



Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (182)
July 1978

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ACCESSION NUMBER RANGES

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

STAR (N-10000 Series) N78-20049—N78-22018

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 182)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in June 1978 in

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



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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 165 reports, articles and other documents announced during June 1978 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

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

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1978 Supplements.

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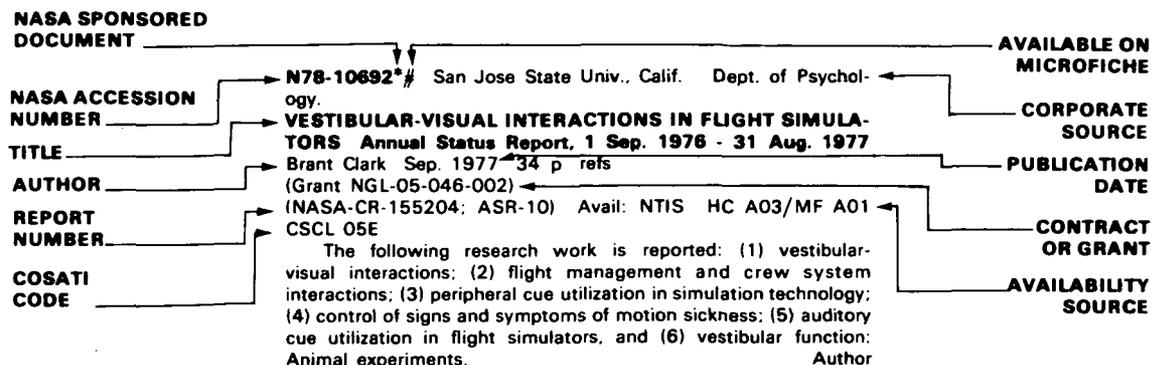
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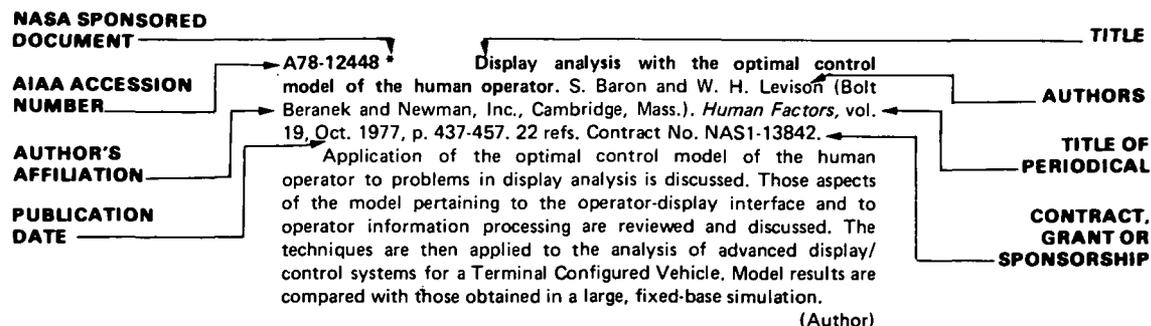
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TYPICAL CITATION AND ABSTRACT FROM STAR



TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 182)

JULY 1978

IAA ENTRIES

A78-28488 # Diurnal rhythm of secretion of 17-oxy corticoids during local and uniform production work (Sutochnyi ritm vydeleniia 17-oksikortikoidov pri lokal'noi i odnoobraznoi proizvodstvennoi rabote). K. M. Smirnov, A. A. Viru, T. E. Sazonova, and T. A. Smirnova (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Okhrany Truda, Leningrad, USSR; Tartuskii Gosudarstvennyi Universitet, Tartu, Estonian SSR). *Fiziologiya Cheloveka*, vol. 4, Jan.-Feb. 1978, p. 42-45. 19 refs. In Russian.

A78-28489 # Hydrocortisone, catecholamines and arterial pressure under work load (Gidrokortizon, katekholaminy i arterial'noe davlenie pri fizicheskoi nagruzke). M. A. Plachinta (Akademiia Pedagogicheskikh Nauk SSSR, Nauchno-Issledovatel'skii Institut Obshchei i Pedagogicheskoi Psikhologii, Moscow, USSR). *Fiziologiya Cheloveka*, vol. 4, Jan.-Feb. 1978, p. 46-52. 36 refs. In Russian.

A78-28490 # Dynamics of cardiorespiratory system indicators in healthy man during passive orthostatic test (Dinamika pokazatelei kardiopiratornoi sistemy zdorovogo cheloveka pri passivnoi ortostaticheskoi probe). V. A. Gornago, L. A. Rustam'ian, V. K. Vasil'ev, and B. S. Katkovskii. *Fiziologiya Cheloveka*, vol. 4, Jan.-Feb. 1978, p. 68-72. 41 refs. In Russian.

A78-28491 # Cardiac rhythm during wakefulness and different stages of sleep (Ritm serdchnykh sokrashchenii vo vremia bodrstrovaniia i v razlichnye periody sna). A. A. Snisarenko (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiya Cheloveka*, vol. 4, Jan.-Feb. 1978, p. 95-100. 15 refs. In Russian.

EEGs, EOGs, and EKGs are recorded on nine healthy male subjects (29-54 yr) during the period of wakefulness and the four stages of sleep. Comparison of data on the mean HR at the various sleep stages show no significant differences. The results indicate that the mean HR manifests only the transition from wakefulness to sleep. In particular, the dispersion of the sinus rhythm appears to be a more informative indicator permitting the identification of sleep stages. Compared to younger subjects, males over 40 years of age show an increased variability in the cardiac rhythm at the 3rd and 4th stages of sleep. S.D.

A78-28492 # Parameters of CNV as indicators of integrative and adaptive processes during different functional states of the central nervous system (Parametry CNV kak pokazateli integrativnykh i adaptivnykh protsessov pri raznykh funktsional'nykh sostoi-

niiakh tsentral'noi nervnoi sistemy). V. I. Klimova-Cherkasova (Institut Ekspertizy Trudospobnosti i Organizatsii Truda Invalidov, Leningrad, USSR). *Fiziologiya Cheloveka*, vol. 4, Jan.-Feb. 1978, p. 101-111. 30 refs. In Russian.

The analysis of CNV (Contingent Negative Variation) as an indicator of cortical integration in dependence upon current functional state of the CNS is performed on 30 healthy subjects of both sexes (18-40 yr). Eighty-four patients with cerebral damage of traumatic and infectious etiology are assayed for comparison. The results demonstrate the nonlinear dependence of the dynamics of the integrating process - whose electrographic correlate is CNV - on the functional state of the CNS. This dependence for healthy and brain-damaged subjects obeys a general law: the degree of sensorimotor integration in the cortical zone of the brain is reduced for changes toward the excitation side (enhancement of tonic activity), and is decreased with decreasing level of wakefulness (degradation of tonic activity). S.D.

A78-28493 # Influence of local decompression on serum sodium and potassium contents in athletes during exercise on a wrist ergograph (Vliianie lokal'noi dekompressii na sodержanie natriia i kaliiia v syvorotke krovi sportsmenov pri rabote na kistevom ergografe). G. V. Taneeva and Z. A. Moskatova (Kazakhskii Institut Fizicheskoi Kul'tury, Alma-Ata, Kazakh SSR). *Fiziologiya Cheloveka*, vol. 4, Jan.-Feb. 1978, p. 163, 164. 11 refs. In Russian.

A78-28725 On the origin of Korotkov sounds at diastole. S. A. Ambartsumian and L. A. Movsian (Akademiia Nauk Armianskoi SSR, Institut Mekhaniki, Yerevan, Armenian SSR). (*Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela*, May-June 1977, p. 141-145.) *Mechanics of Solids*, vol. 12, no. 3, 1977, p. 132-135. 9 refs. Translation.

Korotkov sounds at diastole is a phenomenon of dynamic instability of fluid-filled shells, which still lacks a fully satisfactory mechanical model. In the present paper, an attempt is made to interpret the process of instability of the brachial artery, accompanied by nonlinear oscillations at audible frequency. In the analysis, the brachial artery is treated as an isolated elastic homogeneous orthotropic infinite cylindrical shell of constant thickness. V.P.

A78-28828 Frequency discrimination following the selective destruction of cochlear inner and outer hair cells. T. G. W. Nienhuys and G. M. Clark (Melbourne, University, Melbourne, Australia). *Science*, vol. 199, Mar. 24, 1978, p. 1356, 1357. 7 refs. Research supported by the National Health and Medical Research Council of Australia.

Frequency discrimination was measured behaviorally before and after drug-induced lesions of cochlear hair cells in the cat. Discrimination was unaffected by complete loss of outer hair cells provided that at least 50 percent of inner hair cells were intact. Thus, inner hair cells are important for frequency discrimination, and they can function normally in this regard without the influence of outer hair cells. (Author)

A78-28829 Eye movements of monkeys during learning-set formation. A. M. Schrier and M. L. Povar (Brown University, Providence, R.I.). *Science*, vol. 199, Mar. 24, 1978, p. 1362-1364. 12 refs. NSF Grant No. BNS-76-09036.

Eye movements of stump-tailed monkeys were measured during learning of a long series of two-choice pattern discrimination problems. The amount of scanning per trial (shifts in visual fixation from one pattern to the other) and the duration of individual fixations on the patterns increased during the course of learning-set formation and (except for the amount of scanning by some animals), remained high during the prolonged training following learning-set formation. Some of the changes in eye movements were different from those seen during the learning of single discrimination problems, a difference that possibly reflects cognitive processes specific to the learning-set task. (Author)

A78-28832 Human factors considerations in establishing aircraft collision avoidance system alert thresholds. A. L. McFarland (Mitre Corp., McLean, Va.). *SAFE Journal*, vol. 8, Spring 1978, p. 9-13. 8 refs.

This paper discusses considerations that bear on the effectiveness of the pilot's use of collision avoidance alerts. The paper suggests that the human factors involved in the operational use of a collision avoidance system are as important in establishing alert thresholds as are the purely mathematical measures of false alert rate and late alert or missed alert rates. Collision avoidance commands are expected to occur infrequently. Consequently, the pilot's success in using his collision avoidance equipment to avoid a hazardous mid-air encounter depends upon his performance in a moment of surprise, and upon the attitude that he has developed toward this equipment prior to the time of the alert. The difficulties of assessing the human factors of collision avoidance systems under realistic conditions are discussed. Data from past experiments with collision avoidance systems, and operational experience with stall warning devices and the ground proximity warning system are reviewed. The advantages of conducting an operational flight test evaluation of a collision avoidance system before committing that system to implementation are discussed. (Author)

A78-28872 Evaluation of congenital heart defects from dynamic tracer measurements. M. Nassi (Stanford University, Menlo Park, Calif.), S. Braun, J. Dayan (Technion - Israel Institute of Technology, Haifa, Israel), and H. Weinstein (New York, City University, New York, N.Y.). *IEEE Transactions on Biomedical Engineering*, vol. BME-25, Mar. 1978, p. 166-177. 23 refs.

A novel method for the evaluation of the pulmonary to systemic flow rate ratio in patients with congenital heart defects (shunts) is presented. The evaluation is obtained from the analysis of tracer concentration curves recorded during conventional diagnostic tests. The method is based on a deterministic, time-invariant, linear model of the circulatory system. The impulse response curve of n equal-sized perfect mixers in series is used to derive the first passage time distributions that fit the primary portions of the studied tracer curves. This leads to both 'open-loop' (excluding recirculation of tracer) and to 'closed-loop' shunt evaluations. The former is based on curve-area calculations and the latter on a simple system of two or three algebraic dynamic tracer material balance equations. The method is demonstrated for three actual cases of unidirectional shunts: one right-to-left and two left-to-right. Good agreement of the fitted model to the recorded measurements is obtained. One of the above cases could be cross evaluated by the direct Fick method as well, resulting in practically the same value. (Author)

A78-28950 # Harmonic analysis of the left ventricular pressure waveform of the primate. D. M. Mirvis, G. S. Kopf, and E. W. Potalla (National Institutes of Health, Laboratory of Perinatal Physiology, Bethesda, Md.; Tennessee, University, Memphis, Tenn.). *Cardiology*, vol. 63, no. 2, 1978, p. 79-93. 22 refs.

Harmonic analysis is applied to the left-ventricular (LV) pressure waveform in 38 juvenile rhesus monkeys (*Macaca mulatta*), weighing

2.8-4.0 kg, without and with administration of drugs. The hemodynamic parameters calculated are systolic and diastolic arterial pressures, heart rate, end-diastolic pressure, and the maximum rate of contractile element contraction. The harmonic content of the LV pressure waveform is described and the relationship between it and the hemodynamic state of the animals is examined. Specifically, the relationship between the magnitudes of individual harmonic coefficients and the hemodynamic parameters are studied to determine the usefulness of the harmonic series as a measure of circulatory function. The results suggest that harmonic analysis is a suitable technique for evaluation of myocardial function. S.D.

A78-29030 Tolerance and cross-tolerance using NO2 and O2. I - Toxicology and biochemistry. J. D. Crapo, K. Sjostrom, and R. T. Drew (Duke University, Durham; National Institute of Environmental Health Sciences, Research Triangle Park, N.C.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Mar. 1978, p. 364-369. 38 refs. Grants No. NIH-HL-17603; No. NIH-1-P01-HL-07896-13.

Male rats (300-350 g) are tested for pulmonary tolerance and cross-tolerance to the potent oxidant gases O2 and NO2. A comparison of some of the biochemical changes occurring after exposure to tolerance-inducing doses of these two oxidant agents is presented. Biochemical mechanisms of O2 and NO2 toxicity are described. Exposures to 85% O2 appear to lead to more pulmonary damage than does exposure to 25 ppm NO2. The time courses for the development of tolerance to O2 and NO2 are found to be significantly different. It is shown that exposing rats to 85% O2 continuously for five days results in the development of tolerance to 100% O2, and that these same animals become partially cross-tolerant to exposures to 75 ppm NO2. Rats initially exposed to 25 ppm NO2 for 6 hr/day on each of five successive days exhibit tolerance to 75 ppm NO2 but no significant cross-tolerance to 100% O2 exposures. S.D.

A78-29031 Tolerance and cross-tolerance using NO2 and O2. II - Pulmonary morphology and morphometry. J. D. Crapo, J. Marsh-Salin, P. Ingram, and P. C. Pratt (Duke University, Durham; National Institute of Environmental Health Sciences, Research Triangle Park, N.C.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Mar. 1978, p. 370-379. 21 refs. Research supported by the North Carolina Veterans Administration Hospital; Grants No. NIH-HL-17603; No. NIH-N01-HR-52946.

Optical microscopy and SEM are applied to the study of pathological changes occurring in male rats (300-350 g) exposed to different doses of the oxidant gases O2 and NO2, and stereologic techniques and electron microscopy are used for quantitative evaluation of the observed pathological changes. It is shown that the differences in the distribution of the O2 and NO2 lesions may be accounted for by the diffusion characteristics of a reactive gas in low concentrations (NO2) and a less reactive gas in high concentrations (O2). The relationships of tolerance and cross-tolerance between these two gases are assessed in terms of lesion distribution and differences in biochemical adaptations. S.D.

A78-29032 * Spatial distribution of pulmonary blood flow in dogs in increased force environments. J. F. Greenleaf, E. L. Ritman, P. A. Chevalier, D. J. Sass, and E. H. Wood (Mayo Clinic; Mayo Foundation, Rochester, Minn.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Mar. 1978, p. 384-396. 33 refs. Grants No. NIH-HL-04664; No. NIH-RR-7; No. NGR-24-003-001; No. NIH-CI-10; Contract No. F49620-76-C-0001.

Spatial distribution of pulmonary blood flow during 2- to 3-min exposures to 6-8 Gy acceleration was studied, using radioactive microspheres in dogs, and compared to previously reported 1 Gy control distributions. Isotope distributions were measured by scintiscanning individual 1-cm-thick cross sections of excised, fixed lungs. Results indicate: (1) the fraction of cardiac output traversing left and

right lungs did not change systematically with the duration and magnitude of acceleration; but (2) the fraction is strongly affected by the occurrence or absence of fast deep breaths, which cause an increase or decrease, respectively, in blood flow through the dependent lung; and (3) Gy acceleration caused a significant increase in relative pulmonary vascular resistance (PVR) in nondependent and dependent regions of the lung concurrent with a decrease in PVR in the midsagittal region of the thorax. (Author)

A78-29033 * Continuous distributions of specific ventilation recovered from inert gas washout. S. M. Lewis, J. W. Evans, and A. A. Jalowayski (California, University, La Jolla, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Mar. 1978, p. 416-423. 25 refs. Grants No. NGL-05-009-109; No. PHS-HL-17731; No. NIH-HL-14152; No. PHS-IT-32-HL-07212-01; No. PHS-HL-05831-04.

A new technique is described for recovering continuous distributions of ventilation as a function of tidal ventilation/volume ratio from the nitrogen washout. The analysis yields a continuous distribution of ventilation as a function of tidal ventilation/volume ratio represented as fractional ventilations of 50 compartments plus dead space. The procedure was verified by recovering known distributions from data to which noise had been added. Using an apparatus to control the subject's tidal volume and FRC, mixed expired N₂ data gave the following results: (a) the distributions of young, normal subjects were narrow and unimodal; (b) those of subjects over age 40 were broader with more poorly ventilated units; (c) patients with pulmonary disease of all descriptions showed enlarged dead space; (d) patients with cystic fibrosis showed multimodal distributions with the bulk of the ventilation going to overventilated units; and (e) patients with obstructive lung disease fell into several classes, three of which are illustrated. (Author)

A78-29034 * Emptying patterns of the lung studied by multiple-breath N₂ washout. S. M. Lewis (California, University, La Jolla, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Mar. 1978, p. 424-430. 22 refs. Grants No. NGL-05-009-109; No. PHS-HL-17731; No. NIH-HL-14152; No. PHS-IT-32-HL-07212-01; No. PHS-HL-05831-04.

Changes in the nitrogen concentration seen during the single-breath nitrogen washout reflect changes in relative flow (ventilation) from units with differing ventilation/volume ratios. The multiple-breath washout provides sufficient data on ventilation for units with varying ventilation/volume ratios to be plotted as a function of the volume expired. Flow from the dead space may also be determined. In young normals the emptying patterns are narrow and unimodal throughout the alveolar plateau with little or no flow from the dead space at the end of the breath. Older normals show more flow from the dead space, particularly toward the end of the breath, and some show a high ventilation/volume ratio mode early in the breath. Patients with obstructive lung disease have a high flow from the dead space which is present throughout the breath. A well ventilated mode at the end of the breath is seen in some obstructed subjects. Patients with cystic fibrosis showed a poorly ventilated mode appearing at the end of the breath as well as a very high dead space. (Author)

A78-29035 Calibration of a new ear oximeter in humans during exposure to centrifugation. E. L. Besch, F. W. Baumgardner, R. R. Burton, K. K. Gillingham, R. F. McPherson, and S. D. Leverett, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Mar. 1978, p. 483-487. 16 refs.

An optoelectronic ear oximeter was evaluated as a noninvasive method for determining arterial oxygen saturation (Sa-O₂) in human subjects during exposure to various levels of accelerative forces. This physiological calibration involved exposing five subjects, while breathing air and wearing the ear oximeter, for 60 s to each of three levels of accelerative forces (3, 5, and 7 G); arterial blood samples were withdrawn concurrently. Sa-O₂ was calculated indirectly from the oxygen tensions measured from the sampled arterial blood with a blood gas analyzer and corrected for pH and base excess. These data were compared, as were similar data taken from the same subjects

breathing three different hypoxic gas mixtures while resting at earth's gravity (1 G). Regression analyses of these data for both experimental groups (G exposure, hypoxic exposure), comparing the ear-oximeter Sa-O₂ with the calculated Sa-O₂, showed the ear oximeter to be accurate with correlation coefficients of 0.95 and 0.98, respectively. (Author)

A78-29067 # Systematic approach to the study of intrabrain regulation (O metodicheskoy podkhode v izuchenii vnutrimozgovoy regulatsii). K. A. Ivanov-Muromskii, V. M. Ladnushkin, and K. I. Kuz'mina (Akademiya Nauk Ukrainy SSR, Institut Kibernetiki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naya Tekhnika*, no. 36, 1977, p. 84-90. 17 refs. In Russian.

A methodology for studying the functional organization of specific systems of the brain from the viewpoint of automatic control is proposed. The visual analyzer system during different stages of Nembutal anesthesia is analyzed along with the effect of sodium oxybutyrate and electric current producing electroanesthesia. Experiments on rabbits served as the base for the study. P.T.H.

A78-29068 # The eight-sensor low-energy gamma topograph GNG-8 (Vos'midatchikovyy nizkoenergeticheskii gamma-topograf GNG-8). Iu. M. Sidorov, L. E. Andrievskii, and O. I. Khutorianskii (Kievskoe Proizvodstvennoe Ob'edinenie Medtekhniki, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naya Tekhnika*, no. 36, 1977, p. 111-116. In Russian.

A high-speed gamma topograph for visualization of the distribution of low-energy isotopes introduced into the human organism for diagnostic purposes is described. An algorithm for detecting pathological foci on skenograms during automatic processing is given.

P.T.H.

A78-29247 Dynamics of the amphibian middle ear. S.-H. Chung, A. Pettigrew, and M. Anson (National Institute for Medical Research, London, England). *Nature*, vol. 272, Mar. 9, 1978, p. 142-147. 19 refs.

Laser speckle interferometric experiments were performed on the auditory system of an amphibian. Resonance characteristics of the middle ear were studied by measuring the eardrum response to different forces impinging on it. It was found that the mouth cavity connecting the two ears acts as a resonator, whose characteristics largely determine the frequency selectivity of the middle ear. Direct evidence was obtained that the two eardrums are elastically coupled, the coupling efficiency being about 0.5. Moreover, it was found that the amplitude of vibration of the eardrum is critically dependent on the direction of the incident sound. P.T.H.

A78-29253 Functions of calcium in sweat secretion. C. A. Prompt and P. M. Quinton (California, University, Los Angeles, Calif.). *Nature*, vol. 272, Mar. 9, 1978, p. 171, 172. 12 refs. Research supported by the National Cystic Fibrosis Foundation, and Southern California Kidney Foundation; Grant No. NIH-1-R01-AM-20356-01-GMA.

By means of a novel in vitro preparation, the effects of calcium on the secretory properties of the human eccrine sweat gland were investigated. Secretory activity of skin plugs was found to be entirely dependent on the presence of external calcium in a bath of oxygenated Ringer's solution. Secretion of sweat could not be induced unless calcium was present at a concentration of at least 0.1 mM. Moreover, the concentration of calcium in the final sweat was inversely correlated with sodium reabsorption. The results suggest the action of a mechanism for regulating the composition of sweat through calcium. P.T.H.

A78-29275 Induced visual movement as nonveridical resolution of displacement ambiguity. R. H. Day (Monash University, Clayton, Victoria, Australia). *Perception and Psychophysics*, vol. 23, no. 3, Mar. 1978, p. 205-209. 19 refs.

Following the proposals made by Kinchla (1971), it is argued that induced movement is a nonveridical resolution of stimulus ambiguity. The ambiguity derives from an identity between displacement of one element relative to another and displacement of the second relative to the first in a featureless field at velocities below the threshold for subject-relative movement. In such conditions, which element actually moves is perceptually unresolvable and

veridical judgments therefore accord with chance. When a stationary field is introduced, perception is veridical, but when the field moves with the moving element, perception is nonveridical, i.e., induced movement of the stationary element and induced stationarity of the moving element occur. The results from three experiments supported this interpretation and showed also that movement velocities above the subject-relative threshold contribute to the resolution of ambiguity. (Author)

A78-29296 The visual risk of ethambutol treatment - Aeronautical incidences (Le risque visuel du traitement par l'éthambutol - Incidences aéronautiques). P. J. Manent, J. Senn, and J. Chevaleraud (Hôpital d'Instruction des Armées Dominique Larrey, Versailles; Centre Principal d'Expertise Médicale du Personnel Navigant, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 3rd Quarter, 1977, p. 168-171. In French.

Ethambutol, a drug used to treat tuberculosis, has been noted to cause damage to the optic nerve in 0.8 percent of the cases observed. Usually the damage is reversible, but sometimes it is not. Since impairment of visual acuity is one of the symptoms of an adverse ethambutol reaction, caution is advised in giving the drug to flight personnel. Stages in the progression of ethambutol-caused nerve damage are outlined, as well as a regime of treatment, which consists primarily of cessation of ethambutol therapy for three months before flight time, under the care of an ophthalmologist. D.M.W.

A78-29297 A technique of rapid acclimatization of humans to cold (Technique rapide d'acclimatation de l'homme au froid). C. Boutelier, L. Bougues, and J. Timbal (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 3rd Quarter, 1977, p. 172-176. 8 refs. In French.

This paper presents the results of an experiment in which seven normal subjects were subjected at intervals to water of 15 C over a period of two five-day weeks. Physiological and environmental parameters were evaluated, including basal metabolic rate, body temperature, thermal energy of the water in W/sq m, and thermal loss to the body in water and air. Attention is given to maintaining the manual dexterity of the subjects, regarded as essential for survival in cases of accidental immersion. Increases in tolerance to cold, as well as in manual dexterity were noted as the experiment progressed. D.M.W.

A78-29298 Prediction of hypothermia in humans as a function of morphological characteristics and of environmental conditions (Prévision de l'hypothermie chez l'homme en fonction de ses caractéristiques morphologiques et des conditions de l'environnement). J. Timbal, M. Loncle, H. Marotte, and Ch. Boutelier (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 3rd Quarter, 1977, p. 177-182. 33 refs. In French.

A mathematical model is developed to evaluate those factors which could lead to hypothermia, e.g., ambient air or water temperature, barometric pressure, air vapor pressure, height, weight, and amount of subcutaneous fat of the subjects. The model is intended to be valid for conditions of normal, hypo-, or hyperbaric air pressure, for hyperbaric oxygen-helium mixtures, and in water. Attention is given to the design of diving suits, based on the outlined parameters. D.M.W.

A78-29299 Concerning the utilization of electronic displays in the field of aeronautics (A propos de l'utilisation des visualisations électroniques dans le domaine aéronautique). G. F. Santucci and G. Perdriel (Centre de Recherches de Médecine Aéronautique, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 3rd Quarter, 1977, p. 183-187. In French.

The amount of information a pilot of a modern aircraft must contend with has increased dramatically. To deal with the information, clear, coherent visual displays are a necessity. This paper discusses four such displays (cathode ray tubes, LED, liquid crystals, and plasma ion), and the comparative advantages of each. Attention is given to psychological variables, e.g., color coding, persistence of vision, and layout of the information. D.M.W.

A78-29300 Presentations on aerospace medicine at Bourget (Les entretiens de médecine aéronautique du Bourget). R. P. Delahaye. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 3rd Quarter, 1977, p. 198-216. In French.

This paper presents a summary of medical factors involved in flying the Concorde airliner. Noise parameters during various stages of flight are evaluated, and results of medical examinations of flight personnel are discussed, including a general examination of basic physiological function, EEG, EKG, ophthalmological tests, hearing tests, tests pertaining to the effects of reduced oxygen, and psychological tests. Attention is given to use of the Concorde as a medical transport, and to the extent to which flight aboard the aircraft might aggravate already existing pathological conditions. D.M.W.

A78-29487 A model to quantify reliability of human performance in man-machine systems. A. Raouf and M. A. Abo El Ela (Windsor, University, Windsor, Ontario, Canada). (*Society of Reliability Engineers, Annual Canadian Symposium on Reliability Engineering, 4th, Ottawa, Canada, Oct. 13, 14, 1977.*) *Microelectronics and Reliability*, vol. 17, Jan. 1978, p. 155-163. 10 refs.

To quantify reliability of human performance in a man-machine system a Markovian model for estimating the number of cycles that a worker performs without committing an error has been presented. Methods of collecting data, subsequent analysis, and various types of errors made by workers have been described. For illustrating the application of the model, results of an experimental study have been used. (Author)

A78-29539 Monocular vision and landing performance in general aviation pilots - Cyclops revisited. J. H. Grosslight, H. J. Fletcher, R. B. Masterton, and R. Hagen (Florida State University, Tallahassee, Fla.). *Human Factors*, vol. 20, Feb. 1978, p. 27-33. 10 refs. Research supported by the Florida State University and Link Foundation.

Thirteen low-time, but current, private pilots flew 18 monocular landings and 18 normal binocular landings. To assure equal effort under both conditions, pilots were told that they were in a spot landing contest with from \$200 to \$400 in prizes awarded on the basis of total accuracy on both monocular and binocular trials. No pilot was familiar with any prior research regarding monocular/binocular landing ability. Monocular landings were as accurate as binocular landings, but monocular approaches were flown higher/steeper, those landings tended to be longer and harder, the pilots judged them to be poorer, and they reported greater anxiety during the monocular landings. These results more nearly duplicate one study with military jet pilots but failed to confirm a second study which showed that similar low-time pilots landed significantly better monocularly. The results of that study (Cyclops II) must be considered an artifact of the methodology used. Evidence to date suggests that both high-time and low-time pilots can land as accurately monocularly (not better) but that monocular approaches and landings are flown differently. (Author)

A78-29540 Quantitative models of motor responses subject to longitudinal, lateral, and preview constraints. T. O. Kvalseth (Norges Tekniske Hogskole, Trondheim, Norway). *Human Factors*, vol. 20, Feb. 1978, p. 35-39. 11 refs.

First- and second-order linear models of mean movement time for serial arm movements aimed at a target and subject to preview constraints and lateral constraints were formulated as extensions of

the so-called Fitts's law of motor control. These models were validated on the basis of experimental data from five subjects and found to explain from 80% to 85% of the variation in movement time in the case of the first-order models and from 93% to 95% of such variation for the second-order models. Fitts's index of difficulty (ID) was generally found to contribute more to the movement time than did either the preview ID or the lateral ID defined. Of the different types of errors, target overshoots occurred far more frequently than undershoots. (Author)

A78-29541 * **Transfer of training on manual control systems differing in short period frequency and damping characteristics.** R. S. Lincoln (DeAnza College, Cupertino, Calif.). *Human Factors*, vol. 20, Feb. 1978, p. 83-89. 6 refs. Grant No. NGL-05-046-002.

Each of four groups of 16 subjects was trained on one of four compensatory tracking tasks that differed with regard to short period natural frequency and damping characteristics. After completion of the training sessions, the members of each group either transferred to a task on which they had not been trained or continued with their original task. Analysis of the training data indicated that relative task difficulty was largely determined by system damping which, however, had little effect on the amount of transfer during the transfer trials. The effect of system frequency was essentially reversed, and a marked interaction between training and transfer frequencies was observed in the transfer data. Similar results were obtained both with relative error scores and transinformation scores. Positive transfer was exhibited by most of the groups when they transferred to tasks on which they had not been trained. (Author)

A78-29542 **Caffeine consumption and target scanning performance.** J. M. Childs (Manned Systems Sciences, Inc., Westlake Village, Calif.). *Human Factors*, vol. 20, Feb. 1978, p. 91-96. 24 refs.

Twenty-five minutes after ingesting one of three possible dosages (placebo, 200 mg, or 400 mg) of caffeine, 48 subjects individually participated in two short-term visual target scanning tasks (subject-paced and experimenter-paced). Assignment of subjects to treatment groups was made on the basis of a priori coffee consumption rates. Subjects who reported that they normally consumed less than three cups of coffee per week were assigned to the low usage rate group (LR), while those who reported average consumption rates of three cups or more per week were assigned to the high usage rate group (HR). Significant differences in latencies were obtained between LR and HR only with 400 mg caffeine dosages. LR exhibited significantly higher latencies as a function of these dosages than did HR. No reliable differences occurred between LR and HR for correct detection percentages. (Author)

A78-29543 **Effects of fixed versus variable reference frequencies on psychophysical judgments of vibration.** B. K. N. Rao and B. Jones (Birmingham, University, Birmingham, England). *Human Factors*, vol. 20, Feb. 1978, p. 97-102. Research supported by the Science Research Council.

The 'fixed reference frequency' method and the 'progressive matching' method are used to obtain equal-magnitude contours from ten seated subjects, aged 25-52 yr, exposed to sinusoidal vibrations in the three translational axis. The effects of other variables such as posture, instructions, subjects, and other environmental variables are controlled. While the data in the vertical axis show overall significant difference between the two methods, the results of the horizontal axes reveal no overall significant difference between the two methods. However, the contour shapes produced by both methods substantially deviate from the ISO proposals. S.D.

A78-29544 **Effects of altitude and heat on complex cognitive tasks.** B. J. Fine and J. L. Kobrnick (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Human Factors*, vol. 20, Feb. 1978, p. 115-122. 15 refs.

The effects of heat and altitude on complex cognitive tasks involved in artillery fire direction center operations were examined. Five six-man groups received one week of intensive training on tasks

involving message reception and decoding, arithmetic conversions, and reception and recording of meteorological data. Each group then performed the tasks for 7 hr during each of the following daily series of conditions: control (sea level, normal temperature), altitude (4300 m, normal temperature), control (sea level, normal temperature), heat (sea level, 35 C, 88% RH). All tasks were significantly and similarly affected by altitude and by heat, although individuals differed considerably in degree and type of stress response. Errors of omission greatly exceeded errors of commission. This approach, anchored firmly in basic psychological processes and theory, is considered to be of significant potential value as a technique for analyzing stress-sensitive factors in complex cognitive performance. (Author)

A78-29556 **Perceived orientation of a runway model in nonpilots during simulated night approaches to landing.** H. W. Mertens (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 457-460. 23 refs.

The paper is concerned with the effect of varying levels of motion parallax from both radial and vertical motion on perception of the orientation of a runway relative to the ground. Under simulated nighttime conditions (only runway and approach lighting were visible), 16 nonpilots adjusted the apparent slant of a model runway to make it appear horizontal as the model moved toward them along a 3-deg approach path from a simulated distance of 4.33 to 1.33 nautical miles. Simulated approach speeds of 62 and 125 kn were used, while the rate at which the model rotated during slant adjustments varied between 5 and 30 deg/min. The average generated approach angle for 256 trials was 0.5 deg. This consistent and large deviation from 3 deg is in agreement with the documented tendency of pilots to fly low approaches at night and is explained in terms of the equidistance tendency and/or errors in perceiving the direction of the model in the visual field. The data suggest that motion parallax is not a safe cue for judging glide path at distances greater than 1.33 miles. M.L.

A78-29557 **Speech intelligibility through communication headsets for general aviation.** T. H. Townsend (California State University, Northridge, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 466-469. 9 refs.

A78-29558 **Influence of hyperoxia /1 ATA/ on mouse brain GABA, glutamate, and glutamine.** G. Schäfer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 470-475. 43 refs.

A78-29559 **Blood gas tension and development of lung damage in mice exposed to oxygen at 1 ATA.** G. Schäfer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany) and P. Citoler (Köln, Universität, Cologne, West Germany). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 476-479. 19 refs.

A78-29560 **Effect of clothing insulation beneath an immersion coverall on the rate of body cooling in cold water.** P. Marcus and S. Richards (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 480-483. 10 refs.

Deep body and skin temperatures were measured on nine subjects wearing immersion coveralls during a 1 h immersion in water at 2.5 C. With no additional insulation, mean skin temperature fell 13.1 C and deep body temperature 0.74 C. When a full Acrilan pile suit was worn beneath the coverall, mean skin temperature fell 8.3 C and deep body temperature 0.33 C. With insulation covering the trunk and upper limbs alone, mean skin temperature fell 9.9 C and deep body temperature 0.45 C. Conclusions are drawn concerning the effects on body cooling of changes in insulation of aircrew clothing assemblies designed to protect against immersion in cold water. (Author)

A78-29561 * Postural illusions experienced during Z-axis recumbent rotation and their dependence upon somatosensory stimulation of the body surface. J. R. Lackner (Brandeis University, Waltham, Mass.) and A. Graybiel (U.S. Navy, Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 484-488. 13 refs. Contract No. NAS9-15147; NASA Order T-5904B; NASA Order T-590413.

A blindfolded recumbent subject experiences a variety of postural illusions when rotated about his Z axis. Initially, during the acceleratory phase of rotation, turning about his Z axis is experienced; but, as rotary velocity increases, a spiraling of the body outward in the direction opposite to true rotation is experienced as well. Above 15-20 rpm, only orbital motion of the body is experienced, with the subject feeling that he is always facing in the same direction. One cycle of the apparent orbit is completed each time the subject actually rotates 360 deg. The reverse sequence of illusory motion is experienced during deceleration. The illusory motion all subjects experience during Z-axis recumbent rotation is shown to depend upon the touch and pressure stimulation of the body surface generated by contact forces of support. (Author)

A78-29562 * Responses of articular and epiphyseal cartilage zones of developing avian radii to estrone treatment and a 2-G environment. J. A. Negulesco and T. Kossler (Ohio State University, Columbus, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 489-494. 42 refs. Research supported by the Ohio State University; Contract No. NAS2-6634; Grant No. NIH-5409.

Histological measurements of radii from chickens exposed to estrone and hypergravity are reported. Female chicks at two weeks post-hatch were maintained for two weeks at earth gravity or 2 G with daily injections of 0.2 or 0.4 mg estrone. Animals were sacrificed after the last injection, and the radii were processed by described histological techniques. The results suggest that proximal and distal epiphyses of developing radii show different morphological responses to estrone and hypergravity. M.L.

A78-29563 Prevention of hypoxia-acceptable compromises. J. Ernsting (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 495-502. 23 refs.

The acceptable degree of hypoxia is a most important factor in the design of pressure cabins and of aircrew oxygen breathing equipment. The studies since 1960 of the effects of mild hypoxia upon human performance are reviewed. It is concluded that the hypoxia induced by breathing air at altitudes up to 5000 ft is acceptable for both crew and passengers of combat and passenger aircraft. The magnitude and the effects of the hypoxia induced by rapid decompression are also considered. The results of the experimental investigations are correlated, and it is deduced that the minimum acceptable alveolar oxygen tension on rapid decompression is 30 mm Hg. (Author)

A78-29564 Treatment of hypertension in aviators - A clinical trial with Aldactazide. D. H. Hull, R. A. Wolthuis, J. H. Triebwasser, and D. A. McAfoose (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; PARAF Hospital, Wroughton, Wilts., England). *Aviation, Space, and Environmental Medicine*, vol. 49, Mar. 1978, p. 503-511. 37 refs.

Thirty-two USAF aircrewmembers with mild or moderate uncomplicated essential hypertension were treated with Aldactazide (spironolactone and hydrochlorothiazide). The study was designed to determine the efficacy and safety of this drug combination in aircrew subject to the stress of flying high-performance aircraft. All patients were investigated in detail before, and again 6 weeks after, beginning Aldactazide treatment. Adequate blood pressure control was achieved in 94% of patients; 84% were able to return to flying duties. Treatment was associated with a moderate loss of weight and plasma volume, and a slight reduction in renal function. Tolerance to multiple stress tests was unimpaired after treatment. Symptoms

attributable to treatment were minimal. It is concluded that in the dose used, four tablets or less daily, Aldactazide is a safe and fairly effective second-line treatment for hypertensive aircrewmembers.

(Author)

A78-29591 Axisymmetric vibration of human skull-brain system. J. C. Misra. *Ingenieur-Archiv*, vol. 47, no. 1, 1978, p. 11-19. 11 refs.

Vibrations of the human head modeled as a prolate spheroidal shell are considered. The shell is assumed to be made of a linear viscoelastic solid containing a viscoelastic fluid representing the brain. Steady-state response of human-sized skull-brain system due to an axisymmetric load is analyzed. The effect of the eccentricity of the shell on its stiffness is found to be quite significant. (Author)

A78-29637 Reduced triglyceride secretion - A metabolic consequence of chronic exercise. C. Simonelli and R. P. Eaton (New Mexico, University, Albuquerque, N. Mex.). *American Journal of Physiology*, vol. 234, Mar. 1978, p. E221-E227. 29 refs. Research supported by the KROC Foundation; Grant No. NIH-HL-120858.

A78-29638 Comparison of carotid artery mechanics in the rat, rabbit, and dog. R. H. Cox (Pennsylvania, University, Philadelphia, Pa.). *American Journal of Physiology*, vol. 234, Mar. 1978, p. H280-H288. 22 refs. Research supported by the Henry Warfield Haynes Fund; Grant No. PHS-HL-17840.

A78-29639 Cardiovascular-respiratory reflex interactions between carotid bodies and upper-airways receptors in the monkey. M. Daly, P. I. Korner, J. E. Angell-James, and J. R. Oliver (Baker Medical Research Institute, Prahran, Victoria, Australia). *American Journal of Physiology*, vol. 234, Mar. 1978, p. H293-H299. 20 refs. Research supported by the Royal Society, Wellcome Trust, National Health and Medical Research Council, National Heart Foundation of Australia, and Alfred Hospital Medical Research Fund.

A78-29640 * Comparison of synchronization of primate circadian rhythms by light and food. F. M. Sulzman, C. A. Fuller, and M. C. Moore-Ede (Harvard University, Boston, Mass.). *American Journal of Physiology*, vol. 234, Mar. 1978, p. R130-R135. 22 refs. NSF Grant No. PCM-76-19943; Contract No. NAS9-14249; Grant No. NIH-GN-22085.

It is a well-documented fact that cycles of light and dark (LD) are the major entraining agent or 'zeitgeber' for circadian rhythms and that cycles of eating and fasting (EF) are capable of synchronizing a few circadian rhythms in the squirrel monkey. In this paper, by contrasting how these rhythms are timed by LD and EF cycles, the differential coupling to the oscillating system within adult male squirrel monkeys is examined. The variables measured are the rhythms of drinking, colonic temperature, and urinary potassium and water excretion. Attention is given to a comparison of the reproducibility of the averaged waveforms of the rhythms, the stability of the timing of a phase reference point, and the rate of resynchronization of these rhythms following an abrupt 8-hr phase delay in the zeitgeber. It is shown that the colonic temperature rhythm is more tightly controlled by LD than EF cycles, and that the drinking and urinary rhythms are more tightly coupled to EF than LD cycles. S.D.

A78-29662 # Results of biological experiments carried out by the Viking probes and the possible existence of life on Mars (Wyniki doswiadczen biologicznych w probnikach 'Viking' a mozliwosc wystepowania zycia na Marsie). O. Wolczek (Polskie Towarzystwo Astronautyczne, Warsaw, Poland). *Postepy Astro-nautyki*, vol. 10, no. 4, 1977, p. 51-90. 105 refs. In Polish.

A summary of our knowledge of the conditions, present and past, on Mars is given, and on this basis the probability of occurrence of life or its traces on Mars is evaluated. The results obtained by Viking landers are examined, and their enigmatic nature is stressed.

Certain reactions can take place in the Martian soil that imitate, after a fashion, the activity of living organisms. Synthesis of certain simple organic compounds can also take place in it, but this has only been demonstrated in the lander apparatus. The soil itself is barren and does not contain any such compounds even in quantities of one part per billion. This is the strongest argument against the existence of life on Mars.

P.T.H.

A78-29663 # Biological role of terrestrial gravitation (Biologiczna rola grawitacji ziemskiej). G. Lyson-Wojciechowska and K. Kwarecki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 10, no. 4, 1977, p. 91-102. 35 refs. In Polish.

Basic questions of gravitational biology are briefly discussed. The effect of gravitational forces on biological objects of different sizes is examined. In particular, the shaping function of gravity is discussed. The growth of bone structure under the influence of gravity is considered, and the role of gravity in stimulating activity of osteoblasts and osteoclasts is mentioned.

P.T.H.

A78-29691 The biosphere and active processes on the sun. B. M. Vladimirkii (Krymskaia Astrofizicheskaia Observatoriia, Nauchny, Ukrainian SSR). (*Akademiia Nauk SSSR, Izvestiia, Seriiia Fizicheskaiia*, vol. 41, Feb. 1977, p. 403-410.) *Academy of Sciences, USSR, Bulletin, Physical Series*, vol. 41, no. 2, 1977, p. 138-144. 51 refs. Translation.

The following mechanism for the effects of solar activity on biological phenomena is formulated: solar disturbance (e.g., an intense chromospheric flare), disturbance of the magnetosphere and plasmasphere (a magnetic storm with sudden commencement), changes in the strength and spectrum of the background electromagnetic field on the earth surface and changes in the physiological indices of the organism. The effects of such parameters of the environment as cosmic rays and the geomagnetic field on the organism are also discussed.

B.J.

A78-29937 The interpretation of the T wave of the electrocardiogram. D. Noble and I. Cohen (Oxford University, Oxford, England). *Cardiovascular Research*, vol. 12, Jan. 1978, p. 13-27. 28 refs. Research supported by the Medical Research Council and Muscular Dystrophy Association of America.

The recording and interpretation of the ECG T wave since the middle of the 19th century are reviewed. Factors affecting the inversion of the T wave are discussed in some detail. There is enough experimental evidence to indicate that the T wave corresponds to ventricular repolarization and that its polarity is related to the durations of action potentials in different parts of the ventricle. The basis of T wave inversion during extrasystoles with wide R waves is related to deceleration of conduction. Activity-dependent changes in the Na/K exchange pump may be involved in T wave inversion. S.D.

A78-30296 * Morphogenetic responses of cultured totipotent cells of carrot /Daucus carota var. carota/ at zero gravity. A. D. Krikorian and F. C. Steward (New York, State University, Stony Brook, N.Y.). *Science*, vol. 200, Apr. 7, 1978, p. 67, 68. 10 refs. NASA-supported research.

An experiment designed to test whether embryos capable of developing from isolated somatic carrot cells could do so under conditions of weightlessness in space was performed aboard the unmanned Soviet biosatellite Kosmos 782 under the auspices of the joint United States-Soviet Biological Satellite Mission. Space flight and weightlessness seem to have had no adverse effects on the induction of embryoids or on the development of their organs. A portion of the crop of carrot plantlets originated in space and grown to maturity were not morphologically different from controls.

(Author)

A78-30395 # Prospects for developing a theory of a functional system (Perspektivy razvitiia teorii funktsional'noi sistemy). K. V. Sudakov and K. A. Volkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 9, Jan.-Mar. 1978, p. 3-27. 355 refs. In Russian.

A general survey of the Anokhin theory of the functional system, including its main propositions and possible application in biology and medicine is presented. In more specific terms, the theory is related to studies of the neurophysiological mechanisms of the brain and central nervous system, the self-regulating adaptations of an organism under pathological conditions, and sleep and disease mechanisms. Anokhin's theory is further considered for basic biological motivation processes (hunger, thirst, aggressiveness), the conditioning of animals under new conditions, and an analysis of emotional stress. An extensive bibliography of works by and about Anokhin is given.

S.C.S.

A78-30396 # Methodological aspects of the physiology of behavior (Metodologicheskie aspekty fiziologii povedeniia). Ia. B. Lekhtman and N. A. Shustin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 9, Jan.-Mar. 1978, p. 28-41. 44 refs. In Russian.

Various methodological aspects of the physiology of behavior and activity, i.e., the interaction of an organism with the surroundings, are discussed. The Pavlovian conceptions of equilibration and the physiology of activity are reviewed. The operation of a so-called code model, governing arbitrary actions associated with homeostasis and the reflexes of an organism is described. Bernshtein's theories concerning behavioral mechanisms is outlined along with the development of a theory of reflex conditioning. As a further stage in the study of physiological processes of self-regulation, reflex conditions, and the formation of behavioral acts, Anokhin's theory of a functional system is considered.

S.C.S.

A78-30397 # An experimental analysis of the multiplication of a slow wave of an evoked potential (Eksperimental'nyi analiz mul'tiplikatsii pozdnego kolebaniia vyzvannogo potentsiala). A. I. Shumilina and G. N. Rychkova (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 9, Jan.-Mar. 1978, p. 42-80. 156 refs. In Russian.

A study is made of the neurophysiological mechanisms and the behavioral correlates for the slow wave multiplication of an evoked potential. Various sensor stimulations are considered, including the conditional defense reaction to flashes of light. The multiplication phenomenon is found to be an electrographic correlate to a reaction caused by the misalignment of a functional defense system in an organism when a painful support is revoked. At the basis of this reaction is the interaction of the reverberational nature of the cortex of the hemispheres and subcortical structures, especially the thalamus. The emotion-inducing zones of the hypothalamus are significant factors in these processes.

S.C.S.

A78-30398 # The theory of a functional system as the methodological basis for the neurophysiology of behavior (Teoriia funktsional'noi sistemy kak metodologicheskaiia osnova neurofiziologii povedeniia). V. B. Shvyrkov (Akademiia Nauk SSSR, Institut Psikologii, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 9, Jan.-Mar. 1978, p. 81-105. 73 refs. In Russian.

Various aspects of the neurophysiology of behavior are studied within the limits of the theory of a functional system developed by Anokhin. Consideration is given to the qualitative difference between behavior and elementary physiological processes, the purposefulness of behavior, the separation of a behavioral act in the behavior continuum, and the so-called operational architectonics of the functional system of an elementary behavioral act. It is suggested that the study of the neurophysiology of behavior should arise from an understanding of behavior as a cyclic process where information is exchanged between the surroundings and the organism. At the basis of this exchange are systemic mechanisms which organize elementary

physiological processes into the single functional system of a behavioral act. S.C.S.

A78-30399 # The functional and chemical characteristics of choline-sensitive neurons in the cortex of the brain (Funktsional'nye i khimicheskie svoystva kholinochuvstvitel'nykh neuronov v kore golovnogo mozga). G. N. Oleinik (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 9, Jan.-Mar. 1978, p. 106-129. 152 refs. In Russian.

A study is made of the choline-sensitive neurons in various parts of the cortex of the brain in mammals. The influence of acetylcholine on various neocortical neurons is evaluated, and attention is given to the pharmacologic and chemical characteristics of these neurons. The background and evoked activity of cortical choline-sensitive neurons is studied. It is found that the cholinergic mechanisms in the basic sensor zones of the hemispheric cortices, including choline-reacting neurons of various types, are primarily operative when impulses are transmitted to the sensor zones. S.C.S.

A78-30400 # Pathways for the circulation of pyramidal tract collaterals and their role in the formation of functional system apparatus (Puti rasprostraneniia kollateralei piramidnogo trakta i ikh rol' v formirovanii nekotorykh apparatov funktsional'noi sistemy). I. A. Chernyshevskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 9, Jan.-Mar. 1978, p. 130-156. 164 refs. In Russian.

Based on the work of Anokhin in electrophysiology, a study is made of the circulation and localization of the collateral branchings of the pyramidal tract. It is found that the circulation of pyramidal tract collaterals in the presence of strong afference permits the formation of an efferent-afferent complex of circulating stimulations. S.C.S.

A78-30501 Robots and manipulator systems. Part 2. Edited by E. Heer (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Mechanism and Machine Theory*, vol. 12, no. 5, 1977. 200 p. \$17.

This book represents a conference on robots and manipulator systems. Topics discussed include: mathematical modeling systems integrators, the use of TV monitors for remote operation of machinery on earth and in space, an evaluation of various control modes, remotely piloted aircraft, undersea operations, and prosthetic devices for the physically handicapped. D.M.W.

A78-30503 Inertia forces of robots and manipulators. M. S. Konstantinov (Vissh Mashinno-Elektrotekhnicheski Institut, Sofia, Bulgaria). *Mechanism and Machine Theory*, vol. 12, no. 5, 1977, p. 387-401. 14 refs.

Design of remote manipulators and industrial robot/manipulators requires the derivation of the inertia forces. They determine the forces produced on the arm, and consequently, the actuator torque and arm structure. A technique is developed for the determination of the dynamical forces with the help of point mass models. To this end, a generalized arm structure is introduced. This structure is decomposable in typical units, which represent the elements of a modular design and assembly system for robots and manipulators. Suggestions are made by two examples to assist the designer in obtaining good results. (Author)

A78-30508 New control concept of anthropomorphic manipulators. M. Vukobratovic, D. Stokic, and D. Hristic (Institut za Automatizaciju i Telekomunikaciju, Belgrade, Yugoslavia). *Mechanism and Machine Theory*, vol. 12, no. 5, 1977, p. 515-530. 9 refs.

This paper describes a new control concept of anthropomorphic manipulators for industrial application. A new algorithm is given for finding the dynamic equations of open kinematic chains using a digital computer. The synthesis of the programmed dynamics has been performed via prescribed motion kinematics. The synthesis of the compensating movement level was proposed too, by measuring

contact forces between the object and the terminal device. The presented example of a 6 degrees-of-freedom anthropomorphic manipulator illustrates the proposed approach to manipulator control. (Author)

A78-30509 Stochastic modelling of remotely manned systems. C. J. Ancker, Jr. (Southern California University, Los Angeles, Calif.). *Mechanism and Machine Theory*, vol. 12, no. 5, 1977, p. 531-546. 8 refs.

This report describes a new technique to model remotely controlled systems (Remotely manned systems) in which man is an element of the control loop. It is proposed to model macroscopically the system as a group of stochastic system elements with the objective to predict times to complete a task. Various candidate models are proposed with the ultimate objective of selecting one or more for refinement and greatest utility. A simulation model is proposed, and recommendations are made how to verify the analyses. (Author)

A78-30510 * Effect of hand-based sensors on manipulator control performance. A. K. Bejczy (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Mechanism and Machine Theory*, vol. 12, no. 5, 1977, p. 547-567. 54 refs. Contract No. NAS7-100.

Manipulator task categories and motion phases require various hand-based information systems to meet the control performance requirements. The effect of proximity, tactile and force/torque sensors on the performance of remote manipulator control is discussed. An overview is presented on various experimental hand-based information systems which provide the manipulator controller some non-visual 'awareness' of the task environment. The rest of the paper describes and evaluates various control experiments performed at JPL using hand-mounted proximity sensors to guide and control hand motion near solid objects. (Author)

A78-30650 Quantitative radionuclide angiography in the right anterior oblique view - Comparison with contrast ventriculography. M. M. Bodenheimer, V. S. Banka, C. M. Fooshee, G. A. Hermann, and R. H. Helfant (Pennsylvania University, Philadelphia, Pa.). *American Journal of Cardiology*, vol. 41, Apr. 1978, p. 718-725. 25 refs. Research supported by the Mabel Pew Myrin Trust.

First pass radionuclide angiography performed in the right anterior oblique view is seen as a sensitive noninvasive means of assessing the location and severity of asynergy, as well as global left ventricular performance in patients with coronary artery disease. The paper compares this method with contrast ventriculography in evaluating regional wall motion and ejection fraction. Forty-four patients with a suspected heart condition (excluding valve, congenital, or myocardial disease) were used for the study. Accuracy in ascertaining the site and extent of asynergy was measured in terms of ejection fraction, and determination of end-diastolic and end-systolic perimeters in wall motion analysis. D.M.W.

A78-30724 Noninvasive recording of electrical activity in the PR segment in man. R. Vincent, N. P. Stroud, R. Jenner, M. J. English, D. J. Woollons, and D. A. Chamberlain (Royal Sussex County Hospital, Brighton; Kings College Hospital, London; Sussex University, Falmer, England). *British Heart Journal*, vol. 40, Feb. 1978, p. 124-130. 17 refs. Research supported by the British Heart Foundation.

A computer-aided noninvasive procedure based on signal averaging is developed for obtaining reproducible information on the chest surface recording of the electrical activity in the PR segment in man. High-frequency residual noise after averaging is eliminated by digital filtering. Possible relationships between the surface activity obtained in the PR segment and the intracavity His Bundle electrogram are investigated. It is shown that PR segment activity may arise from depolarization of the His-Purkinje system, a concept supported by the close similarity in timing between the His deflection of a

conventional His bundle electrogram and the early surface activity recorded simultaneously in 8 of 10 subjects. Deflections late in the PR segment in 14 of 23 cases contain potentially useful information as yet unavailable by conventional His electrography. S.D.

A78-30725 Study of left ventricular wall thickness and dimension changes using echocardiography. T. A. Traill, D. G. Gibson, and D. J. Brown (Brompton Hospital, London, England). *British Heart Journal*, vol. 40, Feb. 1978, p. 162-169. 21 refs.

A78-30738 The loss of position constancy during pursuit eye movements. A. Mack and E. Herman (New School for Social Research, New York, N.Y.). *Vision Research*, vol. 18, no. 1, 1978, p. 55-62. 20 refs. NSF Grant No. GB-38670; Grant No. NIH-EY-01135.

Two factors responsible for the position constancy losses during target pursuit are identified experimentally. The first is the under-registration of velocity, which accounts for the loss of constancy when the perception of background objects is determined by the relationship between eye movement and image-movement information. The second factor is the displacement of the background relative to the tracked object, when the background and target are adjacent, which may account for the very substantial losses of constancy that can occur during smooth pursuit. Failure to make the distinction between object-relational (exocentric) cues to motion and eye movement-retinal image (egocentric) displacement information may therefore lead to the erroneous conclusion that smooth eye movement information is not involved in the perception of the motion and stability of the background. S.D.

A78-30739 Corrective saccades - Effects of altering visual feedback. D. B. Henson (University of Wales Institute of Science and Technology, Cardiff, Wales). *Vision Research*, vol. 18, no. 1, 1978, p. 63-67. 13 refs. Research supported by the American Optometric Foundation.

In this experiment, the visual feedback to the oculomotor system is altered in such a manner as to decrease the incidence of undershooting normally seen when the eye makes large interfixational movements. It is found that the saccadic system learns, after a few minutes, to undershoot the target as it did before the feedback was altered. It is concluded that undershooting is a deliberate mechanism of the saccadic system. An hypothesis is put forward that explains the repeated undershooting of the saccadic system. (Author)

A78-30740 Sustained and transient mechanisms in human vision - Temporal and spatial properties. G. E. Legge (Cambridge University, Cambridge, England). *Vision Research*, vol. 18, no. 1, 1978, p. 69-81. 63 refs. NSF Grant No. BNS-75-08437.

The hypothesis that psychophysical detection of sinewave gratings is governed by transient mechanisms at low spatial frequencies in response to temporal changes and by sustained mechanisms at high spatial frequencies in response to steady-state signals is tested by two experiments. In the first, threshold contrasts for two subjects are measured at six spatial frequencies and ten durations in the presence or absence of brief masking gratings. In the second, the masking procedure is used to obtain spatial frequency bandwidths; thresholds for six sinewave grating signals are measured as a function of the spatial frequency of the masking pulses. Results of both experiments confirm that transient and sustained mechanisms operate at low and high frequencies, respectively. In particular, coexisting sustained mechanisms function at low frequencies as well, but manifest their presence in threshold detection only when the transient mechanisms are desensitized. S.D.

A78-30741 Visual adaptation to patterns containing two-dimensional spatial structure. G. J. Burton and K. H. Ruddock (Imperial College of Science and Technology, London, England). *Vision Research*, vol. 18, no. 1, 1978, p. 93-99. 20 refs.

A78-30785 # Effect of vestibular and optokinetic stimuli on the speed of processing information by an operator (Vliianie vestibuliarnykh i optokineticheskikh razdrazhitel' na skorost' p'erabotki informatsii operatorom). V. A. Mozin, Iu. K. Ianov, and Iu. N. Kholodov. *Voenna-Meditsinskii Zhurnal*, Jan. 1978, p. 52-54. In Russian.

The paper is concerned with the effect of either vestibular or optokinetic stimuli on subjects who were asked to determine the locations of arrows in slide illustrations which appeared on a TV screen fixed in front of the subject. Vestibular stimuli were produced by rotating the chair in which the subject sat. Optokinetic stimuli were produced by the motion of black and white stripes on the inner surface of a cylinder rotating around the subject. Rotation in both cases was a constant 2 deg/sec per sec, but in the negative direction during the second half of the test. The time required by each test group - vestibular and optokinetic - was significantly greater than the time required by control subjects (errors were taken into account). For all three groups, the time required to perform the test decreased with experience. M.L.

A78-30786 # Study of the work capability of helicopter crews during a long stay on warships (Izuchenie rabotosposobnosti ekipazhei vertoletov pri dlitel'nom ikh bazirovanii na korabliakh VMF). A. N. Kol'tsov and V. A. Sergeev. *Voenna-Meditsinskii Zhurnal*, Jan. 1978, p. 55-58. In Russian.

The paper describes psychophysiological changes which occurred among helicopter crew members during a long stay on warships. Several visual, auditory, and motor characteristics were examined, and the results are surveyed. Exercises were found to reduce deleterious changes that occurred during the second half of the voyage. Characteristics considered include lability of the visual analyzer, the threshold of electrical sensitivity of the eye, the sensorimotor response to sound, static tremor, maximum muscle force, and static muscle endurance. M.L.

A78-30840 # Interstellar dust grains as possible cold germs of life (Zerna mezhzvezdnoi pyli kak vozmozhnye kholodnye zarodyshi zhizni). V. I. Gol'danskii (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 238, Feb. 1, 1978, p. 823-826. 15 refs. In Russian.

The possibility that highly complex molecules might be synthesized under conditions of extremely low temperatures in combination with cosmic radiation has been revealed by Hoyle and Wickramasinghe (1977), who have studied IR spectra of galactic sources and have detected complex polymers and even polysaccharides in comets and in interstellar dust. These, and results of other investigators point toward the possibility that grains of interstellar dust clouds may constitute cold germs of life. Some aspects and conclusions of this hypothesis are examined in the present paper. V.P.

A78-31250 # Compensatory and adaptive responses of the mesentery microcirculation bed in rats undergoing hypoxia (Kompensatorno-prisposobitel'nye reaktsii mikrotsirkuliatornogo ruksa brysheiki kry's pri gipoksii). Iu. I. Ibragimov (Tadzhikskii Gosudarstvennyi Meditsinskii Institut, D'yushambe, Tadzhik SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 64, Jan. 1978, p. 55-60. 15 refs. In Russian.

A78-31300 * Multichannel electrochemical microbial detection unit. J. R. Wilkins (NASA, Langley Research Center, Hampton, Va.), R. N. Young (NASA, Ames Research Center, Moffett Field, Calif.; Northrop Services, Inc., Hampton, Va.), and E. H. Boykin (Northrop Services, Inc., Hampton, Va.). *Applied and Environmental Microbiology*, vol. 35, Jan. 1978, p. 214, 215.

The paper describes the design and capabilities of a compact multichannel electrochemical unit devised to detect and automatically indicate detection time length of bacteria. By connecting this unit to a strip-chart recorder, a permanent record is obtained of the end points and growth curves for each of eight channels. The

experimental setup utilizing the multichannel unit consists of a test tube (25 by 150 mm) containing a combination redox electrode plus 18 ml of lauryl tryptose broth and positioned in a 35-C water bath. Leads from the electrodes are connected to the multichannel unit, which in turn is connected to a strip-chart recorder. After addition of 2.0 ml of inoculum to the test tubes, depression of the push-button starter activates the electronics, timer, and indicator light for each channel. The multichannel unit is employed to test tenfold dilutions of various members of the Enterobacteriaceae group, and a typical dose-response curve is presented. S.D.

A78-31376 Chance and the origin of life. E. Argyle (Dominion Radio Astrophysical Observatory, Penticton, British Columbia, Canada). *Origins of Life*, vol. 8, Dec. 1977, p. 287-298. 8 refs.

Random chemical reactions in the Earth's primitive hydrosphere could have generated no more than 200 bits of information, whereas the first Darwinian organism must have encoded about a million bits, and therefore could not have arisen by chance. This information gap is bridged by separating reproduction from organism, and postulating a reproductive chemical community that would generate information by proto-Darwinian evolution. The information content of the initial community could have been as low as 160 bits, and its evolution might have led to the first Darwinian cell. (Author)

A78-31382 Porphyrins and phycobilins in Precambrian rocks. M. P. Kolesnikov and I. A. Egorov (Academy of Sciences, Institute of Biochemistry, Moscow, USSR). (*International Conference on the Origin of Life, 5th, Kyoto, Japan, Apr. 9, 1977.*) *Origins of Life*, vol. 8, Dec. 1977, p. 383-390. 12 refs.

Samples of Precambrian rocks (1.7-2.6 billion years, U.S.S.R.) contain metalloporphyrins and linear tetrapyrrole pigment similar to phycobilin 655 from modern blue-green algae *Microcystis* (according to data of phosphorescence spectroscopy). The detection of ancient phycobilin makes it possible to relate the data on pigment paleobiochemistry with the evolution of photosynthetic system. (Author)

A78-31383 * The permuted generator hypothesis for the origin of a genetic code. C. Folsome (Hawaii, University, Honolulu, Hawaii). *Origin of Life*, vol. 8, Dec. 1977, p. 391, 392. Research supported by the University of Hawaii; Grant No. NGR-12-001-109.

Protocells had no known means of ensuring that their randomly collected proteins would be duplicated. A possible, albeit inexact, mechanism for protein synthesis in a primitive t-RNA is presented, whereby an oligonucleotide (12 units) in a circular configuration is able to align a generator site with amino acid discriminator sites. In this way, unique anticodons could be specified for each site and replication could occur. D.M.W.

A78-31473 # Biological effect of a weak low-frequency pulsed electromagnetic field (Biologicheskoe deistvie slabogo nizkочастotnogo impul'snogo elektromagnitnogo polia). V. M. Aristarkhov, V. G. Tishchenkov, and L. A. Piruzian (Akademii Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaiia*, Jan.-Feb. 1978, p. 131-134. 7 refs. In Russian.

The effect of low-frequency electromagnetic fields on the bioelectric activity of the myocardium in mice was investigated for intensities ranging from 8 to 8000 gamma and exposure times up to 6 hr. The EKG of mice before and after receiving 8-Hz pulses (pulse duty factor = 10) were compared, and the greatest changes in R-wave potentials were caused by magnetic field intensities of 80 and 800 gamma. Three hours of exposure were required to produce the effect. M.L.

A78-31748 Coding processes in preselected and constrained movements - Effect of vision. J. A. S. Kelso and G. A. Frekany (Iowa, University, Iowa City, Iowa). *Acta Psychologica*, vol. 42, Mar. 1978, p. 145-161. 31 refs. Grant No. NIH-FR-07035.

Three experiments were conducted to study the effects of visual information on preselected and constrained movements. The first two experiments involve four categories of subjects: preselected-vision, constrained-vision, preselected-no vision, and constrained-no vision. In the first experiment, the subjects were asked to reproduce the movement in the absence of vision; the effects of augmenting the terminal location of the criterion movement with vision were then studied. In the second experiment, the criterion movement was performed in the presence of vision. In the third experiment, the subjects reproduced movements by vision alone, movement alone, or with both visual and movement information. The findings were interpreted as contrary to closed-loop assumptions that additional information necessarily enhances the strength of a motor memory representation. It is concluded that the experiments illustrate the importance of selective attention effects in movement coding. M.L.

A78-31768 Penetration of external thermal perturbations into homeothermic organisms. I, II (Das Eindringen äusserer thermischer Störungen in den Körper homoiothermer Lebewesen. I, II). B. Theves (Kiel, Neue Universität, Kiel, West Germany). *European Journal of Applied Physiology*, vol. 38, no. 2, 1978, p. 101-131. 13 refs. In German.

The mean surface curvature for heat conduction problems is discussed and applied in a study of thermal characteristics of homeothermic organisms. A partial differential equation of heat conduction is derived, and formulas for heat loss to the environment and for steady state temperature profiles are presented. The partial differential equation is solved for the case of sudden change in heat loss. The treatment indicates the importance of the organism's thermal inertia and shows that the mean surface curvature is the most important parameter with regard to the interior temperature field. In the second part, the penetration of external thermal perturbations into body parts with different surface curvatures is discussed. For areas with approximate rotational symmetry, a theoretical treatment indicates that the solution of the partial differential equation can be applied without change, if the correct value of the mean surface curvature of the body part is used. M.L.

A78-31769 Changes in male exercise performance and anthropometric variables between the ages of 19 and 30. B. Ny Lind, R. Schele, and K. Linroth (Forsvarets Forskningsanstalt; Karolinska Sjukhuset, Stockholm, Sweden). *European Journal of Applied Physiology*, vol. 38, no. 2, 1978, p. 145-150. 12 refs.

Physical changes in Swedish men were studied by comparing the results of physical examinations of 55 men approximately 30 with the data from their examinations when they were approximately 19. Findings include a 11 percent increase in body weight accompanied by a 19 percent increase in waist circumference and a 25-41 percent increase in skinfold thickness. A 5 percent increase in work output at heart rate 170 was detected but the ratio (heart rate 170)/weight decreased by 5 percent. More pronounced changes were noted in individuals who did not exercise much at either age. Seventy percent of the 1.3-cm increase in height was due to growth in the tibial region. M.L.

A78-31801 Consequences of noise on the organism - Consideration of the present state of the question (Conséquences du bruit sur l'organisme - Réflexion sur l'état actuel de la question). Mr. Bergot (Aéroport de Paris, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 4th Quarter, 1977, p. 315-324. In French.

The paper surveys the physical characteristics of noise, the auditory effects, the extraauditory somatic effects, and the psychological and sociological effects. Topics include the characteristics of damaging noise (with attention to low and high frequencies), the detection of damage, and standards for noise limitation (for continuous, explosive, and intermittent noises). Extraauditory effects considered involve the circulation, respiratory, visual, and digestive systems, as well as body fluids and equilibrium. Other effects examined involve the concept of annoyance, the disruption of sleep, and the limits of adaptation to noise. M.L.

A78-31802 Neuromuscular hyperexcitability and occupational selection (Hyperexcitabilité neuro-musculaire et sélection professionnelle). H. Monod (CNRS, Laboratoire de Physiologie du Travail, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 4th Quarter, 1977, p. 327-329. 8 refs. In French.

Variability of individual response in a test used to detect latent spasmophilia is reported. Electromyograph responses of 40 subjects to the 'garrot-hyperpnea' test at monthly intervals for seven months were determined, and it was found that 45 percent of the subjects were sometimes positive and sometimes negative. The first test revealed 18 percent positive, but only 11 percent were positive for all seven tests; 44 percent were negative for all seven tests while 82 percent tested negative in the first test. Three questions are discussed: whether the detection of the repetitive activity response in myograms indicates spasmophilia; whether the (inconstant) presence or absence of the response should be used as a basis for selecting people for training as flight personnel; and whether surface electrodes are suitable for use in this kind of test. M.L.

A78-31803 Aircraft fuel crews - Occupational hazards and sicknesses (Les aviateurs d'avions - Risques et maladies professionnelles). R. Nolland (Mobil Oil Française, Paris La Défense, Hauts-de-Seine; Direction Générale de l'Aviation Civile, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 4th Quarter, 1977, p. 330-334. In French.

The work performed by aircraft fuel crews is described, and the occupational stresses are characterized. Features considered include exposure to bad weather, exposure to various organic compounds, unusual work schedules, injury from moving ground vehicles or aircraft, electrocution, fires, and deafening noises. Common occupational injuries involve the back, as a result of moving heavy hoses or other equipment, and contact damage to the head. Protective measures and medical monitoring are described. It is suggested that, while indemnifiable occupational diseases do not occur, sicknesses of an occupational character have not been sufficiently clarified. M.L.

A78-31804 Concerning optical correction by contact lenses for private pilots of aircraft and gliders in VFR conditions (A propos de la correction optique par lentilles de contact des pilotes privés d'avion et de vol à voile en régime V.F.R.). J.-P. Borteyru. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 4th Quarter, 1977, p. 335-338. In French.

A78-31805 Role of the physician in decisions concerning overseas transfers in an airline company (Rôle du médecin dans les décisions d'expatriement au sein d'une compagnie aérienne). M. Périn (Compagnie Nationale Air France, Service Médical Central, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 4th Quarter, 1977, p. 352-357. In French.

The paper discusses the responsibilities of the physician who examines candidates for overseas transfer and explores the interrelation between individual and company interests. It is urged that the doctor should not feel he has the responsibility to disqualify people on the basis of health. Advances in medical hygiene and skills along with the disappearance of prejudices against certain climates eliminates the need for an absolute veto and permits overseas transfer to be considered as a normal event. It is suggested that the doctor's role is to provide information so that both individual and company can be aware of possible consequences of the transfer. The need for a careful examination is stressed, and the problem of confidentiality of information is considered. M.L.

A78-31806 Results of using an 'emergency medical aid box' on Air France Boeing 747 aircraft during 1975 (Résultats de l'utilisation d'une 'boîte d'urgence sur les avions Boeing 747 de la compagnie Air France pendant l'année 1975'). J. Pasquet (Compagnie Nationale Air France, Service Médical, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 4th Quarter, 1977, p. 362-365. In French.

A78-31839 Visual-vestibular interaction in the control of eye movement. G. R. Barnes, A. J. Benson, and A. R. J. Prior (RAF, Institute of Aviation Medicine, Farnborough, Hants.; St. Thomas Hospital, London, England). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 557-564. 29 refs.

Three experimental conditions have been used to investigate the extent to which inappropriate reflex eye movements of vestibular origin can be suppressed by visual feedback. First, the ability to read digits in a display which moved with the head was assessed during angular oscillation about the yaw and pitch axes of the body. Performance decrement was observed at frequencies above 0.2 Hz in pitch and 1.0 Hz in yaw, being greater at higher stimulus velocity levels. A second experiment revealed that the performance decrement was associated with eye movements relative to the head, which increased with the frequency of stimulation. Finally, the response of the pursuit reflex was investigated under similar experimental conditions. The results indicated that the breakdown in the pursuit reflex and in the suppression of the vestibulo-ocular reflex occurred over the same frequency band, implying the similarity of the mechanisms responsible for suppression and pursuit. (Author)

A78-31840 Visual target acquisition and tracking performance using a helmet-mounted sight. G. R. Barnes and G. P. Sommerville (RAF, Institute of Aviation Medicine, Farnborough, Hants.; St. Thomas Hospital, London, England). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 565-572. 14 refs.

Experiments have been conducted on human subjects to assess the efficiency with which a helmet-mounted sighting system can be used to locate and track target sources in the horizontal plane. In the first experimental condition, in which the sight was aligned with discrete stationary target sources, the latency between target presentation and final target location was in the 2-4 s range, dependent upon the amplitude of target offset and the rate of head movement. In the second condition, subjects were instructed to track a sinusoidally oscillating visual image with the sight. Tracking performance was found to be impaired when the frequency of oscillation was increased beyond 0.8 - 1.0 Hz. Recording of eye movement during both experimental conditions indicated that the impairment of performance could, in part, be attributed to involuntary eye movements consequent upon stimulation of the vestibulo-ocular reflex by the head turning movements. (Author)

A78-31841 * Effect of prehatching weightlessness on adult fish behavior in dynamic environments. R. B. Hoffman, G. A. Salinas, J. F. Boyd, A. A. Baky (NASA, Johnson Space Center, Houston, Tex.), and R. J. von Baumgarten (NASA, Johnson Space Center, Houston, Tex.; Mainz, Universität, Mainz, West Germany). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 576-581. 12 refs. Research supported by the Bundesministerium für Forschung und Technologie.

At 16-17 months of age, three groups of fish from the embryonated eggs in the ASTP killifish experiment were subjected to postflight tests consisting of rapidly changing environments. It was found that the group of fish with the least amount of development at orbital insertion (A-32) had a decreased rheotropism for both the moving background and the rotating water current tests when compared to ground control fish. Exposure to parabolic aircraft flight conditions revealed that the A-32 fish were less disoriented during zero gravity periods and were hypersensitive to high-gravity periods. These results suggested a modified vestibular competency due to a 9-d prehatching weightlessness exposure. (Author)

A78-31842 Effects of infrasound on cognitive performance. C. S. Harris and D. L. Johnson (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 582-586. 26 refs.

The cognitive performance of 40 subjects was measured during exposure to infrasound and noise in three experiments. In the first experiment, 12 subjects were exposed for 15 min to each of four experimental conditions while performing a Serial Search Task. The

conditions were: 65 dB ambient noise (AN), a low-frequency background noise (BN) at 110 dB, a 7-Hz tone at 125 dB + AN, and the 125 dB tone + BN. The second experiment was the same as the first except a Complex Counting Task was used and the exposure duration was increased from 15 min to 30 min. In the third experiment, the Complex Counting Task was used and the subjects were exposed for 15 min to each of the following four conditions: BN, 125 dB at 7 Hz plus BN, 132 dB at 7 Hz plus BN, and 142 dB at 7 Hz plus BN. No decrements in performance were obtained in any of the three experiments, and there were no subjective reports of dizziness or disorientation as suggested in some of the previous literature. (Author)

A78-31843 Occupational hazards of missile operations with special regard to the hydrazine propellants. K. C. Back, V. L. Carter, Jr., and A. A. Thomas (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 591-598. 41 refs.

The second generation of ballistic missiles and boosters, characterized by increased range and quick reaction capability, required the development of new high-energy storage propellants. This exploration led to the introduction of hydrazine (Hz), monomethylhydrazine (MMH), and 1,1-dimethylhydrazine (UDMH) into the USAF inventory. Early toxicology experiments were to produce data on acute and subacute effects of the propellants in order to set standards for test and operational procedures to protect propellant handlers. The early work indicated that, despite similar chemical characteristics, there were marked differences between the compounds in terms of toxicological mechanisms. Since the propellant systems have been used for some 15 years, recent emphasis on toxicology has been centered on the more chronic effects and on an increasing body of evidence from animal experiments that the compounds may possess oncogenic potential as well as chronic systemic effects. (Author)

A78-31844 Explosive decompression of subjects up to a 20,000-m altitude using a two-pressure flying suit. U. I. Balldin (National Defence Research Institute, Linköping, Sweden). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 599-602. 12 refs.

The RSAF two-pressure flying suit system to protect the pilot at high altitude has been tested from different medical safety aspects. To secure adequate alveolar oxygen pressure, the suit admits up to 70 mm Hg (9.3 kPa) positive pressure breathing by counter-pressure against the thorax and by a 3.2 times higher pressure in the anti-G suit. After 1 h of oxygen breathing, subjects were exposed to explosive decompression from an altitude of 9,000 m to 17,500 or 20,000 m in 0.5 s in a hypobaric chamber. No symptoms of decompression sickness or of alveolar rupture with gas embolism to the central nervous system were seen. Pulmonary X-rays after the test did not reveal any signs of lung rupture with extrapulmonary gas leakage. With the precordial Doppler ultrasound technique, intracardial gas bubbles (silent bubbles) could be detected only in one subject after explosive decompression to a 20,000-m altitude in the 10 experiments. (Author)

A78-31845 * Cosmic radiation exposure in subsonic air transport. R. W. Wallace and C. A. Sondhaus (FAA, Washington, D.C.). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 610-623. 19 refs. Research sponsored by the University of California, Civil Aeromedical Institute, and NASA.

Data derived from 1973 statistics on 2.99 million intercity flights carrying 468 million seats were included in the calculations, yielding a total of 581 billion seat-kilometer. The average flight was 1,084 km in length, was flown at an altitude of 9.47 km, and lasted 1.41 h. The average dose rate was 0.20 mrem/h, resulting in an average passenger dose of 2.82 mrem/year and an average crew-member dose of 160 mrem/year. The average radiation dose to the total U.S. population was 0.47 mrem/person/year. These results are in good agreement with data from several experiments performed by us and others in aircraft at various altitudes and latitudes. The significance of these doses to the population is discussed. (Author)

A78-31846 Stress and workload in pilots. A. H. Roscoe (Royal Aircraft Establishment, Medical Dept., Bedford, Hants., England). *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 630-636. 28 refs.

Several studies have highlighted the increase in physiological activity which occurs in pilots during flight and especially during takeoffs and landings. For example, it has been clearly demonstrated that pilots' heart rates increase during the landing approach to reach a peak at or just before touchdown. These changes have been attributed to workload and to psychological or emotional stress. This paper examines a number of test pilots' heart rate responses recorded during various flight trials involving different types of aircraft. Examples include ramp takeoffs in a VTOL fighter, automatic landings in fog, supersonic flight through monsoon rain, and a sortie in which the pilot developed acute appendicitis. It is concluded that heart rate responses in experienced pilots are influenced almost entirely by workload-related factors and not by emotional stressors, such as risk and anxiety. Because of the emotional overtones of the word 'stress', it is suggested that the term workload should be used when referring to the reason for increased cardiovascular activity in pilots. (Author)

A78-31847 Systems analysis of an aeromedical evacuation mission. J. B. Burke. *Aviation, Space and Environmental Medicine*, vol. 49, Apr. 1978, p. 637-640. 7 refs.

The author applies general systems theory to the analysis of a social system. Through an examination of information processing in an aeromedical evacuation mission, more meaningful levels of coordination evolve. Thus system analysis, as applied here, is an approach used to not only describe an organization but, more importantly, to clearly discern the interrelationships inherent in an activity of major significance such that change or improvement, if needed, may the more readily result. (Author)

A78-32039 The normal human lung - Ultrastructure and morphometric estimation of diffusion capacity. P. Gehr, M. Bachofen, and E. R. Weibel (Anatomisches Institut, Berne, Switzerland). *Respiration Physiology*, vol. 32, Feb. 1978, p. 121-140. 41 refs. Swiss National Science Foundation Grant No. 3,394,74.

A78-32040 Evidence for cerebral extracellular fluid H⁺ as a stimulus during acclimatization to hypoxia. D. G. Davies (Texas Tech University, Lubbock, Tex.). *Respiration Physiology*, vol. 32, Feb. 1978, p. 167-182. 35 refs.

Results are presented for an experimental study designed to assess the possible role of changes in H⁽⁺⁾ concentration in the extracellular fluid (ECF) of the brain during ventilatory acclimatization to hypoxia. Measurements of ventilation and CSF and plasma acid-base composition are performed on five anesthetized mongrel dogs (20-25 kg) at 30-min intervals for 3 hr of hypoxia; five other dogs are studied as controls. It is found that the ECF H⁽⁺⁾ concentration, calculated from measured values of CSF and blood acid-base composition during the 3-hr hypoxia, correlates with the secondary increase in ventilation following the initial response to hypoxia. The data obtained suggest that part of the initial ventilatory response to chronic hypoxia is initiated by changes in the acidity of cerebral ECF. S.D.

A78-32041 Models of the pressure volume relationship of the human lung. B. G. Murphy (McGill University Clinic, Montreal, Canada) and L. A. Engel. *Respiration Physiology*, vol. 32, Feb. 1978, p. 183-194. 12 refs. Research supported by the Medical Research Council of Canada.

Data on pulmonary ventilation in 11 subjects (42-53 yr) are considered in the development of a hyperbolic-sigmoid model as a functional expression for the entire transpulmonary static pressure-volume (PV) curve from TLC to RV irrespective of the exact interpretation of the lower inflection point. A FORTRAN IV program is employed for computer optimization of the hyperbolic-sigmoid parameters to the table of mean and individual subject data,

using the method of least squares. The model is compared with other PV models, including monoexponential, exponential-sigmoid, logarithmic, hyperbolic-sigmoid, and polynomial models. It is shown that the model developed can closely fit PV curves of markedly different shapes. Major and minor features of an ideal model are identified and discussed. S.D.

A78-32136 Acoustic evaluation of an aircraft canopy fracture emergency egress system. H. H. Mimura, Jr. and R. N. Hancock (Vought Corp., Dallas, Tex.). In: *Environmental technology '77*; Proceedings of the Twenty-third Annual Technical Meeting, Los Angeles, Calif., April 25-27, 1977. Mount Prospect, Ill., Institute of Environmental Sciences, 1977, p. 372-377. 13 refs.

Acoustic levels were determined within a cockpit and pilot's helmet due to fracturing the canopy with a mild pyrotechnic detonating cord. Tests were conducted at -65 F, +200 F, and ambient conditions to determine the adequacy of the canopy fracturing system throughout the operational temperature environment. Two test dummies, fitted with Navy APH-6 Helmets, were used to determine the adequacy of pilot ear protection due to the peak pressure levels up to 185 dB (pulse duration between 11 and 47 milliseconds). Instrumentation problems and impact noise criteria are discussed. (Author)

A78-32196 Cochlear dynamics - The evolution of a mathematical model. A. Inselberg (Negev, University, Beersheba, Israel). *SIAM Review*, vol. 20, Apr. 1978, p. 301-351. 105 refs. Research supported by the IBM Corp.

The structure and function of the inner ear are dealt with in terms of physical-mechanical (as opposed to biological) parameters, and modelled mathematically. The basilar membrane is modelled as a uniform, simply supported beam vibrating in a viscous medium, and driven by a concentrated oscillatory motion at the basal end. The role of fluids at high frequencies, and of cochlear geometry at low frequencies are investigated. Boundary layer dynamics of fluid interactions with cochlear surfaces are outlined with attention to the representation of the basilar membrane by a wedge shaped isotropic plate of constant thickness, and enclosed by an arbitrary surface of revolution representing the cochlear shell. The plate is simply supported along its long edges, while three different boundary conditions are considered for support at the helicotrema. D.M.W.

A78-32225 Simulation of the docking manoeuvre. A. I. MacKinnon, D. J. Murray-Smith, E. Leitch, and P. H. Tanner (Glasgow, University, Glasgow, Scotland). In: *Conference on Computer Simulation*, 2nd, Chester, England, April 4-6, 1978, Proceedings. Conference sponsored by the U.K. Simulation Council and Society for Computer Simulation. Guildford, Surrey, England, IPC Science and Technology Press, Ltd., 1978, p. 390-396.

The paper describes the use of a hybrid computer simulation for the investigation of the performance of a human operator in a space docking maneuver. The size of the image of the target craft which is presented to the operator varies during the maneuver in sympathy with the computed changes in distance, while the center of the image remains at the center of the display screen throughout. Angular motion of the operator relative to the target is represented by changing target aspect and a corresponding movement of a star background. A model of the complete system is also described in which the operator is represented by a set of decision boundaries. A simulation based on this model allows investigation of the effects of varying both the available thrust and certain parameters describing the operator. (Author)

A78-32325 Influence of hypoxia on the longitudinal distribution of pulmonary vascular resistance. C. A. Dawson (U.S. Veterans Administration Center, Wood, Wis.), D. J. Grimm (Wisconsin, Medical College, Milwaukee, Wis.), and J. H. Linehan (Marquette University, Milwaukee, Wis.). *Journal of Applied Physiol-*

ogy: Respiratory, Environmental and Exercise Physiology, vol. 44, Apr. 1978, p. 493-498. 29 refs. Research supported by the U.S. Veterans Administration; Grants No. PHS-5-S01-FR-5435; No. NIH-HL-19298.

We have examined the influence of hypoxia on the longitudinal distribution of vascular resistance and intravascular pressure in isolated cat lungs using the low-viscosity bolus technique. Hypoxia increased total vascular resistance, decreased total lung blood volume, and moved the maximum local resistance downstream away from the main pulmonary artery. The circumference of the main pulmonary artery was increased and the extravascular lung water (double indicator dilution technique) was decreased by hypoxia. Thus, it would appear that distension of the large pulmonary arteries and a decrease in the amount of lung tissue perfused contributed to the change in resistance distribution brought about by hypoxia.

(Author)

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STAR ENTRIES

N78-20742# Joint Publications Research Service, Arlington, Va.

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: BIOMEDICAL AND BEHAVIORAL SCIENCES

31 Mar. 1978 67 p refs Transl. into ENGLISH from various Russian journals

(JPRS-70876) Copyright. Avail: Issuing Activity

Recent Soviet activity in oncology, physiology, psychophysiology, and aerospace medicine are discussed as well as methods for dosimetry near atomic power plants. Norms for buildings and other structures used in animal husbandry, poultry breeding and fur farming are also considered. For individual titles, see N78-20743 through N78-20744.

N78-20743# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND MEDICINE

O. G. Gazenko and A. S. Ushakov *In its* Transl. on USSR Sci. and Technol. (JPRS-70876) 31 Mar. 1978 p 1-9 refs Transl. into ENGLISH from *Zemlya Vseleinnaya* (Moscow), no. 6, 1977 p 30-35 (For availability see N78-20742 11-51)

Copyright. Avail: Issuing Activity

The relation of space medicine to bioastronautics and its associated fields (exobiology, ecophysiology, and biotechnology) is discussed with emphasis on investigations to determine the effects of weightlessness, patterns of evolution of living matter in the universe, and the conditions and performance of man in space. Benefits derived from data obtained during Skylab, Salyut, and Apollo-Soyuz missions are summarized. A.R.H.

N78-20744# Joint Publications Research Service, Arlington, Va.

PILOT RETRAINING AIMED AT STRESS REDUCTION

V. Gnusarkov *In its* Transl. on USSR Sci. and Technol. (JPRS-70876) 31 Mar. 1978 p 61-64 refs Transl. into ENGLISH from *Aviat. Kosmonavt.* (Moscow), no. 1, 1978 p 26-27 (For availability see N78-20742 11-51)

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Occupational, moral-political, and psychological preparedness are criteria used in assessing pilots and in selecting the first candidates for training in the use of complex equipment and armament on new Soviet combat aircraft. Methods for reducing the psychological and psychophysical difficulties associated with retraining, and for maintaining mental stability under stressful conditions are described. A.R.H.

N78-20745 California Univ., Berkeley.

INFLUENCE OF METABOLIC RATE UPON THE METABOLISM OF LACTIC ACID AND THE OXIDATION OF GLUCOSE, ALANINE AND LEUCINE Ph.D. Thesis

Timothy Peter White 1977 228 p

Avail: Univ. Microfilms Order No. 77-31586

A rapid flow, open circuit indirect calorimeter was developed, validated and applied to the investigation of the metabolic responses of rats to rest and treadmill running at selected speeds and grades. These data indicated that the metabolic responses of rats were predictable on the basis of running speed and grade. The metabolic responses to increments in speed were much greater than to increments in grade. The calorimeter was used to test the traditional concept that when caloric supply was adequate, the metabolic demands of exercise were met by

catabolism of carbohydrates and lipids. Using pulse infusions of carbon 14 tracers in rats, the influences of metabolic rate upon the oxidations of glucose, alanine and leucine were studied. Findings are discussed in regard to the integration of lactate with the overall carbon flow during exercise, and the energetics of muscular work. Dissert. Abstr.

N78-20746 Massachusetts Univ., Amherst.

THE EFFECT OF AGE AND ACTIVITY LEVEL ON FRACTIONATED RESPONSE AND REFLEX TIME Ph.D. Thesis

Priscilla Massei Clarkson 1977 209 p

Avail: Univ. Microfilms Order No. 77-30605

Male subjects were divided equally into four groups: old active, old inactive, young active, and young inactive. Subjects reported for two testing days and were measured under four different conditions: simple response time with only one stimulus, choice response time with three stimuli, and simple and choice resisted conditions. Resistance was applied to the reaction task by utilizing an electromagnet placed directly below the subject's heel. The magnet was set to produce a resistance equal to 10 percent of the subject's maximum isometric knee extension strength. Also measured were the fractionated components of normal and Jendrassik patellar reflex time which includes total reflex time, reflex latency, and reflex motor time. Of particular interest was the fact that virtually no decrement was found in speed of reflex time due to age. Dissert. Abstr.

N78-20747 Indiana Univ., Bloomington.

THE PHYSIOLOGY OF RESTRICTED BREATHING Ph.D. Thesis

Robert George McMurray 1977 163 p

Avail: Univ. Microfilms Order No. 77-30304

The problem was to determine whether hypoxic training, restricted breathing exercise, is in fact hypoxic. Restricted breathing rest and exercise were also compared to normoxic, eupnic breathing rest and exercise to evaluate any possible similarities. Furthermore, restricted breathing exercise was compared to the information in available literature on hypercapnia to note any similarities. The results of the study suggest the hypoxic training, restricted breathing exercise, is not truly hypoxic-hypoxia. Restricted breathing exercise increases $P_{sub a}$ sub a CO₂ but not total CO₂, and is therefore not truly hypercapnic. The major benefit of restricted breathing exercise is an increased respiratory efficiency. With the exception of the aforementioned parameters, restricted breathing and eupnic breathing exercise are similar. Dissert. Abstr.

N78-20748 Texas A&M Univ., College Station.

DYNAMIC BEHAVIOR OF THE VISUAL TRACT Ph.D. Thesis

Robert Elvin Bretz 1977 118 p

Avail: Univ. Microfilms Order No. 77-32145

Transient frequency response (TFR) functions for the functional segment of the visual tract between the structures which produce the electroretinogram (ERG) and those which produce the visual evoked response (VER) were obtained using rabbits as an experimental subject. The technique used a light flash to perturb the system and considered the resultant ERG as the system input and the VER as the system output. A fast Fourier transform algorithm was used to transform the biopotential signals to the frequency domain. The luminance phase TFR functions exhibited linear properties above and below a transition level of background illuminance, indicating the existence of a photopic and a scotopic system. A block diagram model is presented. Dissert. Abstr.

N78-20749 Pennsylvania Univ., Philadelphia.

A NEW APPROACH TO VENTRICULAR DYNAMICS: THE FLOW-PULSE RESPONSE Ph.D. Thesis

William Corson Hunter 1977 322 p

Avail: Univ. Microfilms Order No. 77-30206

A systems engineering approach was used to develop the pulse response method for studying the mechanical properties

of the left ventricle. Ventricular responses were measured by applying narrow flow pulses to isovolumically beating hearts, superimposing the flow pulse beat and the isovolumic beat and computing the change in pressure throughout the systole. The elastic, resistive, and nonlinear components exhibited by the pulse response are discussed. Dissert. Abstr.

N78-20750 Iowa Univ., Iowa City.
THE CONFIGURATION OF MOVEMENT OF THE SEMICIRCULAR CANAL CUPULA Ph.D. Thesis
Jay William McLaren 1977 126 p
Avail: Univ. Microfilms Order No. 77-28488

A new technique was developed to mark the normally transparent cupula of the bullfrog horizontal semicircular canal. A glass micropipette was inserted through the bulk of the cupula, from apex to crista, and withdrawn with a simultaneous pressure injection of oil droplets that had been darkened with Sudan black. The positions of these droplets were measured relative to the ampulla using frame analysis of high speed motion pictures that were made during: (1) compression of the canal wall; and (2) sinusoidal rotation of the frog. In a parallel experiment single unit afferent activity was recorded during sinusoidal rotation from three areas of the horizontal ampullary nerve which innervated the narrow end, planar center, and planar end of the crista. Response characteristics were measured and related to the observed configuration of displacement of the cupula. Dissert. Abstr.

N78-20751 Maryland Univ., College Park.
THE MEASUREMENT OF ACOUSTICAL PARAMETERS AND TRANSDUCER ACCELERATIONS IN PULSATILE ECHO-ENCEPHALOGRAPHY Ph.D. Thesis
Thomas David Smith 1977 136 p
Avail: Univ. Microfilms Order No. 77-29138

A technique is described whereby an individual echo signal in the presence of others can be selectively removed and processed to yield a recording of the pulsation signal, and a measure of the mean value of the echo signal. Because of a transducer calibration method described, calibration of the associated ultrasonic system allows conversion of the measured mean value of its equivalent acoustic sound pressure level. The data thereby obtained are then normalized by means of certain analysis techniques discussed. It is shown that under certain conditions, the transducer motion can greatly increase the amplitude of the signal. Data are also presented to show that the pulsatile signal persists in spite of minimized transducer motion, although somewhat reduced in amplitude from that previously observed. Attenuation and target strength measurements are also used in order to determine a comparison between the reflective properties of the brain's reflective surface and those of known reflective properties. Dissert. Abstr.

N78-20752 Virginia Polytechnic Inst. and State Univ., Blacksburg.
TEMPORAL ENCODING IN THE VISUAL SYSTEM Ph.D. Thesis
Maier Almagor 1977 121 p
Avail: Univ. Microfilms Order No. 7801575

A model for temporal and spatial encoding in the visual system is developed and presented. The model indicates that spatial information is encoded in a manner similar to the encoding of temporal information. The obtained results support the proposed model. The principal findings are: (1) Time integration of the eye is locally controlled and set across the retina and has very fast dynamics. (2) The obtained CFF curves suggest a correlation between the frequency at which maximum sensitivity is obtained and the sensitivity itself. (3) As predicted by the model, temporal bands are developed in the visual system for stimuli showing temporal discontinuity points. The width of the temporal bands was measured and a strong correlation was found between the temporal band width and the integration time. The width of the temporal bands is a function of the luminance level at which they are produced; it is not dependent on the stimulus slope. The apparent brightness of the temporal band is, however, dependent on the slope of the stimulus. Dissert. Abstr.

N78-20753 Stanford Univ., Calif.
TOTALLY IMPLANTABLE BIDIRECTIONAL PULSED DOPPLER BLOOD FLOW TELEMETRY: INTEGRATED ULTRASONIC RECEIVER, DIAMETER DETECTION, AND VOLUME FLOW ESTIMATION Ph.D. Thesis
James Walter Knutti 1977 207 p
Avail: Univ. Microfilms Order No. 7802184

Although animal models have been a valuable tool in medical research, their full potential for investigating physiological mechanisms and responses to treatment techniques has been limited by a lack of adequate chronic instrumentation. A totally implantable bidirectional pulsed Doppler ultrasonic blood flowmeter has been developed to meet this need by determining blood velocity as a function of range, vessel diameter, and volume flow on a long-term basis in deep-body vessels. A custom-receiver integrated circuit (IC) is a key element in the implanted package. Doppler frequency shifts of the ultrasonic signal backscattered to the transducer are detected, and quadrature components are multiplexed by this IC for bidirectional velocity estimation. Demultiplexing and demodulating this signal by the external electronics converted it to physiological information. Analysis of alternative system configurations, integrated-circuit designs, multiplexing approaches, and telemetry techniques identifies the optimal realization of the flow-meter. Dissert. Abstr.

N78-20754 Northeastern Univ., Boston, Mass.
CARDIAC OUTPUT AND AORTIC-PULMONARY SHUNT STUDIES Ph.D. Thesis
Arnold Marvin Aaron 1977 610 p
Avail: Univ. Microfilms Order No. 780288

The work involves three distinct areas of study in the measurement of blood flow. First, an analog computer simulation of mass transport through the circulation was constructed. Second, an experimental study was undertaken to compare three competitive techniques for measuring cardiac output: (1) a square wave electromagnetic flowmeter (EMF), (2) a 'withdrawal cuvette' indicator dilution technique, and (3) the flow and pressures were studied in dogs with experimentally induced ascending aorta to right pulmonary artery fistulas. Dissert. Abstr.

N78-20755* National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.
TOXIC SUBSTANCES ALERT PROGRAM
Thomas L. Junod Jan. 1978 287 p refs Revised
(NASA-TM-73866; E-9456) Avail: NTIS HC A13/MF A01 CSCL 06T

A toxicity profile is provided, of 187 toxic substances procured by NASA Lewis Research Center during a 3 1/2 year period, including 27 known or suspected carcinogens. The goal of the program is to assure that the center's health and safety personnel are aware of the procurement and use of toxic substances and to alert and inform the users of these materials as to the toxic characteristics and the control measures needed to ensure their safe use. The program also provides a continuing record of the toxic substances procured, who procured them, what other toxic substances the user has obtained in the past, and where similar materials have been used elsewhere at the center. Author

N78-20756* Methodist Hospital, Houston, Tex.
EVALUATION OF THALLIUM-201 SCANNING FOR DETECTION OF LATENT CORONARY ARTERY DISEASE Final Report
Philip C. Johnson, Adrian LeBlanc, Lawrence Deboer, and Satish Jhingran [1978] 18 p refs
(Contract NAS9-15119)
(NASA-CR-151662) Avail: NTIS HC A02/MF A01 CSCL 06E

The use of thallium imaging as a noninvasive method to accurately screen shuttle passengers for latent coronary artery disease was investigated. All radionuclide procedures were performed using an Anger type camera with a high resolution collimator. A minimum of 200,000 counts were collected for each image using a 20% window centered on the 69-83 keV X-rays. For the images obtained following injection with the patient

at rest, the testing was begun 10 minutes after injection. Injections of TT during exercise were made at a point near the termination of the treadmill procedure as determined by either the appearance of ST segment changes on the electrocardiogram consistent with subendocardial ischemia, the appearance of angina-like chest pain in the patient or fatigue in the patient which required cessation of the test. The severity of heart disease was based on the medical history, physical exam, exercise electrocardiograms, chest X-rays and the coronary arteriogram. Author

N78-20757*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EXPERIMENT REQUIREMENTS: VITAMIN D METABOLITES AND BONE DEMINERALIZATION, SPACELAB 2, EXPERIMENT NO. 1

Henrich K. Schnoes, Emily M. Holton, and Robert G. Thirolf
Mar. 1978 22 p
(NASA-TM-79423; JSC-13933) Avail: NTIS
HC A02/MF A01 CSDL 06P

As a contribution toward an understanding of the molecular basis of bone loss, mineral imbalance, and increasing fecal calcium under conditions of prolonged space flight, the blood levels of biologically active vitamin D metabolites of flight crew members will be quantitatively measured. Prior to the mission, the refinement of existing and the development of new techniques for the assay of all vitamin D metabolites will provide an arsenal of methods suitable for a wide range of metabolite levels. In terms of practical application, the analysis of human and animal plasma samples, Spacelab crew plasma samples, and flight hardware are envisioned. Author

N78-20758*# IIT Research Inst., Chicago, Ill. Management and Techno/Economic Services Section.

MARKET STUDY PHASE 2 FOLLOW-UP ACTIVITY. THE BAYLOR MARK 3 HAPLOSCOPE

Dec. 1977 23 p
(Contract NASw-2837)
(NASA-CR-156141) Avail: NTIS HC A02/MF A01 CSDL 06B

Efforts to accelerate commercialization of the haploscope, and to determine quickly and reliably the level of manufacturer interest in the product are presented. The nature of the decision making process within firms as it concerns project selection and new product evaluation is discussed. Implications for the NASA marketing program were assessed. Author

N78-20759# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

SOME CONTRIBUTIONS FROM THE RADIATION LABORATORY TO THE 20TH NATIONAL CONGRESS OF THE ITALIAN ASSOCIATION OF HEALTH PHYSICS AND RADIATION PROTECTION

25 Oct. 1977 40 p refs In ITALIAN; ENGLISH summary
Proc. of Conf. held at Bologna, 26-28 Oct. 1977
(ISS-P-77/10) Avail: NTIS HC A03/MF A01

Some problems related to protection against ionizing and nonionizing radiations, as well as to some aspects of radiation dosimetry, are dealt with. Topics include radio protection and diagnosis with X-rays; primary medium energy standard; NEXT program for evaluating patient dosage; radiation emitted by color TV sets and by radar therapy equipment; and photodynamic effects induced in man by visible and near ultraviolet radiation. For individual titles, see N78-20760 through N78-20765.

N78-20760# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

RADIO PROTECTION AND DIAGNOSIS WITH X-RAYS [RADIOPROTEZIONE E DIAGNOSTICA CON RAGGI X]

P. L. Indovina and P. Salvadori *In its* Some Contrib. from the Radiation Lab. to the 20th Natl. Congr. of the Ital. Assoc. of Health Phys. and Radiation Protect. 25 Oct. 1977 p 1-6 refs In ITALIAN (For availability see N78-20759 11-52)

Avail: NTIS HC A03/MF A01

Preliminary results of an investigation into the number and the types of medical X-ray examinations in Italy in 1975 are presented and discussed. The data from Veneto, Friuli-Venezia

Giulia, and Umbria regions, elaborated thus far, lead to the genetically significant dosage $D=40$ mrem. ESA

N78-20761# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

PRIMARY MEDIUM ENERGY EXPOSURE STANDARD: COMPARISON BETWEEN ISS AND BIPM [STANDARD PRIMARIO DI ESPOSIZIONE A MEDIA ENERGIA: CONFRONTO FRA ISS E BIPM]

E. Casnati (Ferrara Univ., Italy), L. Pugliani, and P. Salvadori *In its* Some Contrib. from the Radiation Lab. to the 20th Natl. Congr. of the Ital. Assoc. of Health Phys. and Radiation Protect. 25 Oct. 1977 p 7-12 refs In ITALIAN (For availability see N78-20759 11-52)

Avail: NTIS HC A03/MF A01

The measuring exposure unit of the free air medium energy of the ISS was compared with the measuring unit of the BIPM chamber. The results are tabularized. ESA

N78-20762# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

NEXT PROGRAM FOR EVALUATING THE PATIENT DOSAGE: FIRST RESULTS FOR SOME X RAY DIAGNOSTICS INSTALLATIONS [PROGRAMMA NEXT PER UNA VALUTAZIONE DELLA DOSE DEL PAZIENTE: PRIMI RISULTATI PRESSO ALCUNI IMPIANTI DI DIAGNOSTICA CON RAGGI X]

A. Calicchia, A. Marchetti (CNEN, Rome), M. Paganini-Fioratti (CNEN, Rome) F. Baiocco (Umbrian Dept. of Social Serv.), P. DiIoreto (Umbrian Dept. of Social Serv.), and P. Fratini (Umbrian Dept. of Social Serv.) *In its* Some Contrib. from the Radiation Lab. to the 20th Natl. Congr. of the Ital. Assoc. of Health Phys. and Radiation Protect. 25 Oct. 1977 p 13-18 refs In ITALIAN (For availability see N78-20759 11-52)

Avail: NTIS HC A03/MF A01

CNEN and Istituto Superiore di Sanita have implemented the NEXT program for the determination of patient dosage following X-ray examination. After a pilot program, carried out on some typical installations to check the measuring and the calculation procedures, the program was presented to the health authorities of the various regions of Italy in May 1977. Some regions have declared themselves in a position to implement the program within a short time. The first results obtained for thorax, ascending pyelography, lumbar sacral, and anterior dental examinations are presented and discussed. ESA

N78-20763# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

USE OF THERMOLUMINESCENCE DOSIMETRY FOR MEASURING THE RADIATION EMITTED BY COLOR TV SETS [IMPIEGO DELLA DOSIMETRIA A TERMOLUMINESCENZA PER LA MISURA DELLE RADIAZIONI EMESSE DA TELEVISORI A COLORI]

A. Calicchia, A. Panigutti, and A. Rosati *In its* Some Contrib. from the Radiation Lab. to the 20th Natl. Congr. of the Ital. Assoc. of Health Phys. and Radiation Protect. 25 Oct. 1977 p 19-24 refs In ITALIAN (For availability see N78-20759 11-52)

Avail: NTIS HC A03/MF A01

The ionizing radiation emitted by some color television sets was measured using calcium fluoride thermoluminescence dosimetry (CaF₂:Dy). The results are presented and discussed. For all TV sets the highest rates were obtained at the front surface. ESA

N78-20764# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

PHOTODYNAMIC EFFECTS INDUCED IN MAN BY SENSITIZERS AND VISIBLE RADIATION [EFFETTI FOTODINAMICI INDOTTI NELL'UOMO DA SENSIBILIZZANTI E DA RADIAZIONI VISIBILI]

S. Cannistraro *In its* Some Contrib. from the Radiation Lab. to the 20th Natl. Congr. of the Ital. Assoc. of Health Phys. and Radiation Protect. 25 Oct. 1977 p 25-30 refs In ITALIAN

(For availability see N78-20759 11-52)

Avail: NTIS HC A03/MF A01

Those chemical substances used in medicine, cosmetics, and artificial colorants, or originating from modified physiological metabolisms that absorb visible or near ultraviolet radiation (320-700 nm), are liable to induce serious phototoxic and photoallergic reactions in man. At molecular level the absorption of radiation in the presence of oxygen causes photooxidation of the biological substrate according to two mechanisms (type I and type II). The photooxidation process is called photodynamic action. The various factors that influence the two processes are discussed; electronic paramagnetic resonance, spectroscopic techniques used to analyze them are presented; and the effects, on the entire photodynamic process, of some quenchers of the intermediate products are dealt with. The risks connected with the phototherapeutic use of furocoumarin derivatives (psoralene etc.) are discussed. ESA

N78-20765# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

ELECTROMAGNETIC FIELD LEVELS NEAR RADAR THERAPY EQUIPMENT [LIVELLI DI CAMPO ELETTROMAGNETICO ESISTENTI IN PROSSIMITA DI APPARATI PER RADAR TERAPIA]

M. Grandolfo and C. Ranghiasi / *In its* Some Contrib. from the Radiation Lab. to the 20th Natl. Congr. of the Ital. Assoc. of Health Phys. and Radiation Protect. 25 Oct. 1977 p 31-35 refs In ITALIAN (For availability see N78-20759 11-52)

Avail: NTIS HC A03/MF A01

The first results obtained by measuring the electromagnetic field level near radar therapy equipment (Siemens Radiotherm 306) operating at 2.45 GHz are presented. The angular distributions obtained with a Narda model B86-B3 monitor show how it is possible to exceed the limit of 10 mW/m², whose limit is among the highest mentioned in the regulations of various countries. The necessity of studying in greater detail field levels in the neighborhood of microwave equipment used for diathermy was confirmed. ESA

N78-20766# Duke Univ., Durham, N. C.
THE BIOMEDICAL EFFECTS OF THE HYPERBARIC ENVIRONMENT Final Technical Report, 1 Aug. 1974 - 31 Jul. 1977

J. Salzano, H. A. Saltzman, and E. Camporesi 5 Oct. 1977 6 p

(Contracts N00014-67-A-0251-0015; N00014-75-C-0223) (AD-A047173) Avail: NTIS HC A02/MF A01 CSCL 06/19

Hyperbaric bradycardia was observed in 3 of 4 subjects at rest and during exercise at 5.5 Ata while breathing normoxic helium with a gas density equivalent to air at 1 Ata. The bradycardia was evident within 1 hour after reaching the simulated depth but was not present after 24 hours of exposure. Cardiac output at rest and during exercise after 24-48 hours at 5.5 Ata was not significantly different from the control values at 1 Ata; the bradycardia was not present at these times. Airway pressures during the first 100 msec of an occluded breath were greater at 5.5 Ata than at 1 Ata. The data indicate an increased respiratory center motor output at increased hydrostatic pressure. The response may be due either to the increased pressure or to inhalation of a gas with an increased density just prior to the occlusion. Hyperbaric bradycardia was not observed in five subjects after rapid compression to 5.5 Ata at which depth the subjects were breathing normoxic helium. Author (GRA)

N78-20767# Naval Medical Research Inst., Bethesda, Md.
HEAT STRESS, WORK FUNCTION AND PHYSIOLOGICAL HEAT EXPOSURE LIMITS IN MAN

A. R. Dasler Feb. 1977 32 p refs Presented at proceedings of Symp. on Thermal Anal.-Human Comfort-Indoor Environments, NBS, Gaithersburg, Md. 11 Feb. 1977

(AD-A050008) Avail: NTIS HC A03/MF A01 CSCL 06/19

Various operational trials using tolerance criteria available in the literature revealed that predictions of physiological exposure limits were rarely compatible with the observed status of men

in a wide range of heat stress and work conditions. Computer integration of laboratory and industrial-type data led to establishing a comprehensive set of physiological criteria for tolerance limits appropriate to man at work within time-weighted-mean (twm) metabolic rates. These criteria and work rates were integrated with industrial-type heat stress conditions which resulted in developing the Physiological Heat Exposure Limits (PHEL) concept. Several electronic heat stress monitor-devices were evaluated and employed in determining environmental conditions. A comparison of over 200 sets of environmental and physiological data supported the PHEL concept and permitted more definitive identification of material areas requiring corrective engineering actions in the industrial-type settings. Corrective engineering actions based upon results of the data analyses have permitted nearly a sixfold increase of the maximum physiological exposure times; simultaneously, the estimated cardiovascular reserve increased from 15% to as much as 85% during routine work. GRA

N78-20768# Rochester Univ., N. Y. School of Medicine and Dentistry.

BIOLOGICAL EFFECTS OF LOW LEVELS OF RADIATION EXPOSURE

George W. Casarett 1977 29 p refs Presented at the Symp. on Public Health Aspects of Radioactivity in Consumer Products, Atlanta, 2-4 Feb. 1977

(Contract EY-76-C-02-3490)

(UR-3490-1072; Conf-770208-1)

Avail: NTIS HC A03/MF A01

Some consumer products emit low linear energy transfer radiations beyond their confines and these penetrating radiations can result in whole body irradiations. Products may irradiate on the order of 10 to the 6th power to 10 to the 8th power people to average annual whole body or gonadal dose equivalents varying over a range on the order of 1 to 10 millirem (mrem). These include television receivers, time pieces with radium containing dials, gas and aerosol detectors, and building and road construction materials. On the order of 10,000 people may be irradiated by vacuum high voltage switches to 30 mrem or from electron microscopes to 300 mrem average annual whole body or gonadal dose equivalent. Possible health hazards are discussed. ERA

N78-20769# California Univ., Berkeley. Lawrence Berkeley Lab.

HEALTH AND SAFETY IMPACTS OF NUCLEAR, GEOTHERMAL AND FOSSIL-FUEL ELECTRIC GENERATION IN CALIFORNIA. VOLUME 2: RADIOLOGICAL HEALTH AND RELATED STANDARDS FOR NUCLEAR POWER PLANTS

A. V. Nero and Y. C. Wong Jan. 1977 91 p refs

(Contracts W-7405-eng-48; CSERCDC-4-0123)

(LBL-5285-Vol-2) Avail: NTIS HC A05/MF A01

The status and basis of radiation protection standards, and how they particularly apply to nuclear power plants are presented. The national and international organizations involved in the setting of standards are discussed, paying explicit attention to their jurisdictions and to the considerations they use in setting standards. The routine and accidental radioactive emissions from nuclear plants are characterized, and the effect of these emissions on ambient radiation levels is discussed. The state of information on the relationship between radiation exposures and health effects is summarized. ERA

N78-20770# Naval Aerospace Medical Research Lab., New Orleans, La.

DYNAMIC RESPONSE OF HUMAN AND PRIMATE HEAD AND NECK TO Gy IMPACT STATEMENT Final Report, May 1974 - May 1976

C. L. Ewing, D. J. Thomas, L. Lustick; G. C. Willems, W. H. Muzzy, E. B. Becker, and M. E. Jessop Jan. 1978 758 p refs

(Contract DOT-HS-4-00852)

(PB-275448/9; DOT-HS-803058)

Avail: NTIS HC A99/MF A01 CSCL 06S

A study of human and chimpanzee response to lateral (+Gy) impact acceleration with three dimensional inertial instrumentation

of the head and of the first thoracic vertebral (T1) body was presented. Thirty-four human experiments using six volunteers are reported. Twelve chimpanzee experiments were conducted. The human lateral response is considerably different from the -Gx response previously reported. There are also major differences between human and chimpanzee response. The implications of the data for modeling and the validation of such models are discussed. Author

N78-20771# New Mexico State Univ., University Park. Dept. of Psychology.

INPUT, OUTPUT, AND RESPONSE BLOCKING IN IMMEDIATE RECALL Interim Technical Report

Warren H. Teichner Oct. 1977 50 p refs
(Contract F44620-76-C-0013; AF Proj. 2313)
(AD-A050302; NMSU-AFOSR-TR-77-2; AFOSR-78-0140TR)
Avail: NTIS HC A03/MF A01 CSCL 05/10

There are a large number of occasions in which the operator of a complex system must receive and remember a number of briefly displayed visual signals and respond to them appropriately. It is well-known that man's capacity for doing this is limited. Whether that limitation is on the input side of his ability to process information, i.e., to receive and to store in memory, or whether it is on the output side, i.e., to retrieve from memory and select actions, are not known although a great deal of current research and theory is devoted to the question. In this report a method is proposed for measuring the input and the output separately. In addition, by using two assumptions beyond the simple input-output model, the rate of processing of each and the source of loss of information can be determined for specified conditions. Operational definitions of input and output processing times and rates are presented based on a simple model of immediate recall. The temporal measures are then evaluated for the independence of their responsiveness to variables which affect the total processing time. It is concluded that the measures are useful and applicable to a wide variety of theoretical and practical problems. GRA

N78-20772 Virginia Univ., Charlottesville.

ANALYSIS AND SYNTHESIS OF A FLUID-POWERED INTELLIGENT INDUSTRIAL ROBOT END EFFECTOR WITH TACTILE SENSORS Ph.D. Thesis

Kenneth Alward Knowles, Jr. 1977 215 p
Avail: Univ. Microfilms Order No. 7800422

The design of an advanced microprocessor-controlled, sensor configured, pneumatic and hydraulic powered end effector for industrial manipulators is described. An initial review of existing teleoperators and robots points out the need for upgrading these devices. The development of a smart end effector is justified as significantly upgrading such manipulators. Basic end effector motions and senses are first defined, as well as a series of design and operational constraints. These are all used to establish loose specifications for the end effector design. Evaluation of various possible end effector configurations with respect to these specifications results in the choice of a linear motion, parallel finger configuration as the nucleus for the design. Sensors and additional motions are added to yield the final design.

Dissert. Abstr.

N78-20773*# Energy Research Corp., Danbury, Conn.
DEVELOPMENT OF A PROTOTYPE REGENERATION CARBON DIOXIDE ABSORBER Final Report, Jul. 1976 - Aug. 1977

Pinakin S. Patel and Bernard S. Baker 15 Oct. 1977 89 p refs
(Contract NAS2-9265)
(NASA-CR-152063) Avail: NTIS HC A05/MF A01 CSCL 06K

A prototype regenerable carbon dioxide absorber was developed to maintain the environmental quality of the portable life support system. The absorber works on the alkali metal carbonate-bicarbonate solid-gas reaction to remove carbon dioxide

from the atmosphere. The prototype sorber module was designed, fabricated, and tested at simulated extravehicular activity conditions to arrive at optimum design. The unit maintains sorber outlet concentration below 5 mm Hg. An optimization study was made with respect to heat transfer, temperature control, sorbent utilization, sorber life and regenerability, and final size of the module. Important parameters influencing the capacity of the final absorber unit were identified and recommendations for improvement were made. Author

N78-20774# Canyon Research Group, Inc., Westlake Village, Calif.

DESIGN, ANALYSIS, AND INTERPRETATION OF SCREENING STUDIES FOR HUMAN FACTORS ENGINEERING RESEARCH Technical Report, Sep. 1976 - Sep. 1977

Charles W. Simon Sep. 1977 235 p refs
(Contract F44620-76-C-0008)
(AD-A050361; CWS-03-77; AFOSR-78-0055TR) Avail: NTIS HC A11/MF A01 CSCL 05/5

Methods are described for constructing Resolution IV screening designs that are robust to linear, quadratic, and cubic trend effects and will also keep the number of factor-level changes for some variables at a minimum. Complete designs, capable of screening up to 32 variables, are provided along with appropriate methods of analysis. Numerous criteria for selecting non-trivial variables are discussed, including: mean difference, eta squared, cumulative probability, and half-normal plots. How to handle subjects in an experiment is described when their characteristics can be included as experimental factors and when they cannot be, and when subjects are merely a form of replication. Lack-of-fit tests are provided to help decide whether a second- or a third-order response surface is needed. Numerous methods of analyzing screening studies with multiple responses are described. A method is given for developing a prediction equation with data collected from an incompleting screening design. GRA

N78-20775# Illinois Univ., Savoy. Aviation Research Lab.
THE EFFECTS OF PARTICIPATORY MODE AND TASK WORKLOAD ON THE DETECTION OF DYNAMIC SYSTEM FAILURES Interim Technical Report

Christopher D. Wickens and Colin Kessel Jun. 1977 47 p refs
(Contract F44620-76-C-0009)
(AD-A050210; ARL-77-8/AFOSR-77-7) Avail: NTIS HC A03/MF A01 CSCL 05/8

The ability of operators to detect step changes in the order of control dynamics is investigated as a joint function of (1) participatory mode: whether subjects are actively controlling those dynamics or are monitoring an autopilot controlling them, and (2) concurrent task workload. A theoretical analysis of detection in the two modes identifies factors that will favor detection in either mode. Five subjects either tracked or monitored the system dynamics on a 2-dimensional pursuit display under single task conditions and concurrently with a subcritical tracking task at two difficulty levels. Latency and accuracy of detection were assessed and related through a speed-accuracy tradeoff representation. Detection performance was faster, and only slightly less accurate in the manual as opposed to the autopilot mode, and performance in each mode was derogated by the concurrent tracking requirement, but not by increases in loading task difficulty. Further analysis, involving multiple regression techniques, ensemble averaging and examination of response latency distributions suggested that manual superiority was attributable to the additional proprioceptive information resulting from control adaption to the system change. The effects of the loading task on detection and upon primary task tracking were interpreted in terms of the concept of limited processing resources. Author (GRA)

N78-20776# Naval Postgraduate School, Monterey, Calif.
HUMAN VERBAL BEHAVIOR CONSIDERATIONS IN THE DESIGN OF VOICE ACTUATED HARDWARE SYSTEMS M.S. Thesis

Anthony Gerald Quartano Sep. 1977 103 p refs
(AD-A049925) Avail: NTIS HC A06/MF A01 CSCL 05/7

An experimental study was made of the verbal behavior patterns of 15 P-3C and 15 non-P-3C aviators to determine a voice command vocabulary structure to be used with machine voice recognition hardware for implementation in P-3C aircraft. Subjects were required to give a one or two-word verbal command response to a visual slide stimulus of a simulated P-3C pilot's display. There were five distinct sets of slides, each portraying a different visual presentation. The subjects received the five sets in each of three blocks giving a total of 15 responses per subject. The verbal responses were recorded along with response latencies. Response latencies decreased for both groups as they progressed through the experiment with the P-3C group always having lower latency times. Both groups preferred using a two-word versus one-word command to describe changes on the visual display. Due to the different aviation backgrounds of the two groups, there was no uniform preference for a specific syntactic structure of the command phrases. The implications of the findings for the design of systems using vocal commands are discussed. GRA

N78-21747 Materials Research Labs., Melbourne (Australia). **ANTIFOULING ACTIVITY OF PHYTOTOXIC COMPOUNDS AND EXPERIMENTAL POLYMERIC ALGICIDES**
R. W. Pettis, A. T. Phillip, G. C. Smith, and L. V. Wake Sep. 1977 34 p refs

(MRL-R-698; AR-000-669) Copyright. Avail: Issuing Activity
An immersion trial was carried out to examine the effect of pigment type and experimental antifouling material on the settlement of marine fouling. Three series of chlorinated rubber coatings containing various experimental and commercial phytotoxic materials were formulated and exposed. One series had a soluble pigment, another an insoluble pigment and a third had no pigment. Experimental antifouling polymers were also synthesized and immersed in coatings for comparison with the corresponding nonpolymeric materials. These polymeric coatings showed little or no antifouling performance. Author

N78-21748# Naval Research Lab., Washington, D. C. **ALGAE, ULTRAVIOLET LIGHT, AND THE PRODUCTION OF TRACE GASES Interim Report**
P. J. Hannan, R. A. Lamontagne, J. W. Swinnerton, and C. Patouillet Dec. 1977 23 p refs
(AD-A049441; AD-E000097; NRL-MR-3664) Avail: NTIS HC A02/MF A01 CSCL 06/1

Algal cultures were exposed, with and without mylar films as UV absorbers, to various sunlight intensities; gas chromatographic techniques were then used to analyze the cultures for CO and C sub 1 and C sub 4 hydrocarbons. CO was the most abundant gas and its production was fostered by both high visible and UV-B intensities. When the UV-B was absorbed by mylar, even at low light intensities, there was a significant decrease in CO production. Author (GRA)

N78-21749# Institut Franco-Allemand de Recherches, St. Louis (France).

TRANSMISSION OF IMPULSE NOISE TO THE INNER EAR IN THE GUINEA PIG BY THE RECORDING OF THE INTRACOCHELEAR PRESSURE. EVALUATION OF PHENOMENA LEADING TO INJURIES [ETUDE DE LA TRANSMISSION DES BRUITS IMPULSIFS A L'OREILLE INTERNE DU COBAYE PAR ENREGISTREMENT DES VARIATIONS DE PRESSION INTRACOCHELAIRES. ESSAI D'INTERPRETATION LESIONNELLE]
R. Franke, A. Dancer, and G. Evrard 29 Mar. 1977 38 p refs In FRENCH
(Contract DRME-76/534)
(ISL-R-103/77) Avail: NTIS HC A03/MF A01

Tests with an electrical model of the middle ear have shown that stimulation by loads similar to that of a shot can lead to an amplification by means of cochlear excitation. Direct measurements of over pressures in the cochlea of guinea pigs confirm this effect occurring at a duration of about 50 to 60 microseconds of the first positive phase of the incident air shock wave. Peak-to-peak overpressures were measured, being more than a

factor 40 above the external pressure. The amplification ratio is only half for a duration of 25 or 190 microseconds. ESA

N78-21751*# National Aeronautics and Space Administration, Washington, D. C. **WORKING IN A HOT ENVIRONMENT; PERSPIRATION LOSS: A DRINK FOR PERSONS WORKING UNDER HOT CONDITIONS, PART 2**

H. Glatzel Apr. 1978 18 p refs Transl. into ENGLISH from Ther. Gegenw. (West Germany), v. 115, no. 11, 1976 p 1900-1920 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-2790)
(NASA-TM-75285) Avail: NTIS HC A02/MF A01 CSCL 06S
Losses of various nutrients through sweat of persons working under hot conditions were considered. On the basis of these considerations a supplemental drink was formulated consisting of 1 liter of water per hour containing salt, potassium chloride, iron, thiamine and ascorbic acid. Author

N78-21752*# Technology, Inc., Houston, Tex. Life Sciences Div.

MICROPROCESSOR-BASED CARDIOPULMONARY MONITORING SYSTEM

[1978] 295 p refs
(Contract NAS9-14880)
(NASA-CR-151688) Avail: NTIS HC A13/MF A01 CSCL 06B

The system uses a dedicated microprocessor for transducer control and data acquisition and analysis. No data will be stored in this system, but the data will be transmitted to the onboard data system. The data system will require approximately 12 inches of rack space and will consume only 100 watts of power. An experiment specific control panel, through a series of lighted buttons, will guide the operator through the test series providing a smaller margin of error. The experimental validity of the system was verified, and the reproducibility of data and reliability of the system checked. In addition, ease of training, ease of operator interaction, and crew acceptance were evaluated in actual flight conditions. Author

N78-21753*# Cornell Univ., New York. Rogosin Kidney Center.

SEPARATION OF LYMPHOCYTES BY ELECTROPHORESIS UNDER TERRESTRIAL CONDITIONS AND AT ZERO GRAVITY, PHASE 3 Annual Report, 1 Jan. - 31 Dec. 1977
Albert L. Rubin, Kurt H. Stenzel, Jhoong S. Cheigh, Geoffrey V. F. Seaman, and Abraham Novogrodsky 31 Dec. 1977 33 p refs

(Contract NAS9-15378)
(NASA-CR-151702) Avail: NTIS HC A03/MF A01 CSCL 06P

Electrophoretic mobilities (EPM) of peripheral lymphocytes were studied from normal subjects, chronic hemodialysis patients and kidney transplant recipients. A technique to separate B lymphocytes and null cells from non-T lymphocyte preparation was developed. The experiments were designed to determine which subpopulation of the non-T lymphocytes is primarily affected and shows a decreased EPM in chronic hemodialysis patients and kidney transplant recipients. Author

N78-21754# Civil Aeromedical Inst., Oklahoma City, Okla. **EFFECTS OF ETHANOL ON VISUAL UNIT ACTIVITY IN THE THALAMUS**

A. M. Revzin Jan. 1978 10 p refs
(AD-A050922; FAA-AM-78-2) Avail: NTIS HC A02/MF A01 CSCL 06/16

The effects of ethanol on the spontaneous activity of single neurons in functionally differentiated subnuclei of a posterior thalamic visual projection area, nucleus rotundus, were studied in the anesthetized pigeon. Low doses of ethanol, 0.05 to 0.10 ml/kg, inhibited activity in anterior rotundus but had complex excitatory inhibitory effects on posterior rotundus cells. Nonvisual dorsal thalamic cells, and lateral geniculate neurons were inhibited

by ethanol, but threshold doses were far higher than those for the rotundal cells. These differing dose-response curves for visual and nonvisual thalamic neurons suggested that low doses of ethanol impaired peripheral visual functions; that behavioral effects of ethanol are highly dose dependent; The effects of a given dose of ethanol may vary widely and unpredictably. Author

N78-21755# Mayo Foundation, Rochester, Minn. Dept. of Physiology and Biophysics.

PROTECTION OF THE CARDIOPULMONARY SYSTEMS AGAINST THE INJURIOUS EFFECTS OF ACCELERATION Final Progress Report, 1 Jul. 1976 - 30 Sep. 1977

Peter A. Chevalier 23 Nov. 1977 50 p refs

(Contract F49620-76-C-0001)

(AD-A050142; AFOSR-78-0102TR)

Avail: NTIS

HC A03/MF A01 CSCL 06/16

This report describes the development of the parenchymal marker technique which makes it possible to reconstruct 3-dimensional shapes and dimensions of the heart, lung, chest-wall and diaphragm in the intact thorax. The technique presents a unique opportunity to study dynamic regional lung mechanics and lung-chest wall-diaphragm interaction under various conditions of lung volumes and body position and thereby provides the methodology to study the effects on regional lung function of alterations in these parameters induced by changes in the gravitational-inertial force environment. Significant new information has been obtained regarding regional mechanical properties of the lung with techniques possessing sufficient temporal and spatial resolution to permit quantitative determination of the dynamic changes in spatial (three-dimensional) lung parenchymal strains, regional lung volumes and lung-chest wall geometries. Such mechanical studies of the intact lung have not been possible, heretofore, these new results provide a quantitative measure of the mechanical properties of the lung under normal physiologic conditions (i.e., an intact thorax and normal intrathoracic pressures) at 1G and are required before similar studies can be performed under conditions of increased or decreased gravitational-inertial force environments encountered in aerospace flight. GRA

N78-21756# Illinois Univ. at Urbana-Champaign, Savoy. Aviation Research Lab.

HOW BIG THE MOON, HOW FAT THE EYE? Interim Report

Stanley N. Roscoe Jun. 1977 36 p refs

(Contract F44620-76-C-0009)

(AD-A050211; ARL-77-9/AFOSR-77-8; AFOSR-78-0125TR)

Avail: NTIS HC A03/MF A01 CSCL 05/8

Shifts in the apparent size and distance of real objects viewed binocularly and monocularly and of objects viewed indirectly through imaging displays are accompanied by shifts in visual accommodation distance. It is hypothesized that relaxation of accommodation toward the intermediate resting position in the absence of adequate textural cues to distance attenuates the size of the projected retinal image of more distant objects, thereby causing reductions in apparent size or increases in apparent distance, including certain types of optical illusions.

Author (GRA)

N78-21757# California Univ., Los Angeles. Dept. of Psychology.

PUPILLOMETRIC SIGNS OF BRAIN ACTIVATION VARY WITH LEVEL OF COGNITIVE PROCESSING Interim Report

Jackson Beatty and Brennis L. Wagoner 19 Jul. 1977 10 p refs Submitted for publication

(Contract N00014-76-C-0816)

(AD-A050029; TR-9) Avail: NTIS HC A02/MF A01 CSCL

05/10

The idea that hierarchically higher brain processes require greater amounts of ONS vigilance or activation for their execution was tested in two experiments measuring pupillary dilation during the decision interval of a hierarchically-structured letter-matching task. Larger dilations indicative of increased activation were observed for letter pairs requiring higher levels of processing.

Author (GRA)

N78-21758# Vermont Univ., Burlington. Dept. of Orthopaedic Surgery.

RADIOGRAPHIC AND BIOMECHANICAL STUDIES OF THE HUMAN SPINE Final Report, Jul. 1974 - Sep. 1977

M. H. Pope, D. G. Wilder, E. Buturla, R. Matteri, W. W. Frymoyer, and J. W. Frymoyer 1 Oct. 1977 150 p refs

(Grant AF-AFOSR-2738-74; AF Proj. 2312)

(AD-A049984; AFOSR-78-0063TR)

Avail: NTIS

HC A07/MF A01 CSCL 06/16

The techniques and equipment to take biplane and stereo roentgenographs of the spine and pelvis in various positions of flexion-extension, lateral bend and axial rotation are explained. The in vivo load-deflection characteristics are given both for the whole spine and for individual motion segments. Moire fringe topography for the back is introduced and results given. Application of these techniques to USAF ejection seats, the MAST suit and clinical measures of disc space height and rotation are reported. Measurements of the pelvis of various racial groups are reported. There is discussion of interactions between the pelvis and the spine. Author (GRA)

N78-21759# California Univ., Los Angeles. Dept. of Psychology.

ACTIVATION AND SUSTAINED ATTENTION: A PUPILLOMETRIC STUDY OF AN AUDITORY VIGILANCE TASK Interim Technical Report

Jackson Beatty and Cynthia O. Wilson 1 Dec. 1977 15 p refs

(Contract N00014-76-C-0616; NR Proj. 201-207)

(AD-A050040; TR-12) Avail: NTIS HC A02/MF A01 CSCL 05/10

Using a classical auditory vigilance task, the relations between pupillometric indices of phasic central nervous system increases in activation and sustained attention were investigated. The amplitude of the task-invoked pupillary response declined as a function of time in task at a rate paralleling the performance decrement. These findings are discussed in the context of an activation theory of attentional processes. Author (GRA)

N78-21760# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Radiology.

INVESTIGATIONS OF THE BIOLOGICAL EFFECTS OF RADIATION: A MULTI-DISCIPLINE APPROACH Progress Report, 1 Sep. 1976 - 31 Aug. 1977

H. L. Friedell 1 Sep. 1977 61 p refs

(Contract EY-76-S-02-2486)

(COO-2486-366) Avail: NTIS HC A04/MF A01

The quasi-free electron attachment rate, $k_{\text{sub } e/}$, and mobility, $\mu_{\text{sub } e/}$, were studied in non-polar solutions using pulsed conductivity techniques. Measurements of $k_{\text{sub } e/}$ of greater than 50 nitro compounds in liquids have $\mu_{\text{sub } e/}$ ranging from less than 0.1 to 100 sq cm/volt sec at temperatures from -100 to +40 C indicated electron dipole interactions are important in liquids having $\mu_{\text{sub } e/}$ less than 1.0 sq cm/volt sec. The cellular enhancement ratio, CER, of nine of the nitro compounds were measured and a correlation between $k_{\text{sub } e/}$ and CER was found. Diffusion-controlled $k_{\text{sub } e/}$'s were observed for several carcinogens and in reversed micellar solutions. Field-dependent $k_{\text{sub } e/}$'s were measured in liquids. The $\mu_{\text{sub } e/}$ of liquid C₂H₆ was measured and a transition from polaron to delocalized electron conduction was observed. A picosecond (ps) pulse conductivity technique was developed and hot electron and/or autoionization processes were observed in tetramethylsilane, TMS. ERA

N78-21761# Joint Publications Research Service, Arlington, Va.

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 24

10 Apr. 1978 50 p refs Transl. into ENGLISH from various RUSSIAN journals

(JPRS-70928) Avail: NTIS HC A03/MF A01

Information is reported on aerospace medicine, agrotechnology, bionics and bioacoustics, biochemistry, biophysics, environmental and ecological problems, food technology, microbiology,

epidemiology and immunology, marine biology, military medicine, physiology, public health, toxicology, radiobiology, veterinary medicine, behavioral science, human engineering, psychology, psychiatry and related fields, and scientists and scientific organizations in biomedical fields. For individual titles, see N78-21762 through N78-21763.

N78-21762# Joint Publications Research Service, Arlington, Va.

COSMONAUT WORK CAPACITY IN FLIGHT

N. Fefelov *In its* Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci., No. 24 (JPRS-70928) 10 Apr. 1978 p 1-4 Transl. into ENGLISH from Krytya Rodiny (USSR), no. 1, 1978 p 26-27 (For availability see N78-21761 12-52)

Avail: NTIS HC A03/MF A01

A discussion is presented on some of the physiological and psychological conditions encountered by space flight crews and how they effect cosmonaut work capacity while in flight. Also discussed are conditioning methods to alleviate these problems.

G.Y.

N78-21763# Joint Publications Research Service, Arlington, Va.

SOME PROBLEMS IN ASSESSING OCULOMOTOR ACTIVITY DURING INFORMATION RETRIEVAL

Yu. L. Trofimov, Zh. V. Levshinova, and T. M. Sycheva *In its* Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci., No. 24 (JPRS-70928) 10 Apr. 1978 p 31-35 refs Transl. into ENGLISH from Tech. Estekika (USSR), no. 11, 1977 p 24-25 (For availability see N78-21761 12-52)

Avail: NTIS HC A03/MF A01

Using research on the readability of the display elements of motor vehicle instruments, some problems in combined processing of EOG (electrooculography) and VEOG (vector-electrooculography) are examined, as well as the nature of their dependence on the structure of the test information field. Such integral assessment of visual activity allows the correlation of the characteristics of an individual's work effectiveness (rate, precision) with the outlays of the oculomotor system, and to reveal the reasons for keeping the gaze on particular sections of the image having different information capacities. Author

N78-21764# Illinois Univ. at Urbana-Champaign, Savoy, Aviation Research Lab.

EVALUATION OF THE TRANSFER AND COST EFFECTIVENESS OF A COMPLEX COMPUTER-ASSISTED FLIGHT PROCEDURE TRAINER

James Patrick Finnegan Jun. 1977 133 p refs (Contract F44620-76-C-0009) (AD-A050413; ARL-77-7/AFOSR-77-6; AFOSR-78-0192TR) Avail: NTIS HC A07/MF A01 CSCL 05/9

A simple, comparatively inexpensive instrument flight trainer based on computer-assisted instruction (CAI) technology was compared with more traditional training devices in teaching 48 private pilots to fly a standard instrument procedure, the holding pattern. The CAI device, based on the University of Illinois PLATO interactive computer-assisted teaching system, provided the student with instructional information and an opportunity to 'fly' holding patterns by using a hand control to input commands to the PLATO system and with reference to dynamic flight instruments displayed on the computer terminal screen. Groups of students were trained using either (1) CAI and aircraft training, (2) ground school, ground-based trainer, and aircraft training, or (3) ground school and aircraft training. All students were trained to fly both crosswind and quartering tailwind holding patterns and flew to criterion in the aircraft. Measures taken included altitude errors, inbound tracking errors, errors in inbound time, and trials to criterion. GRA

N78-21765# Illinois Univ. at Urbana-Champaign, Savoy, Aviation Research Lab.

ADAPTIVE TRAINING OF PERCEPTUAL MOTOR SKILLS: ISSUES, RESULTS AND FUTURE DIRECTIONS

Gavan Lintern and Daniel Gopher Jan. 1977 82 p refs (Contract F44620-76-C-0009) (AD-A050461; ARL-77-5/AFOSR-77-5; AFOSR-78-0194TR) Avail: NTIS HC A05/MF A01 CSCL 05/9

Adaptive training research is described and evaluated. A critical examination of various experiments reveals that there is less support for the application of adaptive manipulations to applied motor skill training than is generally believed. Some apparently favorable experiments have methodological and interpretive flaws that seriously weaken their conclusions. Other experiments that provide tenable support have characteristics that are unique in adaptive training research so that the generality of their data is in doubt. The limitations of the data prevent firm conclusions being drawn about the efficiency of adaptive training. A detailed analysis of motor skill theory and research indicates that some adaptive manipulations could be effective. Methodological and conceptual issues that are critical to successfully testing those manipulations are clarified in a discussion of the adaptive training concept. Several empirical tests needed to enable a more effective analysis of adaptive training are discussed. GRA

N78-21766# California Inst. of Tech., Pasadena. **COLLISION DETECTION AND AVOIDANCE IN COMPUTER CONTROLLED MANIPULATORS Ph.D. Thesis**

Shriram Mahabal Udúpa 14 Sep. 1976 236 p refs

Avail: NTIS HC A11/MF A01

The problem of planning safe trajectories for computer controlled manipulators with two links and multiple degrees of freedom was examined. A model was developed for collision detection and avoidance systems for such manipulators. The justification for the model lies in the computer implementations for 2D and 3D manipulator systems. These systems incorporate a significant portion of the model. The promising performance of the implementation makes fast collision avoiders a distinct possibility. The solution presented treats manipulators with a sliding joint, and permits the manipulator to transport objects which can be enclosed within the minimum bounding cylinder of the manipulator link. Modifications of the solution that permit handling of large objects are indicated. An extension of the solution that solves the problem for manipulators with only rotary joints is described. Author

N78-21767*# Clemson Univ., S.C. Dept. of Mechanical Engineering.

DYNAMIC HYPERFILTRATION MEMBRANES FOR HIGH-TEMPERATURE SPACECRAFT WASH WATER RECYCLE Final Report

J. L. Gaddis and C. A. Brandon Feb. 1978 134 p refs

(Contract NAS9-13669)

(NASA-CR-151689; T-932-5-2)

Avail: NTIS

HC A07/MF A01 CSCL 06K

The effect of operating parameters on the performance of the hyperfiltration membrane when operating on washwater was examined. The parameters were pressure, temperature, velocity, and concentration. Data taken included rejections of organic materials, ammonia, urea, and an assortment of ions. The membrane used was a dual layer, polyacrylic acid over zirconium oxide, deposited in situ on a porcelain ceramic substrate. Author

N78-21768# Civil Aeromedical Inst., Oklahoma City, Okla. **AIRCREW AND PASSENGER PROTECTIVE BREATHING EQUIPMENT STUDIES**

D. DeSteiguer, M. S. Pinski, J. R. Bannister, and E. B. McFadden Jan. 1978 46 p refs

(AD-A051002; FAA-AM-78-4) Avail: NTIS HC A03/MF A01 CSCL 06/11

A collection of various reports are presented, concerning the protective capability of passenger and crew oxygen breathing equipment and specialized devices and concepts against smoke and toxic gases produced by aircraft fires. Author

N78-21769# Army Aeromedical Research Lab., Fort Rucker, Ala.

HELMET COLD CONDITIONING: CORRELATION OF STRUCTURAL TEMPERATURES IN ACTUAL AND SIMULATED COLD ENVIRONMENTS

John C. Johnson and Stanley C. Knapp Oct. 1977 26 p ref (AD-A050033; USSARL-78-4) Avail: NTIS HC A03/MF A01 CSCL 06/17

An experiment was conducted at the US Army Aeromedical Research Laboratory, USAARL, to correlate the helmet thermal characteristics found in cold temperature conditioning as required by current impact test methodologies (American National Standards Institute (ANSI) Standard Z90.1 and the Department of Transportation (DOT) Motor Vehicle Safety Standard (MVS) No. 218, Motorcycle Helmet 49CSR571.218) and the thermal characteristics which occur during actual use by the wearer in a cold environment. Four types of helmets were used in this evaluation: sling suspension, form-fit, standard motorcycle, and short motorcycle helmets. Temperatures were taken within the helmet structure using thermocouples at the following locations: on top of the exterior surface of the shell, at the interface between the shell and the crushable liner, at the center of the crushable and at the center of the comfort liner. Standard helmet impact test methodologies do not simulate potential, real world, cold climate conditions. The standard impact test methodologies are inappropriate for the determination of cold temperature dynamic response of a helmet system. GRA

N78-21770# Air Force Human Resources Lab., Brooks AFB, Tex.

VISUAL-PROPRIOCEPTIVE CUE CONFLICTS IN THE CONTROL OF REMOTELY PILOTED VEHICLES Final Report, Jul. 1973 - Apr. 1977

Lawrence E. Reed Sep. 1977 32 p refs (AD-A049706; AFHRL-TR-77-57) Avail: NTIS HC A03/MF A01 CSCL 05/8

The purpose of this experiment was to investigate operator performance in an environment which was conducive to visual-proprioceptive conflict. More specifically, the intent was to determine the relative ability of pilot, navigator, and nonrated Air Force officer groups to maneuver a simulated remotely piloted vehicle (RPV) from a simulated airborne control station (i.e., a mother ship). The vehicle and/or the station were given gust-like disturbances on pitch and/or roll. In a between-groups design, the performance of the three groups of subjects was compared under two conditions of conflict (e.g., visual roll right and roll left motion; visual roll right and pitch-up motion), nonconflict, motion only, and no motion. To maintain adequate performance, it was necessary for the subjects to disregard sensations of motion. The results revealed that the two conditions of conflict engendered the highest proportion of control errors (i.e., reversal, and axis errors) by all subjects, regardless of experience, but pilots tended to make more errors than nonpilots. The past experience of pilots did not help them overcome the effects of conflict as measured by control errors, but it did help them reduce response latencies. Motion cues appear to play not only an alerting role, but also provide information on the direction of attitude changes. This research indicated no advantage of training pilots, as opposed to nonpilots, to perform airborne control of RPVs as represented by the conditions of this experiment. Such training should be conducted in the presence of motion cues. Author (GRA)

N78-21771# Illinois Univ. at Urbana-Champaign, Savoy, Aviation Research Lab.

HUMAN PERFORMANCE IN AVIATION SYSTEMS Final Scientific Report, 15 Jul. 1975 - 30 Jun. 1977

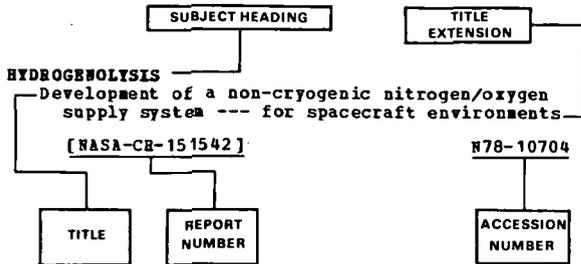
Charles O. Hopkins Jul. 1977 55 p refs (Contract F44620-76-C-0009) (AD-A050078; ARL-77-14/AFOSR-77-12; AFOSR-78-0080TR) Avail: NTIS HC A04/MF A01 CSCL 05/9

Activities and accomplishments are summarized for six research tasks involving various aspects of human performance in the operation of aviation systems. The program has produced information relevant both to the selection and training of pilots

and the design of systems and operational procedures. Topics included are: (1) attention, timesharing, and pilot performance; (2) transfer of computer assisted learning to flight; (3) computer assisted decision training for air combat tactics; (4) Acquisition and transfer of aircraft landing skills through manipulation of the augmented cue structure; (5) synergistic displays for complex navigation and control tasks; and (6) perceived size and distance as correlates of visual accommodation. GRA

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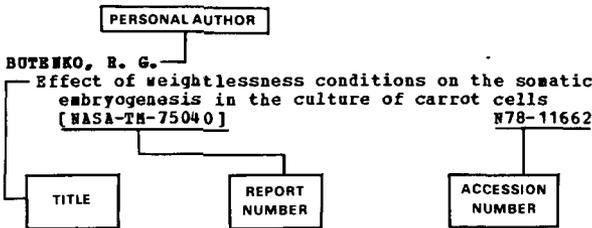
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