituated response is elicited by stopping the water drops or electrically stimulating the preparation. Furthermore, the gill contains nerve cell bodies, and habituation and dishabituation appear to be properties of these peripheral neurons. (Author)

**A70-36526 Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu).** Edited by A. D. Slonim (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). Leningrad, Izdatel'stvo Nauka, 1969. 212 p. In Russian.

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Physiological adaptations and the peripheral structure of the organism's reflex responses (Fiziologicheskie adaptatsii i perifericheskaiia struktura reflektornykh otvetov organizma). A. D. Slonim (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 5-19. 61 refs. (See A70-36527 18-04)

Electromyographic investigations of the structure of the peripheral link of human thermoregulatory reflexes during repeated cooling (Elektromiograficheskie issledovaniia struktury perifericheskogo zvena termoregulatsionnykh refleksov u cheloveka pri povtornykh okhlazhdeniakh). L. A. Isaakian, R. P. Ol'nianskaia, and

G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 20-26. 17 refs. (See A70-36528 18-04)

Features of the adaptation of the organism to extreme factors in a 'machine-organism' system (Osobennosti adaptatsii organizma k ekstremal'nym faktorom v sisteme 'mashina-organizm'). E. V. Maistrakh (Leningradskii Institut Uovershenstvovaniia Vrachei, Leningrad, USSR), p. 27-34. 13 refs. (See A70-36529 18-05)

A possible approach to simulation of the human organism's thermoregulatory system (O vozmozhnom podkhode k modelirovaniu sistemy termoregulatsii organizma cheloveka). I. S. Kandror (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) and V. N. Novosel'tsev (Akademiia Nauk SSSR, Institut Avtomatiki i Telemekhaniki, Moscow, USSR), p. 35-42. 6 refs. (See A70-36530 18-05)

Estimation of thermal control variations in the process of adaptation to a high temperature of the medium (K otsenke izmenenii termoregulatsii v protsesse adaptatsii k vysokoi temperature sredy). L. Novak, L. A. Isaakian, R. P. Ol'nianskaia, and V. Ten (Československá Akademie Věd, Biofyzikální Ústav, Brno, Czechoslovakia; Akademiia Nauk SSSR, Institut Fiziologii, Moscow, USSR), p. 43-51. 11 refs. (See A70-36531 18-04)

Temperature fluctuations in the anterior hypothalamus (O kolebaniakh temperatury v perednem gipotalamuse). L. P. Dymnikova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 52-56. 11 refs. (See A70-36532 18-04)

Adaptation of the entire organism (Adaptatsii tselostnogo organizma).

Adaptive changes of gas exchange in rodents with differing ecological specialization (Adaptivnye izmeneniia gazoobmena u gryzunov s raznoi ekologicheskoi spetsializatsiei). A. I. Shcheglova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 57-69. 26 refs. (See A70-36533 18-04)

Features of temperature adaptation in certain rodents (Osobennosti temperaturnoi adaptatsii u nekotorykh gryzunov). A. I. Shcheglova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 70-77. 13 refs. (See A70-36534 18-04)

Thermal regulation in the nutria and muskrat in relation to their specialization in a semiaquatic form of life (Termoregulatsiia u nutrii i ondatry v sviazi so spetsializatsiei k poluvodnomu obrazu zhizni). A. F. Davydov (Akademiia Nauk SSSR, Institut Fiziologii, Moscow, USSR) and R. Ia. Kuz'mo (Akademiia Nauk Litovskoi SSR, Lithuanian SSR), p. 78-90. 19 refs. (See A70-36535 18-04)

Variation of the gaseous metabolism in certain passerine birds during adaptation (Ob izmenenii gazoobmena pri adaptatsii u nekotorykh vorob'inykh ptits). A. R. Makarova and E. V. Lukina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 91-97. 13 refs. (See A70-36536 18-04)

Effect of overheating on certain types of birds (Vliianie peregrevaniia na nekotorye vidy ptits). V. N. Iakubanis (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 98-104. 23 refs. (See A70-36537 18-04)

Effect of repeated exposure to high temperature on an organism (Vliianie na organizm mnogokratnykh vozdeistvii vysokoi temperatury). V. Ten (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 105-119. 41 refs. (See A70-36538 18-04)

Gas exchange and thermoregulation during repeated overheating under high-temperature conditions (Gazoobmen i termoregulatsiia pri povtornom peregrevaniu v usloviakh vysokikh temperatur). S. I. Burikhanova (Tashkentskii Gosudarstvennyi Universitet, Tashkent, Uzbek SSR), p. 120-125. 5 refs. (See A70-36539 18-04)

Physiological mechanisms of increasing heat production in animals acclimated to cold (Fiziologicheskie mekhanizmy povyseniia teploproduktcii u zhivotnykh, akklimatizirovannykh k kholodu). K. P. Ivanov and D. A. Rashevskaiia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 126-129. 10 refs. (See A70-36540 18-04)

Effect of repeated local cooling on gas exchange and electrical activity of the skeletal muscles of white rats (O vlianii povtornogo lokal'nogo okhlazhdeniia na gazoobmen i elektricheskuiu aktivnost' skeletnoi muskulatury belykh krysov). E. L. Kalacheva and Iu. A. Labas (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR),

p. 130-134. 11 refs. (See A70-36541 18-04)

Thermoregulation during muscle work in a cold environment (O termoregulatsii pri myshechnoi rabote v kholode). Iu. I. Bazhenov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 135-140. (See A70-36542 18-04)

Heat transfer during the recovery period after hypothermia in cold-adapted animals (Teploobmen v vosstanovitel'nom periode posle gipotermii u adaptirovannykh k kholodu zhivotnykh). L. K. Cherednichenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 141-151. 25 refs. (See A70-36543 18-04)

Effect of repeated cooling on heat transfer during the recovery of temperature homeostasis after hyperthermia (Vliianie povtornykh okhlazhdenii na teploobmen pri vosstanovlenii temperaturnogo gomeostazisa posle gipotermii). L. K. Cherednichenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 152-161. 22 refs. (See A70-36544 18-04)

Tissue mechanisms of adaptation (Tkanevye mekhanizmy adaptatsii).

Effect of multiple high-temperature exposures on the respiratory activity of internal organs and skeletal muscles of white rats (Vliianie mnogokratnogo vozdeistviia vysokoi temperatury na dykhatel'nuu aktivnost' vnutrennikh organov i skeletnykh myshts u belykh kryss). L. A. Isaakian, R. P. Ol'nianskaia, G. A. Trubitsyna, and V. Ten (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 162-169. 19 refs. (See A70-36545 18-04)

Respiratory activity of tissues in *Rattus norvegicus* and *Nesokia indica* rats adapted to heat and cold (Dykhatel'naia aktivnost' tkanei u belykh i plastinchatozubykh kryss, adaptirovannykh k teplu i kholodu). A. I. Shcheglova, L. A. Isaakian, and G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 170-178. 29 refs. (See A70-36546 18-04)

Characteristics of the respiratory activity of tissues in birds adapted to various ambient temperatures (Kharakteristika dykhatel'noi aktivnosti tkanei u ptits, adaptirovannykh k raznym temperaturam sredy). L. A. Isaakian, A. R. Makarova, and G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 179-185. 18 refs. (See A70-36547 18-04)

Physiological and histological study of skeletal muscles in white rats during cold adaptation (Fiziologicheskoe i gistokhimicheskoe issledovanie skeletnykh mmyshhts belykh kryss v protsesse kholodovoi adaptatsii). V. I. Deribas, G. B. Livchak, R. E. Filipchenko, and K. A. Shoshenko (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, USSR), p. 186-193. 11 refs. (See A70-36548 18-04)

Oxygen tension in skeletal muscles during the adaptation of white rats to multiple high-temperature exposures (Napriazhenie kisloroda v skeletnykh myshtsakh v protsesse adaptatsii belykh kryss k mnogokratnomu vozdeistviuu vysokoi temperatury). V. Ten (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR), p. 194-199. 18 refs. (See A70-36549 18-04)

**A70-36527 # Physiological adaptations and the peripheral structure of the organism's reflex responses (Fiziologicheskie adaptatsii i perifericheskaiia struktura reflektornykh otvetov organizma).** A. D. Slonim (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 5-19. 61 refs. In Russian.

Brief survey of current knowledge of physiological adaptation mechanisms as classified into individual, type, and population categories. The dynamics of the formation of individual adaptations, their strength, and physiological significance are analyzed. Intimate mechanisms of cold adaptation are examined, together with the structure of the thermoregulatory muscular reflex. Characteristic features are described for adaptations associated with the ambient living conditions (seasonal variations in feeding and activity). T.M.

**A70-36528 # Electromyographic investigations of the structure of the peripheral link of human thermoregulatory reflexes during repeated cooling (Elektromiograficheskie issledovaniia struk-**

**ture perifericheskogo zvena termoregulatsionnykh reflektsov u cheloveka pri povtornykh okhlazhdeniakh).** L. A. Isaakian, R. P. Ol'nianskaia, and G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 20-26. 17 refs. In Russian.

Investigation of the role played by different muscles in the conditioned and unconditioned reflex changes of the gaseous metabolism during thermal stimulation of the organism. Tests were performed with six healthy human subjects from 20 to 30 years of age under slight overall cooling and during repeated local cooling of the wrist and forearm. Respiratory gas exchange was studied with simultaneous recording of bioelectrical activity in the skeletal musculature. The results demonstrate a specific function performed by topographically differing muscles in the control of gas exchange during cooling. The muscular system is shown to be nonuniform with regard to its heat production capacity in the organism. T.M.

**A70-36529 # Features of the adaptation of the organism to extreme factors in a 'machine-organism' system (Osobennosti adaptatsii organizma k ekstremal'nym faktoram v sisteme 'mashina-organizm').** E. V. Maistrakh (Leningradskii Institut Usovsherstvovaniia Vrachei, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 27-34. 13 refs. In Russian.

Investigation of the development of adaptation to extreme stimulation in a large system consisting of automatic devices with feedback and a living organism. Experimental data are used to illustrate the principles of system programming and to demonstrate the interactions between the organism and the automatic equipment. The operation of an automatic system for inducing hypothermia is analyzed, and a digital automatic controller of physiological functions is described. T.M.

**A70-36530 # A possible approach to simulation of the human organism's thermoregulatory system (O vozmozhnom podkhode k modelirovaniu sistemy termoregulatsii organizma cheloveka).** I. S. Kandror (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR) and V. N. Novosel'tsev (Akademiia Nauk SSSR, Institut Avtomatiki i Telemekhaniki, Moscow, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 35-42. 6 refs. In Russian.

Description of a mathematical scheme for modeling the human thermoregulatory system. From the viewpoint of automatic control theory, thermal control is accomplished by a complex multiloop nonlinear system with two negative feedback loops (chemical and physical thermal regulation) and one positive (parametric) feedback loop. The transfer of information throughout the entire network entails both neuroreflex and humoral factors. T.M.

**A70-36531 # Estimation of thermal control variations in the process of adaptation to a high temperature of the medium (K otsenke izmenenii termoregulatsii v protsesse adaptatsii k vysokoi temperatury sredy).** L. Novak, L. A. Isaakian, R. P. Ol'nianskaia, and V. Ten (Československá Akademie Věd, Biofyzikální Ústav, Brno, Czechoslovakia; Akademiia Nauk SSSR, Institut Fiziologii, Moscow, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 43-51. 11 refs. In Russian.

Application of Novak's (1964, 1965, 1967) biophysical model of heat transfer from the organism in order to describe the mechanisms of adaptation to ambient temperature conditions. Measurements of heat loss by radiation, convection, and evaporation

from the skin were made for white mice subjected once daily to the influence of high temperature. The heat loss model and equations for the role of different heat transfer mechanisms demonstrate a mathematical relation between physical and physiological factors controlling heat production during thermal adaptation. T.M.

**A70-36532 # Temperature fluctuations in the anterior hypothalamus (O kolebaniakh temperatury v porednem gipotalamuse).** L. P. Dymnikova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 52-56. 11 refs.

Investigation of the relation between temperature fluctuations in the anterior hypothalamus and temperature changes of the concha auricularae in rabbits. Prolonged (3 to 5 hr) observations showed that the hypothalamus exhibits 0.1 to 0.3 deg fluctuations in temperature as the ear temperature undergoes 0.5 to 7 deg changes. A negative correlation is established between temperature fluctuations in the anterior hypothalamus and the ear. T.M.

**A70-36533 # Adaptive changes of gas exchange in rodents with differing ecological specialization (Adaptivnye izmeneniia gazoobmena u gryzunov s raznoi ekologicheskoi spetsializatsiei).** A. I. Shcheglova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 57-69. 26 refs. In Russian.

Investigation of prolonged adaptation (60 to 70 days) to different ambient temperatures in desert rodents and laboratory albino rats. During cooling (4 to 6 deg), the metabolic level fluctuated but in general remained below the initial level in desert rodents and slightly exceeded the initial level in albino rats. During adaptation to heat, the metabolism was lowered in all tested species. The results demonstrate that each of the species has a specifically different reaction pattern to ambient temperature changes. T.M.

**A70-36534 # Features of temperature adaptation in certain rodents (Osobennosti temperaturnoi adaptatsii u nekotorykh gryzunov).** A. I. Shcheglova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 70-77. 13 refs. In Russian.

Description of differences in the response of *Nesokia indica* and *Rattus norvegicus* rodent species to prolonged (60 days) effects of heat and cold. Thermal regulation becomes disturbed in *Nesokia indica* species under the influence of 4 to 6 deg cooling. This is caused by the fact that the low metabolism cannot ensure the maintenance of a constant body temperature under increasing heat loss conditions. Albino rats manage a high rate of heat production and exhibit a constant body temperature. Prolonged exposure to a heated environment causes similar behavior in both species. T.M.

**A70-36535 # Thermal regulation in the nutria and muskrat in relation to their specialization in a semiaquatic form of life (Termoregulatsiia u nutrii i ondatry v sviazi so spetsializatsiei k poluvodnomu obrazu zhizni).** A. F. Davydov (Akademiia Nauk SSSR, Institut Fiziologii, Moscow, USSR) and R. Ia. Kuz'mo (Akademiia Nauk Litovskoi SSR, Institut Zoologii i Parazitologii, Lithuanian SSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 78-90. 19 refs. In Russian.

Measurement of the oxygen consumption, blood and body temperatures, and electrical activity of the skeletal muscles in adult nutria and muskrats in both air and water environments. Ambient air

temperatures were from 20 to 22 deg C and from minus 5 to minus 7 deg C; water temperatures ranged from 20 to 21 deg C and from 1 to 0 deg C. Results show a relatively low intensity of chemical thermal regulation during cooling and a significant lowering of body and blood temperatures as a measure against increased heat loss. There are differences in the electrical activity of five skeletal muscles in the course of cooling. The spine musculature exhibits the highest rate of thermal control activity. T.M.

**A70-36536 # Variation of the gaseous metabolism in certain passerine birds during adaptation (Ob izmenenii gazoobmena pri adaptatsii u nekotorykh vorob'inykh ptits).** A. R. Makarova and E. V. Lukina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 91-97. 13 refs. In Russian.

Investigation of the adaptation of three species of birds (*carduelis*, canaries, and sparrows) to ambient temperatures of 5 to 25 C. The gaseous metabolism and the body weight and temperature were measured on the 2, 5, 10, 15, 20, 25, 30, 40, and 50th days of maintenance at these temperatures. The body weight and temperature remained practically unchanged. The gaseous metabolism in sparrows and *carduelis* differed from that of canaries during the course of adaptation. At 20 deg, the gaseous metabolism remained almost unchanged for canaries but decreased in *carduelis* and sparrows. T.M.

**A70-36537 # Effect of overheating on certain types of birds (Vliianie peregrevaniia na nekotorye vidy ptits).** V. N. Iakubian (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 98-104. 23 refs. In Russian.

Study of the effect of extreme heating on four types of aquatic birds (ducks and geese). The purpose of the study was to ascertain the special features of the occurrence of a polypnea reaction, its attainment of maximum intensity, and the disruption of this mechanism during the sublethal period as the temperature in the heating chamber is gradually increased. The body temperature (in the cloaca), the respiration rate, and the heart contraction rate were determined. It is shown that three periods with different ratios between the respiration rate, the heart contraction rate, and the body temperature level manifest themselves fairly distinctly as the overheating process progresses. The species features of the reactions of the birds to high temperatures are related to the duration of the second period of the overheating process, when the thermal polypnea mechanism functions most intensely. A.B.K.

**A70-36538 # Effect of repeated exposure to high temperature on an organism (Vliianie na organizm mnogokratnykh vozdeistvii vysokoi temperatury).** V. Ten (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 105-119. 41 refs. In Russian.

Study of the overall gas metabolism changes, the chemical thermoregulation, the body temperature, the skin temperature in various parts of the body, and the body weight during the adaptation of rats to repeated exposure to high temperature. The animals tested were exposed for three hours daily to a temperature of 35 C in electric dry-air thermostats (as against their normal ambient temperature of 19 to 22 C). A reduction in the oxygen consumption of the test animals is noted, amounting to 18 to 22.5%, depending on the individual peculiarities of the animal. An 8.6% reduction in weight from the initial level is noted on the third to fifth days. However, the adapted animals gradually recover the lost weight and by the end of the test do not differ in weight from the control group. A reduction in the intensity of chemical thermoregulation is noted during the

first days of exposure to temperature. However, the adapted animals eventually show a recovery to the initial intensity level. The body temperature of the adapted animals is 0.4 C (on the average) lower than that of the control animals, while the skin temperature settles at a different, somewhat lower level than that of the control animals.

A.B.K.

**A70-36539 # Gas exchange and thermoregulation during repeated overheating under high-temperature conditions (Gazooobmen i termoregulatsiia pri povtornom peregrevanii v usloviakh vysokikh temperatur).** S. I. Burikhanova (Tashkentskii Gosudarstvennyi Universitet, Tashkent, Uzbek SSR). In: *Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu)*. (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 120-125. 5 refs. In Russian.

Study of the effect of single and multiple overheatings on the organisms of dogs confined to an open sunny area. The air temperature on various test days ranged from 35 to 41 C. A determination was made of the body temperature, the pulse, the respiration rate and depth, the pulmonary ventilation, the oxygen consumption, the carbon dioxide liberation, and the heat production both on the day the animals were subjected to overheating and on subsequent days for a month. The presence of prolonged trace reactions after both single and repeated exposures to the sun is noted. The oxygen consumption and the heat production 15 days after the overheating reliably decreased. An adaptation to the effect of high temperature is developed gradually on the basis of the aftereffect of preceding overheatings.

A.B.K.

**A70-36540 # Physiological mechanisms of increasing heat production in animals acclimated to cold (Fiziologicheskie mekhanizmy povysheniia teploproduksii u zhivotnykh, akklimatizirovannykh k kholodu).** K. P. Ivanov and D. A. Rashevskaiia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: *Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu)*. (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 126-129. 10 refs. In Russian.

Comparative study of the gas exchange, body temperature, and electrical activity of the neck and back muscles of tested white rats kept for 35 days in a cold chamber (2 to 6 C) and control rats kept in a warm chamber (24 to 26 C). When taken from a chamber with a temperature of 27 C and put into a chamber with a temperature of 10 C, the acclimated rats showed a smaller increase in electrical activity and a smaller decrease in body temperature than the control rats. No statistically reliable differences in the degree of increase in gas exchange in these two groups of rats were noted.

A.B.K.

**A70-36541 # Effect of repeated local cooling on gas exchange and electrical activity of the skeletal muscles of white rats (O vliianii povtornogo lokal'nogo okhlazhdeniia na gazoobmen i elektricheskuiu aktivnost' skeletnoi muskulatury belykh krysi).** E. L. Kalacheva and Iu. A. Labas (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: *Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu)*. (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 130-134. 11 refs. In Russian.

Study of the adaptation of white rats to repeated local cooling of the spine, as exemplified by variations in gas exchange and electrical activity of the skeletal muscles. A method of simultaneously determining the gas exchange and electrical activity of the skeletal muscles of rodents subjected to local cooling of various parts of the skin is developed. It is found that during repeated coolings of the spines of white rats the initially observed increase in the thermoregulation tonus in response to an applied stimulus disappears while the gas exchange remains constant. These findings are regarded as the consequence of adaptation of the animals to short-term repeated coolings and as an indication of a reduction of the role of contractile thermogenesis in the process of cold adaptation.

A.B.K.

**A70-36542 # Thermoregulation during muscle work in a cold environment (O termoregulatsii pri myshechnoi rabote v kholode).** Iu. I. Bazhenov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: *Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu)*. (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 135-140. In Russian.

Study of the thermal balance of hedgehogs during muscle work under various ambient temperature conditions. The electrical activity of the muscles, the oxygen consumption, and the body temperature at rest, during muscle work, and during the recovery period after work in warm (26 to 27 C) and cold (2 to 3 C) environments were recorded. It is found that muscle work in a cold environment does not completely offset chemical thermoregulation. The overall oxygen consumption is higher during work in a cold environment than in a warm environment. Heat generation in tonic muscles is found to be of dominant importance in chemical thermoregulation (at rest), the thermoregulator role of locomotor muscles being considerably less important. During muscle work these relations are changed. During work in a cold environment an enhanced tonus is preserved even in thermoregulator muscle groups.

A.B.K.

**A70-36543 # Heat transfer during the recovery period after hypothermia in cold-adapted animals (Teploobmen v vosstanovitel'nom periode posle gipotermii u adaptirovannykh k kholodu zhivotnykh).** L. K. Cherednichenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: *Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu)*. (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 141-151. 25 refs. In Russian.

Study of the effect of prolonged (30 days) cold adaptation on the heat transfer, the 'direct' heat production, and the temperature of various parts of the bodies of white rats undergoing self-warming after being cooled to a temperature lower than that of the surrounding air. The method of direct calorimetry is employed in this study. It is shown that adaptation ensures high stability of the animals during cooling, an increase in heat generation, a decrease in the 'passive' component of heat generation, a decrease in heat transfer from the animals, and an increase in the rate of recovery of the body temperature. Continuous measurement of the temperature of various parts of the body showed that at the end of the cooling period and at the start of the recovery period the normal thermotopographic relations changed - i.e., the skin temperature of the front part of the body became the highest body temperature, while the rectal temperature became the lowest.

A.B.K.

**A70-36544 # Effect of repeated cooling on heat transfer during the recovery of temperature homeostasis after hypothermia (Vliianie povtornykh okhlazhdenii na teploobmen pri vosstanovlenii temperaturnogo gomeostazisa posle gipotermii).** L. K. Cherednichenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: *Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu)*. (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 152-161. 22 refs. In Russian.

Investigation of the effect of repeated cooling in snow on heat transfer in white rats by direct calorimetry after recovery from hypothermia. It is found that active heat production in the tissues is a major factor of the body temperature recovery in cooled rats, while the contribution of 'passive' heat is relatively low and diminishes further after repeated cooling. Faster temperature recovery rates in rats subjected to repeated cooling are linked to higher heat production rates in the tissues, enhanced by repeated cooling.

V.Z.

**A70-36545 # Effect of multiple high-temperature exposures on the respiratory activity of internal organs and skeletal muscles of white rats (Vliianie mnogokratnogo vozdeistviia vysokoi temperatury na dykhatel'nuu aktivnost' vnutrennikh organov i skeletnykh myshits)**



u belykh kryss). L. A. Isaakian, R. P. Ol'nianskaia, G. A. Trubitsyna, and V. Ten (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 162-169. 19 refs. In Russian.

Study of the effect of multiple high temperature exposures on the respiratory activity, gas metabolism, and weight of 40 white rats during prolonged experiments in adaptation to intermittent high temperature exposures. A distinct adaptive recession of gas metabolism rates is observed in the rats by the 30th to 40th day of the experiments. V.Z.

**A70-36546 # Respiratory activity of tissues in Rattus norvegicus and Nesokia indica rats adapted to heat and cold (Dykhatel'naia aktivnost' tkanei u belykh i platinchatozubykh kryss, adaptirovannykh k teplu i kholodu).** A. I. Shcheglova, L. A. Isaakian, and G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 170-178. 29 refs. In Russian.

Study of the respiratory activity of internal organs and skeletal muscles in 2 species of rats exposed to temperatures of 5 or 25 C for a long period of time. Distinct adaptive gas metabolism shifts were established in experimental rats of the *Rattus norvegicus* species while such distinct adaptive shifts were not apparent in experimental rats of the *Nesokia indica* species. V.Z.

**A70-36547 # Characteristics of the respiratory activity of tissues in birds adapted to various ambient temperatures (Kharakteristika dykhatel'noi aktivnosti tkanei u ptits, adaptirovannykh k raznym temperaturam sredy).** L. A. Isaakian, A. R. Makarova, and G. A. Trubitsyna (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 179-185. 18 refs. In Russian.

Study of adaptive changes in the respiratory gas metabolism of the liver, heart, brain, and muscles in bullfinches and pigeons exposed to temperatures of 5 or 25 C for a long period of time. The respiratory gas metabolism rates are found to be higher in the birds of both species exposed to the lower temperature, with the adaptive changes more distinct in the bullfinches than in the pigeons. V.Z.

**A70-36548 # Physiological and histological study of skeletal muscles in white rats during cold adaptation (Fiziologicheskoe i gistokhimicheskoe issledovanie skeletnykh myshits belykh kryss v protsesse kholodovoi adaptatsii).** V. I. Deribas, G. B. Livchak, R. E. Filipchenko, and K. A. Shoshenko (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 186-193. 11 refs. In Russian.

Study of changes in respiratory gas metabolism, tissue respiration rates, and esterase and succinic-dehydrogenase distribution in the skeletal muscles of white rats exposed for 60 days to a temperature of 2 C. The succinic-dehydrogenase activity of skeletal muscles was higher in experimental rats than in control rats kept at 22 C. In contrast, the esterase activity was not appreciably affected by exposure to low temperatures. It is theorized that the succinic-dehydrogenase system may be active in noncontractive thermogenesis. V.Z.

**A70-36549 # Oxygen tension in skeletal muscles during the adaptation of white rats to multiple high-temperature exposures (Napriazhenie kisloroda v skeletnykh myshitsakh v protsesse adapta-**

**tsii belykh kryss k mnogokratnomu vozdeistviu vysokoi temperatury).** V. Ten (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). In: Physiological adaptations to heat and cold (Fiziologicheskie adaptatsii k teplu i kholodu). (A70-36526 18-04) Edited by A. D. Slonim. Leningrad, Izdatel'stvo Nauka, 1969, p. 194-199. 18 refs.

Investigation of the dynamics of free oxygen tension in some skeletal muscles of white rats exposed for 3 hr daily to a temperature of 35 C for a period of 7 to 10 days. Higher pO<sub>2</sub> levels, indicating a depressed respiratory activity, are established in the skeletal muscles of exposed rats. These effects reached a maximum by the 3rd to 5th day of the experiment and were more pronounced in the musculus trapezius than in the musculus rectus femoris. V.Z.

**A70-36562 \* # Crew radiation dose from a gas-core nuclear rocket plume.** Charles C. Masser (NASA, Lewis Research Center, Cleveland, Ohio). *American Nuclear Society, Annual Meeting, 16th, Los Angeles, Calif., June 28-July 2, 1970, Paper.* 14 p. 6 refs.

Determination of the radiation dose rate to the crew of a gas-core nuclear rocket from the fission fragments located throughout the plume volume by analytical calculations. The rocket plume is generated by the products of the reactor and consists of hydrogen, uranium, and fission fragments. A total of 1.68 pounds of fission fragments are formed from the rocket that produces one million pounds of thrust at a specific impulse of 1500 sec for a propellant consumption of one million pounds. The age of the fission fragments was a function of retention time in the reactor and of location in the plume. Calculations were carried out for crew compartments - nozzle exit separation distances of 250 and 500 feet. The results are discussed and summarized. O.H.

**A70-36635 # Directional inert shift of endolymph in semicircular canals in the course of man's rotation providing the subject's movement of the head accomplished in the frontal plane (Napriavlenie inertsionnogo sdviga endolimfy v polukruzhnykh kanalakh pri vrashchenii cheloveka s dvizheniiami golovy vo frontal'noi ploskosti).** F. A. Solodovnik, L. M. Vorob'ev, and N. B. Platonov. *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaya*, May-June 1970, p. 337-347. 20 refs. In Russian.

The horizontal and vertical components of nystagmic reaction were registered in the course of man's rotation providing the movement of the subjects head is in the frontal plane. The authors carried out a theoretical analysis of the origin of Coriolis forces in semicircular canals and estimated the direction of the inert shift of the endolymph, which corresponds the direction of the nystagmic reaction. When man rotates rightward his heads movement from the left shoulder to the right one incites ampulopetal flow in the anterior semicircular canals and ampulofugal flow of endolymph in the posterior ones. The heads movement from the right shoulder to the left one causes ampulofugal flow in the anterior semicircular canals and ampulopetal flow of endolymph in the posterior ones. Rotation in the leftward direction causes an endolymph flow in an opposite direction. When the head is raised the endolymph of the horizontal semicircular canals shifts in an opposite direction of the rotation of the testing set-up and when the head is tilted the endolymph shifts in the direction of the rotation. (Author)

**A70-36636 # Electronmicroscopical investigation of the Garding-Passy melanome under the influence of a quantum generator (Elektronnomikroskopicheskoe issledovanie melanomy Garding-Passi pri vozdeistvii kvantovogo generatora).** L. A. Piruzian, V. V. Rogovin, G. V. Romanov, L. V. Mertsalova, and V. A. Dement'ev (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaya*, May-June 1970, p. 463-467. 9 refs. In Russian.

The effect of laser irradiation on the Garding-Passy melanoma ultrastructure is discussed. It was found that the zones which had not been directly illuminated contained irreversible changes. Among the organelles of a Garding-Passy melanoma cell the mitochondria appeared to be most damaged whereas the myelin structures the

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nucleus and the nucleoli as well as virus-like formations revealed no morphological changes. Strong vacuolization of the cell cytoplasm was stated. A diagram of the temperature changes in the melanome tissue relative to the distance of the epicenter of the laser lesion is shown. The lesions caused in the melanome cell under laser action are explained on the basis of the effect of the thermomechanical factor. (Author)

**A70-36639 # Reactions of the spinothalamic neurons of the posterior ventral thalamic nucleus (Reaktsii spinotalamicheskikh neuronov zadnego ventral'nogo iadra talamusa).** V. S. Kobozev (Akademii Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 192, May 11, 1970, p. 458-461. 12 refs. In Russian.

Attempt at a determination of those neurons in the posterior ventral thalamic nucleus which are responsible for the convergence of the lemniscus and spinothalamic signals. Experiments were performed on immobilized cats without narcosis. The results demonstrate the presence of two functionally different types of lemniscus neurons. These consist of (1) typical transfer neurons responding with a short latent period (2 to 5 msec) to stimulation of the dorsal columns of the spinal chord, and (2) neurons without cortical projections responding to dorsal column stimulation with a longer latent period (7 to 12 msec). It is shown that the processes occurring within the posterior ventral thalamic nucleus are under the control of the somatosensory cortex. T.M.

**A70-36640 # Role of calcium ions in the electrical and mechanical trace processes of myocardium cells (Rol' ionov kal'tsiia v sledovykh elektricheskikh i mekhanicheskikh protsessakh kletok serdechnoi myshtsy).** R. S. Orlov and E. F. Chetverikova (Akademii Nauk SSSR, Institut Ekologii Rastenii i Zhivotnykh, Sverdlovsk, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 192, May 11, 1970, p. 466-468. 9 refs. In Russian.

Experimental investigation of the trace effects of myocardial cell stimulation and contraction under conditions of normal calcium content and during reduced permeability of calcium due to manganese ions. Myocardial cells in a solution with normal calcium content show a clear interdependence of the interval between stimuli and changes in the parameters of the transmembrane action potentials. Addition of manganese ions to the solution resulted in a reduced amplitude and shortened duration of the phonic transmembrane action potentials. T.M.

**A70-36750 Ultrasonic visualization of left ventricular dynamics.** Reginald C. Eggleton, Carl Townsend, Julia Herrick (Interscience Research Institute, Champaign, Ill.), Gordon Templeton, and Jere H. Mitchell (Texas, University, Dallas, Tex.). *IEEE Transactions on Sonics and Ultrasonics*, vol. SU-17, July 1970, p. 143-153. 16 refs. PHS Grants No. HE-42144; No. HE-06296.

An ultrasonic system for visualizing the dynamics of the left ventricle has been developed that utilizes a catheter-borne array of four transducers spaced 90 deg apart in a plane normal to the axis of the catheter. The transducers (transceivers) are pulsed sequentially at the rate of 1000/sec and the data are collected over a period of about 8 sec. The cardiac cycle is arbitrarily divided into 24 equal increments or frames depicting the contour of the left ventricle at various stages during the cardiac cycle. The display phase commences upon completion of the data acquisition. Compensation for the motion of the catheter within the heart and determination of the angular orientation of the catheter tip were major problems that had to be dealt with in the development of this instrumentation. The fact that data are not acquired in the same order in which they can be displayed necessitates the use of the computer for sorting and storage of echo-ranging data. The resulting views of the inner wall of the left ventricle are proving to be useful information, which should lead to a better understanding of the dynamic events of the cardiac cycle. (Author)

**A70-36777 Peculiar visual conditions in aeronautics and astronautics (Besondere Sehverhältnisse in der Luft- und Raumfahrt).** Leonard Michael Fenning. In: Wissenschaftliche Vereinigung für Augenoptik und Optometrie, Annual Meeting, Nuremberg, West Germany, 1969, Proceedings (Wissenschaftliche Vereinigung für Augenoptik und Optometrie, Jahrestagung, Nuremberg, West Germany, 1969, Proceedings). Nuremberg, Wissenschaftliche Vereinigung für Augenoptik und Optometrie, 1969, p. 1-12. In German.

Discussion of visual phenomena and effects experienced by astronauts and pilots. Particular attention is given to optical illusions caused by linear and angular accelerations and to illusions caused by one or a combination of factors, such as a sloping portion of the runway, haze, rain, runway lights (and partial absence of these lights), length-to-width ratios of runways, limited vision, and moisture on the runway or windshield, all of which can be the cause of distance estimation errors. Illusions due to lack of oxygen are examined, together with stress effects experienced by helicopter pilots and acceleration-induced stress effects on pilots' eyes. Visual effects associated with flight at very high speeds are analyzed. V.P.

**A70-36893 \* # Circadian systems. VI - Photoperiodic time measurement in *Pectinophora gossypiella*.** Colin S. Pittendrigh, John H. Eichhorn, Dorothea H. Minis, and Victor G. Bruce (Princeton University, Princeton, N.J.). *National Academy of Sciences, Proceedings*, vol. 66, July 1970, p. 758-764. 12 refs. Contracts No. NASr-223; No. Nonr-1858(28).

Diapause (100% incidence) occurs in the moth *Pectinophora gossypiella* when it is exposed to 24-hours light/dark cycles involving 12 hours of red light (600 nm); only 2% occurs when the photoperiod is extended to 14 hours, again with 600-nm light. This wavelength fails to synchronize all the known circadian oscillations of the moth. These observations appear, therefore, to constitute positive evidence that the photoperiodic time measurement is not mediated by a circadian oscillation. However, it remains possible, even plausible, that the photoperiodic clock is a separate circadian oscillator coupled to light by a red-absorbing pigment. That possibility is testable. The nature of the clock - oscillator or not - remains open. (Author)

**A70-37093 # Skin simulants for studies of protection against intense thermal radiation.** John M. Davies (U.S. Army, Pioneering Research Laboratory, Natick, Mass.). *Review of Scientific Instruments*, vol. 41, July 1970, p. 1040-1049. 25 refs.

Demonstration that a simulant with a suitable surface and the correct thermal inertia meets the primary requirement of accepting heat at the same rate as the skin. For protected skin, a simulant with a blackened opaque surface and a certain depth is suitable. Such simulants have been made of fused silica and of an epoxy resin filled with aluminum powder. The detector was a butt-welded copper-constantan thermocouple, flattened to a thickness of 0.0015 cm, or a thermocouple of evaporated gold and bismuth films, approximately 6000 Å thick. Results with water flow simulating blood flow in the skin indicate that an inert system simulates the response of skin rather well; if some adjustment must be made for varying blood flow it can be done experimentally or by calculation. (Author)

**A70-37212 # Cortical evoked potentials in motor conditioning in man (Vyzvannye potentsialy kory golovnogo mozga cheloveka v protsesse obrazovaniia dvigatel'nykh uslovnykh svyazei).** A. A. Kirpichenko (Vitebskii Meditsinskii Institut, Vitebsk, Belorussian SSR). *Zhurnal Vysshoi Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 529-532. 11 refs. In Russian.

A study was made on 58 practically healthy subjects of evoked potentials (EP) in the occipital and central parietal areas of the cerebral cortex in the process of elaboration and extinction of motor conditioned reflexes to a photic stimulus. It has been shown that during positive conditioning the temporal characteristics are shortened, the early EP components are depressed while the late components increase. Extinction results in opposite shifts of the peak latencies of all waves and of the amplitude of late components

in combination with a depression of early components. The data obtained are discussed from the viewpoint of functional significance of EP. (Author)

**A70-37213 # Evoked potentials in the sensori-motor cortex of dogs in the course of defensive instrumental conditioning (Vyzvannye potentsialy v senzomotornoi kore sobak pri vyrabotke oboronitel'nykh instrumental'nykh reflektsov).** E. E. Dolbakian (Akademiiia Nauk SSSR, Institut Vyshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 547-553. 17 refs. In Russian.

Following the elaboration of a primary defensive instrumental reflex (escape reaction) in dogs, significant changes in the parameters of evoked potentials were recorded in the sensory and motor representations of the respective extremity. At the sensory point all the negative components, both early and late, increased, and an additional late negative oscillation appeared in three of the seven dogs. The early and late positive waves diminished. At the motor points, on the contrary, the early and late negative waves decreased. The early positive oscillation were intensified. Late positive waves in some dogs likewise increased, while in others, they decreased. The changes were observed during the whole period of investigation of a stable primary reflex (usually for three to four months). It is assumed that the sensory cortex performs an organizing function in the formation of a primary instrumental reflex. (Author)

**A70-37214 # Some implications of the anomalous excitability cycle of the visual cortex in rabbits (Nekotorye sledstviia anomal'nogo tsikla vozбудimosti zritel'noi kory krolika).** M. S. Myslobodskii (Akademiiia Nauk, SSSR, Institut Vyshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 602-611. 22 refs. In Russian.

Peculiarities of responses of the visual cortical area to a paired photic stimulus were studied in acute and chronic experiments on alert rabbits with local (electrolytic) and extensive ablations (performed by means of an encephalotome) in the rostral part of the brain-stem. The cortical responses were analysed by a summator designed on the basis of an amplitude analyser. Changes in the excitability cycle were manifested in a drastic decrease or complete suppression of the response, if the second stimulus acted on the forefront of the preceding slow negative wave (SNW), and in a decrease or complete absence of reduction of temporal SNW characteristics of the response to a test stimulus (disturbance of the 'escape' phenomenon). An assumption has been made on the possible genesis of the phenomena, and their role in the organization of paroxysmal responses of the visual cortex to a flickering light has been discussed. (Author)

**A70-37215 # The role of the callosal body in transmission of auditory information from one hemisphere to the other (O roli mozolistogo tela v peredache slukhovoii informatsii iz kory odnogo polushariia v drugoe).** V. M. Mosidze and Z. Sh. Kevanishvili (Akademiiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 619-625. 35 refs. In Russian.

It has been shown in chronic experiments on intact dogs that in the course of monaural elaboration of acoustic differentiation, temporary connections are formed and stabilized not only in the contralateral but in the ipsilateral hemisphere as well. Callosotomy results in a disturbance of the transfer of fine acoustic differentiation to the hemisphere ipsilateral to the stimulated ear. A conclusion has been drawn that adequate transmission of the monaural information to the ipsilateral hemisphere calls for integrity of the callosal body along with the non-crossing fibers and the commissures of the rhomboid, mid- and interbrain. (Author)

**A70-37216 # Relation between some higher nervous activity characteristics and myogenic tonus and the electrical activity mode of the cerebrum (O sviazi nekotorykh pokazatelei vyshei nervnoi**

**deiatel'nosti i tonusa myshts s kharakterom elektricheskoi aktivnosti golovnogo mozga).** S. Zh. Tleulin (Akademiiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma-Ata, Kazakh SSR) and M. T. Berdykhodzhin (Institut Kraevoi Patologii, Alma-Ata, Kazakh SSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 644-646. 8 refs. In Russian.

Investigation of electroencephalograms and myogenic tonus in a group of 103 healthy subjects performing assigned activities in response to visual and acoustic stimuli. Variational statistical analysis of the results suggests the existence of a certain relation between the myogenic tonus and the electrical activity of the cerebrum. V.Z.

**A70-37217 # Specific changes in a number of electro-physiological characteristics of man during disorders in the rhythmic system of conditioned motor reactions (Osobennosti izmenenii riada elektrofiziologicheskikh pokazatelei pri narushenii ritmicheskoi sistemy dvigatel'nykh uslovykh reaktsii u cheloveka).** I. S. Dobronravova (Akademiiia Nauk SSSR, Institut Vyshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 647-649. In Russian.

Investigation of changes in electroencephalograms and electro-myograms during disruptions in the rhythmic system activity of a group of 14 subjects instructed to respond with a hand operation to light signals in a total of 54 experiments involving conditioned reflexes. Specific conditions are indicated under which a conditioned stimulus produces an adequate response when a system of successive motor reactions has already been developed by the subject. V.Z.

**A70-37218 # Method of studying the latent period of a human motor reflex (K metodike issledovaniia skrytogo perioda dvigatel'nogo refleksa u cheloveka).** S. A. Perevedentseva (Kubanskii Meditsinskii Institut, Krasnodar, USSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 653, 654. In Russian.

Brief discussion of tests in which the latent period of motor reactions was studied in a group of 2354 persons instructed to press a telegraph key in response to oral command. Faster responses are obtained in the younger persons than in the older persons, especially after 60 years of age. The effectiveness of this testing technique is pointed out. V.Z.

**A70-37219 # Rheoencephalography as an integral method for recording psychic tension (Reoentsefalografiia kak integral'nyi metod registratsii psikhicheskoi napriazhennosti).** V. N. Pushkin, L. S. Nersesian, and M. I. Sinaiskii (Akademiiia Pedagogicheskikh Nauk SSSR, Institut Psikhologii; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Zheleznodorozhnoi Gigieny, Moscow, USSR). *Zhurnal Vyshei Nervnoi Deiatel'nosti*, vol. 20, May-June 1970, p. 655-658. In Russian.

Description of experiments in which a portable Arnautov rheograph in combination with an encephalograph was used for recording global rheograms of a group of 67 healthy persons during rest or mental tension in expectation of a stimulus. Changes shown by rheograms under tension are discussed. V.Z.

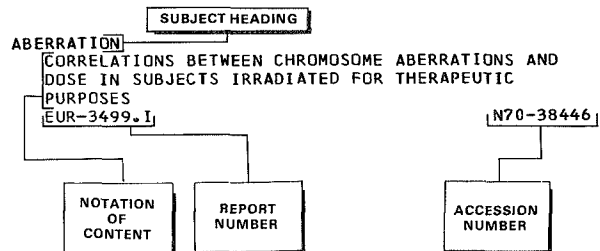
**A70-37222 Pressure-diameter relationship of the intact femoral artery in conscious man and its control by noradrenalin infusions (Die Druck-Durchmesser-Beziehung der intakten A. femoralis des wachen Menschen und ihre Beeinflussung durch Noradrenalin-Infusionen).** J. O. Arndt and G. Kober (Berlin, Freie Universität, Berlin, West Germany). *Pflügers Archiv*, vol. 318, no. 2, 1970, p. 130-146. 38 refs. In German.

Study of the pressure diameter relationship of an intact femoral artery without and during continuous infusions of noradrenalin in 12 conscious men. The experimental procedure is described, and the results are tabulated, presented graphically, and discussed. It is shown that, compared with the 'elastic' common carotid artery in men, the 'muscular' femoral artery is much stiffer, and its reaction to noradrenaline is qualitatively different. The significance of the results for the dynamics of the arterial pulse is discussed. O.H.

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AEROSPACE MEDICINE AND BIOLOGY / a continuing bibliography OCTOBER 1970

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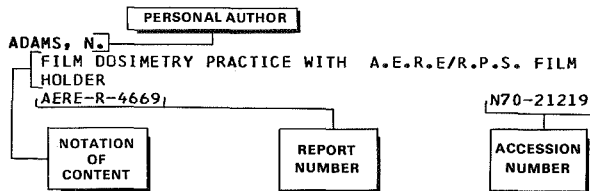
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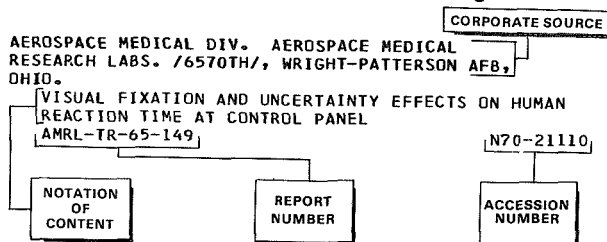
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