NASA SP-7011 (75)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (75)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. APRIL 1970

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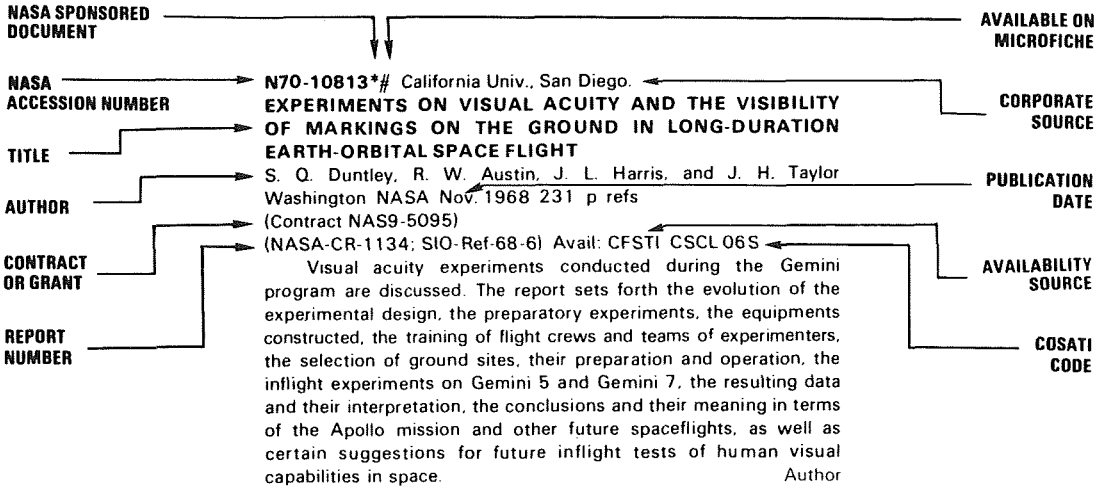

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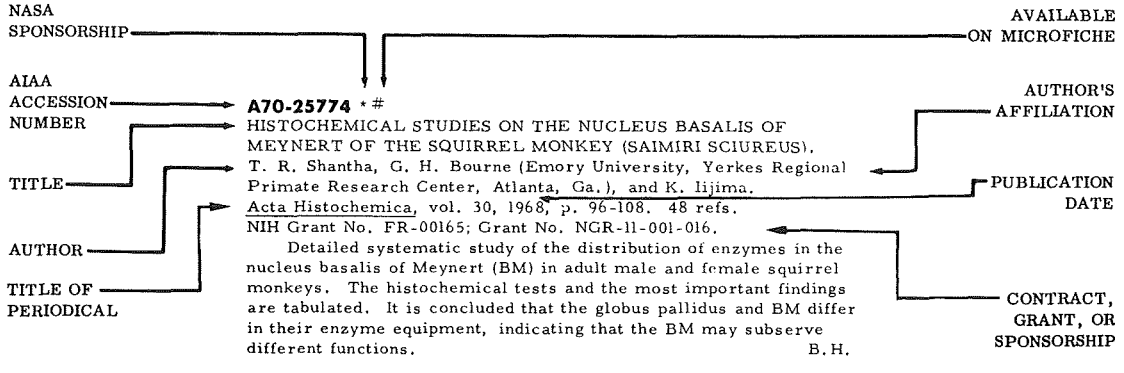

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography APRIL 1970

STAR ENTRIES

N70-15516# Colorado Univ., Denver. Medical Center.
THE EFFECT OF HYPOXIA ON THE PULMONARY MICROCIRCULATION Annual Progress Report, 1 Oct. 1968–30 Sep. 1969
Wiltz W. Wagner, Jr. 1 Oct. 1969 18 p refs
(Contract DADA17-68-C-9071)
(AD-695693; APR-2) Avail: CFSTI CSCL 6/5

A technique designed to permit direct microscopic observation via a transparent window implanted in the chest wall of dogs of the pulmonary capillaries in vivo has been developed. Cine- and photomicrographic techniques have been developed to permit high speed, high resolution study of the pulmonary microcirculation. These systems have been designed to provide information related to the following: The velocity of the erythrocytes as they cross the alveolar capillary net to determine contact time between oxygen and hemoglobin; The orientation of the erythrocytes in the capillaries to determine the intracapillary diffusion distance of molecular oxygen; The site of action of the hypoxic vasopressor response; and The quantitation of the oxyhemoglobin gradient along the microcirculation to determine (a) the boundaries of the oxygen uptake process, (b) the shape of the uptake curve, and (c) how the curve and boundaries are affected by stress, e.g. hypoxemia or exercise. Author (TAB)

N70-15545# Dunlap and Associates, Inc., Santa Monica, Calif.
ADAPTIVE TECHNIQUES IN MEASURING COMPLEX PERFORMANCE Final Report
Charles R. Kelley and Daniel J. Prosin 15 Sep. 1969 67 p refs
(Contract Nonr-4986(00))
(AD-694523) Avail: CFSTI CSCL 5/10

The problem of the measurement of the performance of operators of complex military systems is discussed. Typical Navy tasks and taxonomies for describing and classifying such tasks are reviewed. The problem of the reliability of normative vs. differential measurements is analyzed. At least five approaches are available to measure complex task performance: (1) actual operational measurements; (2) simulated tasks; (3) synthetic tasks; (4) loading tasks; and (5) psychophysiological measurements. Sensing, information processing, planning and action systems are discussed briefly. Author (TAB)

N70-15546# Dunlap and Associates, Inc., Santa Monica, Calif.
HUMAN OPERATOR MODELS FOR MANUAL CONTROL
Charles R. Kelley 1968 35 p refs
(Contract Nonr-4986(00))
(AD-694509) Avail: CFSTI CSCL 5/8

Four functions of human operator models for manual control are delineated, and criteria appropriate to models designed to better our understanding of man are developed. Five classes of models are reviewed. Criticisms of models which apply techniques of description developed in automatic control to the human operator are criticised. Models which endeavor to include the operators internal processes of prediction, planning, and adaptation appear to provide veridical representation of the human operator. Author (TAB)

N70-15552# Pennsylvania State Univ., University Park. Dept. of Zoology.
ADAPTATION TO CHRONIC HYPERBARIC OXYGEN PRESSURES Final Scientific Report, 1 May 1966–31 Sep. 1969
Rodney T. Houlihan 17 Sep. 1969 8 p refs
(Contract Nonr-656(36))
(AD-695822; FP-1-69) Avail: CFSTI CSCL 6/19

The report summarizes the research on the effects of hyperbaric medicine completed at the Pennsylvania State University. The progression of this research involved studies on renal function, blood flow, adrenocortical and sympatho-adreno-medullary (SAM) activity. The blood flow alterations indicated increased adrenocortical function. The adrenocortical function reaches its highest level just prior to death from oxygen poisoning. The excretion of catecholamine indicated an altered metabolism of epinephrine. It is noted that oxygen at high pressure results in the production of adrenochrome, adrenolutin and derivatives. These compounds are highly reactive and can account for the manifestations of oxygen toxicity. Author (TAB)

N70-15568*# Naval Aerospace Medical Inst., Pensacola, Fla.
OFF-VERTICAL ROTATION: A CONVENIENT PRECISE MEANS OF EXPOSING THE PASSIVE HUMAN SUBJECT TO A ROTATING LINEAR ACCELERATION VECTOR
Ashton Graybiel and Earl F. Miller, II 17 Oct. 1969 14 p refs
(NASA Order R-93; NASA Order T-81633)
(NASA-CR-107622; NAMI-1090) Avail: CFSTI CSCL 06S

The study of disturbances of vestibular origin comprising the clinical picture of motion sickness and resulting from exposure to a rotating linear acceleration vector was carried out with a rotating chair modified to permit tilting up to 20 deg away from the upright. While rotating at constant velocity at a given angle of tilt, the subject was thus exposed to a continual change with reference to the gravitational upright. Stepwise increases in the

level of stress were effected through automatic programming of the chair's angular velocity. Subjects were exposed until either they experienced mild motion sickness (the predetermined endpoint), or the cut-off point, a terminal velocity of 25 rpm at 10 deg tilt, was reached. Of the group of 100 healthy men, 88 reached the predetermined endpoint; all but 5 of the remainder reached it only when the angle of tilt was increased to 20 deg. Thus, the scores ranked 95 subjects in terms of their susceptibility to this unusual gravitoinertial force environment and demonstrated that 5 were highly insusceptible. The accuracy and flexibility of the method should prove it to be useful, not only as a provocative test of susceptibility to motion sickness but also a means of studying the symptomatology and underlying mechanisms. Author

N70-15632# Stanford Univ., Calif. Dept. of Computer Science.
DIALOGUES BETWEEN HUMANS AND AN ARTIFICIAL BELIEF SYSTEM
Kenneth Mark Colby and David Canfield Smith Sep. 1969 31 p refs
(Grant PHS-MH-066-45.07; Contract ARPA-SD-183)
(AD-694972; MEMO-AI-97) Avail: CFSTI CSCL 6/4

An artificial belief system capable of conducting dialogues with humans has been constructed. It intakes whatever information it receives, answers questions and establishes the credibility of the information as well as of its human source. It is currently being used to study the problem of change and resistance to change in a belief system. Author (TAB)

N70-15634*# Naval Aerospace Medical Inst., Pensacola, Fla.
ADAPTATION TO CORIOLIS ACCELERATIONS: ITS TRANSFER TO THE OPPOSITE DIRECTION OF ROTATION AS A FUNCTION OF INTERVENING ACTIVITY AT ZERO VELOCITY
James T. Reason and Ashton Graybiel 5 Aug. 1969 21 p refs
(NASA Order R-93)
(NASA-CR-107623; NAMI-1086; Rept-168) Avail: CFSTI CSCL 06S

To determine how adaptation to Coriolis accelerations, acquired through controlled head movements in a room rotating in one direction, transfers to the opposite direction as a consequence of the stimulus mode during an intervening period at zero velocity. Under one experimental condition the subjects continued to make the same head movements during this period as those used to acquire perrotational adaptation, thus evoking postrotational responses opposite in sign but similar in quality to those experienced during the initial period of rotation. Under the other condition mechanical restraints were applied to the head and torso for an equivalent period of time. Subjects who performed head motions during the intervening static period were able to adapt more rapidly to the second (opposite) direction of rotation than to the first. In addition, the intervening activity appeared to confer some immunity to motion sickness during the second direction of rotation. Postrotational effects following the second direction of rotation were less severe and of shorter duration than those experienced following the initial period of rotation. The opposite findings were obtained for those subjects who remained immobilized during the intervening period at zero velocity. Author

N70-15635*# National Aeronautics and Space Administration, Washington, D.C.
COMBINED ACTION OF CARBON MONOXIDE AND HYDROGEN SULFIDE [KOMBINIROVANNOYE DEYSTVIYE OKISI UGLERODA I SEROVODORODA]
R. K. Melnichenko Jan. 1970 6 p refs Transl. into ENGLISH from Vrachebnoe delo (Kiev), no. 7, Jul. 1968 p 87–90
(NASA-TT-F-12721) Avail: CFSTI CSCL 06C

Experiments conducted on white rats, exposed for six months to the effect of 0.3 ml/l of carbon monoxide and to the combination of 0.3 ml/l. of carbon monoxide with 0.05 ml/l. hydrogen sulfide, showed a marked toxic effect of the carbon monoxide and hydrogen sulfide combination. Data of previous acute experiments and results of this study suggested the necessity to reconsider the present hygienic standards of work in conditions of the combined effect of carbon monoxide and hydrogen sulfide. Author

N70-15645# Lockheed Missiles and Space Co., Sunnyvale, Calif.
ON THE COMPUTATION OF ARTIFICIAL GRAVITATION FOR INHABITED SPACE CRAFT COMPARTMENTS
A. M. Genin 1969 4 p refs Transl. into ENGLISH from Kosmich. Issled., (Russian), v. 7, no. 5, 1969 p 797–799
Avail: National Translations Center, John Crerar Library, Chicago, Ill. 60616

The most natural and reliable means of protecting spacecraft crews from the adverse effects of weightlessness is by rotating the spacecraft about a center of mass at a distance from the inhabited compartments. Selecting the disorientation in coordination of motor acts as the criterion, it was determined that an artificial weight equal to 0.3 earth is sufficient for unimpeded movements of astronauts within the craft and for performance of required operations. It is shown that the onset of vestibular disorientation is dependent on the radius of rotation and angular velocity of the craft. Vestibular effects can be reduced by increasing the radius of rotation. R.B.

N70-15667# Stanford Research Inst., Menlo Park, Calif. Information Sciences Lab.
PROMENADE: AN IMPROVED INTERACTIVE-GRAPHICS MAN/MACHINE SYSTEM FOR PATTERN RECOGNITION. APPENDIX 9e: THE PUTGET VIRTUAL-MEMORY FILE-HANDLING SYSTEM
Thomas Humphrey and David Hall Nov. 1968 62 p refs
(Contract F30602-67-C-0351)
(AD-694115; RADC-TR-68-572-App-9e) Avail: CFSTI CSCL 6/4

The PUTGET system performs two important functions. It allows access to the disk via FORTRAN statements without need for programmer knowledge of lower-level disk I/O software or of the actual file formatting on the disk itself. It acts as a virtual-core memory system, so that the user is not responsible for allocation of either core buffer or disk file space. Frequently used disk records are maintained in the core memory so that they are generally available at core access rates rather than disk access rates. The efficiency with which PUTGET can perform this type of operation depends somewhat on the data structure; it works best for sequential access to contiguous files. Author (TAB)

N70-15709*# Battelle-Northwest, Richland, Wash. Biology Dept.
STUDY OF EARLY NAUSEA AND VOMITING RESPONSE OF SWINE TO IONIZING RADIATION Final Technical Progress Report, 15 Sep.–12 Dec. 1969
Maurice F. Sullivan Dec. 1969 36 p refs
(Contract NAS9-9188)
(NASA-CR-102076) Avail: CFSTI CSCL 06R

Numerous reports attest to the fact that humans experience a prodromal response following exposure to ionizing radiation, either as a result of radiation-therapy treatments or as a consequence of accidental exposure. It is entirely possible that the magnitude of the doses which in some cases cause this response would be encountered during space missions, whether of an intra- or an extra-vehicular nature. Although such a response is uncomfortable and distressing in our normal environment, it could conceivably result in death in a hostile environment. While being merely temporarily incapacitating on earth, in a high performance and reliability situation such incapacitation, however temporary, might

lead to an aborted, an incompleted, or even a fatal mission. Furthermore, the consequences of the vomit reflex in a weightless environment are not yet known. It may be that the consequences of such vomiting would be longer than of a temporary nature, such that the performance of the individual might be seriously reduced or terminated altogether. Author

N70-15756*# Kansas State Univ., Manhattan. Inst. for Systems Design and Optimization.
CARBON DIOXIDE REDUCTION CONTRACTORS IN SPACE VEHICLES AND OTHER ENCLOSED STRUCTURES
T. Takahashi and L. T. Fan 20 Jan. 1969 28 p refs
(Grant NGR-17-001-034; Contract F44620-68-C-0020)
(NASA-CR-107699; AD-688240; AFOSR-69-1298TR; Rept-11) Avail: CFSTI CSCL 06K

Processes for the removal of carbon dioxide from gas mixtures have been sufficiently developed in the chemical industry. In aerospace application, however, uses of many of the techniques are restricted severely by weight, power, and volume of the process units and other characteristics of the processes. In addition the processes must be operated in the zero gravitational field. The research is an evaluation of a multistage centrifugal contactor which seems promising for use in life support systems. Author (TAB)

N70-15773# Air Force Systems Command, Wright-Patterson AFB, Ohio. Human Resources Lab.
A FUNCTIONAL MODEL OF MEMORY BASED ON PHYSIOLOGICAL AND VERBAL LEARNING DATA Technical Report Jun. – Aug. 1968
Peter J. Kincaid Jun. 1969 40 p refs
(AD-694078; AFHRL-TR-68-16) Avail: CFSTI CSCL 5/10

The report presents a functional model of memory based on verbal learning and physiological data. These diverse empirical data are used to describe several basic mechanisms of memory including: (a) separate mechanisms for short-term memory and for long-term memory; (b) the initiation of long-term memory by short-term memory; (c) the properties of short-term memory including autonomous decay, distortion by interference, and a limited capacity; (d) the properties of long-term memory including a consolidation process dependent upon ribonucleic acid (RNA) and enzymes, and a very large capacity; (e) the functional grouping of items in long-term memory; and (f) consolidated (long-term) memories that are reactivated, being brought back into short-term memory. Time courses of these events are described. The report describes how mnemonic techniques work and presents suggestions about how to improve memory training. Author (TAB)

N70-15786# Denver Univ., Colo. Dept. of Psychology.
INTEGRATION OF INFORMATION WITH STIMULI IN CONTINUOUS MOTION
Z. Joseph Ulehla and Joseph Halpern Oct. 1969 29 p refs
(Contract N00014-67-A-0394)
(AD-695406; TR-3) Avail: CFSTI CSCL 5/10

Research concerned with information integration has led to conflicting results with respect to the predictions of the integration model of the theory of signal detectability. One difference between auditory or conceptual tasks and visual involves the presence or absence of within-trial stimulus variability. The present experiment employed stimuli in motion which were non-redundant. The results were similar to those obtained with the more static, redundant visual stimuli. It was suggested that the integration model might be invalid in that it predicts integration superior to what Ss are capable of and that the frequent good fit of data to theory is an artifact based on orienting properties of the first stimulus presentation. Author (TAB)

N70-15789*+ Sandia Corp., Albuquerque, N. Mex.
CONTAMINATION CONTROL. A STATE-OF-THE-ART REVIEW
W. J. Whitfield and D. M. Garst Nov. 1968 18 p Presented at Bell System Contamination Control Symp., Allentown, Pa., 12 Nov. 1968
(NASA Order W-12324; NASA Order H-13245A)
(NASA-CR-107700; PB-182927; SC-R-69-1154) Avail: CFSTI CSCL 06Q

A review is presented of the current status of contamination control, covering, in a general fashion, the areas of systems analysis, product design, facilities and equipment, monitoring, and personnel as they are related to contamination control. Author

N70-15795*# Ohio State Univ. Research Foundation, Columbus. Dept. of Preventive Medicine.
CARDIOVASCULAR EFFECTS OF VIBRATION, PART 2 Final Report, 31 Jul. 1968 – 31 Jul. 1969
Lester B. Roberts Jul. 1969 94 p refs
(Grant NGR-36-008-041)
(NASA-CR-107626; Rept-6) Avail: CFSTI CSCL 06S

Each of two volunteer subjects was sinusoidally vibrated (unrestrained, front – back, and transversely while seated) at various intensities. Frank lead orthogonal electrocardiograms were recorded on magnetic tape during the complete test and control periods. Beat-by-beat pulse rate curves and certain vectocardiographs were also obtained from the stored recorded data. Blood pressure readings (cuff) obtained approximately 30 seconds after termination of each vibration are shown on the pulse rate curves. Inspection of the orthogonal scaler electrocardiograms considered together shows them to be generally acceptable for clinical evaluation. No evidence of extrasystoles was detected in the recordings. Changes in the subjects' electrocardiograms which occurred during vibration did not persist after vibration nor did the changes suggest undue stress or any other than normal physiological variations. There seems to be no consistent pattern of pulse rate change for either subject when vibrated. Author

N70-15797*# Pittsburgh Univ., Pa. Knowledge Availability Systems Center.
THE SPACE AND TECHNOLOGY TRANSFER PROGRAM Quarterly Report, Sep. – Nov. 1969
Allen Kent Nov. 1969 76 p
(Contract NSR-39-011-106)
(NASA-CR-107657; QR-3) Avail: CFSTI CSCL 05C

A description of the University of Pittsburgh Knowledge Availability Systems Center as a Regional Dissemination Center and its activities in the transfer of aerospace technology to the non-aerospace sector of the Nation's industry is presented. The report describes: (1) a summary of marketing activities, the net industrial income, plans and objectives, tools of marketing, and the resulting clientele, (2) the services provided and the quantitative units of service, and (3) strategy preparation for computer searches, manual searches, review of search output, impact studies, and aids to marketing. Author

N70-15867# Northwestern Univ., Evanston, Ill. Dept. of Psychology.
THE UTILIZATION OF BEHAVIORAL SCIENCE RESEARCH FOR AN APPLIED PROBLEM: THE MANAGEMENT OF CRISES Technical Report
Thomas W. Milburn 15 May 1969 49 p refs
(Contract N00014-67-A-0356)
(AD-695809; TR-2) Avail: CFSTI CSCL 5/10

The document is concerned with crises, which may be regarded as complex stressors that involve threat, decision pressure, and a need to improvise. It considers some of the stress literature relevant to the study of crises, and refers to laboratory and simulation studies. Crisis management is held to involve information (uncertainty), the selection and training of personnel, and control either for purposes of attenuation or for exploitation. Author (TAB)

N70-15895# Deutsche Versuchsanstalt fur Luft- und Raumfahrt, Hamburg (West Germany). Inst. fuer Flugmedizin.

CHANGES IN THE FACTOR STRUCTURE OF A PSYCHOMOTOR TEST BY TRAINING, DEPENDENT ON FORE AND AFT SEQUENCE OF REFERENCE TESTS [AENDERUNGEN DER FAKTORENSTRUKTUR EINES PSYCHOMOTORISCHEN TESTS DURCH UEBUNG, IN ABHAENGIGKEIT VON DER PLAZIERUNG DER BEZUGSTESTS]

Peter Buttgereit (Ph.D. Thesis—Hamburg Univ.) May 1969 91 p refs In GERMAN; ENGLISH summary
(DLR-FB-69-26; DVL-842) Avail: CFSTI

Psychomotor performance tests are described for determining the dependence of the results on additional reference tests and on the order of the tests. The analysis is based on the concept of factorization of the test variables and proceeds by matrix transformation methods. It is found that with increasing practice the factor structure is simplified and a change from cognitive factors to psychomotor factors takes place. Author (ESRO)

N70-15905# Massachusetts Inst. of Tech., Cambridge. Dept. of Psychology.

THE INFLUENCE OF OCULOMOTOR SYSTEMS ON VISUAL PERCEPTION Final Report

Whitman Richards Jul. 1969 128 p refs
(Contract F44620-67-C-0085)
(AD-694113; AFOSR-69-1934TR) Avail: CFSTI CSCL 6/16

The report summarizes work on the influence of the influence of the oculomotor systems upon perception. Two general problems were considered: saccadic suppression and size-scaling. Of particular interest is whether or not efferent or outflow mechanisms play a significant role in these perceptual phenomena. Author (TAB)

N70-16001# Joint Publications Research Service, Washington, D.C.

SPACE BIOLOGY AND MEDICINE, VOLUME 3, NO. 5

31 Dec. 1969 130 p refs Transl. into ENGLISH from Kosmich. Biol. i Med. (Moscow), v. 3, no. 5, 1969 p 1–88
(JPRS-49533) Avail: CFSTI

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3. TOLERANCE OF RATS TO ACUTELY INCREASING HYPOXIA IN A HELIUM–OXYGEN ATMOSPHERE L. A. Bryantseva et al p 21–25 refs (See N70-16004 05-04)

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6. EFFECT OF ALPHA-PARTICLES OF AN ISOTOPE SOURCE ON VIABILITY AND THE MUTATION PROCESS IN CHLORELLA L. K. Vekshina et al p 44–50 refs (See N70-16007 05-04)

7. CHARACTERISTICS OF THE EFFECT OF HIGH-ENERGY PROTONS ON BIOLOGICAL OBJECTS Yu. G. Grigoryev et al p 51–58 refs (See N70-16008 05-04)

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13. INVESTIGATION OF MICROIMPURITIES EXHALED BY MAN Yu. G. Nefedov et al p 102–110 refs (See N70-16014 05-06)

14. SELECTION OF A CRITERION FOR EVALUATING ILLUMINATION CONDITIONS IN SPACE CABINS E. S. Kotova et al p 111–117 refs (See N70-16015 05-31)

15. METHOD FOR EVACUATING A GAS-AIR MIXTURE FROM SEALED CONTAINERS WHEN CONDUCTING SANITARY-CHEMICAL INVESTIGATIONS OF SYNTHETIC MATERIALS V. D. Bartenev et al p 118–123 refs (See N70-16016 05-06)

16. DEPENDENCE BETWEEN OXYGEN CONSUMPTION AND LUNG VENTILATION IN ORTHOSTATIC TESTS A. D. Voskresenskiy et al p 124–128 (See N70-16017 05-04)

N70-16002# Joint Publications Research Service, Washington, D.C.

PHYSIOLOGIC AND HYGIENIC BASIS FOR A RATIONAL GAS MEDIUM IN SPACESHIP CABINS

N. A. Agadznanyan *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 1–14 refs (See N70-16001 05-04)
Avail: CFSTI

Physiologically substantiated data on the total pressure and partial pressure of oxygen is presented in the atmosphere of spaceship cabins used during missions of short and long duration. Animal studies have revealed a relationship between the atmospheric environment and tolerance to hypoxia. Author

N70-16003# Joint Publications Research Service, Washington, D.C.

MORPHOLOGICAL CHANGES IN PARENCHYMATOUS ORGANS UNDER THE INFLUENCE OF HIGH OXYGEN PRESSURES

S. N. Yefuni et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 15–20 refs (See N70-16001 05-04)
Avail: CFSTI

A morphological study was made of the parenchymatous organs (lungs, liver, heart, kidneys) of white rats exposed to a pure oxygen atmosphere at five excess atmospheres. The rats were kept in the environment until they displayed toxic convulsions. Many of the observed disorders were similar to all the organs; vascular

disturbances (hyperemia, stasis, diapedetic hemorrhages) and dystrophic processes (fatty infiltration, nuclear chromatolysis, focal necrosis). Well expressed tissue eosinophilia accompaned by eosinopenia was found in the peripheral blood. It is suggested that increased tissue eosinophilia represents a minifestation of cellular and tissue adaptation to oxygen toxicity. On the basis of the research data and information in the literature, it is concluded that animal susceptability to hyperbaric oxygen varies significantly in different individuals. Author

N70-16004# Joint Publications Research Service, Washington, D.C.

TOLERANCE OF RATS TO ACUTELY INCREASING HYPOXIA IN A HELIUM-OXYGEN ATMOSPHERE

L. A. Bryantseva et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 21–25 refs (See N70-16001 05-04)

Avail: CFSTI

Animal tolerance to rapidly increasing hypoxia in helium–oxygen and argon–oxygen environments was studied. An attempt was made to determine the mechanism underlying changes in altitude tolerance of animals. Experiments were carried out on 143 albino rats in a heat and pressure chamber. Animal tolerance to rapidly increasing hypoxia was increased in a helium-oxygen atmosphere at 21 C. This is associated with an increased cooling effect of a helium–oxygen mixture due to the higher thermal conductivity of helium in comparison with nitrogen. In an argon–oxygen environment the animal tolerance to rapidly increasing hypoxia remained unaffected in comparison with that in a sea level atmosphere. Author

N70-16005# Joint Publications Research Service, Washington, D.C.

MODELING OF CHANGES IN OXYGEN TENSION IN CEREBRAL TISSUES OF ANIMALS DURING HYPOXIC HYPOXIA

V. Sh. Berikashvili et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 26–34 refs (See N70-16001 05-04)

Avail: CFSTI

A brief description and the basic results of experiments are presented involving a smooth ascent of dogs to an altitude of 12,000 m followed by a rapid ascent to an altitude of 15,000 m in a decompression chamber. A mathematical model was formulated which adequately reproduces changes in oxygen tension in cerebral tissues of animals in response to variations in atmospheric oxygen content. The linear part of the model is a third order differential equation. The nonlinear part takes into account a marked change of pO2 in cerebral tissues during ascent of the animals to altitudes greater than 8,000 m. The model was used in studying pO2 variations during a rapid ascent of animals to simulated altitudes of 2,000, 4,000, 6,000, 8,000, 10,000, 14,000 and 16,000 m. The degree of correlation between components of the mathematical model and certain physiological structures in the animal body is discussed. Author

N70-16006# Joint Publications Research Service, Washington, D.C.

CHANGES IN "MOTIVATED BEHAVIOR" OF RABBITS DURING INCREASING HYPOXIA

G. P. Goyan et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 35–43 refs (See N70-16001 05-04)

Avail: CFSTI

Rabbits were exposed in a pressure chamber at different altitudes. The ascent rate was 25 m/sec. The animals exhibited a slight decrease in the self–stimulation reaction at about 2,000 m, followed by an increase at 3,000 to 4,000 m and a drastic decrease at 5,000 to 6,000 m. The pattern of variations in the reaction remained unaltered when the animals were given aminazin (chlorpromazine), although it developed at a lower level. Administration of scopolamine greatly inhibited the reaction beginning at altitudes of 3,000 to 4,000 m. Throughout the exposure to hypoxia up to an altitude of 6,000 m, the avoidance reaction was alleviated and arrested at an altitude of 7,000 m. Injection of scopolamine alleviated the reaction to a greater extent whereas an aminazin injection slightly reduced it, particularly at altitudes greater than 6,000 m. Author

N70-16007# Joint Publications Research Service, Washington, D.C.

EFFECT OF ALPHA-PARTICLES OF AN ISOTOPE SOURCE ON VIABILITY AND THE MUTATION PROCESS IN CHLORELLA

L. K. Vekshina et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 44–50 refs (See N70-16001 05-04)

Avail: CFSTI

Due to the small size of its cells, Chlorella is a suitable model for studying the effect of dense ionizing radiation on the living organism. Experiments revealed an exponential relationship between Chlorella survival and the dose of alpha-irradiation, a stimulating effect of low irradiation doses on cell division and changes in Chlorella mutability as a function of irradiation doses. Author

N70-16008# Joint Publications Research Service, Washington, D.C.

CHARACTERISTICS OF THE EFFECT OF HIGH-ENERGY PROTONS ON BIOLOGICAL OBJECTS

Yu. G. Grigoryev et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 51–58 refs (See N70-16001 05-04)

Avail: CFSTI

The results of radiobiological studies made over a period of many years using protons in the energy range 660 to 10 MeV are reviewed. Radiations of 180 keV X rays and Cp60 gamma rays were used as standards. Analysis of the data revealed that an exposure of animal organisms and microorganisms to high energy protons does not result in the appearance of essentially new qualitative radiobiological effects typical only of proton radiations. However, reactions have also been recorded in which known symptoms of radiation disease develop in different quantitative proportions. Study of the quantitative characteristics of the proton effect on biological objects has indicated that the coefficients of relative biological effectiveness of protons differ insignificantly, their energy changing by more than one order of magnitude (from 650 to 50 MeVO, amounting to 1 within this energy range. The coefficients of relative biological effectiveness increase slightly if the proton energy falls below 50 MeV. This indicates that a relative biological effectiveness coefficient of 1 can be recommended for all cases of single acute exposures of animals and humans to protons in the range 660 to 50 MeV during short term space flights; this coefficient must be taken into account when designing the shielding of space vehicles. Author

N70-16009# Joint Publications Research Service, Washington, D.C.

EFFECT OF HYPOKINESIA ON CELLULAR AND HUMORAL INDICES OF ANTIBODY FORMATION IN RATS

V. G. Galaktinov et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 59–65 refs (See N70-16001 05-04)

Avail: CFSTI

The effect of hypokinesia on antibody formation in rats was studied. The number of antibody producing cells in the spleen and hemolysin titers of test animals was dependent on exposure

time. For example, two and nine day exposures of rats prior to immunization resulted in an inhibition of antibody formation, that is, a decrease in cellular and humoral indices; a 45 day exposure improved the antibody producing function. A longer exposure (90 days) caused repeated inhibition of antibody production. Author

N70-16010# Joint Publications Research Service, Washington, D.C.
STUDY OF CHEMICAL MODIFICATION OF RADIATION DAMAGE OF PLANTS CAUSED BY EXPOSURE TO FAST NEUTRONS
D. M. Grodzinskiy et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 66–77 refs (See N70-16001 05-04)
Avail: CFSTI

Use of chemical substances made it possible to modify radiation damage in peas during irradiation of seeds by fast neutrons with a dose D37. Catalase, DNA hydrolysate, cysteine, kinetin in combination with heteroauxin and hydroxylamine were used as such substances. The protective effect of chemical substances was evaluated using a new formula which made it possible to determine the degree of recovery produced by the radioprotectors, taking into account their effect on the unirradiated organism. Author

N70-16012# Joint Publications Research Service, Washington, D.C.
DEVELOPMENT OF AUTOMATIC SYSTEMS FOR CONTINUOUS MEDICAL MONITORING IN MANNED SPACE FLIGHTS
L. M. Komarova et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 88–95 refs (See N70-16001 05-04)
Avail: CFSTI

Automatic systems for continuous medical monitoring must be introduced on manned space vehicles; the problems involved in using such systems are discussed. Selection of the parameters to be monitored, logic of diagnosing dangerous conditions, noise immunity and system reliability are discussed. A system for continuous medical monitoring developed for long term simulation experiments is described as an illustration. Author

N70-16013# Joint Publications Research Service, Washington, D.C.
PATTERN OF CHANGES OF ELECTROCARDIOGRAMS AND CARDIAC CONTRACTION PHASES DURING ORTHOSTATIC TESTS AFTER LONG-TERM HYPOKINESIA
B. A. Korolev *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 96–101 refs (See N70-16001 05-04)
Avail: CFSTI

A 70 day bedrest experiment was carried out on sixteen test subjects between the ages of 20 and 25 years. At different time intervals the subjects underwent a 15 minute orthostatic test at a 75 deg tilt. Their electrocardiograms were recorded, phases of systole of the left ventricle were determined and vector analysis of the ECG in the frontal plane was performed. The prolonged bedrest led to orthostatic intolerance of the test subjects which involved intolerance in an erect position, tachycardia, symptoms of ischemia in the subendo– and subepicardiac layers of the myocardium and a decrease in myocardial contractability. Vector analysis of the ECG demonstrated that ECG changes occurred due to a reduction of the blood supply to the myocardium, which when aggravated by altered coronary vessels, may bring about organic disturbances of the myocardium. Author

N70-16017# Joint Publications Research Service, Washington, D.C.
DEPENDENCE BETWEEN OXYGEN CONSUMPTION AND LUNG VENTILATION IN ORTHOSTATIC TESTS
A. D. Voskresenskiy et al *In its* Space Biol. and Med., Vol. 3, No. 5 31 Dec. 1969 p 124–128 (See N70-16001 05-04)
Avail: CFSTI

A statistical analysis was made of lung ventilation and gas exchange indices during orthostatic tests on 16 healthy young males before and after an 18 hour immersion in water at a temperature of 34.5 C. Thirty six experiments were run for studying orthostatic tolerance. The tests were performed using a special table which was rotated 90 deg. Exhaled air was collected in a Douglas bag at rest and during the fifth–tenth minute of orthostasis. In the statistical analysis of the results all the subjects were divided into two groups: first, individuals for whom the tolerance to tests before and after immersion was good; second, individuals for whom symptoms of orthostatic collapse were noted in one of the preceding or current experiments. Two experimental subgroups were defined in each of the groups: (a) prior to immersion and b) after IMMERSION' The 02 utilization factor, the ratio of 02 consumption (in ml/min) to the minute volume of ventilation (in liters/min), was computed as an index of lung ventilation efficiency. Regression analysis was used for evaluating the relationship between minute volume of ventilation and gas exchange indices. Author

N70-16021# Washington Univ., Seattle. Dept. of Physiology and Biophysics.
MODIFICATION AND APPLICATION OF THE BIOTHERMAL ANALOG COMPUTER ***Final Report*** **Feb. 1966–Sep. 1968**
Arthur C. Brown and David L. Johnson Jun. 1969 48 p
(*Contract* AF 33/615/-3705)
(AD-695463; AMRL-TR-69-12) Avail: CFSTI CSCL 6/19

The present report is the third in a series on the electronic analog simulation of the human temperature regulation system. The objectives of the present work were (1) to redesign the original computer circuit to improve reliability; (2) to extend the computer capability to enable simulation of response to solar (or other point source) incident heat load; (3) to compute human survival time for a subject confronted with high heat loads and high ambient humidity. The first objective was realized by substituting electronic for mechanical elements in the computer. Equations relating body heat load to incident solar radiation were developed and the simulating circuits designed and constructed to realize the second objective. The third objective, simulation of hot, humid environments, resulted in the recommendation that exposure to high temperature (45-50C) should be limited to 0.5 hours, with progressively greater exposure time permissible at lower environmental temperatures. Author (TAB)

N70-16085*# Sandia Corp., Albuquerque, N. Mex.
CONTAMINATION CONTROL TRAINING COURSE OUTLINE
K. F. Lindell and D. M. Garst Mar. 1969 22 p *refs*
(NASA Order H-13245A)
(NASA-CR-107703; PB-183453; SC-M-69-127) Avail: CFSTI CSCL 18H

The course outline considers the developing need for contamination control; the types, sources, and migration of contaminants; the methods for eliminating or controlling contaminants in liquids, gases, and on surfaces; and the means for evaluating the effectiveness of these controls. It also includes a treatment of the role of people in contamination control; how they both contribute and control contaminants. Author (USGRDR)

N70-16099# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
PHOTOPIC SPECTRAL SENSITIVITY AND CHROMATIC ADAPTATION AS REVEALED BY HUMAN FLICKER-ELECTRORETINOGRAPHY
P. Padmos and D. van Norren 1969 34 p *refs* Submitted for publication

(IZF-1969-19; TDCK-54370) Avail: CFSTI

The human ERG response to 40 Hz stimulus was measured using a synchronous detection technique. Thus it was possible to record spectral sensitivity quickly and easily. Experiments are reported to demonstrate that only the cones contributed to the total response. Adaptation to a red background of 3.7 × 10 to the 4th power troland and a blue background of 2.2 × 10 to the 4th power troland caused selective depression of spectral sensitivity. Neither green nor white adaptation altered the spectral sensitivity. The results of parallel experiments on a protanope indicated that no change in spectral sensitivity took place during exposure to intense colored backgrounds. Measurements of the influence of chromatic adaptation were also performed using a psychophysical threshold criterion for sensitivity. The results are in close agreement with the ERG data. A study of the recovery of the response after exposure to colored backgrounds indicated that the site of chromatic adaptation is not confined to the receptors' pigments. Author

N70-16128*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.

STUDY OF ANTIBODY SYNTHESIZING FUNCTION OF THE SPLEEN IN MICE IN THE EARLY POSTNATAL PERIOD [IZUCHENIYE ANTITELOSINTEZIRUYUSHCHEY FUNCTSII SELEZENOK Y MUSHEY V RANNEN POSTNATAL'NOM PERIODE]

I. N. Mayskiy et al Washington NASA Dec. 1969 4 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 67, no. 9, 1969 p 68–70

(Contract NASw-1692)

(NASA-TT-F-12777) Avail: CFSTI CSCL 06C

The antibody-synthesizing function of the spleen of A-strain mice in the early postnatal period was studied. With the method of local hemolysis in Erne agar the authors counted cells producing antibodies in the spleens of mice immunized by sheep erythrocytes on the 3rd, 7th, 10th, 14th, 30th and 90th day of life. A significant immune reaction was seen beginning with the 7th day of life. Later the authors noted an increase in the number of antibody synthesizing cells; after a month their level was practically equal to that of the adult immune animals. A definite relationship between the antigenic differentiation of the spleens, studied during former investigations, and its antibody-synthesizing function was shown. Author

N70-16163# Navy Medical Neuropsychiatric Research Unit, San Diego, Calif.

SLEEP REQUIREMENTS OF MAN-IN-THE-SEA

Paul Naitoh, R. Townsend, and M. Greenwood Aug. 1969 43 p refs

(AD-695377; NMNRU-68-22) Avail: CFSTI CSCL 6/19

Despite recent scientific and technological gains in realizing the goal of manned underwater stations, there has been a singular lack of research data on defining the sleep requirements of man-in-the-sea. Behaviorally, sleep loss and sleep disturbances produce lapses in performance and impairment of short-term memory, wither of which may endanger the mission or the life of the entire crew of an ocean floor habitat. Interpersonal difficulties may also arise as a result of undesirable personality changes caused by sleep disturbances, thereby weakening the very root of the miniature society of the ocean floor habitat. Research efforts must be spurred on to learn: (1) whether man as an aquanaut may develop new kinds of sleep requirements which differ from those of land based man, (2) whether man may also develop serious sleep disturbances, whether we can specify the optimal physical and psychological conditions for mans recuperation from fatigue by adequate sleep in the underwater habitat. TEKTITE I, a nitrogen saturation diving experiment is used to illustrate an attempt to obtain the data necessary to define sleep requirements of man-in-the-sea. Author (TAB)

N70-16166# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

PROCESSING OF TEMPORAL INFORMATION AND THE COGNITIVE THEORY OF TIME EXPERIENCE

John A. Michon 1969 28 p refs Presented at 1st Conf. of the Intern. Soc. for the Study of Time, Oberwolfach, West Ger., 30 Aug.–6 Sep. 1969 Submitted for publication

(IZF-1969-21; TDCK-54403) Avail: CFSTI

For man as an information processing system, time is one of the experiential dimensions of information, and it should be considered equivalent to other, non-temporal, aspects of this information, such as intensity, size, etc. Since as a processer man has a limited capacity there will be necessarily a trade-off between temporal and non-temporal information, which is open to quantification. Research in this area is reviewed. Most contemporary models of time evaluation incorporate a-specific pulse counter mechanisms to account for the internal clock by which time is measured subjectively. The rate of this internal clock is thought to be influenced by the information processed by the subject. In this paper an alternative formulation is defended: time evaluation is a cognitive reconstruction of contents of the interval. The latter formulation avoids the unnecessary assumtpion of the former. It explains the same phenomena equally well, while moreover it can handle various matters that offer difficulties to models stated in terms of clock mechanisms. Author

N70-16167# Joint Publications Research Office, Washington, D.C.

ECHOLOCATION DIFFERENTIATION AND CHARACTERISTICS OF RADIATED PULSES IN DOLPHINS

E. Sh. Ayrapetyants et al 19 Dec. 1969 6 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 188, no. 5, 1969 p 1197–1199

(JPRS-49479) Avail: CFSTI

An investigation of the mechanisms of spatial orientation in dolphins was performed. The results of physiological and hydroacoustic investigations of the degree of differentiation of figures and pulses radiated in the course of echo information in the Black Sea dolphins is submitted. At the same time an attempt was made to define some of the parameters of short and long range communication in these animals. Author

N70-16313# Academy of Sciences (USSR), Moscow. Inst. of Geochemistry and Analytical Chemistry.

GEOCHEMICAL ECOLOGY AND EVOLUTIONARY CHANGES IN PLANTS

V. V. Kovalskii et al *In* Israel Program for Sci. Transl., Ltd. Probl. of Geochem. 1969 p 613–627 refs (See N70-16251 05-13)

Copyright. Avail: CFSTI

Element requirements and optimum element contents in soil and their effects on plant ecology and evolutionary adaptation processes are outlined. It is shown that acquired adaptive plant properties may become permanent even under new geochemical conditions; nonadaptive plants may display endemic diseases, stunted growth, and impairment of reproductive parts and generative functions when a deficiency of chemical elements exists in the environment. Excessive presence of needed elements produces similar effects. Adapted plants can concentrate chemical elements to different extents as a result of natural selection based on physiological variability of the plants without apparent morphological changes. Habitual concentrators may form endemic varieties. It is concluded that the following adapted concentrator forms are possible: (1) physiological forms within the variety without morphological changes; and (2) morphologically changed varieties and endemic species connected with certain chemical elements. G.G.

N70-16314# Imperial Coll. of Science and Technology, London (England).
APPLIED GEOCHEMISTRY AND THE COMMUNITY
J. S. Webb *In* Israel Program for Sci. Transl., Ltd. Probl. of Geochem. 1969 p 628–639 refs (See N70-16251 05-13)
Copyright. Avail: CFSTI

The role of applied geochemistry in prospecting for metalliferous mineral deposits is now firmly established. Comprehensive regional and detailed geochemical maps could well be of special value in this connection, and examples are given showing that such maps may be produced using sampling and analytical techniques already developed for purposes of mineral exploration. Although these techniques will undoubtedly need to be modified to meet the ideal requirements of chemical-ecological studies, exploration geochemistry is today yielding such tremendous reserves of samples and data that, given the necessary coordination between the different sciences involved, they could clearly have immediate application in many agricultural, epidemiological and related investigations. Author

N70-16360# Max-Planck-Institut fur Verhaltensphysiologie, Seewiesen uber Starnberg (West Germany).
INVESTIGATIONS OF THE CIRCADIAN PERIODICITY IN MEN, WITH PARTICULAR CONSIDERATION OF THE INFLUENCE OF WEAK ALTERNATING ELECTRIC FIELDS [UNTERSUCHUNGEN ZUR CIRCADIANEN PERIODIK DES MENSCHEN MIT BESONDERER BERUECKSICHTIGUNG DES EINFLUSSES SCHWACHER ELEKTRISCHER WECHSELFELDER]
R. Wever Sep. 1969 212 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Wiss. Forsch.
(BMwF-FB-W-69-31) Avail: CFSTI

In a special underground bunker, circadian rhythms of 108 human subjects were studied under complete isolation from the environment. It is shown that these rhythms are influenced, not only by light, but especially by a 10-cps electric field in a regular manner. Apart from the periodic and other rhythm parameters, the tendency towards internal desynchronization depends on the respective environmental conditions. The significance of the results obtained are discussed with regard to a hypothesis of circadian rhythms. The practical aspects of the influence of weak electromagnetic fields on human beings are proven. Author (ESRO)

N70-16373# School of Aerospace Medicine, Brooks AFB, Tex. Medical Div.
THE PURE-TONE AIR CONDUCTION AUDIOGRAM Final Report
Vernon C. Bragg Jul. 1969 19 p refs
(AD-695850; SAM-TR-69-39; SAM-REV-4-69) Avail: CFSTI CSCL 6/5

Many U. S. Air Force Flight Surgeons, medical officers, and others concerned with the conduct of hearing conservation programs have expressed the need for a set of guidelines to be used in the interpretation of audiometric data. Although the air conduction audiogram does not provide sufficient information to allow a definitive diagnosis to be made, it usually gives an indication as to whether a hearing loss is conductive or sensorineural in origin. In addition, determination may be made from the audiogram as to what further testing should be carried out and what action may be necessary to prevent further hearing loss. A method for interpretation of audiometric data is presented. An explanation of the various audiometric contours is given, followed by a step-by-step procedure for analyzing the pure-tone audiogram. In addition, recommendations are made concerning the handling of patients whose audiograms are not within normal limits. Utilization of these procedures within a compreshensive program of hearing testing, noise control, and education is recommended wherever personnel work in hazardous noise. They should also be helpful in dealing with other types of hearing losses. Author (TAB)

N70-16398*# Indiana Univ., Bloomington. Div. of Optometry.
SOME TIME FACTORS IN STEREOPSIS
R. W. Reading and George C. S. Woo Dec. 1969 35 p refs
(Contract NAS9-8224)
(NASA-CR-102108) Avail: CFSTI CSCL 06P

The effects of monocular changes in retinal illuminance, and delay time on the threshold of stereopsis was studied in three subjects making stereoscopic judgments on an experimental apparatus which is described. Responses are discussed and summarized in tables. It is concluded that measurement of stereopsis under conditions in which the monocular retinal illuminance of the test target is altered indicate that the threshold increases as a function of the dimming of a monocular image regardless of which eye receives the less bright image. F.O.S.

N70-16399*# Naval Aerospace Medical Inst., Pensacola, Fla.
CONDUCTION VELOCITY IN NERVE EXPOSED TO A HIGH MAGNETIC FIELD
Vernon R. Reno 6 Oct. 1969 18 p refs
(NASA Order ER-19841)
(NASA-CR-107729; NAMI-1089) Avail: CFSTI CSCL 06C

Action potentials were recorded at four positions from frog sciatic nerves exposed to a constant magnetic field of 11.6 kilo-oersted. External electrodes arranged in pairs on segments of nerve oriented both parallel and perpendicular to the field permitted conduction velocity measurements to be expressed as a function of field orientation. An increase in conduction velocity was observed to be orientation dependent as was a latent period in its appearance. Possible mechanisms of action of the field are discussed in terms of current theories of impulse propagation. Author

N70-16411# Joint Publications Research Service, Washington, D.C.
METHODOLOGICAL PROBLEMS OF MODELING NEURON STRUCTURES [METODOLOGICHESKIYE VOPROSY MODELIROVANIYA NEYRONYKH STRUKTUR]
N. V. Pozin 5 Dec. 1969 18 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 8, 1969 p 85–96
(JPRS-49384) Avail: CFSTI

Problems involved in modeling information processing and control functions of the nervous system are considered. Two questions of methodology are discussed: (1) whether reality is more closely approached and information processes are more faithfully represented by continuous or discrete methods, and (2) the alternatives of approach. Should the approach be one of determinism or randomness; assuming that the organization of neuron networks of any division of the brain should be treated as deterministic, yet taking into consideration the fact that frequently the prognosis of a specific neural event or at least the parameters of this event will be a random phenomenon. D.L.G.

N70-16423*# Mississippi State Univ., State College. Dept. of Microbiology.
SOME OF THE EFFECTS OF CONCENTRATED SPENT MEDIUM ON THE ACTIVITY OF RESTING CELLS OF HYDROGENOMONAS EUTROPHA
William Scott Moody (M.S. Thesis) Jan. 1970 83 p refs
(Grant NGR-25-001-004)
(NASA-CR-107727) Avail: CFSTI CSCL 06K

Experiments were performed to determine some of the effects of concentrated spent medium on the ability of resting cells of Hydrogenomonas eutropha to utilize a hydrogen-oxygen gas mixture. Preliminary experiments showed that normal mineral salts medium, concentrated mineral salts medium, and spent medium reduced the ability of resting cells of H. eutropha to utilize a hydrogen-oxygen gas mixture. Concentrated spent medium appeared

to have no effect on the gas consumption by the organism. Concentrated spent medium was found to be nontoxic to cells of H. eutropha. It was also discovered that these cells were unable to utilize concentrated spent medium as a substrate. Other experiments showed that resting cells were affected by a change in pH. Author

N70-16476 Indiana Univ., Bloomington.
EFFECTS OF HIGH-ALTITUDE ACCLIMATIZATION ON THE PERFORMANCE OF THE ISOLATED RAT VENTRICULAR STRIP
James Joseph Mc Grath (Ph.D. Thesis) 1968 150 p
Avail: Univ. Microfilms: HC $7.00/Microfilm $3.00 Order No. 69-4779

Tissue level acclimatization to the hypoxia of high altitude was demonstrated using the isolated right ventricular strip preparation. Male, albino rats were acclimatized in a barometric chamber for 15 days. The chamber was programmed for 20 hours per day at a simulated altitude of 22,500 feet and 4 hours per day at sea level. At the end of the acclimatization period, strips of myocardium were removed from the right ventricle and immersed in a buffered Ringer's solution which was aerated with an aerobic gas mixture. The strips were stimulated electrically, and developed and resting tensions were continuously recorded. The tissue level adaptatiion investigated in these experiments is explained as an increased capacity for anaerobic glycolysis induced by chronic exposure to the hypoxia of high altitude. Evidence supporting this viewpoint is seen in the increased anoxic tolerance of the preparations in the presence of glucose as well as in the change in performance of the high-altitude preparatiions after iodacetate treatment. Dissert. Abstr.

N70-16482# Washington Univ., St. Louis, Mo. Dept. of Systems Mechanical and Aerospace Engineering.
DESIGN OF A LEARNING MACHINE AND THE STUDY OF SOME OF ITS CONVERGENCE CHARACTERISTICS
Robert Gordon Bellaire (Ph.D. Thesis) 18 Sep. 1969 148 p refs
(Contract AF-AFOSR-1422-68)
(AD-694094; AFOSR-69-2430TR) Avail: CFSTI CSCL 9/2

Whenever the dynamics and environment of a process are unknown or very complex, there is a need for learning machines capable of learning the optimal decision algorithm from experience. This dissertation proposes such a learning machine. The basic learning situation is specified by a set of six postulates and the machine MAXINE is developed to learn in this situation. MAXINE is designed to have some of the qualities of human decision making: while being able to change its mind in the face of new evidence, it is reluctant to alter firmly held opinions. The learning ability of this machine is tested by placing it in situations of varying degrees of complexity, including those which are deterministic and stochastic. Convergence of the proposed learning algorithm for the deterministic case is proved. Author (TAB)

N70-16486*# Aztec School of Languages, Inc., Maynard, Mass. Research Translation Div.
THE PARTICIPATION OF MACROPHAGES AND NEUTROPHILES OF IMMUNE MICE IN PHAGOCYTOSIS OF CELLS INFECTED BY VIRUS [U CHASTIYE MAKROFAGOV I NEYTROFILOV IMMUNNYKH MYSHEY V FAGOTSITOZE ZARAZHENNYKH VIRUSAMI KLETOK]
A. A. Kyazimova et al Washington NASA Dec. 1969 6 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 67, no. 9, 1969 p 70 - 72
(Contract NASw-1692)
(NASA-TT-F-12778) Avail: CFSTI CSCL 06C

The authors studied the participation of macrophages and neutrophiles in the cellular fragments infected by virus or vesicular stomatitis and Newcastle's disease. Macrophages and neutrophiles of the peritoneal exudate of mice were capable of seizing virus infected cellular particles. Macrophages of immune animals had an increased phagocytic activity towards the particles infected by virus which had a strictly specifical character. Author

N70-16681 Texas Univ., Austin.
THE PRESSURE DISTRIBUTION DEVELOPED WITHIN THE SKULL DURING DYNAMIC LOADING
Johnny Anthony Kopecky (Ph.D. Thesis) 1968 131 p
Avail: Univ. Microfilms: HC $6.40/Microfilm $3.00 Order No. 69-6171

An analysis is presented of the pressure distribution developed during impace within the matter contained inside the human skull. The skull is modeled as a closed, thin elastic shell filled with a homogeneous, elastic fluid. Attention is restricted to impacts having a long duration relative to the traverse time of a stress or pressure wave. For collision with both blunt and pointed objects, parameter studies demonstrate the behavior of the pressure distribution when changes are made in fluid and shell density and elastic modulus in five different shell shapes. Negative gage pressures are found to be of larger magnitude in cases of a pointed collision surface than in blunt impacts, in frontal collision models than in side-on models, in rigid shells than in shells of less rigid materials, and in denser contents than in those less dense. Author

N70-16705*# University of Southern Calif., Los Angeles. Electronic Sciences Lab.
RESEARCH ON NEW TECHNIQUES FOR THE ANALYSIS OF MANUAL CONTROL SYSTEMS Progress Report, 15 Dec. 1968 - 15 Jun. 1969
George A. Bekey, Michael J. Merritt, and Anil V. Phatak Jun. 1969 25 p refs
(Grant NGR-05-018-022)
(NASA-CR-107748; PR-8) Avail: CFSTI CSCL 05H

Continuing work in decision processes of human manual controllers, and the human neuromuscular system are reported. Amethod using multidimensional elements for modeling human decisions is described in terms of smoothing algorithms and applications. Abstracts of publications in stochastic approximation, manual adaptive control, and discrete human control models are included. F.O.S.

N70-16815 Texas Univ., Austin.
Fe-57 MOESSBAUER STUDIES OF FERRITIN AND TRANSFERRIN
James Lee Gilchrist (Ph.D. Thesis) 1968 138 p
Avail: Univ. Microfilms: HC $6.60/Microfilm $3.00 Order No. 69-6146

Ferritin and transferrin are important in human and animal metabolism. Ferritin, an iron storage protein, is composed of a protein coat which encloses an inorganic, iron containing core, the micelle. Transferrin is an iron chelating protein which, in higher animals and man, is important in the transport of iron in blood serum. Mossbauer spectroscopy offers a sensitive way to examine the chemical environment of the Fe-57 in iron containing compounds. The micelle of ferritin was the object of Mossbauer investigation. The Mossbauer spectra of ferritin and four crystalline modifications of FeOOH indicate that the Fe-57 nucleus of these compounds interacts with a magnetic field and simultaneously with an electric field gradient tensor (efg), when these compounds are below their Neel temperature. Dissert. Abstr.

N70-16820*# Honeywell, Inc., Lexington, Mass. Honeywell Radiation Center.
DESIGN OF THE ADVANCED REMOTE OCULOMETER
John Merchant and Ronald Wislon Sep. 1969 141 p refs
(Contract NAS12-531)
(NASA-CR-86309) Avail: CFSTI CSCL 06B

The oculometer measures eye direction without attachment to the subject, without causing interference to the subject, at distances up to several feet from the subject. The development of the oculometer provides a means of accurately monitoring eye fixations, and is also a possible new means of human control and eye control. With eye control, the subject performs a pointing or tracking task by eye, instead of by manual control. A design is presented of the optomechanical part of a remote oculometer intended for laboratory or simulator use, and capable of being easily developed (by careful packaging design) into a flight unit which would fit into the space normally occupied by a standard 3-inch instrument panel. Experimental work was performed to provide optical design information. Author

N70-16827 Ohio State Univ., Columbus.
STUDIES OF THE ADVERSE EFFECTS OF OXYGEN AT ATMOSPHERIC PRESSURE
Marjorie Frances Sparkman (Ph.D. Thesis) 1968 109 p
Avail: Univ. Microfilms: HC $5.40/Microfilm $3.00 Order No. 69-4977

Rats were subjected to 100 per cent oxygen at atmospheric pressure. Variables affecting the response to oxygen examined were weight of rats, adrenalectomy, oral intake of NaCl or NCl solutions, and injections of aldosterone. In addition, experimentaion included in vitro incubation of adrenal tissue as well as quantitative measurements of plasma concentrations of sodium andpotassium andhematocrit values taken from rats exposed to oxygen and to room air while drinking distilled water or 0.9 per cent NaCl solution. Dissert. Abstr.

N70-16848# Florida Univ., Gainesville. Dept. of Opthalmology.
VISUAL CELLULAR STIMULATION BY HIGH QUANTA Comprehensive Report 1967 – 1969
William W. Dawson 1969 17 p refs
(Contract AT(40-1)-3599)
(TID-25195) Avail: CFSTI

A review of previous research by other investigators led to the conclusion that X-ray responsiveness is dependent more upon configuration aspects of neuronal organization than on the presence or absence of photopigment, and its bleach product. Objectives of present research are to determine the particular retinal layers and cellular elements whose functions are altered or activated by low dose pulses of ionizing rays to account for the fact that people can see X-rays on their product. A second goal was the application of ionizing rays to the measurement of retinal scotomata. Athird goal was to test the effectiveness of physiologically equated X-ray and visual stimuli in a simple eye. It was then proposed that findings from the above objections would be incorporated into a generalized theoretical structure which would account for visual excitation by ionizing rays and would also shed knowledge on the excitability of central nervous tissue by ionizing rays using the retina as a model tissue. Progress towards these goals consisted of development of tools for identification of those retinal cells that are excited by X-rays. NSA

N70-16852# Texas Univ., Austin. Electronics Research Center.
QRS DISCRIMINATION FROM NOISY ELECTROCARDIOGRAMS
Carl A. Braun, Carl W. Van Ryswyk, and Fred B. Vogt 9 Sep. 1969 10 p refs
(Contract AF-AFOSR-766-67)
(AD-694125; AFOSR-69-2349TR) CSCL 6/16 Avail: CFSTI

It is the purpose of this paper to present an evaluation of a method of QRS discrimination by defining the accuracy in terms of variation of time error. Indication of reliability of detection may be determined by observing the number of false detections and missed beats. Time error in noisy electrocardiograms is determined by adding noise electronically to an essentially noise-free electrocardiogram which serves as reference for timing of events. The results indicate that electrical activity of the heart may be detected visually under noise-free conditions with an accuracy approximating plus or minus 1 millisecond. With the addition of excessive noise, time variance in the order of 15 milliseconds is observed. False recognitions and missed beats also occur. Author (TAB)

N70-16876*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
AVERAGE EVOKED POTENTIALS: METHODS, RESULTS, AND EVALUATIONS
Emanuel Donchin, ed. and Donald B. Lindsley, ed. (Calif. Univ., Los Angeles) Washington 1969 410 p refs Proc. of Conf. held at San Francisco, 10 – 12 Sep. 1968
(NASA-SP-191) Avail: SOD $2.00; CFSTI CSCL 06B

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13. DYNAMICS OF VERTEX EVOKED POTENTIALS: THE R-M BRAIN FUNCTION M. Clynes (Rockland State Hospital) p 363 – 374 (See N70-16889 05-04)

N70-16877*# California Univ., Los Angeles. Dept. of Psychology.
AVERAGE EVOKED POTENTIALS: ACHIEVEMENTS, FAILURES AND PROSPECTS
Donald B. Lindsley *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 1–43 refs (See N70-16876 05-04)
Avail: SOD $2.00; CFSTI CSCL 06B

Early investigations of the electrical activity of the brain and the development of electroencephalography (EEG) in Europe and the United States are briefly reviewed. It is emphasized that still little is known about the source, nature, and regulation of alpha and other spontaneous rhythms, and that careful attention should be paid to identifying the basic problems and goals in these areas as progress continues into the field of average evoked potentials (AEP) and other slow potential shifts. Important factors related to the locus, variability and components of the AEP are touched upon, as well as the possible source of the potentials (generators) and the condition that modify and control them (modulators and regulators). Finally, mention is made of the spatio-temporal distribution of potentials, the relationship between attention and AEP, specific and nonspecific sensory systems, and central and peripheral factors. A.C.R.

N70-16878*# Albert Einstein Coll. of Medicine, New York. Dept. of Neurology.
THE RELATIONSHIP OF BRAIN ACTIVITY TO SCALP RECORDINGS OF EVENT-RELATED POTENTIALS
Herbert G. Vaughan, Jr. *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 45–94 (See N70-16876 05-04)
(Grants PHS-NB-03356; PHS-MH-06723)
Avail: SOD $2.00; CFSTI CSCL 06B

Event-related potentials (ERP) are identified as the general class of potentials that display stable time relationships to a definable reference event. Five classes of ERP are treated: (1) sensory (evoked) potentials; (2) motor potentials; (3) long latency potentials related to complex psychological variables; (4) steady potential shifts; and (5) extracranial potentials. In many experimental situations, more than one class of ERP is present concurrently, and the investigator must distinguish between them in analyzing the electrophysiological correlations of specific psychological variables. Althouge characterization of specific ERP is aided by the temporal, spatial, and morphological features related to experimental handling of these variables, complete understanding of the effects of psychological manipulations or the descriptive aspects of the ERP has not yet been achieved. This discussion therefore represents a tentative treatment of the highly complex phenomena, including some approaches to defining the underlying brain processes and their psychological counterparts. A.C.R.

N70-16879*# Yale Univ., New Haven, Conn. School of Medicine.
CROSS-MODALITY COMPARISONS OF AVERAGED EVOKED POTENTIALS
W. R. Goff, Y. Matsumiya, T. Allison, and G. D. Goff *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 95–141 (See N70-16876 05-04)
(Grants PHS-MH-05286; NSF GB-5782)
Avail: SOD $2.00; CFSTI CSCL 06B

Studies of the averaged somatic-evoked response to other sensory systems were conducted, because it was felt that examination of common factors and differences between them would advance understanding of a modality. Of particular interest was identification of homologous components among modalities and differentiation between modality specific components and nonspecific components. Problems encountered in the experiments are treated in detail, including those involved with recording techniques, choice of stimulus intensity, and data analysis procedures. Use of bipolar recording is suggested, and a common nonscalp reference location is indicated. Requirements for uniformity of measurement and component nomenclature are also emphasized. The problem of sources of variability in AEP's is treated, with the conclusion that this is intimately related to contamination of scalp-recorded AEP's by extracerebral generators. On the basis of homogeneity in focus and distribution between subjects, AEP components that appear to be of cerebral neurogenic origin are designated, and electrode locations for the three modalities that are likely to record them without serious distortions are suggested. A.C.R.

N70-16880*# Northwestern Univ., Evanston, Ill. Medical School.
VERY SLOW BRAIN POTENTIALS RELATING TO EXPECTANCY: THE CNV
Jerome Cohen *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 143–198 (See N70-16876 05-04)
Avail: SOD $2.00; CFSTI CSCL 06B

Studies into the contingent negative variation (CNV) are reviewed, with emphasis on steady cortical potentials, occasionally referred to as dc shifts or very slow potential changes. Phenomena with a latency of 200 to 300 milliseconds and a duration of 0.5 second or more are included. Research reveals that CNV develops in human subjects as the electrical response of the brain to a conditional signal that an operant response is to be made after a delay. A wide variety of stimulus and response paradigms result in the CNV, even when verbal or ideational responses are made instead of overt motor acts. The CNV varies in amplitude, shape, latency, consistency, and distribution over the head in different subjects. Evidence that eye movements do not account for the CNV is conclusive, it is similar when recorded from surface or intracranial electrodes, has a different spatial distribution than the eye field; and has been reported in a subject with eye glasses when no electroocular field was present. Finally, mention is made of the generator for motor potential as another possible internal brain source for the CNV. A.C.R.

N70-16881*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
DATA ANALYSIS TECHNIQUES IN AVERAGE EVOKED POTENTIAL RESEARCH
Emanuel Donchin *In its* Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 199–236 (See N70-16876 05-04)
Avail: SOD $2.00; CFSTI CSCL 06B

The two data analysis techniques used most often in AEP research, based on direct measurement from X-Y plots, are identified as: (1) visual inspection of the AEP records to detect similarities and differences; and (2) measurement of peak-to-peak amplitudes and latencies of various evoked response components. Drawbacks inherent in using visual inspection as an analysis technique are treated, and the advantages of having the necessary information made directly available from a computer are indicated. It is further suggested that cost factors indicate that most laboratories will be equipped with general-purpose computers, in place of special-purpose averagers, in the near future, and that these will allow extremely detailed analysis of AEP data matrices. In this connection, specific problems encountered in applying statistical analysis to such matrices are reviewed and some recently proposed techniques described. A.C.R.

N70-16882*# Columbia Univ., New York. Dept. of Psychiatry.
THE SPECIFICATION OF PSYCHOLOGICAL VARIABLES IN AN AVERAGE EVOKED POTENTIAL EXPERIMENT

Samuel Sutton *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 237 - 297 (See N70-16872 05-04)
(Grants NGR-33-157; PHS-MH-14580)
Avail: SOD $2.00; CFSTI CSCL 06B

Some problems in the psychological domain of particular relevance to evoked potential experiments that have been completed or are presently in progress are outlined. The importance of obtaining data in the same set of trials for all three domains - those in the area of stimuli and physiology as well as the psychological factors - is emphasized. An example of contributions made by this approach to interpreting uncertainty experiments is given, and problems that arise in attempts to compare psychological and physiological data are treated. Additional difficulties encountered by the requirement to repeat stimuli in the averaging method are also mentioned. It is suggested that the spatial averaging which is a byproduct of scalp recording makes it highly desirable that the behavioral design of experiments be as simple as possible. Finally, the need for a more systematic approach to specifying and defining the terms and constructs involved in reporting evoked potential correlates is stressed. A.C.R.

N70-16883*# Langley Porter Neuropsychiatric Inst., San Francisco, Calif.
DIAGNOSTIC USES OF THE AVERAGE EVOKED POTENTIAL
Enoch Callaway *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 299 - 332 (See N70-16876 05-04)
(Contract Nonr-2931(00))
Avail: SOD $2.00; CFSTI CSCL 06B

The technical feasibility of diagnostic procedures based on averated evoked potential (AEP) is discussed, and it is emphasized that such methods are primarily useful in cases where verbal communication is not possible or practical. Three such situations are identified: (1) When neurological factors, such as lesions or lack of maturity, block verbal exchange, (2) When psychological factors, such as cultural difference or mendacity, interfere. (3) When the state being tested is not accessible to introspective report, and its behavioral consequences are most inexpensively tapped by evoked potential measures. Specific application of AEP methods to sensory, neurological disease, and intelligence testing is treated, as well as usefulness in psychiatric diagnosis. It is concluded that except for diagnosis of deafness in infants, AEP still remains primarily a research technique, although promise of its clinical utility is increasing steadily. A.C.R.

N70-16884*# California Univ., Los Angeles. Space Biology Lab.
DIFFERENCES BETWEEN HUMAN EVOKED POTENTIALS ELICITED BY THE SAME ACOUSTICAL STIMULI DURING LOUDNESS DISCRIMINATION TASKS AND PITCH DISCRIMINATION TASKS
Martin F. Gardiner and Donald O. Walter *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 335 - 342 (See N70-16876 05-04)
(Contracts DADA17-67-C-7124; Nonr-233(91); Grants PHS-NB-02501; PHS-G-5-T1-MH-6415)
Avail: SOD $2.00; CFSTI CSCL 06B

Results regarding waveshape changes for occipital visual evoked response (VER) are reported for situations requiring the subject to discriminate between variations in the luminance of a spot. The scalp-averaged occipital VER for nine human subjects was obtained using a computer of average transients. Visual stimuli of low intensity were used. During luminance discrimination, a reduction of the first positive wave and the appearance of a secondary negative peak were observed. Author

N70-16885*# Instituto de Neurofisiologia, Montevideo (Uraguay). Lab. de Neurofisiologia.
CHANGES OF OCCIPITAL EVOKED RESPONSE DURING LUMINANCE DISCRIMINATION IN MAN
Elio Garcia-Austt, Washington Buno, Jr., and Pablo Handler *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 343 - 348 (See N70-16876 05-04)
(Grant NIH NB-04382-05)
Avail: SOD $2.00; CFSTI CSCL 06B

Results of a statistical study to compare human auditory evoked potentials (AEP's) recorded during two tasks, each of which focussed the subjects' attention on a different property of physically similar stimuli, are reported. The stimulus intensity and stimulus pitch were presented from the same randomized presentation schedules during both studies, and with equal presentation probabilities for all four stimuli in each schedule. The most consistent differences in evoked potentials were found in experiments where both efforts were difficult; they appeared most reliably at delays of 200 to 500 msec after stimulus presentation, in the latency range preceding the motor acts used for reporting the required decisions. They could not, however, be accounted for by potentials time-locked to the response acts themselves. Furthermore, the differences appeared in data that were averaged among subjects and across sessions. It is suggested that the differences recorded during loudness discrimination tests and those recorded from the same stimuli during pitch discriminations tests may hold clues to task-related variations in late steps of underlying physiological mechanisms, by which the stimuli are evaluated and the required decisions made. Author

N70-16886*# California Univ., San Diego. Dept. of Neurosciences.
THE CNV AND THE VERTEX EVOKED POTENTIAL DURING SIGNAL DETECTION: A PRELIMINARY REPORT
Steven A. Hillyard *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 349 - 353 (See N70-16876 05-04)
Avail: SOD $2.00; CFSTI CSCL 06B

Signal detection procedures were used to show that trial-to-trial fluctuations in contingent negative variation (CNV) amplitude are correlated with the correctness of observer's responses and therefore, with his sensitivity. Computer-averaged CNV's and evoked potentials were plotted from 10 trials of four possible types for each observer. The averaged CNV amplitude was larger on those trials where signals were detected correctly (yes/signal) than when the signals were missed (no/signal). The waveshape of the CNV following the signal also depended upon the stimulus-response outcome. An electrophysiological correlate of signal detection, more striking than the CNV, was a long-latency positive wave (labelled P300) in the potential evoked at the vertex by the signal. The findings support the contention that CNV's can appear during purely sensory tasks, as well as in preparation for motor activity. It is emphasized that the results are preliminary, and further study into the CNV and P300 behavior phenomena is recommended. A.C.R.

N70-16887*# California Univ., Los Angeles. Dept. of Psychiatry.
A NOTE ON THE AEP OF AUTISTIC CHILDREN RECORDED DURING SLEEP
Edward M. Ornitz *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 355 - 356 (See N70-16876 05-04)
Avail: SOD $2.00; CFSTI CSCL 06B

Average auditory-evoked responses (AER's) were measured at the vertex in age-matched groups of normal and autistic children during Stage 2 and REM sleep and during the ocular quiescent phase and eye-movement burst phase of REM sleep. Results of the

study suggested that the perceptual inconstancy or variability found in schizophrenia may be related to defective inhibitory mechanisms, possibly involving central vestibular function. Other indications of the validity of the conclusion are currently being sought. A.C.R.

N70-16888*# Rockland State Hospital, Orangeburg, N.Y. Research Center.

AN EXAMINATION OF EVOKED POTENTIALS AS INDICATORS OF INFORMATION PROCESSING IN NORMAL AND SCHIZOPHRENIC SUBJECTS

Kenneth Lifshitz *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 357-362 (See N70-16876 05-04)

(Grants PHS-MH-07292; PHS-FR-05561; PHS-FR-00268; PHS-MH-14934)

Avail: SOD $2.00; CFSTI CSCL 06B

Studies were conducted on schizophrenic and control subjects in an attempt to identify those characteristics representing the individual informational elements from the evoked potentials to stimuli containing multiple elements. It was felt that isolation of these characteristics might give insight into the nature of brain information processing and, additionally, identify processing abnormalities. Preliminary results are given, and a brief evaluation of the findings in relation to previous research is included. A.C.R.

N70-16889*# Rockland State Hospital, Orangeburg, N.Y. Research Center.

DYNAMICS OF VERTEX EVOKED POTENTIALS: THE RM BRAIN FUNCTION

Manfred Clynes *In* NASA. Ames Res. Center Average Evoked Potentials: Methods, Results, and Evaluations 1969 p 363-374 (See N70-16876 05-04)

Avail: SOD $2.00; CFSTI CSCL 06B

The dynamics of vertex evoked potentials were studied with primary emphasis on testing the ability of the central nervous system to differentiate between states of sensory rest and motion. Evidence is provided that the nonspecific, vertex evoked potentials function in a manner based on rein control which allows the organism to distinguish between a state of motion and one of rest for various sensory variables. This response occurs predominantly when a sensory variable leaves the state of rest and enters the state of motion; this is defined as the rest-motion (R-M) function. Once in the state of motion, further changes within this state do not generally elicit another R-M reaction. The R-M function is non-linear and may be represented dynamically by two unidirectiona rate-sensitive channels added in a full wave rectification manner, followed by a low level saturating element that triggers the response through another differentiation and rectification. Author

N70-16906*# National Aeronautics and Space Administration, John F. Kennedy Space Center, Cocoa Beach, Fla.

APOLLO 10 WATER SERVICING, 22 OCTOBER 1968-17 MAY 1969

A. P. Buck, P. LaTorre, V. E. Christensen, and E. Wright 17 Nov. 1969 112 p Prepared by TWA

(NASA-TM-X-64055; GP-785) Avail: CFSTI CSCL 06K

Complete documentation is presented on the chemical, microbiological, and particulate analyses of the Apollo 10 water systems. These water servicing analyses included the verification of facility demineralized water, ground support equipment water units, lunar module, command module spacecrafts, portable life support system, liquid cooling garment, suit wick wetting units, and sterilization of water dispensers. Author

N70-16937*# Brookhaven National Lab., Upton, N.Y. Biology Dept.

RADIOBIOLOGICAL STUDIES OF PLANTS ORBITED IN BIOSATELLITE 2

L. A. Schairer, A. H. Sparrow, and K. M. Marimuthu [1969] 10 p refs Presented at the Space Biol. Session of Working Group 5 of the COSPAR Meeting in Prague, 11-24 May 1969; Sponsored in part by AEC

(NASA Order R-104-7)

(NASA-CR-107799; BNL-13623; CONF-690516-1) Avail: CFSTI CSCL 06R

The Biosatellite II Tradescantia experiment probed the effects of the space environment on spontaneous and radiation-induced mutation rates and on cytological changes in Tradescantia clone 02. Analysis of data on somatic mutation, cell size, and chromosome aberrations endpoints showed no significant differences between flight and nonflight samples. However, pollen abortion frequency of micronuclei in pollen, and loss of reproductive integrity (stamen

George Zuidema, A. M. Kontaratos, and D. B. Hoffman *In its* Proc. of the Winter Study on Uses of Manned Space-Flight, 1975-1985 1969 p 111-162 refs (See N70-17026 06-34)

Avail: CFSTI

The roles of man in the life-sciences aspect of space flight are categorized as active and passive. The passive role includes medical measurements during prolonged space flight, and task performance measurements. A chart summarizing the effects of environmental factors on performance parameters is included. The active role is considered to consist of areas of discipline oriented activity, which are: (1) aerospace medicine, (2) biotechnology, (3) space biology, (4) exobiology, and (5) back-contamination containment and quarantine. It is concluded that physiological or performance degradation can be avoided through the use of preventive medical measures. F.O.S.

N70-16963# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany).

BINAURAL HEARING IN AERONAUTICAL APPLICATION

Hans J. Zetzmann *In* AGARD Aeromed. Aspects of Radio Commun. and Flight Safety Dec. 1969 10 p refs (See N70-16962 06-07)

Avail: CFSTI

Partial results of a running experiment are described which determine values of binaural delay, amplitude disparity and of reverberation required to produce an optimum perception of sound direction in the practical situation of headset reception by the pilot in the cockpit or at the air traffic controller's desk. The different influences are studied with a special test setup of microphones and loudspeakers in an anechoic chamber in order to find out the principles for optimum efficiency in directional hearing and to give reference data for electrical circuitry which allows to separate three different information channels reaching the listener simultaneously, that is to give the best gain in intelligibility. When correctly engineered, this circuitry provides a significant progress towards a better adaptation of equipment to man and is to facilitate many informational tasks in the aeronautical field and elsewhere. Author

N70-16967# Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).

THE EFFECTS OF EAR DEFENDERS ON SPEECH PERCEPTION IN MILITARY TRANSPORT AIRCRAFT

G. Froehlich *In* AGARD Aeromed. Aspects of Radio Commun. and Flight Safety Dec. 1969 6 p (See N70-16962 06-07)

Avail: CFSTI

During aeromedical evacuation in noisy military transport aircraft, the necessary speech communication has to be guaranteed. To provide the best noise protection and speech communication, the following study has been carried out. 25 normal hearing subjects were submitted under a 104 dB aircraft noise to German

double-digits with average speech levels of 93, 88 and 83 dB. The highest articulation scores and smallest standard deviations were obtained with Willson earmuffs, followed by wearing no defenders and the full filter earplug Com-Fit. By far the lowest scores had the low pass filter earplug Selectone K. The more unfavorable the ratios noise-speech, the more marked were the differences of mean scores. These results were supported by the assessment of the test subjects in terms of noise attenuation, discomfort and speech perception. The same results were obtained under the cabin noise of the reciprocating engine cargo aircraft Noratlas. A group of senior pilots with a marked high-tone hearing loss above 2000 cps under the same test conditions had much lower articulation scores especially with the more unfavorable noise to speech ratios. The reasons are discussed. Author

N70-16970# Naval Aerospace Medical Inst., Pensacola, Fla.
IN-FLIGHT MANIKIN RECORDINGS FOR EVALUATING THE EFFICIENCY OF FLIGHT HELMETS AND RADIO COMMUNICATION SYSTEMS
Carl E. Williams, John R. Forstall, and James W. Greene In AGARD Aeromed. Aspects of Radio Commun. and Flight Safety Dec. 1969 11 p refs (See N70-16962 06-07)
Avail: CFSTI

An exploratory study has been conducted to determine the feasibility of obtaining and using in-flight manikin recordings to evaluate flight helmets with respect to both noise attenuation and speech intelligibility. Intelligibility test materials were transmitted to six air-borne subjects and a manikin as each was fitted with different flight helmets. Similar test materials were presented to the same six subjects in a simulated flight situation. Recordings obtained via the air-borne manikin were subsequently played back in the laboratory. Comparison of listener scores obtained in the three test situations revealed that scores obtained for the manikin recordings approximated those obtained during the in-flight tests; relative differences between three helmets for the two test situations were very similar. Standard deviations calculated from listener scores obtained for the three test situations revealed less variance for the manikin recordings. In-flight manikin recordings may provide valuable information for evaluating flight helmets and radio communication systems. Author

N70-16978# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
THE USE OF PSYCHOLOGICAL LEARNING THEORY MODELS IN THE DESIGN OF ADAPTIVE SYSTEMS
K. S. Narendra and I. J. Shapiro Aug. 1969 17 p refs Presented at the 1969 Systems Sci. and Cybernetics Conf., Philadelphia, 22 - 24 Oct. 1969
(Grant NSF GK-11097)
(CT-30) Avail: CFSTI

Optimal parameter value determination for control systems with multimodal performance criteria was suggested. This method which is based on the theory of finite-state automata is discussed in terms of method implications in the dual context of learning models in mathematical psychology. Author

N70-16982# Purdue Univ., Lafayette, Ind. School of Electrical Engineering.
LEARNING CONTROL SYSTEMS: REVIEW AND OUTLOOK
King-Sun Fu Oct. 1969 59 p refs
(Grants AF-AFOSR-1776-69; NSF GK-1970)
(AD-696601; TR-EE-69-41; AFOSR-69-2851TR) Avail: CFSTI CSCL 9/2

The basic concept of learning control is introduced, and the following five learning schemes are briefly reviewed: (1) trainable controllers using pattern classifiers, (2) reinforcement learning control systems, (3) Bayesian estimation, (4) stochastic approximation, and (5) stochastic automata models. Potential applications and problems for further research in learning control are outlined. Theoretically, the algorithms have similar learning properties but, from an engineering viewpoint, the a priori information required and the computation involved are different for the different techniques. Author (TAB)

N70-17004# Purdue Research Foundation, Lafayette, Ind.
SPEECH ANALYSIS Final Report, 1 Jan. 1965 - 31 Jul. 1969
Arthur S. House and George W. Hughes 31 Aug. 1969 68 p refs
(Contract AF 19(628)-5051)
(AD-696599; AFCRL-69-0371) Avail: CFSTI CSCL 17/2

As a general aim the research sought to advance the understanding of the processes of speech perception and speech production. In particular, the report outlines work on speech alternated and switched between the ears; the development and evaluation of a masking noise with speech-envelope characteristics; the estimation of fundamental frequency by harmonic identification; the identification of utterance-final stop consonants from spectrographic displays; and vowel-formant shifts associated with the tense-nontense distinction. The script materials developed for the perceptual studies are appended. Author (TAB)

N70-17033*# National Aeronautics and Space Administration, Washington, D.C.
LIFE SCIENCES, APPENDIX G
George Zuidema, A. M. Kontaratos, and D. B. Hoffman *In its* Proc. of the Winter Study on Uses of Manned Space-Flight, 1975 - 1985 1969 p 111 - 162 refs (See N70-17026 06-34)
Avail: CFSTI

The roles of man in the life-sciences aspect of space flight are categorized as active and passive. The passive role includes medical measurements during prolonged space flight, and task performance measurements. A chart summarizing the effects of environmental factors on performance parameters is included. The active role is considered to consist of areas of discipline oriented activity, which are: (1) aerospace medicine, (2) biotechnology, (3) space biology, (4) exobiology, and (5) back-contamination containment and quarantine. It is concluded that physiological or performance degradation can be avoided through the use of preventive medical measures. F.O.S.

N70-17072# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
CAPTURING CONCEPTS IN A SEMANTIC NET
Anthony Bell and M. Ross Quillian 6 Oct. 1969 55 p refs
(Contract F19628-68-C-0125; ARPA Order 627)
(AD-697035; BBN-1885; AFCRL-69-0438; SR-13) Avail: CFSTI CSCL 6/4

A working memory model based on a semantic network is described in detail. Some advantages and disadvantages of such a model are discussed. An attempt is made to enable a reader to learn to perform the formidable task of representing data in the memory format. Since the actual memory is not easily read (or written), a set of LISP programs are included which make these tasks manageable. Author (TAB)

N70-17074# Illinois Univ., Urbana. Biological Computer Lab.
TOWARDS A SYSTEMATIC METHOD OF BEHAVIOR
Russell D. Stinaff Jun. 1969 133 p refs
(Contract AF 33(615)-3890; Grant AF-AFOSR-7-67)
(AD-696153; TR-15; AFOSR-69-2859TR) Avail: CFSTI CSCL 6/4

As an aid to the study of existing complex systems and the synthesis of new systems with specific properties, the establishment of a systematic method of behavioral modelling could

prove to be of considerable value. Towards this end, certain mathematical processes consisting of determinate and partly determinate transition matrices applied sequentially to an n-state system have been examined for their ability to exhibit complex behavior. Four fully determinate matrix types and four partly determinate types comprise the set from which these processes are formed. Equilibrium conditions and relative process times are examined for a variety of processes involving one and two matrix types. Processes capable of demonstrating behavior similar to that involved in the phenomena of habituation and the conditioned reflex are discussed, including extended processes related to concurrent establishment of two or more conditioned reflexes. Author (TAB)

N70-17082# Harvard Univ., Cambridge, Mass. Div. of Engineering and Applied Physics.

DEVELOPMENT OF MATHEMATICAL MODELS FOR HYBRID COMPUTATION. VOLUME 2: APPENDICES Final Report, 1 Oct. 1967 – 31 Oct. 1968

Robert J. Mc Laughlin and Alfred A. Pandiscio Apr. 1969 277 p refs

(Contract F19628-68-C-0042)

(AD-695815; AFCRL-69-0212-Vol-2) Avail: CFSTI CSCL 6/16

The work described in the report had three objectives. First, to select a number of realistic physical problems and develop mathematical models suitable for solution on both analog and digital computers. Second, to develop successively more complete versions of one of the models to determine its suitability for solution on a hybrid computer. Third, to examine the utility of the parallel logic capabilities of an otherwise conventional modern analog computer. Some five models of problems arising from the dynamic behavior circulatory and respiratory control systems were programmed and solved on a digital computer. Three were also solved on an analog computer. A digital detection system was simulated with emphasis given to utilizing parallel logic. The most elaborate of the respiratory models considered is recommended for further investigation on a hybrid computer. Author (TAB)

N70-17114# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

ANTHROPOMETRIC DIMENSIONS OF AIR FORCE PRESSURE-SUITED PERSONNEL FOR WORKSPACE AND DESIGN CRITERIA Final Report

Milton Alexander, John W. Garrett, and Michael P. Flannery Aug. 1969 265 p refs

(AD-697022; AMRL-TR-69-6) Avail: CFSTI CSCL 6/14

The results of an anthropometric survey of USAF personnel wearing the A/P22S-2 Full Pressure Suit fitted in accordance with the USAF Eight-Size, Height-Weight Sizing Program are presented. One hundred and thirty-eight measures were taken on each of thirty-four subjects standing, sitting and supine, with the suit in the uninflated, inflated, and inflated-restrained conditions. Forty circumferences were measured on a separate sample of thirty-two subjects standing and sitting, with the suit uninflated and inflated. Pictorial and verbal descriptions of the dimensions and detailed numerical results, including clearance ranges, are presented. Graphs comparing various dimensions across suit sizes are presented in the Appendix. Author (TAB)

N70-17136# Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio.

TOXIC EFFECTS IN MONKEYS EXPOSED TO 100% OXYGEN AT AMBIENT PRESSURE Final Report, Jan. – Apr. 1968

Clarke C. Johnston, Marilyn E. George, James P. F. Murphy, and Kenneth C. Back Jul. 1969 33 p refs Prepared in cooperation with IIT

(Contract F33615-68-C-1270)

(AD-697071; AMRL-TR-68-178) Avail: CFSTI CSCL 6/19

Thirty-two monkeys were exposed to 100% oxygen at 750 mm Hg pressure for 4, 7, or 12 days, and the effects of this atmosphere on liver, kidney and lung morphology, kidney function, liver and kidney cellular respiration and energy production, and blood gas levels were studied. The mortality rate was approximately 40%. There was a mild uncoupling of oxidative phosphorylation and a decrease in ATP levels in liver and kidney tissue at all exposure times and a decrease in kidney function at 4 days with a return to normal levels by 12 days. However, the major effect was seen in the lung where the degree and time sequence of lung damage correlated fairly well with the blood Po2 levels. There were mild morphological changes at 4 days, with more severe effects at 7 days. At 12 days, four out of five monkeys had major lung damage whereas the remaining animal seemed to have only minor changes. The cause of death appeared to be hypoxia from severe diffuse lung damage. Author (TAB)

N70-17138# Michigan Univ., Ann Arbor. Human Performance Center.

REHEARSAL, INTERFERENCE, AND SPACING OF PRACTICE IN SHORT-TERM MEMORY Interim Report

Alexander Warren Pollatsek Jul. 1969 124 p refs

(Contracts AF 49(638)-1235; AF 49(438)-1736; Grant NIH GM-01231-05; ARPA Order 461)

(AD-696668; AFOSR-69-2798TR: Rept-08773-41-T; TR-16) Avail CFSTI CSCL 5/10

Short-term memory as exhibited in a variety of experimental paradigms is heavily influenced by variations in the time allotted for rehearsal, in the time allotted for rehearsal-preventing interfering activity, and in the interval separating successive presentations of an item. The dissertation was designed to investigate systematically any interactions among rehearsal, interference, and spacing of practice in an effort to derive constraints on an adequate theory of short-term memory beyond those imposed by prior research. Author (TAB)

N70-17144# RAND Corp., Santa Monica, Calif.

STATISTICAL DETECTION THEORY OF THRESHOLD VISUAL PERFORMANCE

H. A. Ory Sep. 1969 45 p refs

(Contract F44620-67-C-0045)

(AD-696114; RM-5992-PR) Avail: CFSTI CSCL 6/16

The document presents the development of a statistical detection model to provide an accurate, quantitative description of threshold visual performance over a wide range of background luminance and target parameters. The work investigates relationships that exist between visual performance and reconnaissance. A statistical theory is developed in which neural excitation noise results from random fluctuations in both target and background luminance, and decision criterion is assumed to be programmed. Author (TAB)

N70-17152# Consultants in Engineering Science (Conesco) Watertown, Mass. Nuclear Div.

DECONTAMINATION OF FINITE RECTANGULAR AREAS Final Report

A. W. Starbird Aug. 1969 99 p refs

(Contract DAHC20-70-C-0216)

(AD-695668; CONESCO-4897) Avail: CFSTI CSCL 15/2

The CONSTRIP III computer code was used to calculate the reduction factors within single story rectangular buildings due to finite rectangular areas of contamination surrounding the buildings. The CONSTRIP code permitted breaking the reduction factors into wall scattered and non-wall scattered components from finite source strips up to 200 ft wide. Decontamination importance

factors were determined for finite areas subjected to both 1.25 Mev and 0.66 Mev contamination. The directional responses for wall scattered radiation coming from above and below the detector plane were determined separately for finite source fields. Author (TAB)

N70-17156# George Washington Univ., Alexandria, Va.
HUMAN FACTORS IN AIRMOBILITY
Wallace W. Prophet Oct. 1969 18 p refs Presented at the Army Sci. Advisory Panel, Fort Rucker, Ala. May 1969 Its Professional Paper 31-69
(Contract DAHC 19-69-C-0018)
(AD-697081) Avail: CFSTI CSCL 5/5

The paper describes the general organization of the Army Human Factors and Social Science Research Program and its principal research agencies, and discusses current research activities of HumRRO Division No. 6 (Aviation). These activities include studies of prediction of aviator performance, systems engineering of aviation maintenance training, human information processing functions in aerial reconnaissance and surveillance systems, and aviation simulation and training device requirements. Selected human factors research areas of significance to Army airmobility during the 1970-1980 period are also discussed. These are grouped under problems related to airmobile operational considerations, hardware considerations, and human learning considerations. Author (TAB)

N70-17164# Royal Aircraft Establishment, Farnborough (England).
A STANDPIPE HEAT EXCHANGER FOR USE IN A STANDARD CARBON DIOXIDE GAS SUPPLY SYSTEM FOR POWERED ARTIFICIAL LIMBS
A. J. Barter and R. Hastings Dec. 1968 32 p
(RAE-TR-68298) Copyright. Avail: CFSTI

Irregular pressure regulation and abnormally high system pressures occurring under certain conditions in a standard carbon dioxide gas supply system used for artificial limbs were investigated. A major reason for the reported malfunctioning was found to be the presence of carbon dioxide liquid downstream of the pressure regulator. In an attempt to overcome this problem, alternative cylinder non-return valves were evaluated and two standpipe devices were designed and tested. Some recommendations are made which should improve the performance of both existing and future gas supply systems. In addition, the pressure drop created by the standard connecting tubing and the reduced pressure control characteristics of the standard pressure regulator were examined. Author (ESRO)

N70-17171# Army Foreign Science and Technology Center, Washington, D.C.
ELECTRICAL SENSITIVITY OF THE EYE UNDER THE EFFECT OF THE INTENSE PHOTIC STIMULUS
V. I. Shostak 18 Sep. 1969 13 p refs Transl. into ENGLISH from Zh. Vysshe Nervnoi Deyatelnosti (USSR), v. 18, no. 2, 1968 p 339 - 343
(AD-696189; FSTC-HT-23-442-69) Avail: CFSTI CSCL 6/16

A study was made of the electrical sensitivity of the eye and the critical frequency of disappearance of a flickering electrical phosphene upon a 15 min. disadaptation with an intensity up to 70 nt and after a short and very bright flash. It has been found that in the former case electrical sensitivity diminishes, while the critical frequency (a measure of functional mobility) increases in the process of subsequent dark adaptation. After short superbright flashes, the changes also go into opposite directions, but they are of a phasic nature. The phenomena are probably a reflection of trace processes in the visual analyzer induced by intensive photic stimuli. Author (TAB)

N70-17199# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.
EFFECT OF INJECTED PARGYLINE UPON OPERANT AVOIDANCE IN THE MONKEY
Glayde D. Whitney, Daniel J. Craig, and W. Hanly Oct. 1969 20 p refs
(AD-696103; ARL-TR-69-12) Avail: CFSTI CSCL 06/15

Pargyline-HCl is of interest as a possible therapeutic agent in the treatment of decaborane intoxication. Decaborane in low doses is known to have severe disruptive effects upon instrumental behavior. Pargyline, in order to qualify as a therapeutic agent, must not itself lead to severe behavioral disruption. In this study each of five monkeys was given a single intraperitoneal injection of buffered suspension of pargyline, the dosage being equivalent to 45 mg pargyline-HCl/kg of body weight. Their behavior was evaluated for four days following injection on a concurrent free-operant avoidance schedule with two superimposed discriminated avoidance tasks. In no cases were pargyline-induced changes in behavior of sufficient magnitude to affect the efficiency of shock avoidance. It is concluded that the effect of pargyline on these behaviors is quantitatively slight in comparison to the effects of decaborane recorded in the literature, and that behavioral disruption from pargyline itself need not be the major consideration in decisions relevant to the therapeutic use of pargyline-HCl for decaborane induced behavioral intoxication. Author (TAB)

N70-17201# RAND Corp., Santa Monica, Calif.
THE IMPLICATIONS OF GEOGRAPHIC-SPECIFICITY FOR AIR POLLUTION ABATEMENT STRATEGY
Alan Carlin Oct. 1969 7 p refs Presented at the Symp. on the Develop. of Air Quality Standards, Los Angeles, 23-25 Oct. 1969
(AD-696806; P-4237) Avail: CFSTI CSCL 13/12

The paper presents some interesting and instructive models for determining optimal emission abatement for different categories of emitters under somewhat restrictive assumptions and a useful summary of some of the more recent literature on air pollution abatement strategy. Author (TAB)

N70-17259# Yale Univ., New Haven, Conn. School of Medicine.
UHF STIMULATION SYSTEM Interim Report,1 Jul. -31 Dec. 1968
Jose M. R. Delgado and Gerhard Weiss Oct. 1969 23 p
(Contract F29600-67-C-0058)
(AD-696102; ARL-TR-69-11) Avail: CFSTI CSCL 6/2

A UHF remote stimulation system working in the 915 MHz band is described, which generates current pulses in three stimulation channels. The amplitude, duration, repetition rate and channel can be controlled from a remotely located control panel. This system has been installed at Holloman Air Force Base, New Mexico, to stimulate the brain of free ranging chimpanzees and study the induced modifications on individual and social behavior. Author (TAB)

N70-17262# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
AEROSOL BEHAVIOR IN HIGH PRESSURE ENVIRONMENTS
Robert A. Gussman and Anthony M. Sacco 31 Oct. 1969 61 p refs
(Contract N00014-69-C-0228)
(AD-696643; BBN-1884) Avail: CFSTI CSCL 6/11

The report finalizes two phases of a broad study whose general purpose is to elucidate hazards to personnel arising from aerosols in high pressure helium-oxygen atmospheres. Studies have been completed on the generation of aerosols within high pressure environments and experimental evidence has been gathered which generally indicates that particle diameter increases with increasing

pressure to a slight degree but there is a remarkable reduction in numbers concentration of particles. Pulmonary deposition models have been finalized and indicate increases in deposition in the lower respiratory tract with increasing pressure. Author (TAB)

N70-17275# Naval Medical Research Inst., Bethesda, Md.
MINIMUM THRESHOLDS FOR PHYSIOLOGICAL RESPONSES TO FLOW OF ALTERNATING ELECTRIC CURRENT THROUGH THE HUMAN BODY AT POWER-TRANSMISSION FREQUENCIES Interim Report
John C. Keesey and Frank S. Letcher 3 Sep. 1969 28 p refs
(AD-695782; MR-005.08-0030B; Rept-1) Avail: CFSTI CSCL 6/19

A survey was made of all available information about electric shock to humans, including children, at power-transmission frequencies of 50 and 60 Hz. Reliable quantitative data at these frequencies are available for three measurable physiological responses to electrical stimulation: (1) the perception of electric current flow, (2) uncontrollable muscular contraction, and (3) death. Relevant threshold conditions for response to minimum currents include the size and resistance of the body and the duration and pathway of current flow. One percent of the general populace can perceive from 0.1 to 0.5 mA of 50-60 Hz current, depending upon the type of hand contact made with an electrically-energized circuit. A safety threshold of 5 mA, recommended for the general population including children, is based upon the conclusion that any 50-60 Hz current in excess of the release threshold of an individual should be regarded as hazardous and potentially lethal. Ninety-nine percent of adult male workers should be able to release 9 mA of 50-60 Hz current. Voltages calculated from reliable experimental data on effective currents and expected resistances are lower than voltages generally recommended to be safe. Author (TAB)

N70-17308*# Sandia Corp., Alqubuerque, N.Mex.
PLANETARY QUARANTINE PROGRAM Quarterly Progess Report, Period Ending 30 Jun. 1969
Jun. 1969 42 p refs
(NASA-Order R-09-019-040)
(NASA-CR-107800; TID-25154) Avail: CFSTI CSCL 06M

Studies concerning sterilization models, qualitative sampling models, bioburden experimentation and models, and evaluation of release from surfaces of the spacecraft–lunar module adaptor (SLA) during launch are described. Along with these other phases of planetary quarantine problems, a study of the feasibility of combined irradiation and heat sterilization of spacecraft hardware is reported. Heat alone has presented difficulties since some instruments are vulnerable at high temperatures. Dry spores of Bacillus subtilis var. niger, temperature ranges of 100 to 125 C, and low doses of gamma radiation (under 150 krads) were used. Results indicated that a reduction of the initial population by 90% could be accomplished in roughtly 30 to 50% of the time when heat and radiation were combined. Experiments with other organisms have also begun. Author (NSA)

N70-17353*# Exotech, Inc., Washington, D.C. Systems Research Div.
AN ANALYTICAL BASIS FOR ASSAYING BURIED BIOLOGICAL CONTAMINATION Interim Report
Robert C. Kline and Phillip L. Randolph Jan. 1969 36 p refs
(Contract NASw-1734)
(NASA-CR-107854; TRSR-036) Avail: CFSTI CSCL 06R

An analysis of a procedure for assaying biological contamination buried or embedded in spacecraft materials, is presented. The procedure required the controlled fracture of representative samples of a material whose buried loading is of interest. Each sample is tested for biological contamination on the totality of surfaces exposed as a result of the fracturing process. The basic datum or observation consists of the proportion of samples which yield contamination upon culturing. Conventional statistical techniques, combined with an assumed relation between the mean concentration of organisms buried within the material and the observed datum, produce an upper bound estimate for the unknown mean concentration, expressed to any prescribed level of confidence. In principle, the "conservativeness" of the resulting estimate is directly related to the sample size and the amount of surface area exposed by fracture; as the sample size and/or exposed area increase(s) the difference between the estimate and the unknown mean load tends to decrease. Author

N70-17521*# Martin Marietta Corp., Baltimore, Md. Research Inst. for Advanced Studies.
A STUDY OF THE CHEMOSYNTHETIC GAS EXCHANGER, 22 JANUARY–14 JUNE 1969
Leonard Bongers 14 Jun. 1969 17 p refs
(Contract NASw-1596)
(NASA-CR-107874) Avail: CFSTI CSCL 06M

The extent of byproduct formation for growth of H. eutropha under autotrophic conditions is assessed. In addition, results are presented on the assimilation characteristics of a number of organic acids in a heterotrophic environment by H. eutropha. Author

N70-17543*# Illinois Univ., Urbana.
ENGINEERING AIDS FOR THE HANDICAPPED
H. W. Knoebel, J. G. Burr, and G. Stupp *In its* Coordinated Sci. Lab. 1 Aug. 1969 p 346–348 ref (See N70-17526 06-34)
Avail: CFSTI CSCL 06B

A preliminary design is described for a highway vehicle to be operated by a severely disabled person. A vehicle is being donated, and a proposal has been written or further study and the modification of the donated vehicle. A technique which may enable blind to read newsprint is described. Author

N70-17572*# Wisconsin Univ., Madison. Dept. of Radiology.
APPLICATIONS OF THE DIRECT PHOTON ABSORPTION TECHNIQUE FOR MEASURING BONE MINERAL CONTENT IN VIVO. DETERMINATION OF BODY COMPOSITION IN VIVO Progress Report
John R. Cameron 1 Aug. 1969 500 p refs
(Grant NGR-50-002-051; Contract AZ(11-1)-1422)
(NASA-CR-107888) Avail: CFSTI CSCL 06P

The following graphs and tables present summaries of data on normal individuals measured in the University of Wisconsin Bone Mineral Laboratory from the period 1965 to March 1969. Although a variety of bones were measured, these data are all for the radius near midshaft and essentially all of them were for the left arm. These data may be of interest to other groups using the same technique. It should be noted that all of the data are for whites with relatively little information on other races. Author

N70-17655*# California Univ., Los Angeles.
INTERRELATIONS OF PERCEIVED SIZE AND DISTANCE Final Report
22 Dec. 1969 8 p refs
(Grant NGR-05-010-010)
(NASA-CR-107855) Avail: CFSTI CSCL 05J

Significant aspects are presented of an investigation on the basic processes in size cue to distance tasks and the effect of perceived distance on perceived size. Principles of visual organization that are applicable to a variety of visual judgments were identified. D.L.G.

N70-17687# Edinburgh Univ. (Scotland). Visual Lab.
PSYCHOLOGICAL VARIABLES IN COLOUR VISION TESTING
R. Lakowski May 1969 17 p refs Presented at the First Intern. Congr. on Colour, Stockholm, 9-13 Jun. 1969
(AD-695343) Avail: CFSTI CSCL 5/10

The effect of psychological factors in the colour testing situation was assessed for a population of normal trichromats. The colour vision tests used were the F- M 100- Hue, the ISCC- CAT, BCMT, and P- N anomaloscope. Two hypotheses relating (a) personality factors to the difficulty of the discrimination task and (b) cognitive factors to the complexity of the test situation were put forward. Both hypotheses receive some confirmation from the experimental data although the effect of these psychological factors is small. From the results of factor analysis it appears that each colour test in this population is measuring an attribute specific to itself, from which it can be inferred that no one test can be regarded as a substitute for another. Author (TAB)

N70-17720*# Hamilton Standard, Windsor Locks, Conn.
ALTERNATE MISSION STUDIES (AILSS)
Jul. 1969 127 p
(Contract NAS1-7905)
(NASA-CR-66876) Avail: CFSTI CSCL 06K

The advent of longer duration space flights has necessitated the development of a new generation of environmental control and life support equipment and techniques. To satisfy future requirements, the evolution of such systems has been toward developing processes employing regenerative type life support equipment. The "Trade-off Study and Conceptual Design of Regenerative Advanced Integrated Life Support Systems (AILSS)" report describes various systems which meet this objective. The AILSS report is used to supplement the material presented here, particularly in regard to the candidate concept descriptions discussed within this report. An evaluation of two additional environmental control and life support systems for an early AILSS type mission

engineering problems. Bionics is considered to be the study of only those features which are common to and inherent in both living systems and engineering systems, and the specific nature of design-functional relations in the two systems is discussed. The foundation of bionics is identified as the objective laws at the basis of the bionic approach to solving engineering problems. This is seen to incorporate not only the idea of using biological principles in engineering, but also the idea of applying the laws of constructional homomorphism and isomorphism of functionally identical systems in engineering creativity. N.E.N.

N70-17892 Texas Univ., Austin.
EFFECTS OF ADAPTATION ON VISUAL DETECTION
Hienz Albert Gaylord (Ph.D. Thesis) 1968 75 p
Avail: Univ. Microfilms: HC $4.00/Microfilm $3.00 Order No 69-6145

Some of the relevant factors which influence visual detection during partial dark adaptation were investigated using a ten-category rating procedure. Following partial dark adaptation each of the three human observers were light adapted with a 200 ms exposure to a 5.4 X 10 to the 6th power Td. circular 25 deg flash subsequent to which a 20 ms circular 5 deg test flash was randomly presented at successive six second intervals over a four minute period of dark adaptation. Analysis of the data showed that a rating procedure within a signal detection context provided a sensitive measure of the changes in visual sensitivity that occurred during dark adaptation and permitted the construction of dark adaptation curves for multiple detection criteria. The first minute of dark adaptation was found to be mediated primarily by cone mechanisms on the basis of the steep slopes and breaks noted in the 50% and 60% curves as well as the fact that the positive afterimage had a chromatic appearance during this time period. Dissert. Abstr.

N70-17907*# Hamilton Standard, Windsor Locks, Conn.
THE IMPACT OF VEHICLE LEAKAGE ON THE AILSS
Nov. 1969 51 p
(Contract NAS1-7905)
(NASA-CR-66875) Avail: CFSTI CSCL 06K

This supplementary study discusses the influence of cabin leakage on the AILSS. The influence of leakage on oxygen generation is most complex, because hydrogen obtained from decomposition of oxygen or nitrogen-containing chemicals may be used in a reactor for carbon dioxide reduction. This necessitates expanding the scope of the AILSS oxygen generation tradeoff to include generation of oxygen and nitrogen for leakage makeup. Because oxygen generation is the only AILSS area where leakage rate has a drastic impact on concept selection, it is considered at greater length than other topics in this discussion. This subject is also of particular interest, because some of the alternatives described may form the basis for earlier life support systems. Conclusions regarding subsystem selection are indicated in figures which show the influence of leakage rate on AILSS concept selections. Here and throughout this report, "leakage rate" denotes total vehicle leakage to space, including both oxygen and nitrogen. In general, the leakage range considered is sufficient to determine the equivalent weight impact for any reasonable leakage rate. Author

N70-17919# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
METHODS OF REALIZING ADAPTIVE RECOGNITION SYSTEMS
L. V. Klykov et al 26 Mar. 1969 12 p Transl. into ENGLISH from Proceedings of the 3d All-Union Conf. Process of Sci. and Tech. Inform., Moscow, 1967 p 241-244
(AD-696407; FTD-MT-24-77-69) Avail: CFSTI CSCL 064

The use of electron optics and noncoherent optics makes it possible to develop multilayer perceptrons with crossover couplings and feedbacks. A parallel-action perceptron is described which is equipped with lens screens, photoscopic masks, and image converters which have two storage screens and reflector screens. The use of such screens makes possible the repeated reading of information from the potential contour obtained on the dielectric of the storage. Author (TAB)

N70-17953*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
DESIGN AND PERFORMANCE OF A HEART ASSIST OR ARTIFICIAL HEART CONTROL SYSTEM USING INDUSTRIAL PNEUMATIC COMPONENTS
John A. Webb, Jr. and Vernon D. Gebben Washington Jan. 1970 25 p refs
(NASA-TM-X-1953; E-5173) Avail: CFSTI CSCL 06E

The design of a pneumatic driving system for heart assist or total heart replacement pumps is given. The system provides square pressure waveforms to drive the heart assist and uses feedback control to regulate a total heart replacement pump. A pneumatic square wave generator was developed to serve as a flexible tool for studying various cardiac assist techniques. This generator can be synchronized with the natural heart using the R-wave of the electrocardiogram as a trigger. The addition of feedback control to regulate a total heart replacement is discussed and data is given. Author

N70-17964# Honeywell, Inc., St. Paul, Minn. Research Dept.
LASER RADIATION EFFECTS ON THE MORPHOLOGY AND FUNCTION OF OCULAR TISSUE Final Report, 1 Aug. 1968 - 31 Jul. 1969
Arthur E. Jones, Perry Spyropoulos, and Robert W. Massof Aug. 1969 39 p refs
(Contract DADA17-67-C-0019)
(AD-696447; Rept-12047-FRI) Avail: CFSTI CSCL 6/18

The effects of different energy levels of ruby laser radiation

on electrophysiological, psychophysical and anatomical measures were examined. Spectral sensitivity tests, using an ERG analysis, demonstrated prolonged laser effects on rhesus and mangabey monkeys. At 15-months post-exposure for the rhesus monkey (0.8J/sq cm), the amplitude of the b wave was depressed at all wavelengths except 420 nm. At one-year post-laser exposure for the mangabey monkey (0.2J/sq cm), the amplitude of the b wave was depressed at all wavelengths and the amplitude of the b wave as a function of intensity at 570 nm was depressed by about 20 percent at high intensity and not affected at low intensity. Also, the third oscillatory potential remained absent. An ERG analysis of the Rayleigh match demonstrated that rhesus monkeys have normal color vision (A.Q. = 1.0), that squirrel monkeys are protanomalous (A.Q. = 0.305), and that owl monkeys are monochromatic (A.Q. = infinity). Following laser exposure of two rhesus monkeys the match was unbalanced in favor of the green component, indicating a protanomalous response. Behavioral studies of two rhesus monkeys, one laser exposed at 1.8J/sq cm and one exposed at 0.18J/sq cm, demonstrated a reduction in sensitivity at all but two spectral points for the monkey exposed at 1.8J/sq cm and no significant change in the sensitivity of the monkey exposed at 0.18J/sq cm. The latter monkey did, however, show a marked change in the shape of the function indicating an anomalous finding.
Author (TAB)

N70-18001 National Lending Library for Science and Technology, Boston Spa (England).
SCIENTIFIC BASES FOR SENSORY ODOUR AND FLAVOUR ANALYSIS [WISSENSCHAFTLICHE GRUNDLAGEN DER SENSORISCHEN GERUCHS UND GESCHMACKSANALYSE]
Gisela Jellinek 1968 58 p Transl. into ENGLISH from Intern. Z. Lebensmittel und Lebensmitteltechnologie (German), v. 68, 1968 p 9–14, 84–90, 132–135, 185–188, 228–230, 269–271
Presented at the Assoc. of Ger. Chemists, Berlin, Jan. 1966; also presented at Inst. for Nutr. of the Ger. Acad. of Sci., Pottsdam-Rehbruecke, East Germany, Apr. 1967
(NLL-M-7700-(5828.4F)) Avail: Natl. Lending Library, Boston Spa, Engl.: .6 NLL photocopy coupons

Described is a combined method of analytical instrumental and scientific executed sensory analysis for quality control in the food industry. Definite distinctions are made between: (1) analytical test procedures such as difference-, threshold-, ranking-, and quality tests; and (2) popularity tests such as preference evaluation, consumer surveys, and market research. Both methods are combined in odor and flavor testing procedures; their results depend mainly on establishing differences between two or more samples where the change of guessing is kept at a minimum. The recognized four basic tastes: salty, sour, bitter, and sweet are analyzed by parameterization and used in arriving at a final flavor profile for the individual components and their intensities in a product. A brief outline of training in taste description by flavor recognition tests is included. G.G.

N70-18043# Joint Publications Research Service, Washington, D.C.
MODELING OF THE PSYCHE
A. N. Bratko 29 Jan. 1970 121 p refs Transl. into ENGLISH from the book "Modelirovaniye Psikhiki" Moscow, Nauka, 9 Jan. 1969 p 9–117, 165–173
(JPRS-49710) Avail: CFSTI

Theoretical problems and practical attempts at making models of the psyche are discussed. Models are divided into physical, material-mathematical, and logical-mathematical types, and the making of models of biological systems is traced from ancient times to the present. It is felt that there is no substantial difference between psychic and machine operations, and that the essence of psyche modeling is the transference of more perfect operations to the cruder machine operations. The psychology of memory, thinking, perception, and learning is reviewed, and practical aspects of making models are described. Examples of models and experiments performed with them are discussed. N.E.N.

N70-18044# Joint Publications Research Service, Washington, D.C.
BIOMECHANICAL SYSTEMS DISCUSSED, EXPLAINED
Interview with Ivan Ivanovich Artobolevski
22 Jan. 1970 5 p Transl. into ENGLISH from Urania (East Ger.), Dec. 1969 p 30–33
(JPRS-49667) Avail: CFSTI

A brief discussion, given in an interview, is presented on mechanisms which can perform functions of purposeful human activity under conditions to which man is not accustomed or cannot expose himself. Examples of these conditions are space stations, another planet, the ocean floor, and danger zones in nuclear technology. The control systems can be electronic systems based on biological currents, or biomechanical systems such as manipulators and pedipulators. N.E.N.

N70-18047# Joint Publications Research Service, Washington, D.C.
MAN AMONG THE AUTOMATA
S. Ivanov 28 Jan. 1970 63 p refs Transl. into ENGLISH from the book "Chelovek Sredi Automatov" Moscow, Znaniye Publishing House, 1969 p 245–319
(JPRS-49703) Avail: CFSTI

A discussion of the psychology of the human thinking process in solving problems is presented, with the end object of developing a computer with problem solving capability. Investigations of animal and human thought processes are reviewed, along with descriptions of the way solutions came to men such as Poincare and Kekule. Illustrations of novel ways of problem solving are given; for example, adding another variant rather than selecting from variants present. The problem of optimal verbal communication is also considered for situations in which maximum information must be communicated in minimum space, as happens in air traffic controller operations. Studies of optimallity, man-machine interfaces, and computer chess playing are outlined. Cybernetics, heuristics, and their interrelation are discussed. N.E.N.

N70-18048 Howard Univ., Washington, D.C.
MICROBIOLOGICAL AND TOXICOLOGICAL STUDIES WITH PASTEURELLA PSEUDOTUBERCULOSIS TOXIN: PATHOPHYSIOLOGICAL EFFECTS AND POSSIBLE MECHANISMS OF ACTION
James Allen Brown, Jr. (Ph.D. Thesis) 1968 176 p
Avail: Univ. Microfilms: HC $8.20/Microfilm $3.00 Order No. 69-5734

The crude toxin was isolated from Pasteurella pseudotuberculosis cells. Each lot was standardized by quantitative protein assay. The LD sub 50 was 2.4 microg/gm/24 hours and 0.6 microg/gm/72 hours; after lyophilization it was 5.2 microg/gm/24 hours and 3.13 microg/gm/72 hours. P. pseudotuberculosis toxin produced a shock-like syndrome in many animal species similar to that known to be produced by gram-negative bacterial endotoxins. Physicochemical properties were similar to those known to be characteristic of exotoxins. For example, it appears to be a heat labile protein. Pathophysiological findings were a marked leukopenia accompanied by an elevation in body temperature, an increase in respiration which reached a maximum in one hour, no significant change in the hematocrit, and no significant change in the EKG until the terminal phase. A progressive sequence of events culminated in the irreversible fall in blood pressure to shock levels.
Dissert. Abstr.

N70-18062*# National Aeronautics and Space Administration. Washington, D.C.
STORAGE AND RETRIEVAL OF INFORMATION IN

AEROSPACE MEDICINE. THE MATRIX APPROACH
G. Hoover, E. M. Roth, F. B. Benjamin, S. P. Vinograd, and J. W. Humphreys Jul. 1969 8 p
(NASA-TM-X-62632) CSCL 06E

A matrix covering 58 environmental factors and 142 physiological-psychological functions was prepared to make the information of the Compendium of Human Response to the Aerospace Environment readily available. The criteria in coding the intersections of the parameters are given. It is concluded that none of the current approaches to information storage and retrieval are suitable for the Compedium, and that the future approach appears to be a combination of matrix and computer. F.O.S.

N70-18084*# Stanford Research Inst., Menlo Park, Calif.
EFFECTS OF SONIC BOOMS AND SUBSONIC JET FLYOVER NOISE ON SKELETAL MUSCLE TENSION AND A PACED TRACING TASK
Jerome S. Lukas, Donald J. Peeler, and Karl D. Kryter Washington NASA Feb. 1970 44 p refs
(Contract NAS1-7592)
(NASA-CR-1522) Avail: CFSTI CSCL 06P

Electrical activity in the trapezius muscle of the shoulder in twelve subjects was monitored while they were: (1) performing a paced tracing task in the presence of occasional simulated indoor sonic booms of 2.5 pounds per square foot (as measured outdoors), (2) performing a paced tracing task in the presence of occasional subsonic jet flyover noise of 100 PNdB (perceived noisiness in dB), (3) performing the tracing task under quiet conditions, (4) seated at rest in the presence of occasional simulated indoor sonic booms. A measure of time-on-track during a paced tracing task was obtained. A group of three subjects (males, 31 to 44 years of age), was tested under each of the four conditions. Simulated sonic booms increased the electromyographic activity in the group who performed the tracing task as well as in the group who heard booms while seated at rest. In addition, the booms were found to degrade tracing performance during the five test sessions. Flyover noises did not affect tracing performance nor result in electromyographic responses of the magnitude found as a result of the sonic booms. Author

N70-18088*# National Aeronautics and Space Administration, Washington, D.C.
EFFECT OF SOLAR ACTIVITY ON THE FREQUENCY OF FUNCTIONAL LEUKOPENIAS AND RELATIVE LYMPHOCYTOSES [O VLIYANII SOLNECHNOY AKTIVNOSTI NA CHASTOTU FUNKTSIONALNYKH LEYKOPENIY I OTNOSITELNYKH LIMFOTSITOZOV]
N. A. Shults Feb. 1970 20 p refs Transl. into ENGLISH of Acad. of Med. Sci. USSR summary report, 1967
(NASA-TT-F-592) Avail: CFSTI CSCL 06P

The effect of solar activity on the cell composition of blood is investigated using statistical methods. Data on inhabitants of the Arctic region is compared with data on inhabitants of the subtropics. It was found that the percentage of leukopenia in the north was higher than in the south. Analysis of the incidence of functional leukopenias has revealed a strict pattern of fluctuations in the leukocyte count under nonpathological conditions. F.O.S.

N70-18109# Joint Publications Research Service, Washington, D.C.
THE PROBLEM OF THE OBJECTIVE FOUNDATION OF BIONICS
S. N. Smirnov 20 Jan. 1970 15 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 11, 1969 p 117–128
(JPRS-49644) Avail: CFSTI

A discussion is presented on the origin, development, and nature of bionics. The essence of the bionic principle is given as the search for appropriate designs in living nature and the elaboration of the methods and means of reproducing the specific features of the biological solutions to functional problems analogous to engineering problems. Bionics is considered to be the study of only those features which are common to and inherent in both living systems and engineering systems, and the specific nature of design-functional relations in the two systems is discussed. The foundation of bionics is identified as the objective laws at the basis of the bionic approach to solving engineering problems. This is seen to incorporate not only the idea of using biological principles in engineering, but also the idea of applying the laws of constructional homomorphism and isomorphism of functionally identical systems in engineering creativity. N.E.N.

N70-18135# Directorate of Scientific Information Services, Ottawa (Ontario).
THE INTENSITY OF THE NARCOTIC ACTION OF HYDROGEN AT HIGH PRESSURE
N. V. Lazarev Oct. 1969 5 p refs Transl. into ENGLISH from Farmakol. i Toksikol., (USSR), v. 6, 1943 p 29–32
(T-532-R) Avail: CFSTI

The biological narcotic action of hydrogen under pressure was tested in a preliminary experiment on a white mouse in a pressure chamber containing a mixture of 95 percent nitrogen and 5 per cent oxygen; a hydrogen feed up to 55 atmospheric pressure of the nitrogen hydrogen mixture did not produce narcosis. The animal stayed alive even at total pressure of 90 atm with the hydrogen partial pressure at 55 atm. It was concluded that the presence of hydrogen hardly effected the toxicity of the gaseous mixture which already contained a narcotic concentration of carbon monoxide. G.G.

N70-18150# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PECULIARITIES OF HUMAN SLEEP UNDER CONDITIONS OF CONTINUOUS PROLONGED INFLUENCE OF BROAD-BAND NOISE OF AVERAGE INTENSITY
V. I. Myasnikov et al 1 Apr. 1969 22 p Transl. into ENGLISH from Akad. Nauk SSSR, Izv. Ser. Biol. (USSR), v. 33, no. 1, 1968 p 89–98
(AD-696500; FTD-MT-24-499-68) Avail: CFSTI CSCL 6/19

Studies were conducted at the Prof. F. D. Garbov laboratory on the effects of continuous protracted broad band noise on sleep and on the transitional state between sleep and wakefulness to determine the physiological basis for the disturbing effects of noise on man during rest. Quality of sleep was evaluated subjectively, and by the dynamics of the bioelectric activity of the brain, reactions of waking to acoustic stimulation, changes in performance indices (sensory motor reactions to light stimulus) and deviation of certain acoustic sensitivity indexes (screening threshold and acoustic adaptation). A relationship between length of presleep and subsequent sleep stages was established: those who fell asleep rapidly slept soundly and awoke feeling well, while those having difficulty falling asleep slept lightly, awakened frequently, and did not feel well. EEG observations were made. The motor reflex latent period was reduced in the first group and increased in the second group compared to background data. In the first group function of the auditory analyzer was restored and in the second group it was not, as shown by respectively lowered and raised screen thresholds.

In the first group the disturbance of acoustic adaption (after 8 hr exposure to noise) was reduced or completely eliminated, while in the second group it did not level out. Author (TAB)

N70-18184# National Institutes of Health, Bethesda, Md. Library Div. Research Sciences.
RESEARCH OF STRUCTURAL CHANGES IN A NERVE DURING EXCITATION AND IN ARTIFICIAL MEMBRANES UNDER THE ACTION OF AN ELECTRICAL FIELD BY OPTICAL METHODS
G. N. Berestovskii et al 1969 62 p refs Transl. into ENGLISH from Pushchino, VINITI (RUSSIAN), 1969 64 p
(Rept-10-5-69) Avail: Issuing Activity

The structural and physicochemical changes in nerves, that occur when there is a change in ionic permeability, are investigated by optical methods, at the molecular and hypermolecular levels. These structural changes are divided into two groups. To one group belong those changes which are directly connected with the regenerative cycle of the generation of the action potential, and to the other group are assigned the slow changes which accumulate from impulse to impulse associated with metabolic changes. It is concluded that during the generation of the action potential, a reversible decrease occurs in the light flow which passed through the nerve fiber and the crossed polarizer and analyzer, and the decrease of the light flow occurs simultaneously with the action potential and repeats its shape. This phenomenon is related to the change of the parameters of the axon under the action of an electrical field. F.O.S.

N70-18211# Defence Research Board, Ottawa (Ontario).
DEPTH INTOXICATION IN DIVING WITH AIR
Pierre Cabarrou Nov. 1969 12 p refs Transl. into ENGLISH from Presse Med. (Paris), v. 72, no. 13, 1964 p 793 797
(DRB-T-6-F) Avail: Issuing Activity

Recent investigations into the physiological and behavioral effects of deep diving with respiratory equipment containing various air mixtures are reviewed. Two theories that explain the disorders produced under these circumstances are explained and their validity analyzed on the basis of test data. The first theory, that of nitrogen narcosis, states that nitrogen has a depressive action on the central nervous system sufficient to cause the symptoms. The second hypothesis is based on the fact that compression of the respiratory mixture increases its specific gravity to a hypoventilation. The hypercapnia resulting from this causes the effects that have been noted. From the test data, the conclusion is reached that depth intoxication is not caused by retention of carbon dioxide, although any hypercapnia occurring during the dive will aggravate the disorders. It is thought instead that the intoxication is caused as a result of some yet unknown mechanism triggered by breathing neutral gas under pressure. Strong conclusions were reached that no narcosis is involved. A.C.R.

N70-18226 Pittsburgh Univ., Pa.
EFFECTS OF CHANGES IN ENVIRONMENTAL LIGHTING ON PARADOXICAL SLEEP IN THE ALBINO RAT
Ross Fishman 1968 99 p
Avail: Univ. Microfilms: HC $5.00/Microfilm $3.00 Order No. 69-6396

The possible effects of changes in environmental lighting conditions on sleep states were studied in adult male albino rats. EEG records were used to determine time spent in pardoxical sleep (PS) and slow-wave sleep (SWS). In a pilot study the effects of continuous darkness and continuous light were determined. Following exposure to a L-12, D-12 light cycle (baseline), rats were exposed to either three weeks of continuous darkness or continuous light. The results indicated that rats in continuous darkness showed increases in minutes of PS and SWS and of PS as a percentage of total sleep (%PS). Rats in continuous light showed decrease in PS and %PS with little overall change in SWS. These results lend support to the proposition that under appropriate conditions "lights-off" facilitates the appearance of PS while lights-on may inhibit paradoxical sleep appearance. Dissert. Abstr.

N70-18237# National Institutes of Health, Bethesda, Md. Library Div. of Research Sciences.
POLYGRAPHIC STUDY OF SLEEP IN THE PIG
Y. Ruckebusch et al 1968 10 p refs Transl. into ENGLISH from C R Soc. Biol. (Paris), v. 162, no. 7, 1968 p 1346 1354
(Rept-10-7-69) Avail: Issuing Activity

Sleep states which are well individualized on the behavioral level in the growing pig are analyzed by polygraphic means in order to establish both the duration of each sleep state and the concomitant cardiorespiratory signs. Young pigs aged 3 to 4 months were observed for more than 20 complete 24-hour cycles resulting in data on the electrical activity of the cortex and the states of sleep, a comparative study of hypnograms and actograms, and observations of somato-vegetative manifestations during sleep. Two states of sleep are demonstrated in the growing pig: (1) Rapid sleep phases are characterized by rapid ocular movements with facial clonus and rapid cortical activity (8 to 10%) and comprise about 20% of total sleep time, approximating the values in man. (2) Slow sleep phases are accompanied by slow cortical waves and spindles (45% of the 24 hours). The organization of the phases of rest and activity and of alternations of wakefulness and sleep occur in relation to meals. The polygraphic study reveals an extreme complexity in the evolution of spontaneous motility, cardiac frequency, and respiratory rhythm during a 24-hour period. M.H.E.

N70-18251# National Institutes of Health, Bethesda, Md. Translating Unit.
NIGHT SLEEP OF THE SCHIZOPHRENIC AT THE START OF EVOLUTION. POLYGRAPHIC STUDY BY TELEMETRY
J. D. Vincent et al 26 Apr. 1969 10 p Transl. into ENGLISH from Ann. Medicopsychol., (Paris), v. 2, 1968 p 227 – 235
Avail: CFSTI

The night sleep of a group of 11 normal control subjects, 15 schizophrenics, and 4 patients with chronic hallucinatory psychosis quantitatively and qualitatively by telemetry recording. Recordings involved three parameters: ocular movements, electroencephalography, and muscle state. Analysis of the tracings indicates: (1) At the onset of their illness, schizophrenics do not show any major quantitative abnormality of rapid eye movements. (2) The schizophrenics were insensitive to the first night effect which did play a role in the sleep of the control subjects. (3) Dormition was more variable in the schizophrenics than in the normal subjects and its mean value was higher in the shizophrenics. (4) The time of appearance of the first rapid eye movements was higher, and the mean duration longer, in the normal subjects. (5) In the chronic hallucinatory psychosis subjects (all insomniacs), there was less rapid eye movement suggesting a relationship between insomnia, the poverty of rapid eye movements, and the symptomatic richness of the illness. D.L.G.

N70-18275# Congress. House. Committee on Science and Astronautics.
THE FUTURE OF THE BIOSCIENCE PROGRAM
Washington GPO 1970 242 p Hearings before Comm. on Sci. and Astronaut., 91st Congr., 1st Sess., No. 11, 12 – 13, 17 – 18 Nov. 1969
Avail: Subcomm. on Space Sci. and Appl.

Testimony and discussions on the future of bioscience research are documented, with emphasis on the Biosatellite 3 mission and biomedical aspects and foundations of manned space flight. The future directions of NASA programs in the life sciences are briefly discussed, along with life support systems and biological effects of aerospace environments. J.A.M.

N70-18278# Congress. House. Committee on Science and Astronautics.
FUTURE OF THE BIOSCIENCE PROGRAM OF THE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Philip P. Dickinson and Frank R. Hammill, Jr. Washington GPO 1969 41 p Presented to the Comm. on Sci. and Astronaut., 91st Congr., 1st Sess., By the Subcomm. on Space Sci. and Appl., 24 Dec. 1969 *Its* Serial I
Avail: Subcomm. on Space Sci. and Appl.

An analytical report is presented on the exploratory hearings held to assess the biomedical planning which may be required to establish the extent and limits of human endurance to the space environment. Two alternative approaches to the future of NASA'S bioscience program are cited: a new biosatellite approach, involving more refined and extensive subhuman and instrumental experimentation, in additional space flights of 30 days or longer; and the incremental manned flight approach under the AAP program, with or without primates aboard as in-flight laboratory test subjects. It was recommended: (1) The abandoned biosatellite program of animal experimentation in earth orbit should be reinstituted. (2) Bioscience research should be extended to the planets when technologically feasible. (3) To justify space exploration costs, the role of science should be uprated as a mission objective, and bioscience programs in the fields of medicine and physiology should be given highest relative priority by NASA and Congress. M.G.J.

N70-18284# Joint Publications Research Service, Washington, D.C.
PROTON IRRADIATION OF MICROCOCCUS RADIODURANS AND SARCINA FLAVA MICROORGANISMS PLACED IN A METEORITE
G. P. Vdovykin et al 22 Dec. 1969 8 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 189, no. 1, 1969 p 192 - 195
(JPRS-49492) Avail: CFSTI

The survival percentage of microorganisms undergoing irradiation was considered in the process of experimental work on the radiogenic synthesis of complex organic substances from gases during high energy proton irradiation. The resistance of microorganisms placed in a meteorite was investigated during proton irradiation of 600 MeV. The experiments show that even such radiation resistant microorganisms as Micrococcus radiodurans perish under the effect of the radiation dosage used. If it is assumed that microorganisms may have been found in portions near the surface of bodies ancestral to meteors, they could not have survived due to high energy cosmic and solar radiation. These conclusions are confirmed by the total absence of microorganisms in the lunar rocks and soil brought back to earth by the Apollo 11 missions. R.B.

N70-18286# Joint Publications Research Service, Washington, D.C.
EFFECT OF SUSPENDED PARTICLES ON BREATHING INVESTIGATED
V. I. Babin 2 Jan. 1970 7 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 10, Oct. 1969 p 49 - 53
(JPRS-49537) Avail: CFSTI

The coefficient of retention, or effective retention, of dust in the respiratory organs is generally understood to mean the percentage of aerosol particles which have settled or accumulated over a certain time interval in some part of the respiratory system with respect to all inhaled dust particles. Coefficients of retention are classified according to the principle of evaluating the percentage of dust retained, as a function of the time of accumulation of the aerosol particles in the respiratory organs, according to the location where the dust deposit settles in the respiratory system, according to the size distribution of the particles inhaled and retained, as a function of breathing conditions, and according to the type of dust. A classification table and formulas are constructed for the different coefficients of retention. R.B.

N70-18300# Joint Publications Research Service, Washington, D.C.
CYBERNETICS AND THE SCIENTIFIC-TECHNICAL REVOLUTION
8 Jan. 1970 23 p refs Transl. into ENGLISH from Visny Akad. Nauk. Ukr. RSR (Kiev), v. 33, no. 5, 1969 p 3 - 7, 44 - 52 81 - 82
(JPRS-49568) Avail: CFSTI

The part played by cybernetics in economic forecasting, planning, and automatic production control and distribution is reviewed. The increased demand for well-trained scientists and technicians in response to computer-based technological advances is emphasized as well as the need to maximize the creative use of increased leisure time. Scientific control of the social factors of production is assessed. A brief account is given of a symposium on the accuracy and efficiency of computer algorithms. E.C.

IAA ENTRIES

A70-15763
PHYSIOLOGICAL AND PHYSIOPATHOLOGICAL EFFECTS OF TRANSVERSE ACCELERATIONS IN AEROSPACE MEDICINE (EFFETS PHYSIOLOGIQUES ET PHYSIOPATHOLOGIQUES DES ACCELERATIONS TRANSVERSES EN MEDECINE AEROSPATIALE).
F. Violette, A.-P. Gibert, and Cl. Nogues (Ministère des Armées, Service de Santé des Armées, Paris, France).
Revue des Corps de Santé des Armées, vol. 10, Oct. 1969, p. 523-546. 8 refs. In French.

Review of studies of the physiological effects of transverse accelerations on spacecraft crews, which led to the determination of the optimum tolerance thresholds for the position judged to be most favorable for an astronaut in the interior of a spacecraft. Launchings by means of the two-stage Titan rocket, for the Gemini operation, did not cause accelerations greater than 8 g for about 10 sec, at which point the astronauts, who had previously had to support the accelerations of the Atlas-Agena system of the Mercury operation, stated that after a difficult beginning they had arrived at an acceptable stage of comfort. Acceleration, however, can cause injurious cardiovascular and respiratory effects, which are described in some detail. F.R.L.

A70-15764
EVALUATION OF THERMAL EXCHANGES IN MAN WITH THE AID OF A COMBINED HEAT TRANSFER COEFFICIENT (EVALUATION DES ECHANGES THERMIQUES DE L'HOMME A L'AIDE D'UN COEFFICIENT COMBINE DE TRANSFERT DE CHALEUR).
J. Colin, J. Timbal, J.-D. Guieu (Ministère des Armées, Service de Santé des Armées, Paris, France), and Ch. Boutelier.
Revue des Corps de Santé des Armées, vol. 10, Oct. 1969, p. 547-569. 24 refs. In French.

Discussion of various methods of evaluating heat exchanges between man and his environment, which may occur owing to incidents or accidents in the course of operation of aircraft and may involve decompression or immersion. Heat exchange may take place by evaporation, radiation, conduction, and convection. The measurement of the combined coefficient of thermal transfer by two or more of these methods by direct calorimetry is considered, as well as measurement of this coefficient by fractional calorimetry. It is considered that the heat transfer coefficient for the combined effects of radiation and convection can be utilized in numerous practical situations and makes it possible to calculate the thermal load imposed on a man. However, it must be remembered that the coefficient describes temperature changes, without taking account of the important action of the vapor pressure of ambient water on the efficacity of sudation. F.R.L.

A70-15765
RADIOGRAPHY OF THE SPINE IN THE SEATED POSITION—SIGNIFICANCE TO AERONAUTICAL MEDICINE (LA RADIOGRAPHIE DU RACHIS EN POSITION ASSISE—INTERET EN MEDECINE AERONAUTIQUE).
R.-P. Delahaye, R. Auffret, G. Gueffier (Ministère des Armées, Paris, France), and H. Seris.
Revue des Corps de Santé des Armées, vol. 10, Oct. 1969, p. 571-574. In French.

Examination of spinal statics in the seated position, including a discussion of studies of aircraft seats. Radiography in the seated position, in the particular problem of aeronautical ergonomics, facilitates understanding of the appearance of fractures at a certain point and the role of various factors such as seat position, condition of the spine, and equipment. F.R.L.

A70-15766
PROBLEMS POSED BY THE WAKE-SLEEP RHYTHM IN THE COURSE OF ASTRONAUTICAL FLIGHTS (PROBLEMES POSES PAR LE RYTHME VEILLE-SOMMEIL AU COURS DES VOLS COSMONAUTIQUES).
Ph. Chemin (Bordeaux, Université, Laboratoire de Physiologie, Bordeaux, France).
Revue des Corps de Santé des Armées, vol. 10, Oct. 1969, p. 575-584. In French.

Discussion of the importance of organizing the waking and sleeping periods of spacecraft crews in order to ensure sufficient operational capacity to maintain a constant watch and good operation of the spacecraft. It is also necessary to ensure a suitable life rhythm which does not involve physiopathological disorders. The importance of synchronizers on space flights of extended duration is shown. It is considered essential that man recreate the terrestrial time cycle in space. F.R.L.

A70-15767
THE PROFESSIONAL PERSONALITY OF THE AVIATOR (LA PERSONNALITE PROFESSIONNELLE DE L'AVIATEUR).
R. Gelly (Ministère des Armées, Service de Santé des Armées, Paris, France).
Revue des Corps de Santé des Armées, vol. 10, Oct. 1969, p. 585-598. In French.

Consideration of the factors which form and organize the professional personality of an aviator. Motivation arises in infancy, even though it may not be consciously thought of in adolescence. Among the origins of motivation is the Icarus complex; in adolescence this is transformed into the desire to pilot. Factors arising during the training period, such as identification with the instructor, are important in shaping the professional personality. There appears to be an imperceptible transition toward professional maturity which does not depend on administrative limitations. An aviator is considered to be essentially a realist, more interested in technique than in abstractions. Success in the business is not possible unless, coupled to the strong motivation, there is a rigorous control of the entire emotional life. F.R.L.

A70-15772
CONTINUOUS RECORDING OF HYDROSTATIC PRESSURE IN RENAL TUBULES AND BLOOD CAPILLARIES BY USE OF A NEW PRESSURE TRANSDUCER.
P. Wunderlich and J. Schnermann (München, Universität, Physiologisches Institut, Munich, West Germany).
Pflügers Archiv, vol. 313, no. 1, 1969, p. 89-94.
Research supported by the Deutsche Forschungsgemeinschaft.

Using a new ultraminiature pressure sensor, hydrostatic pressure in renal tubules and renal blood capillaries was continuously recorded. The transducer was mounted in a special Plexiglass device which was fixed on a micromanipulator. With a glass capillary attached to one end of the Plexiglass block, tubules and capillaries were punctured using conventional micropuncture techniques. The recorded signal was found to be linear up to 300 mm Hg. The frequency of the system was highly dependent upon the capillary tip diameter. Examples of recorded pressures in renal tubules and blood capillaries are given. (Author)

A70-15833
ADVANCED TECHNOLOGY IN AIRLINE PASSENGER SERVICES.
Richard P. Ensign (Western Air Lines, Inc., Los Angeles, Calif.).
Society of Automotive Engineers, National Aeronautic and Space

Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 6-10, 1969, Paper 690674. 11 p.
Members, $1.00; nonmembers, $1.50.

Discussion of the impact of airline transportation on the business and leisure worlds. The demand for greater effectiveness in servicing larger numbers of passengers each year is examined, along with the need for more stringent public health measures in the preparation, storage, and service of foods. Technical advancements in low-temperature storage are reviewed, and Western Air Lines operating experience with cryogenic cooling of galleys on their 707, 727, and 737 fleets is described. (Author)

A70-15843
LONG-TERM OPERATION OF A WATER ELECTROLYSIS MODULE.
F. H. Schubert (TRW, Inc., Cleveland, Ohio).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 6-10, 1969, Paper 690643. 8 p.
Members, $1.00; nonmembers, $1.50.

Description of a water electrolysis module designed to provide 3.6 lb/day of oxygen at a current density of 100 amps/sq ft and at a pressure level of 80 psia. Although designed for aircraft application, the concepts employed in the design of the module make its use in other life support systems possible. One of the ten-cell water electrolysis modules fabricated has been successfully operated for 7525 hr. These hours consist of 300 hr of parametric, 180 hr of cyclic, and 7045 hr of endurance testing, to date. The endurance test program is being conducted at a current density of 80 amps/sq ft, a temperature of 175 deg F, and a pressure level of 30 psia. Results of the parametric and cyclic test programs are presented, and cell performance and servicing and maintenance requirements are discussed. (Author)

A70-15844 *
A HYDROPHOBIC-HYDROPHILIC ZERO-GRAVITY LIQUID-GAS PHASE SEPARATOR.
Charles G. Saunders (NASA, Langley Research Center, Hampton, Va.).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 6-10, 1969, Paper 690638. 13 p.
Members, $1.00; nonmembers, $1.50.

Description of the theory of a hydrophobic-hydrophilic type of zero-gravity liquid-gas phase separator presently being developed for spacecraft use. The application of the surface tension phenomenon in the design is discussed, and the materials of construction are covered. The ultimate use on Apollo 11 is described. (Author)

A70-15845 *
ADVANCED INTEGRATED LIFE SUPPORT SYSTEMS—A STATUS REPORT.
John B. Hall, Jr. (NASA, Langley Research Center, Hampton, Va.).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 6-10, 1969, Paper 690637. 22 p.
Members, $1.00; nonmembers, $1.50.

Life support systems to support multiman crews on extended space missions will require the development of regenerative systems more advanced than those presently available. This equipment must be maintainable and highly reliable, and must possess automatic features to enhance mission success. A program is underway to provide the technology for such systems. The status of the program is presented, including a discussion of the Integrated Life Support System now in-house, plans for the development of advanced subsystems, and a summary of the Advanced Integrated Life Support Systems (AILSS) program to provide maintainable subsystems integrated into a multicompartment chamber. (Author)

A70-16004
WHAT IS ADAPTIVE TRAINING?
Charles R. Kelley (Dunlap and Associates, Inc., Santa Monica, Calif.).
(New England Psychological Association, Annual Meeting, Nov. 29, 30, 1968.)
Human Factors, vol. 11, Dec. 1969, p. 547-556. 11 refs.

Discussion of the concept and techniques of adaptive training, and comparison of different methods of adaptation. The fundamental characteristics of adaptive trainers are enumerated and contrasted with those of fixed trainers. The implementation of an adaptive training system is discussed, taking into consideration the choice of an adaptive variable, performance measurement, the adaptive logic, the error standard and difficulty level, and knowledge-of-results displays. Caution is expressed against expecting adaptive techniques to correct training devices with inherently poor training validity. Z.W.

A70-16005
THE EFFECTIVE TIME CONSTANT—A NEW TECHNIQUE FOR ADAPTIVE TRAINING.
W. G. Matheny (Life Sciences, Inc., Fort Worth, Tex.).
(New England Psychological Association, Annual Meeting, Nov. 29, 30, 1968.)
Human Factors, vol. 11, Dec. 1969, p. 557-560.

Outline of a hypothetical construct based on and derivable from the properties of the vehicle being controlled and the characteristics of man as a controller. This construct, called the effective time constant of the man-machine system, is related to and predictive of control task difficulty. Since it has its root in quantifiable properties of the man-machine system, it can be used and varied as an adaptive variable in training devices. Z.W.

A70-16006
ADAPTIVE TECHNIQUES IN MULTIPARAMETER PROBLEMS.
E. M. Hudson (Kollsman Instrument Corp., Syosset, N.Y.).
(New England Psychological Association, Annual Meeting, Nov. 29, 30, 1968.)
Human Factors, vol. 11, Dec. 1969, p. 561-567. 8 refs.

Description of a technique for conducting multiparameter experiments in a manner such that the number of data points investigated is reduced to a minimum. The method is based on the observation that human responses to psychophysical inputs follow a pattern and are not random, and hence can be predicted from mathematical equations. The procedure developed is iterative and is continued until the residual error between computed and observed values for all points falls below some desired value. Z.W.

A70-16007
ADAPTIVE TRAINING—AN APPLICATION TO FLIGHT SIMULATION.
Paul W. Caro, Jr. (George Washington University, Human Resources Research Office, Washington, D.C.).
(New England Psychological Association, Annual Meeting, Nov. 29, 30, 1968.)
Human Factors, vol. 11, Dec. 1969, p. 569-575. 11 refs.
Army-supported research.

Description of a synthetic flight training system for pilot training, and assessment of the rationale for the incorporation of adaptive training into this system. The selection of appropriate adaptive variables, techniques for error measurement and for providing feedback to trainees, and the adaptive logic employed are discussed. Z.W.

A70-16008
MODELS, MEASURES, AND JUDGMENTS IN SYSTEM DESIGN.
William B. Knowles, William J. Burger, Meredith B. Mitchell, Donald T. Hanifan, and Joseph W. Wulfeck (Dunlap and Associates, Inc.,

Santa Monica, Calif.).
Human Factors, vol. 11, Dec. 1969, p. 577-590.
Research sponsored by Dunlap and Associates; Contract No. Nonr-4314(00).

Discussion of some characteristics of analytical models in system design, noting the requirements for human performance data compatible with these models. Methods for obtaining human performance data for use in design models are considered. The use of expert judges to generate performance measures is reviewed. Two new studies are reported in support of the proposition that expert judgments may offer a practical method of obtaining performance measures with potentially wide application in analytical modeling efforts. Z.W.

A70-16020 * #
NOREPINEPHRINE-INDUCED DEPOLARIZATION OF BROWN FAT CELLS.
B. A. Horwitz, J. M. Horowitz, Jr., and R. Em. Smith (California, University, Dept. of Physiological Sciences and Dept. of Animal Physiology, Davis, Calif.).
National Academy of Sciences, Proceedings, vol. 64, Sept. 1969, p. 113-120. 16 refs.
PHS Grant No. HD-03268; Grant No. NGR-05-004-035.

Measurement in vivo of intracellular potentials of brown fat cells in lightly anesthetized cold-acclimated rats. The effects of adrenergic agonists and antagonists on these potentials are examined in an attempt to relate the electrical activity of the cells to the adrenergic-induced stimulation of brown fat thermogenesis. It is found that norepinephrine-induced electrical changes and the ensuing increase in brown fat thermogenesis appear to be causally independent and experimentally separable. M.M.

A70-16045 *
COMPUTER STUDY OF THE EFFECTS OF SMALL NONLINEARITIES IN THE ARTERIAL SYSTEM.
V. C. Rideout and J. B. Sims (Wisconsin, University, Dept. of Electrical Engineering, Madison, Wis.).
Mathematical Biosciences, vol. 4, 1969, p. 411-426. 7 refs.
Grant No. NGR-50-002-083.

Application of a mathematical approach based on perturbation techniques to show that a two-circuit scheme can be used to represent separately linear events and distortion products in a slightly nonlinear system. When this scheme is applied to a nonlinear transmission line with slight quadratic nonlinearities in its series inductance and shunt capacitance, it can be shown that cancellation of nonlinear harmonic production is possible for certain combinations of the nonlinear L and C. It can also be shown that the amplitude of harmonics produced by nonlinearities distributed along the line may increase with distance along the line away from the sinusoidal input. The second of these results suggested that some of the distal pressure peaking observed in the arterial system may be related to this result. The perturbation, or two-circuit, scheme was therefore used as a basis for a hybrid computer simulation study of the effects of small nonlinearities in the human arterial system. This study shows that the rather small nonlinearities in arterial wall compliances can contribute to the pressure peaking in the smaller arteries by an amount comparable to that resulting from characteristic impedance tapering effects in the purely linear case. (Author)

A70-16049 *
NEUROPHYSIOLOGICAL EFFECTS OF TETRODOTOXIN IN LATERAL GENICULATE BODY AND DORSAL HIPPOCAMPUS.
Dennis R. Hafemann, Anatol Costin, and Theodore J. Tarby (California, University, Los Angeles, Calif.).
Brain Research, vol. 12, 1969, p. 363-373. 20 refs.
NIH Grant No. MH-03708; Contract No. AF 49(638)-1387; Grants No. NsG-237-62; No. NGL-05-007-003.

Study of tetrodotoxin (TTX) effects on the electrical activity of the mammalian brain. Introduction of TTX into the lateral geniculate body (LGB) of the cat causes the amplitudes of flash-evoked potentials in the LGB and visual cortex to decrease in a predictable manner. Subsequently, the evoked potential amplitude returns to the initial level. M.V.E.

A70-16094
EYE MOVEMENT-RETINA DELAYED FEEDBACK.
Karl U. Smith, Vernon Putz, and Killian Molitor (Wisconsin, University, Behavioral Cybernetics Laboratory, Madison, Wis.).
Science, vol. 166, Dec. 19, 1969, p. 1542-1544. 10 refs.
Research supported by the U.S. Social and Rehabilitation Service and NSF.

Time delays between ocular movement and retinal input have been studied by yoking a visual target to eye movement by experimental programming methods and a laboratory real-time computer system. The subject's task was to manipulate this eye movement-yoked target cursor to perform either compensatory or pursuit eye tracking. The computer thereafter was programmed to store input eye-movement signals and read them out after a delay interval to control the yoked visual target cursor controlled by the eye movements. Delay time constants of 0.1 sec significantly affected tracking. Eye movement-retinal feedback delays appeared to have an even more marked effect on positive pursuit eye tracking. (Author)

A70-16101
THE EFFECT OF GLUCAGON ON THE CORONARY CIRCULATION IN MAN.
Nora Goldschlager, Erwin Robin, Charles M. Cowan, Georg Leb (Wayne State University, Detroit, Mich.), and Richard J. Bing (Huntington Memorial Hospital, Pasadena, Calif.).
Circulation, vol. 40, Dec. 1969, p. 829-837. 30 refs.
Research supported by the Michigan Heart Association, the American Medical Association, and the Detroit General Hospital Research Corp.; PHS Grant No. HE-05043.

Glucagon, 300 micrograms per minute, was infused intravenously over 15 min in 27 subjects. The patients were divided into three groups—patients without heart disease, patients with arteriosclerotic heart disease, and patients with congestive heart failure. Hemodynamic measurements included observations on myocardial blood flow using bolus injections of Rb-84 and a coincidence counting technique. Myocardial oxygen consumption was determined after coronary sinus intubation in nine of the 27 patients. Significant increases were noted in heart rate, mean arterial pressure, tension-time index/minute, and left ventricular work. Myocardial blood flow increased significantly while myocardial oxygen extraction remained constant suggesting that the augmentation in blood flow was sufficient to meet the increased myocardial demands for oxygen. The effects of glucagon on the coronary circulation resemble that of isoproterenol rather than norepinephrine without, however, leading to the production of arrhythmias seen with these catecholamines. (Author)

A70-16102 *
THE EFFECTS OF PROPRANOLOL ON CARDIAC CONDUCTION.
Walter D. Berkowitz, Andrew L. Wit, Sun H. Lau, Charles Steiner, and Anthony N. Damato (U.S. Public Health Service Hospital, Staten Island, N.Y.).
Circulation, vol. 40, Dec. 1969, p. 855-862. 26 refs.
NASA-supported research; NIH Grants No. HE-11829; No. HE-12536.

Study of the effects of propranolol on cardiac conduction in man using the technique of recording His bundle electrograms. The effects of propranolol, 0.1 mg per kg given intravenously, on atrioventricular (A-V) conduction and intraventricular conduction

were studied in eight patients. Atrial pacing was used to control the heart rate. His bundle electrograms were recorded, and the interval from the pacing impulse to the His bundle electrogram (P-H interval) was used as a measure of A-V conduction and the interval from the His bundle electrogram to the S wave (H-S interval) was used as a measure of intraventricular conduction. Propranolol significantly prolonged the P-H interval in every patient at all paced heart rates, and it had no effect on the H-S interval. G.R.

A70-16103 *
ULTRASOUND IN THE DIAGNOSIS AND EVALUATION OF THERAPY OF IDIOPATHIC HYPERTROPHIC SUBAORTIC STENOSIS.
Richard L. Popp and Donald C. Harrison (Stanford University, Palo Alto, Calif.).
Circulation, vol. 40, Dec. 1969, p. 905-914. 30 refs.
Research supported by the American Heart Association; NIH Grants No. HE-09058; No. HE-5709; No. HE-5866; Grant No. NGR-05-020-305.

Discussion of a study designed to explore the uses of cardiac echography in idiopathic hypertrophic subaortic stenosis (IHSS). Twenty patients with IHSS were studied with cardiac echography. Eight of these patients were studied during left heart catheterization. The echographic pattern of mitral valve motion during systole was altered in a characteristic manner when hemodynamically significant left ventricular outflow obstruction was present in the eight patients studied at catheterization. The abnormal systolic pattern was abolished by spontaneous loss of outflow obstruction or loss of obstruction induced by beta-adrenergic blockade. G.R.

A70-16104
LOCALIZATION OF THE SITE OF MYOCARDIAL SCARRING IN MAN BY HIGH-FREQUENCY COMPONENTS.
Nancy C. Flowers (U.S. Veterans Administration Hospital, Forest Hills, N.Y.), Leo G. Horan (Medical College of Georgia, Augusta, Ga.), W. J. Tolleson (Kennedy Veterans Administration Hospital), and J. R. Thomas (Tennessee, University, Memphis, Tenn.).
Circulation, vol. 40, Dec. 1969, p. 927-934. 21 refs.
Research supported by the Tennessee Heart Association and the Georgia Heart Association; NIH Grants No. HE-5586; No. HE-08861; No. HE-09495.

Study of the localization of the site of myocardial scarring in 130 subjects who has one or more sets of high-frequency, orthogonal ECG (XYZ) leads and direct-writing standard ECG leads recorded *ante mortem*. In each case careful dissection of the heart was performed. Correlations were made between the site of infraction and the occurrence of notching in specific high-frequency ECG leads. Postero-inferior infarctions tended to express themselves with a predominance of increased notching in the Y lead, while anterior infarction manifested dominantly in the X lead. This was true in intramural as well as transmural lesions. G.R.

A70-16105
ON-LINE ANALYSIS OF THE EXERCISE ELECTROCARDIOGRAM.
L. T. Sheffield, J. H. Holt, F. M. Lester, D. V. Conroy, and T. J. Reeves (Alabama, University, Birmingham, Ala.).
Circulation, vol. 40, Dec. 1969, p. 935-944. 21 refs.
Research supported by the Alabama Heart Association; PHS Grants No. HE-11310-01; No. 5M01-FR-00032-08.

A computer program has been developed which clarifies the distorted exercise ECG and performs desired measurements of it which are reported in the laboratory almost immediately, so that the program can be used as an aid to exercise test monitoring. We have introduced a new measurement of the ECG, the negative ST (-ST) integral, which, while unfamiliar to the eye, is readily performed by computer. A -ST integral value of 7.5 microvolt-sec during exercise served to separate a normal group from a group with angina pectoris. Strenuous exercise was often necessary to elicit positive responses in diseased subjects, and the graded exercise test was found well-suited for this purpose. Use of a computer program as an investigative instrument in its own right, rather than as a means of duplicating classical human measurements, shows promise for improving the diagnosis of ischemic heart disease. (Author)

A70-16123
OPEN-LOOP PORTABLE LIFE SUPPORT SYSTEM LIGHTENS CREW LOAD.
Daniel L. Curtis (Litton Systems, Inc., Space Sciences Center).
Space/Aeronautics, vol. 52, Dec. 1969, p. 68, 69, 71.

Description of an open-loop portable life support system which contains a "breathing vest" that is worn within the space suit. Weighing slightly over 8 oz, the breathing vest is responsible for reducing by a factor of four the amount of oxygen required to flow to the helmet. The new life-support system promises to perform fully as well as a more conventional, closed-loop system, although weighing only half as much and occupying only half as much space. G.R.

A70-16124
FLUID THERMAL ACTUATOR AIDS SPACECRAFT TEMPERATURE CONTROL.
B. A. Shepherd and K. R. Johnson (Radio Corporation of America, Astro-Electronics Div., Princeton, N.J.).
Space/Aeronautics, vol. 52, Dec. 1969, p. 71-73.

Description of a fluid thermal actuator that is the temperature sensor and prime mover for an active thermal controller in a spacecraft. The device consists of three major components: the drive system, including bellows and associated hardware to transform fluid expansion to linear motion; the adjustment system; and the reservoir. The design uses silicon fluid, because of its constancy of expansion coefficient and low vapor pressure. G.R.

A70-16126 *
CONCURRENT RESPONDING WITH FIXED RELATIVE RATE OF REINFORCEMENT.
D. Alan Stubbs (New York University, New York, N.Y.) and Stanley S. Pliskoff (Maine, University, Orono, Me.).
Journal of the Experimental Analysis of Behavior, vol. 12, Nov. 1969, p. 887-895. 9 refs.
NIH Grant No. 5 501 FR 05636; Grant No. NsG-450.

Study of the response of pigeons to concurrent variable-interval reinforcement schedules. Responding by pigeons on one key of a two-key chamber alternated the color of the second key, on which responding produced food according to a variable-interval schedule of reinforcement. It is found that relative overall rates of responding and relative times in the presence of a key color approximated the proportions of reinforcements obtained in the presence of that color, while relative local rates of responding changed little. Changeover rate is found to decrease as the proportions diverged from 0.50, and also to decrease as the delay or fixed ratio was increased. M.M.

A70-16127
REINFORCEMENT OF EYE MOVEMENT WITH CONCURRENT SCHEDULES.
Stephen R. Schroeder (North Carolina, University, Chapel Hill, N.C.) and James G. Holland (Pittsburgh, University, Pittsburgh, Pa.).
Journal of the Experimental Analysis of Behavior, vol. 12, Nov. 1969, p. 897-903. 18 refs.

Experimental investigation in which human macrosaccadic eye movements to two areas of a four-dial display were conditioned by concurrent variable-interval schedules of signals. Reinforcers were delivered to the two right-hand dials on one schecule and to the two left-hand dials on another, independent schedule. The results obtained suggest that for stimuli whose critical components are

arranged spatially, conditioned eye movements play an important part in selective stimulus control. M.M.

A70-16128 *
EFFECTS OF d-AMPHETAMINE ON OBSERVING BEHAVIOR IN THE SQUIRREL MONKEY.
Fogle C. Clark (North Carolina, University, Chapel Hill, N.C.).
Journal of the Experimental Analysis of Behavior, vol. 12, Nov. 1969, p. 977-987. 21 refs.
NIH Grants No. 1 R03 MH-14401; No. MH-05863; Grant No. NGR-15-002-001.

Experimental investigation in which four squirrel monkeys were trained to press a lever, which produced stimuli indicating availability or nonavailability of reinforcement for pushing a key. Food reinforcements were available for the key response at random intervals with an average rate of 1 per min. The results obtained are discussed in relation to previous findings regarding effects of amphetamines on operant behavior and on observing and monitoring performance. M.M.

A70-16129
THE SENSE OF TIME: AN ELECTROPHYSIOLOGICAL STUDY OF ITS MECHANISMS IN MAN.
Josef Holubár.
(Translation of Casový Smysl, Prague, State Medical Publishing House, 1961.)
Cambridge, Mass., MIT Press, 1969. 134 p. 343 refs.
$5.95.

Experimental studies of the psychological and physiological aspects of the sense of time are reviewed. The existence of a special sense of time is demonstrated by examples of temporally conditioned reflexes and the navigation of birds. A brief review of the psychological literature on the sense of time is presented, taking into account the methods of investigation, principal concepts, significance of the different factors, and the basis of the sense of time. The working hypothesis based on the biological and brain rhythms is formulated, and its experimental verification is discussed. The effect of flicker or photic stimulation on the EEG (i.e., photic driving or photic entrainment) in combination with temporal conditioning is studied in 29 human subjects. It is found that the intervals of temporally conditioned galvanic skin responses can be specifically altered by flicker in a manner that is determined by the relation between the rates of flicker and the frequency of the alpha rhythm. Z.W.

A70-16141
PHYSIOLOGICAL AND SUBJECTIVE REACTIONS TO DIFFERENT PHYSICAL WORK LOADS.
Marianne Frankenhaeuser, Birgitta Post, Bo Nordheden, and Hans Sjoeberg (Stockholm, University, Psychological Laboratories, Stockholm, Sweden).
Perceptual and Motor Skills, vol. 28, Apr. 1969, p. 343-349. 14 refs.
Research supported by the Swedisch Medical Research Council and Swedish Council for Social Science Research.

Catecholamine excretion, cardiovascular functions, and subjective effort were studied in ten healthy male subjects in a control condition and in three experimental sessions. In each session, five successive 6-min tests of either 150, 450, or 750 kpm/min were performed on a bicycle ergometer. Catecholamine-excretion rates remained close to control levels at the lower work loads, while the highest load induced a significant increase in both adrenaline and noradrenaline output. Heart rate, systolic pressure, and subjective effort increased consistently with increasing work load. (Author)

A70-16142
DISPLACEMENT OF APPARENT STRAIGHT AHEAD AS AN AFTEREFFECT OF DEVIATION OF THE EYES FROM NORMAL POSITION.
John N. Park (George Washington University, Human Resources Research Office, Washington, D.C.).
Perceptual and Motor Skills, vol. 28, Apr. 1969, p. 591-597. 15 refs.
Army-supported research.

Testing of Helmholtz's proprioceptive theory of apparent visual direction which predicts a displacement of egocentric straight ahead as an aftereffect of deviation of the eyes from normal frontal position. The 91 subjects selected from a line of lighted disks the one which appeared to be straight ahead; they fixated the eyes for 30 sec on a point in the line of disks which was either 30 deg from frontal position or at the most extreme position attainable. The subjects then returned the eyes to what seemed to be frontal position and selected the disk which appeared to be straight ahead. Ocular deviation produced as an aftereffect a displacement of apparent straight ahead which had a mean value of 3.12 deg and occurred in the same meridian and in the same direction as the eyes had been deviated. The amount of displacement was not significantly affected by the degrees of prior ocular deviation or by the orientation of the line of disks. M.M.

A70-16143
EFFECT OF REMOVING ACCELERATION CUES ON SENSING VEHICULAR VELOCITY.
Santo Salvatore (U. S. Public Health Service, Injury Control Research Laboratory, Washington, D.C.).
Perceptual and Motor Skills, vol. 28, Apr. 1969, p. 615-622. 9 refs.

Study of the effect of varying the sensory input (visual, auditory, kinesthetic, tactile and vestibular cues) on the perception of traveled velocity. A movie technique was developed to remove the effects of acceleration and to present controlled frontal and peripheral visual cues. The range of velocities was extended to 100 mph. It is concluded that the removal of the force sense feedback mechanism acts to reduce the ratio of the estimated to the presented or actual range of velocities. There is direct variation of the absolute error with velocity as the range is extended to include high speeds. Sensing of velocity based on peripheral visual stimulation appears to be more resistant to experimental artifacts, such as monotonous environment, fatigue, and the beta effect—apparent movement produced by an increase of illumination of part of the field—than frontal visual stimulation. (Author)

A70-16177
IDENTIFICATION OF DATA DISPLAY REQUIREMENTS IN COMMAND CONTROL.
John H. Proctor (Data Dynamics, Inc., Fort Walton Beach, Fla.).
IN: DISPLAYS FOR COMMAND AND CONTROL CENTERS; NATO, AGARD, SYMPOSIUM, MUNICH, WEST GERMANY, NOVEMBER 11-14, 1966, PROCEEDINGS. (A70-16176 05-11)
Edited by I. J. Gabelman.
Slough, England, Technivision Services (AGARD Conference Proceedings No. 23); Pelham, N.Y., Circa Publications, Inc., 1969, p. 1-13; Discussion, S. Sherr, p. 12, 13. 12 refs.

Description of command control systems in a way which characterizes them as problem-solving information processing systems. Systematic methods of identifying information requirements during the evolutionary development of a command control system are presented. Emphasis is placed on the necessity of specifying information requirements prior to the design of man-display partnerships. Five questions relating to display justification in command control are discussed within functional analysis and design techniques as they have been successfully applied to command control system development. The conclusion is reached that an orderly process of identifying data-display requirements facilitates the meaningful introduction of man-display partnerships into ongoing control activities. F.R.L.

A70-16298
COMBAT USE OF LIFE SUPPORT SYSTEMS IN SOUTHEAST ASIA.
Robert H. Shannon and Arthur N. Till, Jr. (USAF, Directorate of

Aerospace Safety, Norton AFB, Calif.).
Safe Engineering, vol. 3, Nov. 1969, p. 13-16.

Evaluation of some life-support systems and equipment items exposed to the combat environment. The combat use of aircrew life-support systems and equipment items in Southeast Asia during 1967 and 1968 is reviewed on the basis of data reported from 131 combat ejections. The distribution of combat ejections with respect to altitude, indicated airspeed, kind of landing terrain, survival duration time, and primary and secondary rescue aid is tabulated and discussed, as well as data on injury severity, causes of fatalities, causes of major injuries, difficulties encountered during and after ejection, helmet loss or retention, and kinds of survival equipment failure. The analysis is intended to provide the all-important basis for systems improvement programs. M.V.E.

A70-16325
USE OF HELICOPTERS IN THE CARE OF EMERGENCY PATIENTS (DER EINSATZ VON HUBSCHRAUBERN BEI DER VERSORGUNG VON NOTFALLPATIENTEN).
F. W. Ahnefeld and H. Böll (Ulm, Universität, Abteilung für Anästhesiologie, Ulm, West Germany).
Wehrmedizinische Monatsschrift, vol. 13, Dec. 1969, p. 329-334. In German.

From August 1967 to January 1969, the usefulness of helicopters in rescue service was studied by test flights. The results of these tests are presented. An extension and reorganization of the rescue car system (i.e., the right vehicles with the correct crew at the right location) is postulated. The second step is the formation of rescue centers with the possibility of a coordinated use of helicopters. It is suggested that further investigation and planning concerning the rescue service with helicopters be coordinated in a federal ministry. (Author)

A70-16379
ROD AND CONE CONTRIBUTIONS TO S-POTENTIALS FROM THE CAT RETINA.
Roy H. Steinberg (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Vision Research, vol. 9, Nov. 1969, p. 1319-1329. 41 refs.

Study of the problem of whether the rods contribute to S-potentials in the intact eye of the cat. S-potentials from luminosity units (L-units) were evoked by small spots of relatively monochromatic light in dark- and light-adapted retinae. The spectral sensitivity curve for dark-adapted S-potentials had its maximum at 500 nm and the form of dark-adapted responses also suggested that rods were excited. The spectral sensitivity curve for light-adapted S-potentials had its maximum at 560 nm and response latencies even at threshold were much faster than in dark-adaptation. Individual S-potentials exhibited Purkinje shifts. It is concluded that rhodopsin rods contribute to S-potentials (L-type) in the cat and that cones contribute to the same responses. (Author)

A70-16380
ROD-CONE INTERACTION IN S-POTENTIALS FROM THE CAT RETINA.
Roy H. Steinberg (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Vision Research, vol. 9, Nov. 1969, p. 1331-1344. 16 refs.

Study of rod-cone interaction in cat S-potentials by analyzing the effect of wavelength and intensity upon the form of dark-adapted responses. Flashes of white light and relatively monochromatic flashes produced responses that seemed to originate from the excitation of both receptor types. The rod response changed as a function of intensity, peaking at about 2.5 log above threshold and increasing in duration at 3.0 log above threshold. The cone response seemed in some way to add to the changing rod response. Voltage-log current curves showed that the rod responses reached a ceiling (initial peak voltage) at 3.5 log above threshold while the maintained voltage leveled off at a lower intensity. Both ceilings were obscured by the apparent addition of the cone contribution. Cone and rod responses to brief orange and blue lights of moderate intensity, separated in time, added together across a complete range of intervals. (Author)

A70-16381
THE ROD AFTER-EFFECT IN S-POTENTIALS FROM THE CAT RETINA.
Roy H. Steinberg (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
Vision Research, vol. 9, Nov. 1969, p. 1345-1355. 17 refs.

The relation of the rod after-effect to per cent rhodopsin bleached was studied in S-potentials from cat retina. At threshold, flashes that produced the rod after-effect bleached only very small quantities of rhodopsin, and at a fixed flash duration, the duration of the after-effect increased as a function of log intensity. The after-effect's threshold occurred at about the intensity which saturated the maintained voltage. With flash intensity fixed and flash duration increased, the duration of the after-effect was a linear function of exposure time. The duration continued to increase after an exposure of 16 sec, even though at least 99 per cent of the rhodopsin had been bleached. It is concluded that the after-effect originates from something that accumulates after the maintained voltage in rod pathways reaches a ceiling. The accumulation can continue at a fixed rate irrespective of the bleaching rate. (Author)

A70-16382
HUMAN CORTICAL CORRELATES OF COLOR WITH MONOCULAR, BINOCULAR AND DICHOPTIC VISION.
Nathan W. Perry, Donald G. Childers, and William W. Dawson (Florida, University, Visual Sciences Laboratory, Gainesville, Fla.).
Vision Research, vol. 9, Nov. 1969, p. 1357-1366. 30 refs.
PHS Grants No. NB-06654; No. NB-06875; No. NB-06635.

Five subjects (three normals, one amblyope and one deuteranope) were presented red (630 nm), yellow (577 nm), green (520 nm), and achromatic stimuli twice in all possible monocular and binocular combinations. Four averaged visual evoked responses (VERs) were simultaneously recorded over four scalp areas to reach stimulus condition, giving 224 VERs for each subject. Color coding was found in all normal subjects over a large scalp area above the occipital cortex and was questionable with the deuteranope. Most marked color coding (changes in waveshape of the VER produced by the different wavelengths) occurred late in the VER (more than 215 msec). It was possible to examine the contribution of each eye to the cortical response during binocular stimulation. (Author)

A70-16400 #
CIRCULATORY SYSTEM ANALYSIS BY A STOCHASTIC METHOD USING AN ANALOGUE CORRELATOR.
B. Szücs (Budapest, Technical University, Dept. of Automation, Budapest, Hungary) and E. Monos (Budapest, Medical University, Experimental Research Dept., Budapest, Hungary).
(International Federation of Automatic Control, Symposium on Technical and Biological Problems of Control, Yerevan, Armenian SSR, Sept. 24-28, 1968.)
Periodica Polytechnica, Electrical Engineering Series, vol. 13, no. 1-2, 1969, p. 91-104. 8 refs.

Investigation of the changes in mean arterial pressure and suprarenal blood flow in anesthetized dogs, manifested under basal conditions or elicited by stimuli applied upon both afferent and efferent nerves. The approximate transfer functions of the tested section of the circulatory system have been determined on an analog model. Properties of "useful" and "noise" components of the signals have been estimated. Stochastic methods were found to be very efficient in studies of the dynamic properties of the circulatory system. M.V.E.

A70-16449 *
DIMENSIONS OF THE APPARENT PUPIL WHEN VIEWED AT OBLIQUE ANGLES.
Richard F. Haines (NASA, Ames Research Center, Moffett Field, Calif.).
American Journal of Ophthalmology, vol. 68, Oct. 1969, p. 649-656. 10 refs.

Calculation of the correction factors required for estimating the influence of a reduction in entrance pupil area on the level of retinal illumination. The dimensions of the apparent pupil under conditions which produce extremes in its size are determined. It is shown that it is relatively inaccurate to use the cos θ curve to predict the ratio of apparent horizontal to apparent vertical dimension when the eye is viewed at oblique angles. V.P.

A70-16477 *
MICROORGANISMS, ALIVE AND IMPRISONED IN A POLYMER CAGE.
S. J. Updike, D. R. Harris, and E. Shrago (Wisconsin, University, Medical School, Dept. of Medicine, Madison, Wis.).
Nature, vol. 224, Dec. 13, 1969, p. 1122, 1123. 5 refs.
PHS-NASA-supported research.

Description of a nontoxic method of immobilizing microorganisms, such as protozoan *Tetrahymena pyriformis* and the bacterium *Escherichia coli*, in acrylamide polymers. In the immobilization procedure, stock solutions of 50 per cent acrylamide and 3.0 per cent methylenebisacrylamide were used in the growth medium of microorganisms. Several experiments are carried out for determining the viability of the entrapped microorganisms. Z.W.

A70-16487
LINEAR AND NONLINEAR MODELS OF THE HUMAN CONTROLLER.
B. R. Gaines (Essex, University, Dept. of Electrical Engineering Science, Colchester, Essex, England).
International Journal of Man-Machine Studies, vol. 1, Oct. 1969, p. 333-360. 110 refs.

Review of recent studies of the human controller both in psychology and in control engineering. Theoretical and technological problems in the study of skilled behavior are discussed, and the desirable constraints upon any "model" are outlined. The foundations of linear continuous modelling of the human controller and experimental data on the validity and utility of linear models are reviewed. The evidence for nonlinear and discontinuous behavior in the human controller is outlined, and studies of nonlinear models based on modern optimal and sampled-data control theory are presented. (Author)

A70-16492 #
NASAL AND ORAL BREATHING IN HYPERVENTILATION DUE TO WORK (RESPIRAZIONE PER VIA NASALE OD ORALE NELLA IPERVENTILAZIONE DA LAVORO).
F. Saibene, P. Mognoni, and G. Rotondo (CNR, Centro di Fisiologia del Lavoro Musculare; Istituto Medico-Legale per l'Aeronautica Militare, Milan, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 32, July-Sept. 1969, p. 329-339. 8 refs. In Italian.

Determination of the ventilation value at which transition is made from exclusively nasal breathing to oronasal breathing, and investigation of the effect of nasal breathing on gaseous exchanges. It was found that the difference in ventilation between nasal and oronasal breathing is 14.5 per cent and is significant. Assuming an increase in ventilation of dead space of 1 liter/min on transition to oronasal breathing, the difference in alveolar ventilation between nasal and oronasal breathing can be calculated at 5.8 liter/min. M.M.

A70-16493 #
ACUTE HYPERBARIC OXYGENATION—EFFECTS ON PLASMA K^+ AND Na^+ AND ON THE TRANSAMINASES GOT AND GPT IN RATS SUBJECTED TO 3 ATA OF OXYGEN (L'OSSIGENAZIONE IPERBARICA ACUTA—EFFETTI SUL K^+ E Na^+ PLASMATICI E SULLE TRANSAMINASI GOT E GPT IN RATTI SOTTOPOSTI A 3 ATA DI O_2).
S. Cifaldi, C. Vacca, V. Izzo, and G. Marone (Napoli, Università, Istituto di Fisiologia Umana; Istituto Medico-Legale per l'Aeronautica Militare, Naples, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 32, July-Sept. 1969, p. 340-350. 5 refs. In Italian.

Investigation of the effects of hyperbaric oxygenation in sets of ten albino rats by examining the plasma behavior of the transaminases GOT and GPT and of the Na^+ and K^+ electrolytes. The experimental results show that hyperbaric oxygenation changes the permeability of cellular membranes, particularly in the case of the electrolyte K^+, confirming the findings of previous investigations carried out in rabbits. M.M.

A70-16494 #
RESULTS OF A MEDICAL INVESTIGATION OF AIR TRANSPORTATION OF ITALIAN PARATROOPERS (RISULTATI DI UN'INCHIESTA SANITARIA SUL TRASPORTO PER VIA AEREA DI PARACADUTISTI ITALIANI).
P. Rota (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 32, July-Sept. 1969, p. 351-366. In Italian.

Quantitative evaluation of the conditions of efficiency of airborne military paratroopers with regard to the carrying out of their mission. On the basis of the questionnaire data collected, comments are made on the operational efficiency during the different stages of the mission, as related to habits of life, state of health, weather conditions, and flying and parachuting experience. M.M.

A70-16495 #
PERIPHERAL ARTERIAL PIEZOGRAM—CLINICAL AND FUNCTIONAL EVALUATION FOR SCREENING AND CHECKUP (IL PIEZOGRAMMA ARTERIOSO PERIFERICO—VALUTAZIONE CLINICO-FUNZIONALE IN TEMA DI SELEZIONE E CONTROLLO).
E. Busnengo (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 32, July-Sept. 1969, p. 367-375. 16 refs. In Italian.

Description of the practical applications of peripheral arterial piezography as a cardiological laboratory technique for the clinical and functional evaluation of the cardiovascular system. Stress is placed on the particular importance that arterial piezography can assume in the field of aviation medicine both during screening tests and in checkups of flying personnel. M.M.

A70-16496 #
UNIFORMITY OF INTRAPULMONARY DISTRIBUTION OF INHALED AIR STUDIED WITH THE SINGLE-BREATH METHOD (L'UNIFORMITA DI DISTRIBUZIONE INTRAPOLMONARE DELL'ARIA INSPIRATA STUDIATA COL METODO DEL RESPIRO SINGOLO).
G. Janigro (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 32, July-Sept. 1969, p. 376-395. 12 refs. In Italian.

Investigation of the uniformity of intrapulmonary distribution of inhaled gases with the single-breath technique proposed by Comroe and Fowler (1951) in 32 subjects between 14 and 64 years of age. The increase in nitrogen concentration in the alveolar air breathed out throughout the expiration phase was used as an index

of the nonuniformity of the ventilation distribution, in addition to the index suggested by Comroe et al. (1967). In healthy subjects the value of the index did not exceed 4 per cent following Comroe's method, and 20 per cent following the method proposed by the author. In the patients examined, the values yielded by the two methods were always above the ones indicated. These values are proposed by the author as limits between normal and pathological subjects. M.M.

A70-16497 #
SOME PROBLEMS OF FORENSIC MEDICINE IN THE FIELD OF AVIATION–MEDICAL INVESTIGATION IN FLIGHT ACCIDENTS (SU ALCUNI PROBLEMI DI MEDICINA LEGALE APPLICATI AL CAMPO AERONAUTICO–L'INDAGINE MEDICA NEGLI INCIDENTI DI VOLO).
G. Paolucci (Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 32, July-Sept. 1969, p. 396-405. In Italian.

Brief survey of some medicolegal problems in the field of aviation, specifically those connected with flight accidents. Aspects of the investigation, of the examination of victims, and of the human factor, which are basic in all investigations of flight accidents, are discussed. M.M.

A70-16574
MICROBIOLOGICAL EVALUATION OF THE VACUUM PROBE SURFACE SAMPLER.
Norman J. Petersen and Walter W. Bond (National Communicable Disease Center, Phoenix, Ariz.).
Applied Microbiology, vol. 18, Dec. 1969, p. 1002-1006. 5 refs.

Microbiological evaluation of a slightly modified version of the vacuum probe, a new device for surface sampling. The probe proved to be an effective sampling device, removing 98 per cent and recovering 88 per cent of surface contaminants resulting from the accumulation of airborne microorganisms. The probe was decidedly less effective in removing and recovering handling contamination than fallout contamination. There was also evidence that certain microorganisms could not survive prolonged exposure to airflow in the probe. However, the vacuum probe procedure recovered twice as many microorganisms as did the swab-rinse technique when compared directly. (Author)

A70-16624
NONSPECIFIC INFLUENCES ON NEURONAL FIRING IN THE CENTRAL VISUAL PATHWAY.
V. G. Skrebitskii (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR).
Experimental Brain Research, vol. 9, no. 4, 1969, p. 269-283. 42 refs.

A microelectrode investigation of 287 units in the visual cortex (VC) of chronic, semirestrained rabbits shows that about 40 per cent of the neurons react to different arousing nonvisual stimuli (acoustic, electrocutaneous, and reticular). These reactions are nonspecific, they become extinguished by stimulus repetition, and bear a certain relation to the electrocortical arousal reaction. The nonspecific inhibitory influence is more common in the VC during sensory or reticular arousal. In approximately 75 per cent of the neurons, spontaneous activity and photically evoked discharges are inhibited, whereas in approximately 25 per cent they are facilitated. In the lateral geniculate body, facilitation of spontaneous and photically evoked neuronal discharges prevails during sensory arousal. The mechanisms and the functional role of these nonspecific influences are discussed. (Author)

A70-16625
IMPAIRED DISCRIMINATION FOLLOWING POLARISATION OF THE STRIATE CORTEX.
Roger Ward and Lawrence Weiskrantz (Cambridge University, Cambridge, England).
Experimental Brain Research, vol. 9, no. 4, 1969, p. 346-356. 31 refs.

Two rhesus monkeys were trained to solve a problem involving the recognition of tachistoscopically presented objects. Performance at this task was impaired by the passage of surface-positive polarizing currents through the striate cortex: the impairment persisted after current was turned off, decaying in a reasonably exponential manner with a time constant of about 20 min. The magnitude of the impairment varied both with the intensity of the applied current and with the duration of application. (Author)

A70-16632
MAN IN SPACE.
D. H. Howle (RCA, Princeton, N.J.).
IN: THE SPACE ENVIRONMENT. (A70-16626 05-30)
Edited by N. H. Langton.
New York, American Elsevier Publishing Co., Inc. (Space Research and Technology. Volume 1), 1969, p. 170-231.

Discussion of the requirements of manned space flight. Factors which are either essential or desirable in maintaining man alive, healthy, and able to carry out the tasks required of him during journeys in space are considered. The basic requirements connected with the provision of a cabin atmosphere suitable both in composition and pressure to maintain life are examined, together with the matter of food and water supplies and the disposal of waste products. Other aspects of environmental conditioning for space, such as temperature control, energy supply, and protection against radiation, are treated. M.M.

A70-16663 #
MODEL REPRESENTATION OF THE REGULATORY PRINCIPLES OF THE HUMAN ORGANISM. II–DIURNAL AND SEASONAL VARIATIONS OF MORTALITY DUE TO CARDIAC AND CIRCULATORY FAILURE (MODELLVORSTELLUNG ÜBER REGULATIONSPRINZIPIEN DES MENSCHLICHEN ORGANISMUS. II–TAGES- UND JAHRESZEITLICHE VARIATIONEN DER MORTALITÄT DURCH HERZ-KREISLAUF-VERSAGEN).
L. Klinker and W. Leidreiter (Meteorologischer Dienst, Forschungsinstitut für Bioklimatologie, Berlin, East Germany).
Zeitschrift für Meteorologie, vol. 21, no. 3-4, 1969, p. 88-93. 14 refs. In German.

Discussion of a model which represents the principles of regulation of the human organism, including the effects of daylight on this regulation, taking into account a self-excited single diurnal oscillation of the vegetative system. The model is based on concepts developed by Klinker (1968). The existence of two cycles which control human regulation is assumed. Diurnal and seasonal variations of mortality are examined to verify the predictions of the model. G.R.

A70-16668
SOME METHODOLOGICAL ASPECTS OF SYSTEMATIC CATEGORIZATION OF BEHAVIOR.
Guillermo F. Mascaro (Florida, University, Gainesville, Fla.).
Perceptual and Motor Skills, vol. 28, June 1969, p. 779-784. 12 refs.

Analysis of some of the research problems arising from studies using observational methods, including recommendations of procedures that might be used for effective solutions. A number of categorization systems are described, and problems of estimating validity and reliability of coding are discussed. M.M.

A70-16669
EFFECT OF HEAD MOVEMENT IN VISUAL-KINESTHETIC LOCALIZATION.
A. V. Churchill (Defence Research Establishment, Toronto, Canada).
Perceptual and Motor Skills, vol. 28, June 1969, p. 785, 786.

The results of a previous experiment showed that visual

estimates of kinesthetic localization and kinesthetic estimates of visual localization were equally accurate, but with errors in opposite directions, when the subject was free to move his head. The present experiment was designed to measure the contribution of head movement to the accuracy of visual and kinesthetic localization. Results indicate that performance is equivalent under the free-head and fixed-head conditions. (Author)

A70-16670
PREFERENCE FOR CONSISTENT AND INCONSISTENT INFORMATION IN IMPRESSION FORMATION.
Clyde Hendrick (Kent State University, Kent, Ohio).
Perceptual and Motor Skills, vol. 28, June 1969, p. 877, 878.

Attempt to extend Dustin and Baldwin's (1966) model of impression formation to sets of six traits. Subjects rated the probability that three undesirable traits (U) would describe a person, given that he possessed three desirable traits (D). Subjects then rated their liking for the person, assuming that he actually did possess all six traits. The results showed a curvilinear relationship between probability ratings and liking ratings, thus only partially supporting the model. When the perceived relation between D and U traits was relatively improbable, the greater the improbability, the greater the liking. When the perceived relation was relatively probable, the greater the probability, the greater the liking. The results supported both a need for novelty and a need for consistency. (Author)

A70-16671
A NEW THEORY OF POST-REST UPSWING OR "WARM-UP" IN MOTOR LEARNING.
H. J. Eysenck (Institute of Psychiatry, London, England).
Perceptual and Motor Skills, vol. 28, June 1969, p. 992-994. 16 refs. Research supported by the Maudsley and Bethlem Royal Research Fund.

Postrest upswing in motor learning is traditionally explained in psychological terms—i.e., either as a regaining of "set" or as extinction of conditioned inhibition. It is suggested that physiological evidence points to an alternative, namely a true "warming-up" of the muscles involved in the work under consideration. The hypothesis is shown to explain certain otherwise puzzling features of "warm-up" in pursuit rotor performance. (Author)

A70-16672
HYPOXIA AND SELF-PACED WORK.
Martin J. Gerben and Joyce L. House (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.).
Perceptual and Motor Skills, vol. 28, June 1969, p. 995-1002. 15 refs.

Nine soldiers were required to perform a fixed amount of work on a bicycle ergometer during each of 18 sessions. Subjects were allowed to determine their own schedules of work and rest. Subjects breathed air during the first nine sessions (training). During the second nine sessions (experimental), subjects breathed 21, 14, or 12 per cent oxygen. Results indicated that subjects paced themselves by stopping rather than changing their rate of pedaling. Training reduced the number of stops per session, while hypoxia had the opposite effect. (Author)

A70-16673
EFFECT OF PERSPECTIVE ON TWO TRAPEZOID ILLUSIONS.
Robert Zenhausern (Fordham University, New York, N.Y.).
Perceptual and Motor Skills, vol. 28, June 1969, p. 1003-1009. 9 refs.

A new perceptual illusion, the perception of rotation with an oscillating trapezoid, was compared with an older, similar illusion, the perception of oscillation with a rotating trapezoid. Perspective was found to have a differential effect on the two phenomena. In addition, a negative correlation was found between the magnitudes of the two illusions. (Author)

A70-16674
EFFECTS OF STANDARDIZED ERGOMETER TRAINING PROGRAM AT THREE DIFFERENT ALTITUDES.
H. Roskamm, F. Landry, L. Samek, M. Schlager, H. Weidemann, and H. Reindell (University Hospital, Freiburg im Breisgau, West Germany).
Journal of Applied Physiology, vol. 27, Dec. 1969, p. 840-847. 20 refs.

Study of the effects of a standardized ergometer training program at sea level and at simulated altitudes of 2250 and 3450 m, respectively. Eighteen students were trained daily on a bicycle ergometer six times a week, for a period of four weeks. Derived individual training heart rate was established: heart rate at rest, plus 70 per cent of the difference between the heart rate at rest and that achieved during maximum exercise. The results obtained are interpreted as further evidence of the fact that hypoxia plays a potentiating role in the effects of physical training on the human organism. G.R.

A70-16675 #
ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION.
George H. Cohen and William K. Brown (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Journal of Applied Physiology, vol. 27, Dec. 1969, p. 858-862. 27 refs.

Ten normal volunteers were exposed to positive headward accelerations under control conditions, after breathing of 100 per cent oxygen, and after administration of propranolol, a beta-adrenergic blocking agent. All subjects were monitored with an electrocardiographic system capable of recording six simultaneous leads. A consistent pattern of increased p-wave amplitude in II, III, and AVF and T-wave flattening or inversion in II, III, AVF, and V_4-V_6 were noted. These changes could not be prevented by having the subjects breathe 100 per cent oxygen. Administration of propranolol completely normalized the electrocardiogram during prolonged positive headward acceleration. The observations support the conclusion that the electrocardiographic changes noted are a reflection of increased sympathetic tone similar to that noted during orthostasis. No evidence is noted supporting the presence of myocardial ischemia during prolonged positive headward acceleration. (Author)

A70-16702 *
IMMEDIATE AND FUTURE CHALLENGES TO CONTAMINATION CONTROL TECHNOLOGY.
George Ervin (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 3, 4.

Discussion of challenges to biological contamination control of spacecraft intended for planetary exploration missions. It is emphasized that most of the immediate challenges seem to be in the area of better equipment or procedures, and that one of the major future challenges is to learn to apply the technology to a broader base. The need for better particulate monitoring equipment and for better cleaning procedures is stressed. M.M.

A70-16703 *
MONITORING FOR PARTICLE CONTAMINATION ON SURFACES WITH THE VACUUM PROBE SAMPLER.
W. J. Whitfield and M. E. Morris (Sandia Laboratories, Albuquerque, N.Mex.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH,

NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 23-26. 7 refs.
Contract No. NSR-09-019-040.

Description of a device which may be used to monitor surfaces for particle contamination. The device which has been developed is known as a vacuum probe and is designed for use on surfaces within clean environments, such as clean rooms and clean benches. The vacuum probe is capable of removing particles down to one micron size at efficiencies up to 95 per cent. Particle enumeration may be done manually when captured on a membrane filter or automatically when a high-rate particle counter is connected in line with the vacuum probe. (Author)

A70-16704
A MICROBIOLOGICAL EVALUATION OF THE VACUUM PROBE SURFACE SAMPLER.
Norman J. Petersen and Walter W. Bond (National Communicable Disease Center, Phoenix, Ariz.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 27-29.

Evaluation of a vacuum probe used to remove microbial contamination from a surface and to capture the microorganisms on a membrane filter. The vacuum probe proved to be an effective device for sampling surface contamination resulting from the accumulation of airborne microorganisms. The 98 per cent removal and 88 per cent recovery demonstrated in this study compared favorably with the 89 per cent removal and 67 per cent recovery reported in preliminary tests. The vacuum probe procedure recovered twice as many microorganisms as did the swab-rinse technique when compared directly. M.M.

A70-16705
PROCEDURES FOR THE MICROBIOLOGICAL EXAMINATION OF SPACE HARDWARE—NASA'S CURRENT EDITION.
Martin S. Favero (National Communicable Disease Center, Phoenix, Ariz.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 33-37. 33 refs.

General description of the rationale and development of the current microbiological assay procedures used in the field of spacecraft sterilization. The types of microorganisms found on Surveyor 7 are tabulated. This type of pattern is typical for most spacecraft. When environmental controls are relaxed, there is a marked increase in microorganisms originating from soil and dust, such as bacterial spore formers, molds, and actinomycetes. M.M.

A70-16708 *
STERILE ACCESS STUDIES IN THE PILOT ASSEMBLY STERILIZER SYSTEM (PASS).
Franklin H. Farmer and Richard M. Hueschen (NASA, Langley Research Center, Hampton, Va.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 63-66.

Description of feasibility studies of a full-scale sterile access system, using the pilot assembly sterilizer system (PASS). PASS is basically a glove-box system consisting of four major units. The results obtained indicate that this type of sterile access system can meet the stringent contamination control requirements of the Planetary Quarantine Program and still allow operations necessary to the assembly, checkout, repair, and/or recycle of a sterile spacecraft. M.M.

A70-16709 *
SOME LESSONS LEARNED IN CLEAN ROOM DESIGN.
G. F. Weber (California Institute of Technology, Jet Propulsion Laboratory, Plant Engineering Div., Pasadena, Calif.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 73, 74.

Discussion of experience gained in a research and development program for clean rooms. Problems experienced in connection with dampers, high-pressure blowers, dry steam humidifiers of the supporting bio-lab facilities, and HEPA filters are discussed. Lessons learned on the current state of the art of epoxy floor coverings are described. M.M.

A70-16710
THE IBM CLEAN ROOM COMES OF AGE.
Harvey Heuring and E. Wayne Davis, Sr. (IBM Federal Systems Div., Huntsville, Ala.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 75, 76.

Discussion of problems encountered in the building of a clean room complex. The complex consists of the quality control analysis laboratory, the main cleaning room, the preclean room, and the airlock. With this complex, it is possible to keep a continuous flow of work moving through the system. Tubing and fittings arrive at the preclean room exposed, oily, and otherwise contaminated, and enter the clean room in a nearly spotless condition. Final cleaning and testing are performed, and the clean packaged parts are sent on their way to the clean assembly area. The area has been in continuous operation for 12 months with no shutdowns. Overall performance by the complex has been more than satisfactory. M.M.

A70-16711
MICROBIAL CONTAMINATION DETECTED ON THE APOLLO 9 SPACECRAFT.
John R. Puleo, Gordon S. Oxborow, and Richard C. Graves (National Communicable Disease Center, Cape Kennedy, Fla.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 80-83. 9 refs.

Determination of the levels and general types of microbial contamination present on the Apollo 9 spacecraft, and description of the related effects of the various test and assembly environments. The results obtained showed that the levels of microbial contamination were relatively low, but higher than the levels detected on the automated lunar spacecraft. Variations in the contamination levels at different sampling periods could have been due to differences in environmental control. M.M.

A70-16712
CONTAMINATION CONTROL CASE BOOK.
K. C. Halliday and F. B. Terry (Bendix Corp., Teterboro, N.J.).

IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 95-106. 51 refs.

Description of methods by which actual sources of contamination were traced, giving specific examples, such as ball bearing contamination, relay contact failure, internal fogging of instrument windows, corrosion in electronic circuitry, and air-conditioning system problems. The specific cases are chosen to represent the widest possible range of analytical techniques. A literature survey is very much a part of any organized investigation, and references are made to general and specific chemical literature, where such is pertinent. The work is illustrated with photographs of contamination specimens taken during various stages of investigations. It is shown that any significant contamination is closely related to the actual manufacturing operations, and that improvements in such will generally improve the reliability of the product. (Author)

A70-16713
CONSIDERATIONS FOR CONTAMINATION CONTROL.
Harry J. Marx (Grumman Aerospace Corp., Bethpage, N.Y.).
IN: AMERICAN ASSOCIATION FOR CONTAMINATION CONTROL, ANNUAL TECHNICAL MEETING AND EXHIBIT, 8TH, NEW YORK, N.Y., MAY 19-22, 1969, PROCEEDINGS. (A70-16701 05-03)
Boston, American Association for Contamination Control, 1969, p. 107-109.

Discussion of criteria followed for teamwork operation in contamination control. Procedures and processes adopted to ensure the cleanliness of components are examined in connection with specific examples. Some of the areas that must be considered for an effective program in contamination control are touched upon in digest form. M.M.

A70-16721 #
HOMO SAPIENS ON THE WINGS AND THE CARDIOLOGIST.
Dirk Durrer (International Academy of Aviation Medicine, Brussels, Belgium).
International Congress of Aerospace Medicine, 18th, Amsterdam, Netherlands, Sept. 15-18, 1969, Paper. 7 p. 14 refs.

Review of the increasing importance of cardiology to commercial aviation medicine. The conservative 20 per cent estimate given for moderate and advanced arteriosclerosis in the 20- to 50-year pilot age group has to be at least doubled for the 40- to 50-year age group. On the other hand, the 50- to 59-year age group among pilots is expected to increase from 10.3 per cent in 1967 to 40.7 per cent in 1987, while the stress of flight operation is likely to grow only with the advent of the jumbo jet and SST. Furthermore, present crew organization places the main burden upon the oldest, most experienced pilot—the captain. In the light of all this, the magnitude of the cardiologist's part in the prophylactic, flight-safety ensuring, risk-minimizing functions of commercial aviation medicine is self-evident. An analysis is made of the influence of the flying task upon circulation, the physiological significance of the pulse rate increase, emotions and the circulatory response in pilots, the pilot-cooperation problem, the passenger and the jumbo jet, and time displacement and biological rhythm. M.V.E.

A70-16861 #
HUMAN SUSCEPTIBILITY TO WEAK MAGNETIC FIELDS (PRO SPRIIMANNIA LIUD'MI SLABKIKH MAGNITNIKH POLIV).
V. M. Mikhailovs'kii, M. M. Krasnogors'kii, K. S. Voichishin, L. I. Grabar, and V. M. Zhegar' (Akademiia Nauk Ukrains'koi RSR, Fiziko-Mekhanichnii Institut, Kharkov, Ukrainian SSR).
Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B—Geologiia, Geofizika, Khimiia i Biologiia, vol. 31, Oct. 1969, p. 929-933. 8 refs. In Ukrainian.

Experimental investigation showing that at least some people are capable of sensing weak fluctuations in geomagnetic field intensity. The perceptible fluctuations in geomagnetic field intensity lie in the frequency range between 0.01 and 2 Hz. V.P.

A70-16947 *
CRYSTALLINE TRANSFER RNA—THE THREE-DIMENSIONAL PATTERSON FUNCTION AT 12-ANGSTROM RESOLUTION.
Sung-Hou Kim and Alexander Rich (MIT, Cambridge, Mass.).
Science, vol. 166, Dec. 26, 1969, p. 1621-1624. 13 refs.
NIH-NSF-NASA-supported research.

An orthorhombic form of crystalline formylmethionine transfer RNA has been obtained which contains one molecule as the asymmetric unit of the unit cell. Three-dimensional X-ray diffraction data have been collected up to a resolution of 12 Å, and from this a Patterson function has been calculated. The function contains an elongated ridge of interatomic vectors parallel to the c-axis of the crystal. Analysis of the function suggests that the molecules are elongated and dimerized in an overlapping antiparallel fashion along the c-axis. The dimer has a length near 109 Å and a width of 35 Å in one direction. The individual molecular length is approximately 80 Å with an irregular cross section measuring 25 by 35 Å. (Author)

A70-16948 *
CYTOSINE TO THYMINE TRANSITIONS FROM DECAY OF CYTOSINE-5-^{3}H IN BACTERIOPHAGE S13.
Fred Funk and Stanley Person (Pennsylvania State University, University Park, Pa.).
Science, vol. 166, Dec. 26, 1969, p. 1629-1631. 11 refs.
NSF Grant No. GB-4485; Grant No. NGR-39-009-008.

Decay of cytosine-5-^{3}H incorporated into bacteriophage S13 DNA causes a molecular rearrangement of the cytosine molecule undergoing the decay. The molecular rearrangement produces a cytosine to thymine coding change with an efficiency approaching one. Decay of either thymidine-(methyl)-^{3}H or cytosine-6-^{3}H is less than 1 per cent as effective in causing either cytosine to thymine or thymine to cytosine transitions. (Author)

A70-16967 #
INTELLECTUALITY OF THE PILOT AND COSMONAUT (INTELLEKTUAL'NOST' LETCHIKA I KOSMONAVTA).
I. Akulinichev.
Aviatsiia i Kosmonavtika, Nov. 1969, p. 36, 37. In Russian.

Investigation of the psychological factors involved in the training and education of pilots and astronauts to ensure optimal matching between the human operator and the vehicle control system. The problem of selecting the most appropriate candidates is considered from the viewpoint of recall ability, the capacity of self-learning, and other intellectual measures. Intellectual levels are considered, along with possible limitations of the human mind. T.M.

A70-17089
CONTROL PROBLEMS IN VTOL AIRCRAFT TAKING PARTICULAR ACCOUNT OF MAN AS A LINK IN THE CONTROL LOOP. II (REGELUNGSPROBLEME BEI VERTIKALSTARTERN UNTER BESONDERER BERÜCKSICHTIGUNG DES MENSCHEN ALS REGELKREISGLIED. II).
G. Schweizer (Dornier-System GmbH, Friedrichshafen, West Germany) and R. Staufenbiel (Vereinigte Flugtechnische Werke GmbH, Bremen, West Germany).
Luftfahrttechnik Raumfahrttechnik, vol. 15, Dec. 1969, p. 303-310. In German.

Study of the means of improving control characteristics in VTOL aircraft. The various possibilities of phase lead generation, the stabilization systems applicable to VTOL aircraft, and the means usable in controlling translational motions during transition from hovering to aerodynamic flight are evaluated as aids toward better flight characteristics and man-machine interaction. A review of

solutions to problems of matching stabilization systems with flight control systems is presented, taking into account reliability factors in flight-control and automatic-control systems. M.V.E.

A70-17109
THE HYPOTHETICAL BIOSPHERE OF MARS.
K. A. Liubarskii.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 3-9.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 167-172. 24 refs. Translation.
(For abstract see issue 22, page 3876, Accession no. A69-40271)

A70-17110
EXAMINATION OF THE MATHEMATICAL MODEL OF THE LIFE SUPPORT SYSTEM.
V. A. Darg and B. G. Kovrov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 10-14.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 173-176. Translation.
(For abstract see issue 22, page 3892, Accession no. A69-40272)

A70-17111
BIOLOGICAL EFFECTIVENESS OF MYCELIUM OF THE CHANTERELLE CANTHARELLUS CIBARIUS FR. AND ITS UTILIZATION AS A FOODSTUFF.
A. Torev and D. Toreva.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 14-16.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 177, 178. Translation.
(For abstract see issue 22, page 3892, Accession no. A69-40273)

A70-17113
SURVIVAL OF CHLORELLA IN CONTINUOUS CULTURING AFTER A SINGLE γ-IRRADIATION.
I. S. Sakovich and L. K. Vekshina.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 24-27.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 185-187. 10 refs. Translation.
(For abstract see issue 22, page 3876, Accession no. A69-40275)

A70-17114
INFLUENCE OF LOCAL STRESS EFFECT ON IMMUNOCOMPETENT CELLS.
V. Ia. Ganina and K. A. Lebedev.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 37-41.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 196-199. 9 refs. Translation.
(For abstract see issue 22, page 3877, Accession no. A69-40277)

A70-17115
DEVELOPMENT AND PROLONGATION OF ARTIFICIAL HYPOBIOSIS IN RATS.
L. L. Marfina, L. A. Karaseva, and N. N. Timofeev.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 41-48.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 200-205. 14 refs. Translation.
(For abstract see issue 22, page 3877, Accession no. A69-40278)

A70-17116
RELATION BETWEEN THE CHANGES IN THE CEREBELLAR CORTEX ACTIVITY OF WHITE RATS AND THE ACCELERATION APPLIED.
L. D. Klimovskaia and N. P. Smirnova.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 48-53.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 206-209. Translation.
(For abstract see issue 22, page 3877, Accession no. A69-40279)

A70-17117
INVESTIGATION OF THE PERFORMANCE OF THE MAN-OPERATOR DURING 64-HOUR CONTINUOUS WORK.
R. M. Baevskii, G. A. Berezina, B. A. Dushkov, F. P. Kosmolinskii, V. I. Kudriavtseva, T. D. Semenova, and S. A. Cherniaeva.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 53-61.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 210-216. 6 refs. Translation.
(For abstract see issue 22, page 3877, Accession no. A69-40280)

A70-17118
BIOLOGICAL PRINCIPLES OF THE CONSTRUCTION OF HUMAN OPERATOR SENSORIMOTOR ACTIVITY MODELS.
A. M. Volkov and A. K. Popov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 61-65.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 217-220. Translation.
(For abstract see issue 22, page 3892, Accession no. A69-40281)

A70-17119
MODELLING OF THE OPTIC DISTANCE PERCEPTION IN VERTICALLY TAKING-OFF AND LANDING AIRCRAFT.
Ia. Ia. Belik.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 66-70.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 221-225. Translation.
(For abstract see issue 22, page 3892, Accession no. A69-40282)

A70-17120
CHRONOTROPIC REACTION OF THE HUMAN HEART UNDER THE ACTION OF ACCELERATION.
E. P. Tikhomirov.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 71-75.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 226-229. 16 refs. Translation.
(For abstract see issue 22, page 3877, Accession no. A69-40283)

A70-17121
POSSIBILITY OF USING AN ARTIFICIAL ATMOSPHERE WITH VARIABLE GAS COMPOSITION IN PRESSURIZED CABINS.
A. M. Genin, E. Ia. Shepelev, V. B. Malkin, A. D. Voskresenskii, I. G. Krasnykh, E. V. Loginova, D. G. Maksimov, M. F. Fomin, and V. S. Khalturin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 75-81.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 230-234. 11 refs. Translation.
(For abstract see issue 22, page 3892, Accession no. A69-40284)

A70-17122
INFLUENCE OF CYSTAMINE AND SHIELDING OF CERTAIN REGIONS OF THE BODY ON THE FUNCTIONAL STATE OF THE GASTROINTESTINAL TRACT OF IRRADIATED RATS.
I. G. Krasnykh, B. L. Razgovorov, and L. A. Tiutin.
(*Kosmicheskaia Biologiia i Meditsina,* vol. 3, May-June 1969, p. 82.)
Environmental Space Sciences, vol. 3, May-June 1969, p. 235. Translation.
(For abstract see issue 22, page 3877, Accession no. A69-40285)

A70-17201
NON-IONIZING RADIATION—THE PHYSICAL RELATIONSHIP BETWEEN TYPICAL SOURCES AND HUMAN TARGETS.
A. G. Hunt (Atomic Weapons Research Establishment, Southend-on-Sea, England).
Non-Ionizing Radiation, vol. 1, Dec. 1969, p. 105-112. 12 refs.

An interpretation is given of typical radiation sources as applied to human targets, and some deficiencies in the application of available information to the determination of safe working levels indentified. Laser radiation problems are discussed and particular attention is drawn to the critical near infrared region. It is suggested that improved data is required for the spectral biological effect on nonionizing radiation at all wavelengths with the emphasis on damage threshold levels. (Author)

A70-17202
HEAT STRESS DUE TO R.F. RADIATION.
W. W. Mumford (Bell Telephone Laboratories, Inc., Whippany, N.J.).
(*IEEE, Proceedings,* vol. 57, Feb. 1969, p. 171-178.)
Non-Ionizing Radiation, vol. 1, Dec. 1969, p. 113-119. 12 refs.

The radiation protection guide number of 10 mW/sq cm is generally accepted for normal environmental conditions. For conditions of moderate to severe heat stress, the guide number should be appropriately reduced. A proposal to reduce the guide number 1 mW/sq cm for every temperature-humidity index point above 70 (until 1 mW/sq cm is reached) is examined in terms of heat stress. (Author)

A70-17203
EFFECTS OF 2450MHz MICROWAVES ON PROTEIN SYNTHESIS AND ON CHROMOSOMES IN CHINESE HAMSTERS.
D. E. Janes, W. M. Leach, W. A. Mills, R. T. Moore, and M. L. Shore (Bureau of Radiological Health, Rockville, Md.).
Non-Ionizing Radiation, vol. 1, Dec. 1969, p. 125-130. 20 refs.

Experimental investigation of the effects of whole body microwave irradiation on the in vivo incorporation of 14C-labeled phenylalanine into protein of liver and testis, and the chromosomes of mitotic bone marrow cells of Chinese hamsters. The exposure source was a microwave oven (2450 MHz, 12.25 cm wavelength) operated with the door open. Incorporation of labeled amino acid into protein was decreased in both liver and testis. Chromosome stickiness phenomena were increased. Chromatime aberrations were not seen in the first division following microwave exposure. V.P.

A70-17221 *
INDEPENDENCE OF MECHANICAL FRAGILITY AND RED BLOOD CELL AGE IN THE RAT.
S. I. Shapiro, S. A. Landaw, H. S. Winchell, and M. C. Williams (California, University, Berkeley, Calif.).
Society for Experimental Biology and Medicine, Proceedings, vol. 131, Sept. 1969, p. 1206-1209. 9 refs.
NASA-supported research; AEC Contract No. W-7405-eng-48.

Experimental investigation of the mechanical fragility of rat erythrocytes as a function of cell age, in order to ascertain the possibility that increasing susceptibility to mechanical trauma may be the primary factor limiting the lifespan of red blood cells (RBC). The experimental results indicate that RBC susceptibility to mechanical hemolysis is independent of cell age. M.M.

A70-17223 *
DETECTION AND SCALING OF STATISTICAL DIFFERENCES BETWEEN VISUAL TEXTURES.
Peter H. Stoloff (Center for Naval Analysis, Arlington, Va.).
Perception and Psychophysics, vol. 6, 1969, p. 333-336. 9 refs.
Grants No. NGL-21-002-008; No. NsG-398.

Investigation, using stochastically textured patterns, of the sensitivity of subjects to differences in the statistical distributions of locally defined properties of element density and shape. Results indicate that when the textures were most structured, in terms of their variance, subjects were most accurate at detecting dissimilarities between pairs of patterns. Subjects also rated the similarity of the statistical distributions of elements of patterns differing in local properties. Mutidimensional scaling analysis of the ratings showed two dimensions, representing monotonic orderings of the stimuli. (Author)

A70-17259
THE CURRENT EXPERIMENTAL APPROACH TO THE RADIOLOGICAL PROBLEMS OF SPACEFLIGHT.
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969. 133 p.

CONTENTS:

PREFACE. J. F. Janni and F. E. Holly (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. v.

INTRODUCTION. J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1439, 1440.

THE SPACE RADIATION ENVIRONMENT. F. Holly (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.) and L. Trafton (Texas, University, Austin, Tex.), p. 1441-1455. 81 refs. (See A70-17260 06-29)

TECHNIQUES USED FOR THE CALCULATION OF SPACE RADIATION DOSE. R. Case (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1455-1461. 24 refs. (See A70-17261 06-04)

SPACE RADIATION DOSIMETRY. F. Holly and J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1462-1475. 44 refs. (See A70-17262 06-04)

GENERAL RESULTS FROM THE OV1-2 SATELLITE. R. Fortney (TRW, Inc., Cleveland, Ohio), p. 1476-1485. 5 refs. (See A70-17263 06-14)

CORRELATION OF DOSE RATE MEASUREMENTS WITH THE PROTON ENVIRONMENT IN THE INNER VAN ALLEN BELT. A. Thede (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1486-1494. 8 refs. (See A70-17264 06-29)

SOLAR FLARE DOSE RATES IN A NEAR EARTH POLAR ORBIT. G. Radke (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1495-1503. (See A70-17265 06-29)

DOSE MEASUREMENTS FROM THE OV1-4 SATELLITE AND THE WL-304 SPACE PROBE. G. Radke (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.) and J. Conklin (Computer Sciences Corp., Los Angeles, Calif.), p. 1504-1508. (See A70-17266 06-04)

RADIATION MONITORING ON PROJECT MERCURY. H. Schaefer (U.S. Naval Aviation Medical Center, Pensacola, Fla.), p. 1509-1516. 11 refs. (See A70-17267 06-29)

A REVIEW OF GEMINI AND APOLLO ASTRONAUT DOSIMETRY DATA. R. Richmond (NASA, Manned Spacecraft Center, Houston, Tex.), p. 1517-1527. 19 refs. (See A70-17268 06-29)

SPACECRAFT CABIN RADIATION DISTRIBUTIONS FOR THE FOURTH AND SIXTH GEMINI FLIGHTS. J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1527-1535. 6 refs. (See A70-17269 06-04)

A COMPREHENSIVE SUMMARY OF DOSE RATE MEASUREMENTS ABOARD THE FOURTH AND SIXTH GEMINI FLIGHTS. M. Schneider and J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1535-1546. (See A70-17270 06-04)

A REVIEW OF SOVIET MANNED SPACE FLIGHT DOSIMETRY RESULTS. J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1547-1556. 29 refs. (See A70-17271 06-04)

AN EVALUATION OF CURRENT METHODS OF PRE-

DICTING SPACE RADIATION DOSES BY COMPARING DOSE RATE CALCULATIONS WITH GEMINI-IV, OV1-2, OV1-4, AND OV1-9 EXPERIMENTAL MEASUREMENTS. G. Radke (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1557-1564. (See A70-17272 06-04)

CONCLUSIONS. J. Janni and F. Holly (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.), p. 1565-1567. (See A70-17273 06-04)

A70-17261
TECHNIQUES USED FOR THE CALCULATION OF SPACE RADIATION DOSE.
R. Case (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1455-1461. 24 refs.

Review of radiation doses at dose points of interest and techniques of their calculation for various space radiation environments. The environments included are those of the geomagnetically trapped, solar-particle, and cosmic radiation. The radiation doses are derived from up-to-date models of each space radiation environment, incorporated in the SPARDEC (i.e., the acronym of Radiation Dose Evaluation Codes) computer codes, as well as from radiation interaction models, accounting for the penetration of the incident radiation field into the space vehicle to the dose point of interest, where the dose is calculated. M.V.E.

A70-17262
SPACE RADIATION DOSIMETRY.
F. Holly and J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1462-1475. 44 refs.

Discussion of the requirements, development problems, and implementing means of appropriate radiation monitoring systems. In order to be appropriate, space radiation dosimetry must be capable of recording both the total dose and the 'quality' from all types of radiation which might be incident upon an astronaut in significant intensities. There exist, however, some uncertainties in the primary radiation field because of the difficulties involved in making statistically self-consistent measurements in all energy regimes of interest and the extreme criticality of knowing the exact material distribution about the dose points. These factors demand above all the development of sophisticated dosimetry systems which, when interpreted correctly, will provide meaningful astronaut dose information and will obviate any necessity for radiation spectrometry inside of manned space vehicles. Toward the development of such dosimetry systems, special attention is devoted to dose-equivalence aspects, parameters involving absolute accuracy, and to currently available active and passive dosimetry varieties. A review of the advantages, philosophy and design of unmanned vehicle experiments concludes the discussion. M.V.E.

A70-17266
DOSE MEASUREMENTS FROM THE OV1-4 SATELLITE AND THE WL-304 SPACE PROBE.
G. Radke (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.) and J. Conklin (Computer Sciences Corp., Los Angeles, Calif.).
Aerospace Medicine, vol. 40, Dec (Section 2) 1969, p. 1504-1508.

Review of the results of the radiation-dose experiments performed from the satellite OV1-4 and the WL-304 space probe. The dose rate measured from the OV1-4 shows a periodic variation caused by the combined effects of nonuniformity in the shielding protecting the tissue-equivalent ionization chambers, anisotropy of the geomagnetically trapped radiation, and the slow tumbling motion of the OV1-4 satellite. This variation shows how the instantaneous dose rate in space can change by nearly a factor of 2 depending on the satellite orientation. As to the WL-304 experiment, its purpose was to measure tissue dose rate along a trajectory with an apogee of approximately 17,575 km, i.e., through the high radiation intensities of the inner radiation zone of the Van Allen belts. The measured and calculated peak dose rates for the first pass through the inner zone agree within 2.3%. M.V.E.

A70-17269
SPACECRAFT CABIN RADIATION DISTRIBUTIONS FOR THE FOURTH AND SIXTH GEMINI FLIGHTS.
J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1527-1535. 6 refs.

Description of the spacecraft shielding configuration and radiation detectors used on the Gemini 4 and 6 flights and discussion of the monitored cabin-radiation data. In order to determine the integral internal radiation intensity, five multidosimeter packages were placed aboard at points of maximum, minimum, and intermediate shielding. The experimental results are a function of mission length, orbital variables and detector location within the spacecraft, as well as of onboard radiation sources (e.g., luminous watch dial, etc.) and differing responses of the detectors themselves. Each of these influences is discussed, and directional effects, in particular, are evaluated. M.V.E.

A70-17270
A COMPREHENSIVE SUMMARY OF DOSE RATE MEASUREMENTS ABOARD THE FOURTH AND SIXTH GEMINI FLIGHTS.
M. Schneider and J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1535-1546.

Results of a series of experiments conducted on the Gemini IV and Gemini VI flights to measure the accumulated dose and dose rate as a function of elapsed time and position within the spacecraft. The radiation environment consisted mainly of energetic protons and electrons from the inner Van Allen belt, which was encountered each time the spacecraft passed through the South Atlantic Anomaly. The instruments used were designed to measure the low radiation levels that were anticipated. The measurements were made using two tissue-equivalent ionization chambers which were carefully calculated using proton, photon, and electron radiations. A portable sensor was used by the astronauts to conduct a series of radiation survey measurements. It is shown to be possible to carry out predictions of the doses interior to a complex manned spacecraft with an accuracy of at least a factor of three. It is considered that the doses received were not sufficiently high to create a hazard. F.R.L.

A70-17271
A REVIEW OF SOVIET MANNED SPACE FLIGHT DOSIMETRY RESULTS.
J. Janni (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1547-1556. 29 refs.

Review of Soviet manned space flight radiation evaluation studies including a comparison of U.S. and Soviet techniques. Soviet manned spacecraft designs and Soviet spacecraft trajectories are briefly considered. Devices and methods for measuring radiation intensity are described, and the radiation data obtained on the various space missions are discussed. U.S. and Soviet approaches taken to provide protection of the astronauts against harmful radiation are examined. G.R.

A70-17272
AN EVALUATION OF CURRENT METHODS OF PREDICTING SPACE RADIATION DOSES BY COMPARING DOSE RATE CALCULATIONS WITH GEMINI-IV, OV1-2, OV1-4, AND OV1-9 EXPERIMENTAL MEASUREMENTS.
G. Radke (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1557-1564.

Determination of the accuracy of space radiation dose prediction techniques by comparing dose rate calculations with experimental data gathered in the inner Van Allen radiation belt by the Gemini-4, OV1-2, OV1-4, and OV1-9 satellites. In summarizing the comparisons between calculated and measured dose rates, it was found convenient to divide the inner Van Allen belt into the high-B and low-B regions and then separately discuss the dose rate comparisons in each region. G.R.

A70-17273
CONCLUSIONS.
J. Janni and F. Holly (USAF, Weapons Laboratory, Kirtland AFB, N.Mex.).
Aerospace Medicine, vol. 40, Dec. (Section 2) 1969, p. 1565-1567.

Discussion of data and information regarding the radiation exposure hazards for astronauts. Questions regarding the correct determination of the radiation environment are examined, and effects of spacecraft shielding are considered. It is found that the spacecraft structure becomes critically important for protons greater than 50 MeV and electrons greater than 1 MeV. G.R.

A70-17282
LIMITING FACTORS IN THE CAPACITY TO ACHIEVE MAXIMUM CARDIAC WORK.
Lawrence E. Lamb, Roy J. Kelly, Wilbur L. Smith, Adrian D. LeBlanc, and Philip C. Johnson (Baylor University, Houston, Tex.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1291-1296. 5 refs.
Research supported by the Jewish Institute for Medical Research; PHS Grant No. HE-05435.

The influence of exercise during hypoxia was studied by subjecting six individuals to maximum exertion while breathing different gas mixtures. The decrease in maximum ventilated air and exercise capacity during increasing hypoxia despite near constant values for heart rate, systolic pressure and pulse pressure is interpreted as indicating that maximum exertion was limited by cardiac output capacity but not necessarily by coronary blood flow capacity. (Author)

A70-17283
EXPERIMENTAL HEMATOLOGIC CHANGES INDUCED BY HYPERGRAVITY.
A. Vrabiescu and Georgeta Enachescu (Institute of Geriatrics, Bucharest, Rumania).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1300-1304. 24 refs.

Hematologic changes were studied in 145 white rats subjected to 4.5 and 6.5 g. The studies included the possibilities of therapeutic prevention of changes by administration of vitamin B_{12} and folic acid and the degree of reversibility of the changes after return to 1 g environment. In nontreated animals, sacrificed immediately after return to 1 g, the study showed: a statistically significant decrease of erythrocytes and Hb-values, the inversion of the leukocytic formula, in the sense that neutrophyl granulocytes increased and relative leukocytics decreased. There was a total decrease of elements in the medullary erythropoietic system, maturation inhibition of erythropoietic series, a decrease of medullary mitotic index and leftward deviation to the prophase of the medullary mitotic curves. Decrease of hematopoietic activity with its effects on peripheral blood were in proportion to the hypergravitation at values 4.5 and 6.5 g compared to 1 g. These changes though showing a tendency to recover toward normal physiological values, did not attain the normal ranges two months after return to an environment of 1 g. The favorable effect of vitamin B_{12} and folic acid were demonstrated in the treated groups of animals by the prevention of premature hematologic lesions and by resistance against late effects of excess gravity which were still present after two months at 1 g in nontreated animals. (Author)

A70-17285
SHOCK HAZARD PROTECTION IN THE LABORATORY AND IN FLIGHT.
K. Above the ignition temperature the additional electronic energy loss caused by the diatomic gas is due only to rotational excitation. The main features of the theory have been confirmed in preliminary experiments conducted in the MIT nonequilibrium MHD generator. An assessment of the possible advantages of molecular gas addition indicates that it may help in suppressing electrode layer shorting, and in slowing recombination in supersonic nozzles. M.V.E.

A70-17287 *
TESTICULAR DEGENERATION IN MACACA NEMESTRINA MONKEYS USED IN PRE-SPACE FLIGHT TESTS.
R. Zemjanis, B. Gondos, W. R. Adey, and A. T. K. Cockett (Harbor General Hospital, Torrance, Calif.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1316-1322. 17 refs.
Contract No. NAS 2-2151.

Testicular tissue was obtained from eight Macaca nemestrina monkeys before and after pre-space flight tests. Normal spermatogenesis was observed in all of the pre-test specimens, except for one taken from an animal with juvenile testes. One animal which was involved in the test for only seven days had a normal terminal specimen. Severe testicular degeneration developed in the six remaining animals, all of whom were kept under test conditions for 14 days or more. Seminiferous tubules were generally lined by a single to double layer of Sertoli cells and scattered spermatogonia, mainly type A. Spermatocytes were rare and no spermatozoa were seen. The change involved all of the tubules in a uniform manner. The changes finding of testicular degeneration in the test animals indicates that potentially adverse effects of space flight conditions on spermatogenesis must be considered. Immobilization appears to be one of the factors deserving particular attention. (Author)

A70-17288
EFFECT OF TWO WEEKS BED REST ON VENOUS POOLING IN THE LOWER LIMBS.
Richard P. Menninger, Richard C. Mains, Fred W. Zechman, and Thomas A. Piemme (Kentucky, University, Lexington, Ky.; Pittsburgh, University, Pittsburgh, Pa.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1323-1326. 5 refs.
Contracts No. AF 33(615)-67-C-1370; No. AF 33(615)-67-C-1323.

Greater leg circumference increase with tilt following weightlessness (NASA Gemini V Interim Report, 1966) suggests that increased venous distensibility may contribute to postflight orthostatic intolerance. The present study was conducted to determine by more direct measurements, the effect of inactivity (two weeks bed rest) on the pressure-volume characteristics of the legs. Lower body negative pressure (LBNP) of a magnitude (minus 40 mm. Hg) known to produce blood volume shifts similar to those occurring with tilt was applied to two subjects before and at the end of the bed rest period. Leg volume changes were measured directly at one, three, and five minutes using whole leg water plethysmographs located in the LBNP chamber. The measured volume changes suggest that venous distensibility was not increased by two weeks bed rest. The characteristic increase in heart rate elicited by LBNP was greater following bed rest as anticipated. In view of the apparent inconsistency between previous circumference measurements and the present plethysmographic observations, additional studies are needed to delineate the importance of changes in venous distensibility in 'cardiovascular deconditioning.' (Author)

A70-17289 * #
DECOMPRESSION SICKNESS IN SPACE-CABIN ATMOSPHERES AFTER ONLY TWO HOURS OF 'GROUND LEVEL DENITRO-

GENATION.'
Thomas H. Allen and Sarah E. Beard (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1327-1330. 15 refs.
NASA-supported research.

Bends incidence was observed in 16 volunteer men who, chiefly after 2 hr of 'shirtsleeve' exposure to oxygen, took a decompression from 14.5 to 5 psia (pounds per sq in., absolute) and then exercised intermittently in either a ratio of oxygen to nitrogen of 70 to 30 or oxygen for 3 and 9 hr at psia. This was followed by a second decompression to 3.5 psia oxygen for a period of 3 hr also with exercise for a total of 102 manflights. Among the 12 men who suffered bends in 45 instances, there were 36 cases of grade 1 that within a mean 1.5 hr increased to grade 2. With one exception, those who had lesser quantities of body fat were less susceptible to bends. The absence of diluent nitrogen tended to protect those with greater burdens of fat. (Author)

A70-17290
COMPLEX PERFORMANCE DURING EXPOSURE TO HIGH TEMPERATURES.
P. F. Iampietro, W. D. Chiles, E. A. Higgins, and H. L. Gibbons (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1331-1335. 10 refs.

The effects of high temperature on psychomotor performance and physiological function were studied in the laboratory on male pilots (age 30-51) holding a current medical certificate. A total of 41 runs were made at neutral (23.8 C, 75 F) or hot (60 C (140 F), 71.1 C (160 F)) temperatures with low humidities (less than 20 mm Hg at 60.0 and 71.1 C). Heart rate (ECG), deep body temperature (rectal probe) and skin temperature were recorded at two-minute intervals. Performance on a complex performance device (two-dimensional tracking, mental arithmetic, and monitoring) was scored for five-minute intervals which varied in task difficulty. During exposure to 71.1 C, mean rectal temperature reached 38.05 C (100.5 F), mean peak heart rate was 132 beats/min, and mean finger temperature peaked at 42 C (107.6 F). There were significant decrements in performance (tracking and mental arithmetic) at 71.1 C. At 60.0 C there were no performance decrements during 30 minutes of exposure. Results are discussed as they apply to aircrew in high performance aircraft. (Author)

A70-17291
HIGH FIDELITY SIMULATIONS IN THE EVALUATION OF ENVIRONMENTAL STRESS—ACUTE CO2 EXPOSURE.
James R. Wamsley, Edward W. Youngling, and William F. Behm (McDonnell Douglas Astronautics Co., St. Louis, Mo.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1336-1340. 17 refs.

The usual laboratory evaluations of psychophysiologic responses to stress are based on measurements of uncertain relevance to operational effectiveness. This study examines the use of high fidelity simulations for such evaluations. Because of its importance in artificial environments, carbon dioxide (CO2) was chosen as the stressor. The test gas was 5% CO2 in air (normoxic), delivered by mask. CO2 and O2 concentrations were continuously monitored. Each subject served as his own control with performance evaluations on air without mask, on air only with mask, and on CO2 in air by mask. The first test involved image motion compensation in optically tracking a ground target from simulated orbit. The second involved the simulated horizontal landing of a reentry vehicle by jet qualified pilots. Exposure to 5% CO2 in air for 15 minutes did not result in detectable decrements in image motion compensation. The horizontal landing simulations, however, revealed detectable degradation in the pilot's ability to control the final landing phase. It is concluded that high fidelity simulations appear to be useful in confirming practical stress tolerance limits. In addition limited conclusions as to emergency limits for acute CO2 exposure are made. (Author)

A70-17292 *
EFFECT OF SPACECRAFT LEVEL VIBRATIONS AND GRAVITIES ON PLECTONEMA BORYANUM.
E. Wright, L. R. Brown, and R. G. Tischer (Mississippi State University, State College, Miss.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1341-1345. 14 refs.
NASA-supported research.

This study was designed to determine if spacecraft level vibrations and G's caused changes in the blue-green alga Plectonema boryanum. The proposed use of unicellular algae as a medium of gas exchange, food and water supply, and waste disposal during prolonged space flight prompted this investigation. Exposure to vibration or gravity (G) ranges for 15, 30, and 60 minutes failed to cause a change in algal colonial morphology. A critical G range (9.6 to 10 G's) at constant vibration of 700 hertz for 30 minutes caused a significant decrease in the amount of contamination in impure cultures. Algae cells exhibited swelling when exposed to 9.6 and 9.8 G's at the same vibrational frequency and time period as mentioned above. An increase in extracellular polysaccharide production was exhibited in pure cultures inoculated with algal samples vibrated at 700 hertz, 10 G's for 30 minutes. Chromatographic studies indicated that the composition of the polysaccharide was not changed as a result of vibration of the inoculum at 700 hertz, 10 G's for 30 minutes. (Author)

A70-17293
FAILURE TO DEMONSTRATE AN INFLUENCE ON VIGILANCE DEGRADATION BY BREATHING GAS MIXTURES CONTAINING INCREASED OXYGEN CONCENTRATION AND 4.5% CO2.
P. D. Newberry, J. R. Smiley, and W. R. Franks (Canadian Forces Institute of Environmental Medicine, Toronto, Canada).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1345-1348. 19 refs.

Each of 18 subjects breathed each of six gas mixtures (20%, 45% and 100% oxygen in nitrogen and the same three concentrations of oxygen, each with 4.5% of carbon dioxide in nitrogen) while performing a clock watching vigilance test. There was no significant effect on vigilance degradation with time attributable to breathing the different gas mixtures. (Author)

A70-17294
THEORETICAL DETERMINATION OF THE TIME OF USEFUL FUNCTION (TUF) ON EXPOSURE TO COMBINATIONS OF TOXIC GASES.
J. G. Gaume and Paul Bartek (Douglas Aircraft Co., Long Beach, Calif.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1353-1357. 10 refs.

The term 'TUC' (Time of Useful Consciousness) has been used to describe the time during which an individual may be able to help protect himself from pressure change following sudden decompression at altitude. A similar term has not been suggested in the case of sudden exposure of humans to rapidly developing, serious contamination of the breathable atmosphere by the products of combustion and pyrolysis in relatively closed spaces, resulting from fire. This paper suggest the use of the term 'TUF' (Time of Useful Function) and makes an attempt to establish a TUF for human exposure to a selected mixture of contaminants, with emphasis on short exposures (less than five minutes) at relatively high concentrations. (Author)

A70-17295 *
HISTOPATHOLOGICAL EVIDENCE FOR PULMONARY EMBOLI IN EXPERIMENTAL DECOMPRESSION SICKNESS DIAGNOSED BY RADIOISOTOPIC LUNG SCANNING.
A. T. K. Cockett, S. M. Pauley, J. C. Saunders, and A. P. Roberts

(Harbor General Hospital, Torrance, Calif.; Rochester, University, Rochester, N.Y.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1357-1360. 8 refs.
Navy-supported research; Grant No. NsG-237-62.

Animals underwent experimental overcompression and decompression. Radioisotopic pulmonary scans were performed to diagnose aeroemboli. Biopsy of the cold areas were performed 48 hours after the chamber procedure and following dextran treatment. Pulmonary edema and hemorrhage are demonstrated. (Author)

A70-17296
REACTION OF CHICK EMBRYO DEVELOPMENT TO VARIOUS HYPERBARIC GAS MIXTURES.
T. K. Akers (North Dakota, University, Grand Forks, N. Dak.) and R. E. Thompson.
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1361-1364. 20 refs.
NSF-supported research; Contract No. N 00014-68-A-0499.

White single-comb Leghorn eggs were incubated in a pressure chamber for 10-day periods at either 10 atm N2-O2, 10 atm He-O2, 2.5 atm air, or 2.5 atm He. During the experiments the O2 was kept at 150-400 mm Hg. After decompression and blood analysis of the embryos, it was found that 10 atm N2-O2 inhibited viability and development even though 100% of the eggs were fertile. Ten atm He did not prevent partial development, but all embryos were dead. The 40% of the embryos which had developed were alive, 13% were developed but dead, 13% were fertilized only, and 14% were not fertilized. The embryos incubated under 2.5 atm air weighed 27.8% less than controls and possessed 8.1% greater Hb, 20% greater MCHbC, and 26.4% greater MCHb. At 2.5 atm the experiment was inconclusive in assessing nitrogen's role as a growth inhibitor, as seen at 10 and 2.5 atms. (Author)

A70-17297
ON DETERMINING THE EMOTIONAL STATE OF PILOTS DURING FLIGHT—AN EXPLORATORY STUDY.
Carl E. Williams (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.) and Kenneth N. Stevens (Bolt Beranek and Newman, Inc.; MIT, Cambridge, Mass.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1369-1372.

Possible indicators of a pilot's emotional state which have thus far received little research attention are his vocal utterances during air-to-ground radio communications. An exploratory study has been conducted wherein excerpts of tape-recorded conversations between pilots and control tower operators transmitted during known emotionally stressful situations were subjected to spectrographic analysis. Quantitative and qualitative analyses of narrow-band spectrograms of selected utterances indicate that measurements of fundamental frequency and range of fundamental frequency, together with observation of the fundamental frequency contour, may serve to signify when a pilot is undergoing emotional stress. (Author)

A70-17298 #
NOMOGRANS CORRELATING DOSE OF MMH WITH BLOOD LEVELS.
E. B. Smith and D. A. Clark (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1373-1376. 8 refs.

Nomograms were developed to show the interrelationship of time and dose to methemoglobinemia or plasma MMH concentration as observed during the first 2 hours after application of MMH to the chest of anesthetized male dogs. Limitations of the nomograms are discussed in respect to range and accuracy. It is emphasized that the nomograms were compiled from responses of anesthetized dogs. These nomograms could be used to estimate the severity of human exposure only in conjunction with other known MMH intoxication symptoms. In the absence of dose-response data from humans, however, the nomograms are considered the best available data by which to evaluate accidental exposure by skin contact with MMH. (Author)

A70-17299
NEW CRITERIA IN INDIRECT BLOOD PRESSURE RECORDING.
C. A. Verghese and C. S. Nair (Indian Air Force, Institute of Aviation Medicine, Bangalore, India).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1377-1380. 6 refs.

Keeping a crystal pick up over the brachial artery and under a pneumatic blood pressure cuff, pulses were recorded along with the cuff pressures as the pressure in the cuff was dropped from 200 mm Hg to zero. The pulse complex for presystolic pressures in the cuff consisted of two components corresponding to compression and decompression of the crystal surface in contact with the cuff. The amplitude of the second component of the pulse complex appreciably increased in comparison to the first component at one point, and the first component vanished at another point while the cuff pressures were decreased from presystolic values. The pressure in the cuff corresponding to the first point agreed with the systolic pressure and that corresponding to the second agreed with the diastolic pressure. Possible explanation for the changes in the pulse wave as observed at systolic and diastolic points are also given. (Author)

A70-17300
RETURN TO FLYING AFTER COCCIDIOIDOMYCOSIS.
William H. Greendyke and William C. Harvey (USAF, Luke AFB, Ariz.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1381, 1382.

Coccidioidomycosis is a common cause of flying disability in the southwestern United States. The average loss of flying time at this base is 63 days. Clinical criteria of activity of the fungal disease are reviewed. It is believed that the period of flying disability can be materially shortened, and recommendations for earlier return to flying duty are presented. (Author)

A70-17301
AEROMEDICAL CONSULTATION SERVICE CASE REPORT—TEMPORAL LOBE EPILEPSY.
Louis F. Romain and Timothy N. Caris (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1383-1385. 9 refs.

The problem of a pilot with loss of consciousness associated with transient inappropriate behavior, automatism and a history of episodic chest pain is presented. Electroencephalographic studies implicated temporal lobe dysfunction. The clinical picture of temporal lobe epilepsy is discussed. (Author)

A70-17302 #
AN ELECTROENCEPHALOGRAPHIC STUDY OF FLYING PERSONNEL UTILIZING NASOPHARYNGEAL ELECTRODES.
Louis F. Romain (USAF, School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1385-1387. 7 refs.
USAF-sponsored research.

The results of the first 51 consecutive nasopharyngeal electroencephalograms done at the USAF School of Aerospace Medicine are presented. Nine healthy aviators selected for the advanced pilot program were studied as controls. Forty-two flyers were studied for evaluation of suspected neurological disorders. Of 14 patients believed to have psychomotor seizures on purely clinical grounds, 5 (36%) had abnormal routine EEGs, 7 (50%) had abnormal records following sleep deprivation, but 11 (79%) had significant abnormalities when nasopharyngeal electroencephalography was done. Thus, in 6 cases, routine records revealed no abnormalities, but the

nasopharyngeal records were definitely abnormal. Although the nasopharyngeal electroencephalogram does not automatically identify patients subject to psychomotor seizures, it does supply confirmatory data in clinically suspected cases as well as identify patients in whom a work-up for the process is indicated. (Author)

A70-17303
ALTITUDE EFFECTS ON ALVEOLAR ETHANOL ANALYSIS.
Leo P. Leonelli, Richard Pfau, and Robert L. Wick, Jr. (Ohio State University; Franklin County Crime Laboratory, Columbus, Ohio).
Aerospace Medicine, vol. 40, Dec. (Section 1) 1969, p. 1388, 1389. 8 refs.

The Borkenstein Breathalyzer was evaluated at reduced atmospheric pressures in a two phase experiment. The first phase compared the accuracy of this instrument at several altitudes by means of standard ethanol solutions. In the second phase, alveolar air samples were obtained from six subjects who had been given specific amounts of alcohol. Statistical analysis of the data obtained failed to show a reduction in Breathalyzer accuracy due to changes in altitude up to and including 10,000 feet. (Author)

A70-17311
EVOKED CORTICAL RESPONSES TO CHECKERBOARD PATTERNS—EFFECT OF CHECK-SIZE AS A FUNCTION OF VISUAL ACUITY.
M. Russell Harter (North Carolina, University, Greensboro, N.C.) and Carroll T. White (U.S. Naval Electronics Laboratory Center, San Diego, Calif.).
Electroencephalography and Clinical Neurophysiology, vol. 28, Jan. 1970, p. 48-54. 18 refs.
Navy-supported research; NSF Grant No. GB-8053.

Investigation of the interaction effects between check-size and degree of focus on visually evoked response amplitude. The stimuli, applied to eight subjects ranging from 21 to 43 years of age, consisted of six checkerboard patterns, with checks subtending visual angles of 5, 10, 20, 40, 60, and 120 min. A seventh blank pattern, where luminous transmittance was the same as the average transmittance of the checkerboard patterns, was used as a control. It is demonstrated that the check-size which produces responses of maximal amplitude depends on the refractive error and thus on the visual acuity of the subjects. A.B.K.

A70-17315
BASIC BIOMEDICAL CONCEPTS IN THE JET AND SPACE AGE.
Hubertus Strughold.
Applied Mechanics Reviews, vol. 22, Dec. 1969, p. 1339-1342. 11 refs.

Discussion of certain basic biomedical concepts which are important for engineers to know. These are (1) the human body as a self-regulating system (homeostasis) and (2) the physiological time regulator, or the biological clock (cyclostasis). In manned orbital space flight and on a manned landing mission to the moon and Mars, the solution for survival is a closed ecological system with adequate life-supporting and protecting subsystems to meet the respective requirements for man as a homeostatic system. The cyclostatic nature of the body clock is evidenced by the fact that the duration of the cycle can be shortened to 18 hr or extended to 28 hr; the fact that the sleep/wakefulness cycle continues in its nearly circadian pattern under constant light or dark conditions; and the fact that a shift in the phases of the cycle cannot be achieved instantly, rather it requires a certain time for readjustment. F.R.L.

A70-17350 #
FUNCTIONAL MECHANISMS OF THE DEVELOPMENT OF RADIOBIOLOGICAL EFFECTS (FUNKTSIONAL'NYE MEKHANIZMY RAZVITIIA RADIOBIOLOGICHESKIKH EFFEKTOV).
I. F. Kovalev.
Moscow, Atomizdat, 1969. 312 p. 728 refs. In Russian.

The monograph sets forth a comprehensive theory designed to explain the development of biological effects of ionizing radiation by a single scheme based on both the author's observations and the published studies. Basic in this theory is the concept that the ultimate effects of ionizing radiation are the final phase of a three-phase process whose first phase consists of physicochemical changes produced by radiation on the cellular level and the second phase consists of functional changes in the affected cells. The monograph also contains a detailed review of other hypotheses and concepts concerning the mechanisms of the biological action of ionizing radiation. Also included are a discussion of the mechanisms of recovery processes and an extensive bibliography. The monograph is addressed to radiobiologists, oncologists, and researchers in related fields. V.Z.

A70-17422 #
EFFECT OF ALPHA-METHYL-DOPA ON THE SPONTANEOUS ACTIVITY OF THE PACE-MAKER OF THE HEART.
Witold Tuganowski and Adam Wolański (Śląska Akademia Medyczna, Zabrze, Poland).
Acta Physiologica Polonica, vol. 19, no. 6, 1968, p. 715-721. 11 refs. Translation.

The cardiac spontaneous activity is assured by the presence of catecholamines in the pace-maker fibers. Experiments were performed on 15 isolated preparations of sinus node of the rabbit hearts, placed in a plastic chamber. The bioelectric activity was recorded with glass microelectrodes. All preparations were treated with alpha-methyl-DOPA until complete ceasation of biolectric activity. It was found that the alpha-methyl-DOPA, as inhibitor of catecholamine synthesis, arrested the spontaneous activity of the isolated pace-maker. Addition of catecholamines or washing out the preparation with Tyrode solution reactivated the bioelectric activity of the pace-maker. Glucagon, possessing an analogical mechanism of action to that of catecholamines, did not restore the activity of the pace-maker, arrested by alpha-methyl-DOPA. These phenomena seem to indicate that catecholamines are indispensable for the process of spontaneous excitation. (Author)

A70-17423 #
EFFECT OF SHORT-TERM PHYSICAL EFFORT ON BLOOD CLOTTING.
Janusz Bielski (Wyższa Szkoła Rolnicza, Poznań, Poland) and Zygmunt Zyskowski (Akademia Medyczna, Poznań, Poland).
Acta Physiologica Polonica, vol. 19, no. 6, 1968, p. 784-790. 22 refs. Translation.

The influence of short term physical effort on blood clotting was studied in 30 healthy men, physical workers, aged 17-19 years. Thrombelastograms of the full blood were recorded. Clotting and bleeding times, plasma fibrinogen level, euglobulin fibrinolysis rate as well as thrombocytes count were determined. Physical work was measured, using a bicycle foot ergostat at 100-150 watts for 5-10 min, corresponding to 3000-9000 kGm. Clotting processes were studied before exercise, immediately after effort, as well as 30 min after effort termination. It was found, that short-term physical work, did not produce any distinct disorders in blood clotting or fibrinolysis in physical workers. The lack of significant disorders of clotting factors and their inhibitors was connected with too short duration of exercise. (Author)

A70-17424 #
EFFECT OF VIBRATION ON THE ADRENOCORTICAL FUNCTION.
Krzysztof Kwarecki (Wojskowy Instytut Medycyny Lotniczej; Akademia Medyczna, Warsaw, Poland).
(Congress of Aviation and Cosmic Medicine, 15th, Prague, Czechoslovakia, Sept. 26-Oct. 1, 1966.)
Acta Physiologica Polonica, vol. 19, no. 6, 1968, p. 800-809. 22 refs. Translation.

The influence of vibration on the adrenocortical function was studied in mature guinea pigs. Vibration stimuli (frequency 50 Hz,

amplitude 1 mm, time of exposure 3 hrs daily) were applied. The animals were subjected to vibration for 3.6 and 12 days. Sinusoidal, vertical vibration induced after a sufficiently long duration, produced a significant adrenocortical response. The reaction of adrenal cortex to the vibration stimuli was biphasic. The first stage, lasting up to the 6th day of vibration, was characterized by the occurrence and gradual enhancement of stimulation symptoms. In the second stage, occurring between the 6th and 12th day of exposure, gradual regression of stimulatory phenomenon was stated, corresponding to adaptation or secretory exhaustion of the adrenal cortex. (Author)

A70-17425 #
CHANGES IN ACETYLCHOLINE CONCENTRATION IN THE CEREBRAL TISSUE OF RATS DUE TO REPEATED EXPOSURE TO THE ACTION OF MECHANICAL VIBRATIONS.
Zofia Brzezińska (Polska Akademia Nauk, Zakład Patologii Doświadczalnej, Warsaw, Poland).
Acta Physiologica Polonica, vol. 19, no. 6, 1968, p. 810-815. 7 refs. Translation.

The aim of work was to investigate the course of changes in acetylcholine concentration in the brain tissue of rats exposed repeatedly to the action of mechanical vibrations. Experiments were performed on 263 rats. Rats were exposed to the action of mechanical vibration together with noise, or only noise, 2 hrs daily, for 3, 6, 9, 12 and 15 days. Concentration of acetylcholine, acetylcholine esterase activity and acetylcholine synthesis ability were studied in fresh tissue of the cerebral hemispheres. It was found that after a single 2-hr exposure, the concentration of acetylcholine increased in the cerebral tissue of rats, then gradually decreased and concentration in the brain tissue of rats exposed repeatedly to the action returned to normal values after 15 exposures, similarly to the control group. Acetylcholine esterase activity and ability of cerebral tissue to synthesize acetylcholine gradually increased. The adaptation mechanisms to mechanical vibration were discussed. (Author)

A70-17429 #
PROTECTIVE EFFECT OF CYSTEAMINE ON THE TERATOGENIC ACTION OF X-RAYS IN GOLDEN HAMSTER (PRELIMINARY REPORT).
A. Kulig, K. Kowalczyk, and I. Płonkowa (Kraków, Uniwersytet; Akademia Medyczna, Kraków, Poland).
(*Patologia Polska,* vol. 19, no. 3-4, 1968.)
Polish Medical Journal, vol. 8, no. 4, 1969, p. 902-908. 19 refs. Translation.

Development of an experimental procedure for investigating the radioprotective effectiveness of chemical compounds against the effects of low-dose X-ray irradiation. The effect of ionizing radiation on golden hamster fetuses and the protection afforded by cysteamine have been studied. Doses of 70 r and 100 mg of cysteamine per kg body were used. Under the influence of radiation the fetuses showed development anomalies of the eyeball and/or died. Cysteamine provides a certain protection from radiation injury, but it is probably also harmful to the fetuses. The described experimental procedure appears to be useful for studies of the effectiveness of chemical radioprotective substances. M.V.E.

A70-17430 #
THE EFFECT OF THE NERVOUS SYSTEM ON THE COURSE OF RADIATION REACTIONS DUE TO THE APPLICATION OF SOFT X-RAYS.
J. Bachurzewski, A. Pawłowski, and J. Wasyłyszyn (Akademia Medyczna, Warsaw, Poland).
(*Przegląd Dermatologiczny,* vol. 56, no. 2, 1969.)
Polish Medical Journal, vol. 8, no. 4, 1969, p. 932-936. 10 refs. Translation.

Evaluation of the influence of the nervous system on the course of erythema radiation reactions. Symmetric sites on the forearms of subjects with unilateral paralysis or after unilateral sympathectomy were irradiated. In one woman erythema essential radiation reaction in the paralyzed extremity occurred with a two weeks delay, but the further course of the reaction was the same as in the healthy extremity. In rabbit ears deprived of the spinal and autonomic nerve supply the reaction usually occurred earlier and was more intense. On the other hand, on denervated ears late complications in the form of perforation of the ear concha were not observed. It is believed that the different course of the reaction is due to the better blood supply to the denervated ear. M.V.E.

A70-17431
COMPARED EVOLUTION OF HEART RATE AND BODY TEMPERATURE DURING MUSCULAR EXERCISE IN HOT ENVIRONMENT (EVOLUTION COMPAREE DE LA FREQUENCE CARDIAQUE ET DE LA TEMPERATURE CORPORELLE PENDANT L'EXERCICE MUSCULAIRE A HAUTE TEMPERATURE).
F. Pirnay, J. M. Petit, and R. Deroanne (Institut Provincial Ernest Malvoz; Liège, Université, Liège, Belgium).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 28, no. 1, 1969, p. 23-30. 20 refs. In French.

Heart rate and body temperature were measured in 23 men walking on a treadmill during 1/2 an hour in a very hot environment with an energy expenditure of about 1 liter of oxygen per minute. A linear relationship was found between the two parameters, at least for the middle part of the diagram. For lower values, below 100 beats/min, heart rate is influenced in a variable manner by the body temperature. Above 170 beats/min, heart rate approaches its highest value, and is hence no more influenced by hyperthermy. From one subject to another, the extent of cardiac reaction varies considerably. On the average, when body temperature increases by 1 deg C, heart rate increases by 32.3 beats/min, but extreme values are 21 and 46 beats/min. The linearity of the diagram justifies the use of heart rate as a reference of a thermal overloading during muscular exercise in hot environment. The individual comportment truly reflects each subject's capacity in bearing hot climates. (Author)

A70-17432
PULMONARY DIFFUSING CAPACITY DURING MUSCULAR EXERCISE (DIFFUSION PULMONAIRE AU COURS DE L'EXERCICE MUSCULAIRE).
F. Pirnay, A. Fassotte, J. Gazon, R. Deroanne, and J. M. Petit (Liége, Université; Institut Provincial Ernest Malvoz, Liége, Belgium).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 28, no. 1, 1969, p. 31-37. 26 refs. In French.

The CO diffusing capacity has been measured by a 'steady state' method with direct measurements of P sub CO in the alveolar air. Seven young males where tested during muscular exercises. The CO diffusing capacity increased without leveling off in relation to the energetic expense even till very high O sub 2 intake, ranging about 4 or 5 l/min. By each subject, the relation between the O sub 2 intake and the diffusing capacity was variable; by the whole group of subjects submitted to many tests, this relation seems to be linear. The possibility of a maximal pulmonary permeability that involves a humoral impairing during exhaustive work is discussed. (Author)

A70-17433
DESIGN FOR A BREATHING VALVE WITH REDUCED AIR RESISTANCES (KONSTRUKTION EINES WIDERSTANDSARMEN ATEMVENTILS).
J. Temming and E. Haas (Darmstadt, Technische Hochschule, Darmstadt, West Germany).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 28, no. 1, 1969, p. 49-54. 5 refs. In German.

High resistances in a commonly used breathing valve led to the construction of a new valve. The new design, based on aerodynamic principles, allows the air to pass through the valve more easily. Laboratory and field trials have shown the new design to be satisfactory. (Author)

A70-17434
THE VALIDITY OF THE OXYGEN CONDUCTANCE EQUATION.
Roy J. Shephard (Toronto, University, Toronto, Canada).
Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie, vol. 28, no. 1, 1969, p. 61-75. 28 refs.
Research supported by the Department of National Health and Welfare.

Experimental investigation of the validity of an approximate theoretical equation describing the conductance of atmospheric oxygen to the working tissues of the human organism. Tests on a group of 14 young adults and 48 children indicate that the theoretical oxygen intake values are 15 to 20% higher than the experimental values. The discrepancies are linked to a local inhomogeneity in the diffusion/perfusion relationships. V.Z.

A70-17450
ANALYSIS OF THE HUMAN UNLOADING REFLEX (ANALYSE DES ENTLASTUNGSREFLEXES AM MENSCHEN).
A. Struppler, O. Mehls (Neurologische Klinik, Munich, West Germany), and W. M. Landau (Neurologische Klinik, Munich, West Germany; Washington University, St. Louis, Mo.).
Pflügers Archiv, vol. 313, no. 2, 1969, p. 155-167. 16 refs. In German.
Research supported by the Deutsche Forschungsgemeinschaft.

Analysis of the unloading reflex in humans, using an experimental setup by which a muscle could be unloaded without any increase in tension and the acceleration of the unloading could be varied independently of the preexisting innervation level. It is found that under both static and dynamic conditions there regularly occurred a silent period with constant latency if certain thresholds of shortening and acceleration were exceeded during the shortening. This is interpreted as due to a decrease in spindle afferent discharge and is compared with the temporal course of the phasic muscle stretch reflex. The unloading reflex is decreased or disappears completely if the mode of innervation of motor neurons during the initial baseline innervation is irregular and shows a tendency to synchronize. The role of the mode of innervation for the origin of the unloading reflex is discussed. A.B.K.

A70-17521
COMPARATIVE STUDIES IN LUNG MECHANICS BASED ON A SURVEY OF LITERATURE DATA.
K. E. Spells (RAF, Institute of Aviation Medicine, Farnborough, Hants., England).
Respiration Physiology, vol. 8, Dec. 1969, p. 37-57. 101 refs.

Data for the various components of compliance and resistance of the chest-lung system, and for inertance and natural frequency, have been collected for different species. Possible theoretical relationships have been indicated. Generally, the trends with body mass (m) are roughly as expected. A notable exception is the slow variation proportional to m(-0.393) implied by the statistical analysis of the data for total respiratory (less upper airway) resistance, but here the evidence is rather meagre. The data for inertance and natural frequency are too few for statistical analysis and are included mainly to emphasize the need for further experimental work to be undertaken. Theory suggests that the dimensionless product (total respiratory resistance times lung-thorax compliance times resting respiratory frequency) should be a constant independent of body mass, but insufficient evidence has been collected to confirm this. (Author)

A70-17522
EFFECT OF SLOPE AND SHAPE OF DISSOCIATION CURVE ON PULMONARY GAS EXCHANGE.
John B. West (Royal Postgraduate Medical School, London, England).
Respiration Physiology, vol. 8, Dec. 1969, p. 66-85. 11 refs.

Factors affecting gas exchange in the presence of ventilation-perfusion inequality have been examined. These include the slope and shape of the blood-gas dissociation curve, the type of ventilation-perfusion distribution, and whether the gas is being transferred into or out of the blood. It was found that the impairment of gas output caused by ventilation-perfusion inequality was greatest for inert gases of medium solubility such as nitrous oxide and was less for gases of both lower and higher solubilities. This was true both for symmetrical and skewed log normal distributions of ventilation-perfusion ratios. The factors governing gas uptake were similar except at high inspired concentrations. The shape of the blood-gas dissociation curve made remarkably little difference to the effect of uneven distribution on gas transfer. For example, when the effects of the shapes per se of the O2 and CO2 curves were compared, the differences were very small. In practice, the greater vulnerability of O2 uptake to ventilation-perfusion inequality can be explained by the slopes, not the shapes, of the two dissociation curves. (Author)

A70-17598
HEARING THRESHOLD AND EAR-CANAL PRESSURE LEVELS WITH VARYING ACOUSTIC FIELD.
E. A. G. Shaw (National Research Council, Div. of Applied Physics, Ottawa, Canada).
Acoustical Society of America, Journal, vol. 46, Dec. 1969, pt. 2, p. 1502-1514. 9 refs.

A well-damped circumaural enclosure is equipped with five independent acoustic driver units located at cardinal positions. The acoustic field near the external ear may thus be varied in a manner corresponding to angle of incidence. The acoustic pressure at a well-defined position at the ear-canal entrance is measured with a probe tube passing under the circumaural cushion. With each subject and frequency, the driver voltage level at hearing threshold L_C and the ear-canal response R_{EC} are determined for each driver unit in turn. A double series of measurements has been made with six subjects from 1 to 12 kHz and three to six subjects from 13 to 16 kHz at 1-kHz intervals. The ear-canal pressure level at hearing threshold L_E is found to be virtually independent of the acoustic-field geometry up to 12 kHz. Changes in L_C and R_{EC} observed after a one-week interval can be related to changes in (1) subject hearing sensitivity, (2) coupling between probe-tube orifice and ear-canal wave pattern, and (3) coupling between the various driver units and the ear canal. Changes in subject sensitivity are approximately 2 dB, independent of frequency, up to at least 13 kHz. Probe coupling changes are small below 9 kHz. At the higher frequencies, driver coupling changes are occasionally very large (more than 20 dB in extreme cases), generally much greater than changes in subject sensitivity, and dependent on frequency in a distinctive manner related to the geometry of the sound field. (Author)

A70-17616 *
AMINO ACID COMPOSITION AND TERMINAL SEQUENCES OF FERREDOXINS FROM TWO PHOTOSYNTHETIC GREEN BACTERIA.
K. K. Rao, H. Matsubara, B. B. Buchanan, and M. C. W. Evans (California, University, Berkeley, Calif.; King's College, London, England).
Journal of Bacteriology, vol. 100, Dec. 1969, p. 1411, 1412. 12 refs.
Research supported by the Science Research Council and the University of London; PHS Grant No. HE-11553-02; Grant No. NGR-05-003-020.

The amino acid composition of ferredoxins from Chlorobium thiosulfatophilum 8327 and Chloropseudomonas ethylicum, like C. thiosulfatophilum Tassajara, resembled ferredoxins from nonphotosynthetic anaerobes rather than Chromatium; the terminal sequences, however, more closely resembled Chromatium ferredoxin. (Author)

A70-17631 #
BOUNDARY CONDITIONS OF VISUAL PERCEPTION (WARUNKI GRANICZNE PERCEPCJI WZROKOWEJ).
Jan J. Kulikowski.
Polska Akademia Nauk, Instytut Automatyki, Prace, no. 77, 1969.

132 p. 202 refs. In Polish.

Experimental study of the influence of different physical properties of observed objects on their visibility by the human eye. The purpose of the study is to demonstrate the existence of quantitative relationships between the visibility of simple solitary objects on the one hand and the proposed fundamental characteristics of visual sensitivity and resolution on the other hand. One series of experiments measured contrast sensitivity at variable temporal and spatial frequencies. A generalized equation is derived for the spatial and temporal resolving power as a function of pattern contrast and average luminance. Another series of experiments provides evidence that there is no interaction between threshold detection processes for patterns of different orientations and of different spatial frequencies; this suggests that these processes are functionally separate. Additional experiments show a correlation between subjective pattern perception and the visual evoked potentials recorded from the occipital part of the cortex with scalp electrodes. T.M.

A70-17649

ENGINEERING IN THE HEART AND BLOOD VESSELS.

G. H. Myers (New York, University, New York, N.Y.) and Victor Parsonnet (New Jersey College of Medicine and Dentistry, Newark, N.J.).

New York, Wiley-Interscience, 1969. 210 p. 105 refs.

$14.95.

This book is devoted to the technological, device-oriented aspects of artificial internal organs in the human cardiovascular system. The principal devices discussed are the pacemakers, the artificial heart, heart valves, and vascular prostheses. These devices are covered from three aspects. First, there is a description of the pertinent physiology of the 'natural' human organ, written so that a knowledge of biology is unnecessary to understand the nature of the material. Second, there is a summary of the basic operating principles of the most important of the devices of the class (including many in the research stage). Third, there is a review of the materials used in the implanted devices, in which particular attention is given to their properties in a biological environment. Numerous tables and experimental data are included in this category. The approach is to indicate the general working principles of each of the devices, along with the relative problems and advantages, and to show the areas in which future improvement may be expected. Thus researchers and clinicians in the field may learn the general methods of operation and the theoretical principles of new devices. Data on the physiology and materials involved is presented. F.R.L.

A70-17666 #

ACCELERATION OF THE DISCHARGE OF RADIOACTIVE MATERIALS FROM THE ORGANISM (USKORENIE VYVEDENIIA IZ ORGANIZMA RADIOAKTIVNYKH VESHCHESTV).

Iu. F. Koval'.

Voenno-Meditsinskii Zhurnal, Oct. 1969, p. 38-41. 21 refs. In Russian.

Review of the effectiveness of published methods for expeditious removal of radioactive isotopes from the respiratory tract, the lungs, and the gastrointestinal tract. The methods covered include those based on ion dilution and antagonism, on blood transfusion and hemodialysis, on stimulation of the metabolism of radioactive compounds, and on the use of coplexons as discharge stimulators. V.Z.

A70-17667 #

STATE OF HEMODYNAMICS DURING CARDIOSCLEROSIS ACCORDING TO MECHANOCARDIOGRAPHIC DATA UNDER CONDITIONS OF A SPECIAL TEST UNDER LOAD (SOSTOIANIE GEMODINAMIKI PRI KARDIOSKLEROZE PO DANNYM MEKHANOKARDIOGRAFII V USLOVIIAKH SPETSIAL'NOI NAGRUZOCHNOI PROBY).

V. M. Kondrakov.

Voenno-Meditsinskii Zhurnal, Oct. 1969, p. 47-50. 6 refs. In Russian.

Investigation of heart activity and blood circulation characteristics in groups of 104 cardiosclerosis patients and 35 healthy subjects under conditions of hypoxia. Tachooscillograms and sphygmograms are recorded and the diastolic, systolic and endocardial pressure, the minute heart volume, and various characteristics of blood circulation dynamics are measured in the subjects. Statistical analysis of the results indicates diverse disorders in the hemodynamics of cardiosclerosis patients. V.Z.

A70-17668 #

BASIC PRINCIPLES OF PSYCHOLOGICAL TESTS IN THE PRACTICE OF THE FLIGHT SURGEON'S APPRAISALS (OSNOVNYE PRINTSIPY PSIKHOLOGICHESKOGO ISSLEDOVANIIA V PRAKTIKE VRACHEBNO-LETNOI EKSPERTIZY).

K. K. Ioseliani.

Voenno-Meditsinskii Zhurnal, Oct. 1969, p. 58-61. In Russian.

Outline of general approaches to the appraisal of the psychological fitness of flying personnel. The history and published papers on the subject are reviewed. The relative values of various psychological test programs are discussed. The necessity of such tests for adequate selection of prospective professional pilots is pointed out. V.Z.

A70-17669 #

MEDICALLY CONTROLLED FEEDING OF AIRCRAFT CREWS DURING FLIGHT (MEDITSINSKII KONTROL' ZA PITANIEM LETNOGO SOSTAVA V POLETE).

V. A. Petrovykh, I. G. Popov, and P. P. Lobzin.

Voenno-Meditsinskii Zhurnal, Oct. 1969, p. 61-63. In Russian.

Discussion of the physiological and nutritive value of food products designed for use by aircraft crewmembers during flights without removing the mask. The composition of some adequate tube-packed food rations is specified. The medical checks required are mentioned. V.Z.

A70-17702

SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1.

Van Nuys, Calif., Survival and Flight Equipment Association, 1969. 306 p.

$10.00.

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APOLLO SUIT FEATURES POSSIBLY APPLICABLE TO OPERATIONAL OR RESEARCH PRESSURE SUITS. G. Durney (ILC Industries, Inc., Dover, Del.), p. 8-22. (See A70-17704 06-05)

DITCHING OF A JET TRANSPORT. J. M. Simpson (FAA, Oklahoma City, Okla.), p. 23-29. (See A70-17705 06-02)

KEEP IT SIMPLE. C. A. Lehman (USAF, Washington, D.C.), p. 30-34. (See A70-17706 06-05)

CRASH-FIRE PROTECTION AT LOS ANGELES INTERNATIONAL AIRPORT. A. J. McKaskle (Los Angeles City Fire Department, Los Angeles, Calif.), p. 35-42. (See A70-17707 06-11)

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17710 06-02)

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A PERSONNEL/CARGO LOWERING AND RETRIEVAL SYSTEM FOR THE CH-47 HELICOPTER. P. D. Talbot (Aerostructures, Inc., Menlo Park, Calif.), p. 86-104. (See A70-17711 06-02)

AN ESCAPE SYSTEM FOR HELICOPTERS. G. A. Valentine (Stanley Aviation Corp., Denver, Colo.), p. 105-120. (See A70-17712 06-02)

OPTIMAL COLORS FOR MARKERS AND SIGNALS. R. L. Hilgendorf (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), p. 121-131. 7 refs. (See A70-17713 06-05)

AIR CRASH RESCUE IN THE ARMY. W. R. Briot (NASA, Manned Spacecraft Center, Houston, Tex.), p. 132-136. (See A70-17714 06-05)

CREW OXYGEN SYSTEM FOR THE NEW BREED OF COMMERCIAL AIRCRAFT. R. T. Stringer (Robertshaw Controls Co., Anaheim, Calif.), p. 137-142. (See A70-17715 06-05)

SAFETY, ALTITUDE AND OXYGEN. R. W. Duer (Sierra Engineering Co., Sierra Madre, Calif.), p. 144-160. 7 refs. (See A70-17716 06-05)

EMERGENCY ESCAPE FROM THE LUNAR LANDING TRAINING VEHICLE. L. T. Vinson (Weber Aircraft Corp., Burbank, Calif.), p. 161-168. (See A70-17717 06-05)

LUMINESCENCE AND AIR SAFETY. O. Strongin (Canrad Precision Industries, Inc., New York, N.Y.), p. 169-178. (See A70-17718 06-02)

RAPIDJET—A NEW CONCEPT IN AIRCREW ESCAPE FOR LARGE MULTIPLACE MILITARY AIRCRAFT. R. G. McIntyre (Douglas Aircraft Co., Long Beach, Calif.), p. 179-190. (See A70-17719 06-02)

SOLID-PROPELLANT COOL GAS GENERATING SYSTEMS. R. J. Richards (Teledyne, Inc., Los Angeles, Calif.), p. 191-201. (See A70-17720 06-02)

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EMERGENCY IN-FLIGHT EVACUATION FROM FUTURE COMMERCIAL AIR TRANSPORT AIRCRAFT. R. G. Snyder (Michigan, University, Ann Arbor, Mich.) and J. P. Stapp (U.S. Department of Transportation, Washington, D.C.), p. 214-233. 44 refs. (See A70-17722 06-02)

THE AN/PRC-87 PARARESCUE RADIO. J. J. Kiefer (Magnavox Research Laboratories, Torrance, Calif.), p. 234-253. 6 refs. (See A70-17723 06-02)

A NEW GENERATION ROCKET CATAPULT FOR AIRCRAFT SEAT EJECTION. V. D. Williams, N. L. Peterson, and B. E. Church (Quantic Industries, Inc., San Carlos, Calif.), p. 254-272. (See A70-17724 06-02)

HOMING SYSTEM FOR THE LOCATION OF EMERGENCY BEACONS. G. Birutis (Granger Associates, Palo Alto, Calif.), p. 273-281. (See A70-17725 06-02)

A70-17703
RECENT ADVANCES IN PROVIDING U.S. ARMY AVIATORS WITH ADEQUATE EAR PROTECTION.

Robert T. Camp, Jr. (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 1-7.

Investigation of past work performed in the field of ear protectors for Army aviation personnel, and recapitulation of the results of measurements of thirty-six ear-protection devices. The standard APH-5 helmet was evaluated and found to be inefficient. The SPH-4—a modification of the SPH-3 helmet—was introduced. At some test frequencies the attenuation provided by this helmet approaches the upper limits of available protection. M.M.

A70-17704
APOLLO SUIT FEATURES POSSIBLY APPLICABLE TO OPERATIONAL OR RESEARCH PRESSURE SUITS.

George Durney (ILC Industries, Inc., Dover, Del.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 8-22.

Discussion of features of the Apollo suit which may be valuable to any operational or research program requiring pressure suits. It is noted that the methods employed to maintain excellent comfort and reproducible performance in the Apollo suit are features that improve pilot acceptance and should be very valuable to any pressure-suit program. The suit's low-torque constant-volume joints afford excellent mobility with natural movements. M.M.

A70-17706
KEEP IT SIMPLE.

Charles A. Lehman (USAF, Washington, D.C.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 30-34.

Discussion of criteria for the design, testing, manufacture, supply, and maintenance of life support and survival gear to cope with actual combat ejections over rugged enemy terrain. Cases of pilots severely injured in ejections in Southeast Asia are examined, the pilots' inability to operate their signal and survival equipment is discussed, and recommendations are made to improve the availability, reliability, and simplicity of operation of a pilot's survival gear. M.M.

A70-17708
EQUIPMENT AND PHYSIOLOGICAL TRAINING NEEDS IN MODERN AIR TRANSPORTS.

William H. Antley, Jr. (Lockheed-Georgia Co., Marietta, Ga.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 43-46.

Discussion of physiological training programs and equipment for life support being used and soon to be used in modern transports. Changes needed in the protective helmet and quick-donning harness are described, and problems encountered with the standard Air Force oxygen mask are examined. A new concept of solid state chemical oxygen, which the oxygen industry is introducing at first only for emergency passenger oxygen, is described. The concept will use the active chlorate oxygen system; its various advantages are enumerated. M.M.

A70-17709
A REPORT ON THE EVALUATION OF THE INTEGRATED OXYGEN WINDBLAST HELMET.

B. C. Bredenbeck (Robertshaw Controls Co., Anaheim, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 47-57.

Description of the results of a fleet evaluation program of the AOH-1 helmet, a single integrated assembly designed to replace the standard flight helmet, oxygen mask retainer kit and mask-mounted or panel-mounted oxygen regulator. The evaluation program was carried out by means of a questionnaire, which was completed by approximately 150 pilots, and by means of many individual reports which were received from both military and civilian personnel who wore the helmet. The completed questionnaire is summarized, and some of the reports are excerpted. M.M.

A70-17713 #
OPTIMAL COLORS FOR MARKERS AND SIGNALS.
Robert L. Hilgendorf (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 121-131. 7 refs.

Study of certain segments of three main aspects of the problem of what color or colors to use for target and/or rescue markers. These are (1) the color of the stimulus (marker or signal), (2) color of the background for the stimulus (terrain color, sea, etc.), and (3) ambient illumination or viewing condition of the stimulus and background (daylight, dusk, night, etc.). Major attention is given to the effects of these factors on the time required to detect a signal and make a response, and the ability to correctly identify the color of the signal. Reddish colors are considered to be the most universally effective. F.R.L.

A70-17714 *
AIR CRASH RESCUE IN THE ARMY.
William R. Briot (NASA, Manned Spacecraft Center, Houston, Tex.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 132-136.

Discussion of air crash rescue by air ambulances of the Army Medical Department. Air crash rescue is concerned with the suppression of postcrash fires sufficiently to permit extrication and recovery of injured personnel, emergency treatment of the injured, and evacuation to a medical treatment facility. It is considered that properly trained and equipped units will significantly reduce mortality rates. F.R.L.

A70-17715
CREW OXYGEN SYSTEM FOR THE NEW BREED OF COMMERCIAL AIRCRAFT.
R. T. Stringer (Robertshaw Controls Co., Anaheim, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 137-142.

Description of a crew oxygen system which utilizes a mask-mounted diluter demand regulator which provides excellent physiological protection for crew members and reduces the oxygen system weight, installation costs, line and shop maintenance costs, and aircraft down time for trouble-shooting oxygen system complaints. The complete system will be standard equipment on the Lockheed L-1011 and Fokker F-28. The mask regulator is scheduled for installation on the Boeing 747 and Douglas DC-10 aircraft. F.R.L.

A70-17716
SAFETY, ALTITUDE AND OXYGEN.
Robert W. Duer (Sierra Engineering Co., Sierra Madre, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 144-160. 7 refs.

Explanation of the physiological and environmental factors influencing the design and use of oxygen breathing systems for passengers and aircrews of high flying aircraft. An attempt is made to provide familiarization with the basic needs for oxygen with increased altitudes, and some of the past and present types of oxygen breathing equipment are described. F.R.L.

A70-17717
EMERGENCE ESCAPE FROM THE LUNAR LANDING TRAINING VEHICLE.
Lewis T. Vinson (Weber Aircraft Corp., Burbank, Calif.).
IN: SURVIVAL AND FLIGHT EQUIPMENT ASSOCIATION, NATIONAL FLIGHT SAFETY, SURVIVAL AND PERSONAL EQUIPMENT SYMPOSIUM, 7TH, LAS VEGAS, NEV., OCTOBER 27-30, 1969, PROCEEDINGS. VOLUME 1. (A70-17702 06-05)
Van Nuys, Calif., Survival and Flight Equipment Association, 1969, p. 161-168.

Description of two successful emergency ejections from the lunar landing training vehicles. Astronaut Armstrong ejected after the vehicle went out of control and crashed when pressure was lost in the attitude-control system. NASA test pilot Algranti ejected at 90 ft, a second before the trainer crashed and burst into flame. It was concluded that wind forces were the primary cause of the crash. The working sequence of the ejection system is outlined. F.R.L.

A70-17750 #
RADIATION SENSITIVITY OF ESCHERICHIA COLI IN VACUUM.
Horst Bücker, Gerda Horneck, and Helga Wollenhaupt (Frankfurt, Universität, Frankfurt am Main, West Germany).
International Congress on Biophysics, 3rd, Cambridge, Mass., Aug. 29-Sept. 3, 1969, Paper. 10 p.
Research supported by the Bundesministerium für Wissenschaftliche Forschung.

Study of the effects of X rays and UV radiation on the bacteria Escherichia coli B/r in a vacuum of 0.00001 torr. It is shown that the inactivation of the irradiated cells was much increased as compared with the controls irradiated at an atmospheric pressure. It is found that the sensitivity to X rays in vacuums was enhanced by a factor of 4, and the sensitivity of to UV even by a factor of 10. It is excluded that the increased UV sensitivity was due to a selection of UV-sensitive mutants by a vacuum treatment. Z.W.

A70-17799 #
CONTENT OF THE ACID-SOLUBLE NUCLEOTIDES IN THE SPLEEN OF GAMMA-IRRADIATED RATS AT VARIOUS RATES OF THE DOSE.
E. Geshanova (Bulgarian Academy of Sciences, Institute of Comparative Pathology of Animals, Bulgaria).
Bolgarskaia Akademiia Nauk, Doklady, vol. 22, no. 7, 1969, p. 801-803. 7 refs.

Study of the changes found in the content of a number of acid-soluble nucleotides from the spleen of male Wistar rats following irradiation with doses of different strenth. A table is presented which shows the content of the acid-soluble nucleotides in a spleen of normal rats and of rats irradiated with 800 r of gamma-rays. G.R.

A70-17805 #
A STUDY OF THE RESPONSES OF NEURONS OF THE VASOMOTOR CENTER TO AN ADEQUATE STIMULUS OF THE VESTIBULAR APPARATUS IN CATS (ISSLEDOVANIE REAKTSII NEIRONOV SOSUDO-DVIGATEL'NOGO TSENTRA NA ADEKVATNOE RAZDRAZHENIE VESTIBULIARNOGO APPARATA U KOSHEK).

S. N. Malikova (Institut Mediko-Biologicheskikh Problem, Moscow, USSR).

Akademiia Nauk SSSR, Doklady, no. 188, Sept. 11, 1969, p. 485-488. In Russian.

Study of the reactions of vasomotor neurons of cats to vertical rocking movements. In experiments on mildly anesthesized cats, immobilized cats given artificial respiration, and delabyrinthectomized cats a difference was noted in the reactions of the first two groups of cats as opposed to animals of the third group. In particular, five different types of reactions of neurons of the vasomotor center to stimulation of the vestibular apparaturs were noted in the anesthesized and immobilized cats, while the delabyrinthectomized cats showed no change in the pulse activity of the neurons in response to vestibular stimulation. A.B.K.

A70-17806 #
A QUANTITATIVE CHARACTERISTIC OF THE CENTRAL COMPENSATORY PROCESS (KOLICHESTVENNAIA KHARAKTERISTIKA TSENTRAL'NOGO KOMPENSATORNOGO PROTSESSA).

A. A. Shipov, V. A. Galichii, and E. L. Epshtein.

Akademiia Nauk SSSR, Doklady, vol. 188, Sept. 11, 1969, p. 493-495. 5 refs. In Russian.

Derivation of a quantitative characteristic of the central compensatory process on the basis of a study of the mystagmus responses of guinea pigs subjected to bilateral labyrinthectomy carried out in two stages. After removal of the left labyrinth, a clearly expressed rightward spontaneous nystagmus was noted. In this case the average number of nystagmus strokes per 20 sec amounted to 45 plus or minus 4. A day after the operation, this number decreased to 21 plus or minus 2 (i.e., a decrease of 54%). Thereafter, the number of nystagmus strokes continued to decrease, until eight days after the operation no spontaneous nystagmus was observed in any of the animals. After removal of the right labyrinth, a spontaneous nystagmus toward the initially removed labyrinth was noted. In this case the average number of nystagmus strokes amounted to 25 plus or minus 4.5 (or about 56% of the value obtained after the first operation). A day after the operation, this number decreased by 50% and continued to decrease thereafter. A.B.K.

A70-17822
FORTY GERMINAL PAPERS IN HUMAN HEARING: A SOURCE BOOK IN PSYCHOACOUSTICS.

Edited by J. D. Harris.
Groton, Conn., Journal of Auditory Research, 1969. 452 p.
$10.00.

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A70-17850 *
X-RAY DENSITY CHANGES IN THE HUMAN HEEL DURING BED REST.
George P. Vose (Texas Woman's University, Denton, Tex.) and Lewis M. Hurxthal (Lahey Clinic Foundation, Boston, Mass.).
American Journal of Roentgenology, Radium Therapy and Nuclear Medicine, vol. 106, July 1969, p. 486-490. 6 refs.
Grant No. NGR-44-013-005.

Study of the effects of recumbency on bone density. Three young adults participated in a study involving 14 days of complete bed rest, and one subject was retained as an ambulatory control. A slight but significant increase in X-ray density at the os calcis site was noted among the bed rest subjects as the study progressed, but the increase was not evident in the control subject. No significant density variations occurred in the hand phalanx or distal radius. Periodic caliper measurements of the heel indicated that increased tissue thickness during the latter phases of bed rest may have accounted for the apparent gain in X-ray density of the os calcis. An adequate soft tissue correction factor must be applied in future studies of the effects of bed rest and weightlessness upon skeletal density. M.V.E.

A70-18015 *
ESTIMATION OF CHANGES IN BONE CALCIUM CONTENT BY RADIOGRAPHIC DENSITOMETRY.
George P. Vose (Texas Woman's University, Denton, Tex.).
Radiology, vol. 93, Oct. 1969, p. 841-844. 8 refs.
Grant No. NGR-44-013-005.

Description of an experiment equating percentage changes in 'X-ray calibration wedge mass equivalency' to actual changes in bone calcium content. Utilizing X-ray mass absorption coefficients determined for a heterogeneous beam, it was determined that a decrease in wedge mass equivalency of 4% in the os calcis within a 14-day period would represent a loss of 6 mg of calcium per day. Such a loss may be possible in a small trabecular bone such as the os calcis but obviously cannot be concurrent throughout the skeleton. Previously reported X-ray absorption changes of -2.91% and -2.87% in the Gemini 7 astronauts indicate a probable calcium loss of about 3 mg a day from the os calcis. M.V.E.

A70-18016
AN INVESTIGATION INTO THE EFFECTS OF STRESS UPON SKILLED PERFORMANCE.
M. Hammerton and A. H. Tickner (Medical Research Council, Cambridge, England).
Ergonomics, vol. 12, Nov. 1969, p. 851-855. 6 refs.

Investigation of the effect of an anxiety-producing situation, such as an impending parachute jump, on the performance of a pilot in the execution of an acquisition tracking task. Tests on a group of 19 experienced Regular Army men, a group of 9 Regular Army trainees and a group of 16 Territorial Army trainees showed that the effects of such situations were more in evidence in the Territorial

Army trainees, less in evidence in the Regular Army trainees and did not occur in the experienced Regular Army men. It is concluded that anxiety does affect the execution of such tasks but its effects can be minimized by appropriate training. V.Z.

A70-18017
HEART RATE AND THE CONCEPT OF CIRCULATORY LOAD.
G. C. E. Burger (Amsterdam, University, Amsterdam, Netherlands).
Ergonomics, vol. 12, Nov. 1969, p. 857-864. 21 refs.

Discussion of physiological functional loads produced in humans by dynamic and static muscular work, exposures to extremely hot or cold environments, mental stresses, and information processing assignments. The validity of oxygen consumption and heartbeat rates as integral ergonomic criteria is assessed, showing that these criteria are effective only for heavy dynamic muscular loads. A concept of circulatory load designed to cover the above mentioned variety of physiological loads is introduced and its quality as a more universal ergonomic criterion is analyzed. V.Z.

A70-18018
MULTIDIMENSIONAL SCALING OF AN AIRCRAFT HANDLING RATING SCALE.
J. F. Murrell (Institute of Aviation Medicine, Farnborough, Hants., England).
Ergonomics, vol. 12, Nov. 1969, p. 925-933. 7 refs.

Discussion of the quality of the Cooper aircraft handling rating scale on the basis of the experience of test pilots who used it during flight. An analysis of the responses of individual pilots indicates that problems arise in comparing the ratings when they are obtained by different users of the scale. It is concluded that the Cooper Scale cannot be used as an equal interval scale when ratings are made by one pilot, because of a severe data distortion. Suggestions are made as to how the scale could be used more effectively. V.Z.

A70-18085 #
A REVIEW OF ATMOSPHERIC CONTAMINATION ASSOCIATED WITH EXHAUST PRODUCTS FROM BERYLLIUM SOLID PROPELLANT.
F. G. Gorman and H. M. White (Aerospace Corp., San Bernardino, Calif.).
American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 8th, New York, N.Y., Jan. 19-21, 1970, Paper 70-117. 13 p. 46 refs.
Members, $1.00; nonmembers, $1.50.

Development of high-performance Be motors has been impeded by existing restrictions. Actions by government agencies which have been taken pertaining to curtailment of open-air test firings of high-performance solid rocket motors utilizing beryllium (Be) powder as a fuel are summarized. Atmospheric contamination of cities from existing firing sites is examined by means of mathematical model predictions and actual exhaust sample data; results indicate concentrations are within limits recommended by NAS-NRC. A critical review of existing restrictive measures is recommended in light of present toxicological information; recent analytical and biological test data indicate that exhaust products from Be motors are essentially insoluble and hence present few health hazards, so that safety can be assured by adherence to reasonable control standards. A methodology whereby Be propellant could be developed for high-performance rocket motors is suggested. (Author)

A70-18123 * #
HYDRODYNAMIC PROBLEMS IN BLOOD COAGULATION.
H. E. Petschek and R. F. Weiss (Avco Everett Research Laboratory, Everett, Mass.).
American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 8th, New York, N.Y., Jan. 19-21, 1970, Paper 70-143. 16 p. 18 refs.
Members, $1.00; nonmembers, $1.50.
NIH Contract No. PH 43-67-1120; Contract No. NASw-1894.

Recent experimental observations of thrombus formation in a stagnation point flow are described. The coagulation process includes diffusion of platelets to the surface, attachment of white cells within a critical radial distance of the stagnation point and subsequent aggregation of platelets near white cells. The radius of the white cell attachment region increases with decreasing flow parameter, and is correlated by the local surface shear stress. The experimental data are analyzed with a two-phase, non-Newtonian flow model. The velocity field and surface stress distribution are calculated with an approximate viscosity law, using a boundary layer formulation, and a white cell bonding stress is deduced. Diffusion of platelets is shown to depend on red cell tumbling, and an approximate diffusion coefficient is derived. The calculated platelet diffusion rate is compared to experimental data, and the effects of rouleaux formation are considered. Finally, perturbations of the flowfield due to aggregation and thrombus growth are analyzed. The dependence of thrombus shape and growth rate on flow separation and wake formation is also discussed. (Author)

A70-18220 #
HOW TO LISTEN TO ARTERIES (OR WHAT YOUR DOCTOR WOULD HEAR IF HE WERE A FLUID DYNAMICIST).
Jeffrey J. Fredberg, Robert S. Lees, and C. Forbes Dewey, Jr. (MIT, Cambridge, Mass.).
American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 8th, New York, N.Y., Jan. 19-21, 1970, Paper 70-144. 14 p. 10 refs.
Members, $1.00; nonmembers, $1.50.
Research supported by the Charles A. King Trust; PHS Grant No. RR-88.

Evaluation of the use of frequency spectra of arterial sounds as a tool in the study of atherosclerosis. Frequency analyses of these sounds were performed and their spectra correlated with a fluid mechanical model of turbulence produced by jet-like flow past an occlusion. On the basis of these results, significant information can be obtained concerning the diameter of the vessel, the degree of occlusion, and the local flow velocity. The noninvasive technique appears to have widespread application in the study of arterial disease. M.V.E.

A70-18401 * #
HYDROCARBON DISTRIBUTION OF ALGAE AND BACTERIA, AND MICROBIOLOGICAL ACTIVITY IN SEDIMENTS.
Jerry Han and Melvin Calvin (California, University, Berkeley, Calif.).
National Academy of Sciences, Proceedings, vol. 64, Oct. 1969, p. 436-443. 14 refs.
AEC-NASA-supported research.

The chemical taxonomic relationship of microorganisms has been studied through the hydrocarbon fraction of their chemical constituents. The diagenesis and biological transformations of some hydrocarbons in sediments is suggested, as a result of this information. (Author)

A70-18402 * #
DAILY RHYTHMS IN HEPATIC POLYSOME PROFILES AND TYROSINE TRANSAMINASE ACTIVITY—ROLE OF DIETARY PROTEIN.
Bette Fishman, Richard J. Wurtman, and Hamish N. Munro (MIT, Cambridge, Mass.).
National Academy of Sciences, Proceedings, vol. 64, Oct. 1969, p. 677-682. 17 refs.
PHS Grants No. CA-08893-04; No. AM-11237; Grant No. NGR-22-009-272.

Hepatic polysome profiles vary in untreated rats as a function of time of day. The ratio of polysomes to total ribosomes increases from 50 to 73 per cent in darkness. There is also a daily rhythm in tyrosine transaminase activity which resembles but does not coincide

with the polysome rhythm. Both rhythms are dependent on the cyclic ingestion of dietary protein, and disappear in rats given a protein-free diet. (Author)

A70-18405
EARLY PHASE OF MYOCARDIAL ISCHEMIC INJURY AND INFARCTION.
Robert B. Jennings (Northwestern University, Chicago, Ill.).
American Journal of Cardiology, vol. 24, Dec. 1969, p. 753-765. 55 refs.
Research supported by the Chicago Heart Association; NIH Grant No. HE-80729.

The acute effects of ischemia on myocardial tissue are reviewed in this paper with emphasis on how the events observed in experimental myocardial ischemic injury in dogs relate to the sequential changes occurring in the myocardium of man during the first few hours after the onset of acute infarction. The general effects of ischemia on myocardium include those which are secondary to a diminished local supply of substances such as oxygen and metabolites as well as changes resulting from the impaired diffusion of substances such as lactic acid and electrolytes from the poorly perfused ischemic tissue to the general circulation. Cell death (irreversible injury) first develops after 20 minutes of ischemia in areas of maximum injury in the dog heart and infarcts are not fully developed for 60 to 120 minutes after occlusion. Prior to the development of cell death, the severely ischemic cells are reversibly injured and show a variety of alterations from normal. These changes include depletion of supplies of glycogen and high energy phosphate, increased content of lactic acid and hydrogen, relaxation of myofibrils and failure of contraction. Cells which have just died show the same changes as well as mitochondrial, electrolyte, and nuclear defects. Which, if any, of the preceding changes causes the development of irreversibility in ischemic injury remains to be established. Some data is presented in support of the hypothesis that mitochondrial defects may be critical in the genesis of the irreversible state. (Author)

A70-18406
BIOCHEMICAL ASPECTS OF EARLY MYOCARDIAL ISCHEMIA.
Robert B. Case, Michel G. Nasser, and Richard S. Crampton (St. Luke's Hospital Center, New York, N.Y.).
American Journal of Cardiology, vol. 24, Dec. 1969, p. 766-775. 55 refs.
PHS Grant No. HE-02621.

The biochemical disturbances resulting from inadequate coronary blood flow are briefly reviewed. Results of experiments in which the onset of myocardial ischemia was examined by use of a continuous sampling technic are presented. At the point of maximal coronary arteriolar dilatation, a rise in coronary sinus lactate and potassium levels occurred simultaneously, accompanied by a rise in left atrial pressure. The rates of potassium loss and lactate production from ischemic tissue were directly related; the ratio was approximately 1:2 on a molar basis. The total amount of potassium lost by the left ventricle after 7 minutes of ischemia was estimated to be 1.0 per cent of its normal content, and 5.4 per cent after 17 minutes of ischemia. Restoration of coronary flow resulted in potassium uptake, indicating that potassium lost from an ischemic area is replaced quickly in the presence of adequate coronary flow. Electrocardiographic correlation showed that depression of the junction between the QRS complex and the S-T segment appeared simultaneously with the rise in coronary sinus potassium and lactate levels. The junction became progressively more depressed as metabolic evidence of ischemia increased. The flat 'ischemic' S-T segment depression was a later feature, appearing only after ischemia had been well established for several minutes. The early electrocardiographic changes seen in these experiments are not currently accepted as evidence of ischemia in clinical practice. A reexamination of electrocardiographic criteria for ischemia in man, with metabolic correlation, seems warranted. (Author)

A70-18407
MECHANISMS OF VENTRICULAR ARRHYTHMIAS ASSOCIATED WITH MYOCARDIAL INFARCTION.
Jaok Han (Union University; Albany Medical Center Hospital, Albany, N.Y.).
American Journal of Cardiology, vol. 24, Dec. 1969, p. 800-813. 53 refs.
Research supported by the Central New York Heart Association; NIH Grant No. HE-12498.

Ventricular ectopic beats may be generated during acute myocardial infarction as the result of enhanced automaticity in the His-Purkinje system, focal reexcitation due to the flow of current between myocardial fibers which are repolarized at disparate times, or reentry of the impulse induced by local impairment of excitability and conductivity in the ventricular tissues. The ect c beats occur more frequently when the basic ventricular rate is slow, and the danger of fatal episodes of ventricular fibrillation is also increased at slow ventricular rates. Fibrillation is more likely to be induced by early ectopic beats in the ventricle during myocardial infarction, because the development of sustained ectopic activity and turbulent impulse propagation is facilitated by increased inhomogeneity of the ventricular tissues with respect to excitability and conductivity. The aggressive prevention and treatment of ventricular ectopic beats and bradyarrhythmia was emphasized as one of the most effective means of preventing life-threatening ventricular fibrillation and lowering mortality rates from acute myocardial infarction. The mechanisms of action of various drugs and the efficacy of increased ventricular rates in suppressing ectopic activity were discussed. It was concluded that the artificial pacing of the heart at relatively rapid rates is a valuable adjunct to the measures used in the management of ventricular arrhythmias associated with acute myocardial infarction. (Author)

A70-18484
NEUROPHYSIOLOGICAL LOCALIZATION OF THE VERTICAL AND HORIZONTAL VISUAL COORDINATES IN MAN.
L. Maffei (CNR, Laboratorio di Neurofisiologia, Pisa, Italy) and F. W. Campbell (Cambridge University, Cambridge, England).
Science, vol. 167, Jan. 23, 1970, p. 386, 387. 6 refs.
Research supported by the Medical Research Council.

The amplitude of the potential evoked by a moving grating, recorded from the occipital scalp, is less when it is oblique compared with vertical and horizontal. This inequality is not found by recording the electroretinogram. Thus, orientational effects must arise between the site of origin of the electroretinogram and the evoked cortical response. (Author)

A70-18408
THE CLINICAL SIGNIFICANCE OF BRADYCARDIC RHYTHMS IN ACUTE MYOCARDIAL INFARCTION.
Douglas P. Zipes (Naval Hospital, Portsmouth, Va.).
American Journal of Cardiology, vol. 24, Dec. 1969, p. 814-825. 64 refs.

The clinical significance of bradycardic rhythms as they pertain to patients developing acute myocardial infarctions is reviewed. Proper therapy of the arrhythmia frequently is predicated on an understanding of (1) the pathophysiologic mechanisms responsible for the production of the bradyarrhythmia, (2) the hemodynamic and electrophysiologic consequences of the slow ventricular rate, and (3) the exact electrocardiographic interpretation of the bradycardic rhythm. These three points are discussed in detail and illustrated by appropriate electrocardiographic examples. The factors responsible for the production of the bradycardic rhythm as well as the consequences of the slow heart rate may be unique in a patient with an acute myocardial infarction. The advent of artificial pacing has made it mandatory to be able to predict initially which bradyarrhythmia is likely to be progressive—in terms of further, more severe disturbance in impulse formation or conduction, or hemodynamic or electrophysiologic consequences—and may not respond to a medical approach. Artificial pacing must be instituted early in patients with these disturbances. (Author)

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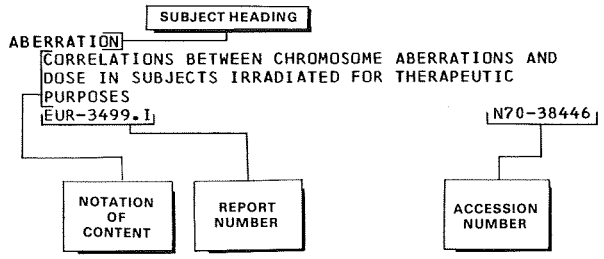

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Organic chemical modification of radiation damage in pea plants from fast neutron exposure
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Radiation dose measurements from satellite and space probe experiments, considering radiation and shielding characteristics, sensor orientation effects, etc
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Space radiation doses in inner Van Allen belt, comparing calculated and satellite measured rates
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Early nausea and vomiting response of swine to ionizing radiation related to radiation dosage and effect on humans in space missions
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Whole body microwave irradiation effect on chromosomes and protein synthesis in Chinese hamsters
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Soviet manned space flight radiation dosimetry evaluation, comparing U.S. and Soviet techniques for astronaut protection
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Nervous system influence on erythema radiation reactions from soft X ray irradiation, discussing blood supply effect
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Collection of papers on spaceflight radiological problems experimentation covering satellite data, dosimetry, solar flares, etc
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Spacecraft radiation environment, dosage and shielding problems, discussing high energy protons and electrons exposure hazards for astronauts and mission planning computer codes
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Accumulated dose and dose rate during Gemini 4 and 6 flights measured as function of elapsed time and position within spacecraft
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Radioactive isotopes removal from respiratory tract, lungs and gastrointestinal tract by ion dilution and antagonism, blood transfusion and hemodialysis, etc
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Heat stress due to microwave radiation, establishing reduction factor for radiation protection guide number under adverse thermal environments
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Methods for eliminating or controlling contaminants in liquids, gases, and on surfaces, means for evaluating effectiveness of these controls - training course outline
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Cytosine-thymine transitions from cytosine-5-H3 decay in bacteriophage S13 DNA, discussing coding change efficiency
A70-16948

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Soviet monograph on radiobiological effects of ionizing radiation covering physicochemical and functional cellular changes, recovery mechanisms, etc
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Radiography of spine in seated position, discussing aircraft seats, aeronautical ergonomics, etc
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Cooper aircraft handling rating scale on basis of test pilot experience
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Hematologic changes in rats under hypergravity, effects of vitamin B12, folic acid and return to 1 g
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Acid soluble nucleotides content in normal and gamma irradiated rat spleens, presenting table
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High energy proton effects on animal organisms and microorganisms reviewed including RBE data
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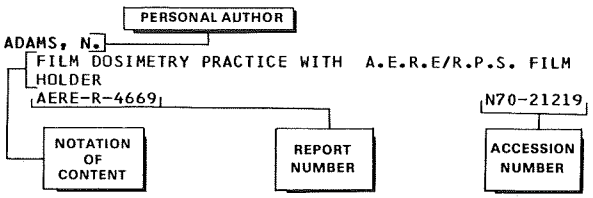

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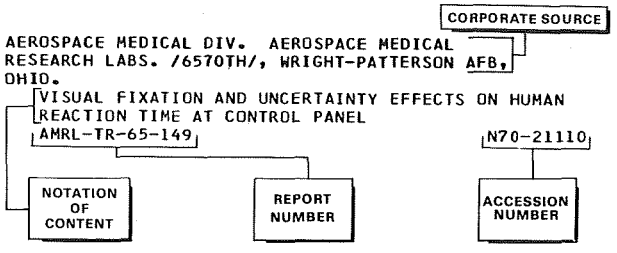

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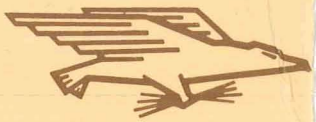

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