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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 143)

JULY 1975

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 143)

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 1975 in:

- *Scientific and Technical Aerospace Reports (STAR)*
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 251 reports, articles and other documents announced during June 1975 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.

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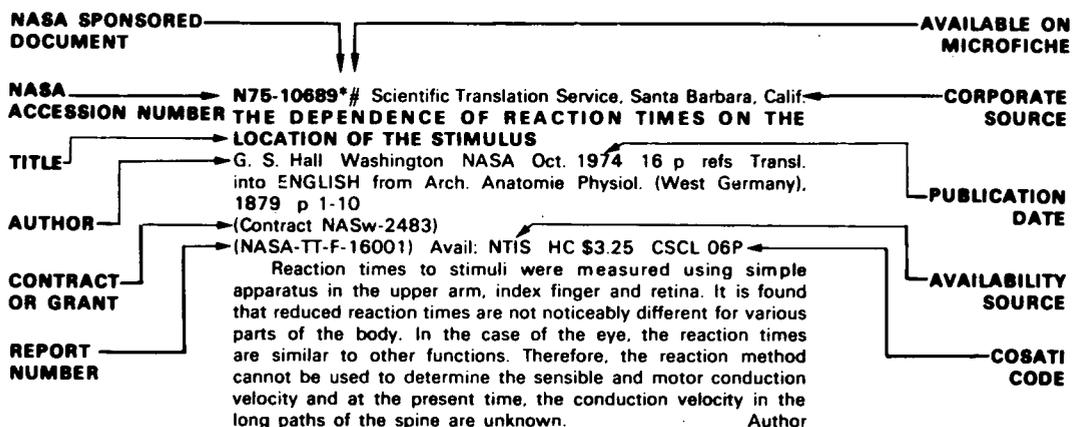
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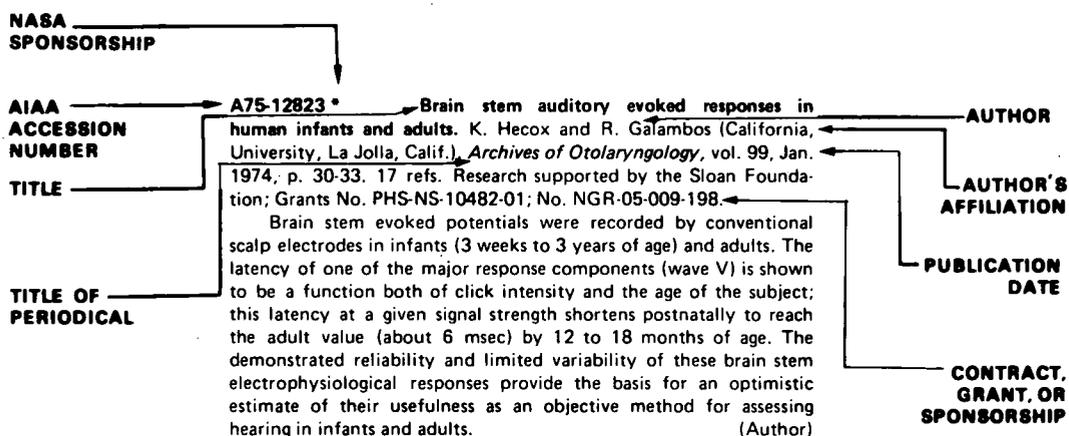
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TYPICAL CITATION AND ABSTRACT FROM IAA





AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 143)

JULY 1975

IAA ENTRIES

A75-26164 # The temperature dependence of myosin fluorescence of skeletal and smooth muscles (Temperatura zalezhnist' fluorestsentsii miozynu skeletnikh i gladen'kikh m'iaziv). P. G. Bogach, V. L. Zima, V. M. Danilova, and V. M. Dubonos (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrain'skoi RSR, Dopovidi, Seriya B - Geologiya, Geofizika, Khimiia i Biologiya*, Jan. 1975, p. 54-56. 13 refs. In Ukrainian.

The study of the temperature dependence of myosin fluorescence made it possible to reveal some discrete conformational states of molecules which determine the functional peculiarities of the system. For the skeletal muscles myosin two reversible structural transitions were detected in the region of 19-37 C. For the smooth muscle myosin a reversible change of the fluorescence spectrum was observed in an interval of 35-40 C. Irreversible changes in the molecules of the smooth muscle myosin took place at lower temperatures, which evidences for their less stability to the temperature action as compared with the molecules of skeletal muscles.

(Author)

A75-26198 Labyrinthine influence on cat forelimb motoneurons. M. Maeda, R. A. Maunz, and V. J. Wilson (Rockefeller University, New York, N.Y.). *Experimental Brain Research*, vol. 22, Jan. 31, 1975, p. 69-86. 44 refs. Grants No. NIH-NS-02619; No. NIH-NS-05463.

Intracellular responses in forelimb motoneurons to electrical stimulation of the whole labyrinth and of individual semicircular canal nerves were studied in decerebrated, unanesthetized cats. Labyrinthine control of forelimb motoneurons was more direct than control of neck and back motoneurons. It is suggested that the interneuron in the pathway to forelimb motoneurons is the site of integration of labyrinthine with other reflexes. S.J.M.

A75-26199 Neural pathways from the vestibular labyrinths to the flocculus in the cat. Y. Shinoda and K. Yoshida (Tokyo, University, Hongo, Tokyo, Japan). *Experimental Brain Research*, vol. 22, Feb. 5, 1975, p. 97-111. 22 refs.

A75-26200 Vestibular and somatosensory inflow to the vestibular projection area in the post cruciate dimple region of the cat cerebral cortex. L. M. Odkvist, S. R. C. Liedgren, B. Larsby, and L. Jerlvaall (Regional and University Hospital, Linköping, Sweden). *Experimental Brain Research*, vol. 22, Feb. 5, 1975, p. 185-196. 54 refs. Research supported by the Ollie och Elof Ericssons Fond and Statens Institut for Medicinsk Forskning; Swedish Medical Research Council Grant No. 503504503-7.

A75-26220 The effects of orientation-specific adaptation on the duration of short-term visual storage. G. E. Meyer, R. Lawson, and W. Cohen (New York, State University, Buffalo, N.Y.). *Vision Research*, vol. 15, May 1975, p. 569-572. 15 refs.

A75-26221 Spatial organization of binocular disparity sensitivity. C. W. Tyler (Northeastern University, Boston, Mass.). *Vision Research*, vol. 15, May 1975, p. 583-590. 18 refs.

The range of sensitivity to spatial modulation of disparity in a vertical line was investigated. The function obtained was not greatly altered by conditions of fixed aperture, constant number of cycles, high resolution, foveal or eccentric presentation. The simplest hypothesis to account for the observed disparity scaling of the upper disparity limit was a correlation between preferred sizes and disparities of cortical receptive fields. Binocular fusion shows a disparity scaling effect for sinusoidal variations in a vertical line, but little change for sinusoidal variations in a horizontal line or for rectangular variations in either direction. Fusion thus exhibits vertical/horizontal anisotropy but the effects are not explained by a size-disparity correlation in cortical receptive fields. (Author)

A75-26222 Spectral shaping and waveguide modes in retinal cones. P. M. Tannenbaum (Bell Telephone Laboratories, Inc., Holmdel, N.J.). *Vision Research*, vol. 15, May 1975, p. 591-593. 10 refs.

Analytic approximations for the waveguide mode intensity distributions, photographed by Enoch in retinal cones, are suggested. Using this representation the power coupled into each of these modes per unit wave number is calculated for an incident plane wave. It is found that the functions so derived are the same as those previously for fitting the 1964, 10-deg field, x-, y-, z-bar, color matching functions. (Author)

A75-26223 On the mechanisms of the interocular light adaptation effect. J. Paris (Ferrum College, Ferrum, Va.) and A. M. Prestrude (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *Vision Research*, vol. 15, May 1975, p. 595-603. 26 refs. Research supported by the Virginia Polytechnic Institute and State University.

Lansford and Baker (1969) recently demonstrated that the adaptation state of the contralateral eye effects the sensitivity of the test eye during dark adaptation. Specifically, a smaller and dimmer contralateral preadapting field which partially overlaps the preadapting field seen by the test eye accelerates subsequent monocular dark adaptation. The present study replicated the interocular light adaptation (Lansford-Baker) effect and produced the same effect under different test conditions. By the use of limited wavelength contralateral preadapting fields it demonstrated the interocular light adaptation effect in both cone and rod segments of the dark adaptation curve and that the rod effect is larger. Both long and short wavelength contralateral preadapting fields enhanced the effect to the point of doubling its magnitude. (Author)

A75-26224 **A mathematical approach to explain subjective color perception.** L. Polizzotto and R. A. Peura (Worcester Polytechnic Institute, Worcester, Mass.). *Vision Research*, vol. 15, May 1975, p. 613-616. 9 refs.

The present work discusses the application of statistical communication theory and harmonic analysis techniques to the pulses produced by the rotation of a modified Benham's disk, in order to explain human subjective color perception. Results suggest that phase angle modulation is the process used by the visual system in the perception of subjective color. It is shown that, using the double cross-correlation waveforms for blue, green and red, the double cross-correlation waveforms of other colors such as yellow and orange can be predicted. S.J.M.

A75-26225 **Flicker adaptation shows evidence of many visual channels selectively sensitive to temporal frequency.** T. H. Nilsson, C. F. Richmond, and T. M. Nelson (Alberta, University, Edmonton, Canada). *Vision Research*, vol. 15, May 1975, p. 621-624. 13 refs. Research supported by the National Research Council of Canada.

A75-26235 **The central arterial pulses - Experiments on a hybrid model of the heart and the arterial system.** T. Kenner (Graz, Universität, Graz, Austria). *Pflügers Archiv*, vol. 353, no. 1, 1975, p. 67-81. 13 refs. Research supported by the Österreichischer Fonds zur Förderung der wissenschaftlichen Forschung.

A75-26236 * **Effect of local cooling on sweating rate and cold sensation.** L. I. Crawshaw, E. R. Nadel, J. A. J. Stolwijk, and B. A. Stamford (John B. Pierce Foundation Laboratory; Yale University, New Haven, Conn.). *Pflügers Archiv*, vol. 354, no. 1, 1975, p. 19-27. 12 refs. Grants No. NIH-ES-00354; No. NIH-ES-00123; No. NGR-07-008-002.

Subjects resting in a 39 C environment were stimulated in different skin regions with a water-cooled thermode. Results indicate that cooling different body regions produces generally equivalent decreases in sweating rate and increases in cold sensation, with the forehead showing a much greater sensitivity per unit area and temperature decrease than other areas. The high thermal sensitivity of the face may have evolved when it was the thinnest-furred area of the body; today's clothing habits have reestablished the importance of the face in the regulation of body temperature. S.J.M.

A75-26237 **Depletion of muscle and liver glycogen during exercise - Protective effect of training.** K. M. Baldwin, R. H. Fitts, F. W. Booth, W. W. Winder, and J. O. Holloszy (Washington University, St. Louis, Mo.). *Pflügers Archiv*, vol. 354, no. 3, 1975, p. 203-212. 28 refs. Grant No. NIH-HD-01613.

Carbohydrate depletion during exercise was measured in the liver, in the three different types of skeletal muscle, and in the blood of exercise-trained and untrained rats. Glycogen stores in muscle and liver were depleted significantly more slowly in trained than in untrained animals during an acute treadmill test. Blood lactate concentration was significantly lower in the trained group. Thus endurance training appears to induce adaptations that protect against the depletion of glycogen during prolonged exercise. S.J.M.

A75-26238 **M. quadriceps femoris of man, a muscle with an unusual enzyme activity pattern of energy supplying metabolism in mammals.** A. Bass, K. Vondra, R. Rath, and V. Vitek (Czechoslovak Academy of Sciences, Institute of Physiology; Institute of Clinical and Experimental Medicine, Prague, Czechoslovakia). *Pflügers Archiv*, vol. 354, no. 3, 1975, p. 249-255. 25 refs.

A75-26239 **Differences in action potentials and accommodation of sensory and motor myelinated nerve fibres as computed on the basis of voltage clamp data.** A. H. Bretag (South Australian Institute of Technology, Adelaide, Australia) and R. Stämpfli (Saarland, Universität, Homburg, West Germany). *Pflügers Archiv*, vol. 354, no. 3, 1975, p. 257-271. 22 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A75-26240 **The role played by elasticity in an exercise involving movements of small amplitude.** H. Thys, G. A. Cavagna, and R. Margaria (Milano, Università; CNR, Centro di Studio per la Fisiologia del Lavoro Muscolare, Milan, Italy). *Pflügers Archiv*, vol. 354, no. 3, 1975, p. 281-286. 10 refs.

In an exercise consisting of repetitive small jumps on both feet at a frequency of 116/min, the mechanical work performed and the O₂ consumption at steady state were measured. Of the positive work performed in the jump only 40 per cent appears to be due to the chemical transformations taking place in the contractile component of the muscle fibers; the remaining 60 per cent appears to be due to the elastic energy accumulated in the elastic elements of the contracted stretched muscles of the lower limbs during the falling phase of the previous jump, when the body hits the ground. (Author)

A75-26241 **Microrheology and light transmission of blood. III - The velocity of red cell aggregate formation.** H. Schmid-Schönbein, K. A. Kline, L. Heinrich, E. Volger, and T. Fischer (München, Universität, Munich, West Germany). *Pflügers Archiv*, vol. 354, no. 4, 1975, p. 299-317. 18 refs. Research supported by the Deutsche Forschungsgemeinschaft.

The present report is concerned with studying the process of spontaneous aggregate reformation in static blood following hydrodynamic aggregate dispersal in high flow. Red cell aggregation (RCA) was studied by microcinematography and photometry in a counter-rotating 'rheoscope' chamber. Differences between syllectograms of normal human blood and blood from pregnant women at term, as well as from myeloma and diabetes patients, are explored. A new method of processing the photometric data is presented. The rate of formation of primary and secondary RCAs was measured by rate of increase in transmitted photovoltage; this derivative decayed exponentially with time after flow stoppage. The half-time of the decay process is inversely related to the adhesivity of red blood cells and/or plasma. By the new method, (1) extremely small samples (20 microliters) suffice for a measurement and (2) the corrected aggregation constants can be correlated to the concentration of various aggregating colloids. S.J.M.

A75-26242 **Microrheology and light transmission of blood. IV - The kinetics of artificial red cell aggregation induced by dextran.** E. Volger, H. Schmid-Schönbein, J. v. Gosen, H. J. Klose, and K. A. Kline (München, Universität, Munich, West Germany). *Pflügers Archiv*, vol. 354, no. 4, 1975, p. 319-337. 39 refs. Deutsche Forschungsgemeinschaft Grant No. Schm-84/1-5.

The rheology of pathological red cell aggregation (RCA) was studied in model experiments employing microscopic and photometric methods. Suspensions of washed human red blood cells in dextran solutions containing rising concentrations and/or molecular weights of dextrans were used to induce artificial aggregation. It was found that (1) in all samples the rate of spontaneous aggregate reformation in stasis (following hydrodynamic disaggregation) rose with rising dextran concentration up to 5.0 g-%; (2) the shear resistance of the aggregates, as measured by the shear stress necessary to keep them dispersed, rose up to concentrations of 2.5 g-%, but fell at higher concentrations; (3) only with dextran of a molecular weight above 110,000 could coarse agglomerates be produced at high concentrations. Loose elastic meshes were rapidly produced at high concentrations of Dx 70; and (4) when subjected to steady-state low shear (7/sec), only the agglomerates and not the meshes increased rapidly in size. S.J.M.

A75-26243 **An application of long-term frequency analysis in measuring drug-specific alterations in the EEG of the cat.** M. D. Fairchild, D. J. Jenden, and M. R. Mickey (California, University, Los Angeles; U.S. Veterans Administration Hospital, Long Beach, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 337-348. 34 refs. Grants No. PHS-MH-17691; No. NIH-RR-3.

A75-26244 Spinal cord potentials evoked by peripheral nerve stimulation. L. T. Happel, H. J. LeBlanc, and D. G. Kline (Louisiana State University, New Orleans, La.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 349-354. 15 refs. Grant No. DADA17-69-C-9133.

The present study was undertaken to compare responses recorded directly from the surface of the spinal cord with those recorded at the skin level overlying the cord. Computer averaging techniques were used for both response measurements. The increased sensitivity of computer methodology permitted recordings of conduction over greater distances of cord than in previous studies. Clinical implications of the techniques and possible explanations of the waveforms recorded are discussed. S.J.M.

A75-26245 Human frequency-following responses to monaural and binaural stimuli. G. M. Gerken, G. Moushegian, R. D. Stillman, and A. L. Rupert (Texas, University, Dallas, Tex.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 379-386. 10 refs.

Frequency-following responses were recorded from five normal-hearing human subjects to brief 500 Hz tone bursts presented monaurally. Comparisons were made between the frequency-following responses evoked by binaural and monaural stimuli. The results show that the binaural responses may be interpreted as the sum of two monaural responses. It is concluded, therefore, that there are two independent populations of neurons, each capable of generating a frequency-following response and each activated by one ear. It is also argued that the frequency-following response is not a microphonic-like response, but rather that the individual waves in the frequency-following response are evoked by the collective activity of phase-locked single units. Finally, on the basis of the distinctness of the individual waves in the frequency-following response, it is concluded that the neural generators of the response must be spatially compact. S.J.M.

A75-26246 * Two varieties of long-latency positive waves evoked by unpredictable auditory stimuli in man. N. K. Squires, K. C. Squires, and S. A. Hillyard (California, University, La Jolla, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 387-401. 37 refs. Grants No. NGR-05-009-198; No. NIH-MH-25594; No. NIH-NS-07454.

Two distinct late-positive components of the scalp-recorded auditory evoked potential were identified which differed in their latency, scalp topography and psychological correlates. The earlier component (latency about 240 msec) was elicited by infrequent, unpredictable shifts of either intensity or frequency in a train of tone pips; whether the subject was ignoring or attending. The later component (latency about 350 msec) occurred only when the subject was actively attending to the tones; it was evoked by the infrequent, unpredictable stimulus shifts, regardless of whether the subject was counting that stimulus or the more frequently occurring stimulus. Both of these distinct psychophysiological entities have previously been collectively referred to as 'P-3' or 'P-300' in the literature. S.J.M.

A75-26247 A syndrome of hypersomnia with automatic behavior. C. Guilleminault, R. Phillips, and W. C. Dement (Stanford University, Stanford, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 403-413. 11 refs. Grant No. NIH-NS-10727.

Patients having a history of daytime sleep attacks and automatic behavior were recorded continuously by polygraph and compared to normal controls. Abnormals presented anomalous sleep structures, with lack of stage 3 and 4 NREM sleep, as well as repetitive brief periods of 'micro-sleep.' This syndrome, which greatly impairs the social life and working ability of the patients, may be more closely related to an impairment of the 'wakefulness' structures than to a dysfunction of the 'sleep' structures. S.J.M.

A75-26248 EEG correlates of visual-motor practice in man. J. Busk (California, University, Pomona, Calif.) and G. C. Galbraith (Southern California, Los Angeles, Calif.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 415-422. 33 refs. U.S. Department of Health, Education, and Welfare Grant No. RR-05632; Grants No. PHS-HD-04612; No. NIH-HD-06650.

EEG activity was recorded from visual, motor, and premotor scalp areas during the performance of three visual-motor tasks. A measure of average weighted coherence (C) was computed between the six possible combinations of four scalp areas (O-z, C-3, C-4 and F-z). In all subjects, regardless of task, scalp recordings over cortical areas known to have relatively dense fiber connections had significantly greater C values. However, when the effects of task difficulty and practice were superimposed upon this basic pattern, it was shown that the most difficult and least difficult tasks resulted in the highest and lowest coherence levels, respectively. Practice was associated with a significant decrease in the overall level of coherence. These results suggest that patterns of scalp EEG coherence may reflect some aspects of the underlying pattern of anatomical pathways, as well as the more dynamic properties of task difficulty and visual-motor practice. S.J.M.

A75-26249 The pattern of swallowing during sleep. I. Lichter and R. C. Muir (Otago, University, Dunedin, New Zealand). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 427-432. 9 refs.

The pattern of swallowing during sleep was investigated by means of a study in 10 normal subjects. Sleep was staged by means of EEG, EOG, and EMG, and swallowing was monitored by means of an external sensing device attached to the neck. It was found that during sleep, swallowing is episodic, with long swallow-free periods. Swallows occur almost exclusively in association with movement arousals which are most frequent during stages REM, 1, and 2 of sleep. S.J.M.

A75-26250 Detection of human sleep EEG waveforms. J. R. Smith, W. F. Funke, W. C. Yeo, and R. A. Ambuehl (Florida, University, Gainesville, Fla.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, Apr. 1975, p. 435-437. 10 refs. Grants No. NIH-MH-16960; No. NIH-MH-15508.

A method of detecting waveforms in the EEG taken during human sleep is presented. Such waveforms correspond to alpha, beta, delta, sleep spindles, and muscle activity. Design criteria are provided for the waveform detectors, which can be readily constructed from linear and digital integrated circuits or programmed on a mini-computer. S.J.M.

A75-26298 * Arthrobacter globiformis and its bacteriophage in soil. L. E. Casida, Jr. and K.-C. Liu (Pennsylvania State University, University Park, Pa.). *Applied Microbiology*, vol. 28, Dec. 1974, p. 951-959. 13 refs. Grant No. NGR-39-009-180.

An attempt was made to correlate bacteriophages for *Arthrobacter globiformis* with soils containing that bacterium. The phages were not detected unless the soil was nutritionally amended (with glucose or sucrose) and incubated for several days. Phage was continuously produced after amendment without the addition of host *Arthrobacter*. These results indicate that the bacteriophage is present in a masked state and that the bacteria are present in an insensitive form which becomes sensitive after addition of nutrient. S.J.M.

A75-26435 # Effect of radiation on nucleic and polysaccharide metabolism in the central nervous system and the blood of experimental animals during exposure (Vliianie radiatsii na nukleinovyi i polisakharidnyi obmen v tsentral'noi nervnoi sisteme i krovi eksperimental'nykh zhitovnykh pri obлучenii). M. Sh. Tskhadadze (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Psikiatrii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 76, Dec. 1974, p. 713-715. In Russian.

A75-26437 Measuring instrument for the long-term surveillance of respiratory volume and respiration rate (Messgerät zur Langzeitüberwachung der Atemvolumina und der Atemrate). E. Appel (Neurochirurgische Universitätsklinik, Düsseldorf, West Germany). *Elektronik*, vol. 24, Mar. 1975, p. 80-84. In German. Research supported by the Bundesministerium für Forschung und Technologie.

Data obtained with the aid of an instrument which measures respiratory flow as a function of time are used to determine respiratory volume and respiration rate parameters of a patient whose vital functions must be kept under surveillance. The procedure used for the processing of the respiratory flow data is considered, giving attention to the incoming data, the respiration rate parameters, respiratory volume definitions, respiratory rate counting, and integration approaches used for the respiratory volume and respiration rate data. G.R.

A75-26503 * Accuracy of measurements in potassium content of monkeys in vivo body counting as compared to chemical analysis. A. M. Kodama, N. Pace (California, University, Berkeley, Calif.), and S. J. Parot (Reims, Université, Reims, France). *Physics in Medicine and Biology*, vol. 19, no. 6, 1974, p. 862-873. 16 refs. Grant No. NGL-05-003-024.

A75-26505 * Alterations in acid-base homeostasis during water immersion in normal man. M. Epstein, N. S. Schneider, and C. A. Vaamonde (U.S. Veterans Administration Hospital, Miami, Fla.). *Journal of Laboratory and Clinical Medicine*, vol. 84, Dec. 1974, p. 777-790. 38 refs. Research supported by the Florida Heart Association and U.S. Veterans Administration Research Funds; Grants No. NIH-RR-261; No. NGR-10-007-097.

The effects of water immersion on renal bicarbonate and acid excretion were assessed in 10 normal male subjects. Immersion resulted in a highly significant progressive increase in the rate of sodium and bicarbonate excretion, and in urine pH. Immersion was also associated with a significant increase in urine P-CO₂; this increase presupposes a maintained rate of hydrogen secretion in the distal tubular segment. The rapidity of onset of the bicarbonaturia (2 hrs of immersion) and the concomitant increase in urinary P-CO₂ suggest that enhanced bicarbonate excretion of immersion cannot be completely accounted for by immersion-induced suppression of aldosterone, and that the natriuresis and bicarbonaturia of immersion is mediated in part by an increased proximal rejection of sodium and bicarbonate. S.J.M.

A75-26513 * Prebiotic chemistry and nucleic acid replication. L. E. Orgel (California, University, San Diego, Calif.) and R. Lohrmann (Salk Institute for Biological Studies, San Diego, Calif.). *Accounts of Chemical Research*, vol. 7, 1974, p. 368-377. 54 refs. NASA-NIH-NSF-supported research.

Recent work is reviewed on some reactions that could have occurred on the primitive earth and that could have played a part in the evolution of a self-replicating system. The transition from the primitive atmosphere to the simplest replicating molecules is considered in four stages: (1) the formation of a 'prebiotic soup' of organic precursors, including the purine and pyrimidine bases and the pentose sugars; (2) the condensation of these precursors and inorganic phosphate to form monomeric nucleotides and activated nucleotide derivatives; (3) the polymerization of nucleotide derivatives to oligonucleotides; and (4) the complementary replication of oligonucleotides in a template-directed process that depends on Watson-Crick base pairing. S.J.M.

A75-26514 Negative arterial-mixed expired P/CO₂/gradient during acute and chronic hypercapnia. D. B. Jennings and C. C. Chen (Queen's University, Kingston, Ontario, Canada). *Journal of Applied Physiology*, vol. 38, Mar. 1975, p. 382-388. 47 refs.

Research supported by the Ontario Heart Foundation and Defence Research Board of Canada.

In resting conscious dogs physiological dead space was calculated using the Bohr equation and measurements of arterial and mixed expired carbon dioxide tension. Whenever dogs inhaled carbon dioxide mixtures (5-10%) that had normal or low oxygen concentrations, the calculated dead space became negative. This paradox was based on the fact that the mixed expired carbon dioxide tension was significantly higher than arterial carbon dioxide tension in resting hypercapnic dogs. Under these circumstances carbon dioxide was produced from the lung as measured by gas analyses and blood analyses. By reasoning this implies that 'alveolar' carbon dioxide tension was higher than pulmonary venous carbon dioxide tension. The negative carbon dioxide gradient persisted at 14 days of chronic hypercapnia and reverted to normal within 10 min of breathing air after chronic hypercapnia. These findings suggest that the exchange of carbon dioxide in the lung cannot be explained solely on the basis of passive diffusion. (Author)

A75-26515 Respiratory gas exchange ratio and prediction of aerobic power. R. J. Shephard (Toronto, University, Toronto, Canada). *Journal of Applied Physiology*, vol. 38, Mar. 1975, p. 402-406. 16 refs.

The Issekutz procedure for the prediction of maximum oxygen intake from the respiratory exchange ratio (R) has been evaluated on a diverse group of 308 subjects, including 'whites' and Eskimos, men and women ranging in age from 16 to 65 yr. When applied to young white men performing 12 min of progressive step or treadmill exercise, the prediction procedure has a coefficient of variation of less than 10%, without systematic error. Unfortunately, the standard equation lacks generality, and erroneous predictions can arise from a change of test protocol, the use of a different exercise modality, or application to older subjects. If a brief exercise format is used, low R values may be reported during an early phase of relative hypoventilation. At a given metabolic loading, bicycle ergometry yields a higher respiratory minute volume than other modes of exercise. A heavy loading of one muscle group seems responsible, and the result is a high R value in submaximum effort. Aging is associated with a lowering of maximum blood lactate levels and thus maximum figures for R. (Author)

A75-26516 Effect of intrathoracic pressure on pressure-volume characteristics of the lung in man. H. S. Goldberg, W. Mitzner, K. Adams, H. Menkes, S. Lichtenstein, and S. Permutt (Johns Hopkins University, Baltimore, Md.). *Journal of Applied Physiology*, vol. 38, Mar. 1975, p. 411-417. 29 refs. Grant No. NIH-HL-05453.

Quasi-static pressure-volume (P-V) curves in normal seated human subjects were determined with pressure at the airway opening (Pao) set below (negative pressure), above (positive pressure), or equal to ambient pressure. Dynamic compliance (C_{dyn}) during controlled continuous negative pressure breathing (CNPB) was also studied. Quasi-static P-V curves at negative pressure were decreased in slope, reflected a decrease in total lung capacity, and intersected the P-V curve obtained at ambient Pao. At positive pressure the P-V curves showed an increase in slope and an increase in total lung capacity. During CNPB a fall in C_{dyn} was found. The fall in C_{dyn} was rapid and persisted for the duration of CNPB. C_{dyn} promptly returned to control levels when Pao was adjusted to ambient pressure. (Author)

A75-26517 Maximal oxygen consumption test during arm exercise - Reliability and validity. O. Bar-Or and L. D. Zwirn (Wingate Institute for Physical Education and Sport, Wingate, Israel). *Journal of Applied Physiology*, vol. 38, Mar. 1975, p. 424-426. Research supported by the Ministry of Education and Culture of Israel.

The purpose of the present study was to determine the test-retest reliability of a continuous progressive all-out arm test and to check its validity as an instrument for assessing maximal aerobic

power capacity. Findings indicate that following the suggested protocol, the individual uses the same muscles and does reach an all-out stage; however, different individuals apparently are aided by their trunk and leg muscles to different degrees, which lowers the validity of this test as a predictor of aerobic capacity. S.J.M.

A75-26518 * Frequency and duration of interval training programs and changes in aerobic power. E. L. Fox, R. L. Bartels, R. O'Brien, R. Bason, D. K. Mathews (Ohio State University, Columbus, Ohio), and C. E. Billings (Ohio State University, Columbus, Ohio; NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.). *Journal of Applied Physiology*, vol. 38, Mar. 1975, p. 481-484. 18 refs. Contract No. DA-49-193-MD-2741.

The present study was designed to ascertain whether a training frequency of 2 days/wk for a 7- and 13-wk interval training program would produce improvement in maximal aerobic power comparable to that obtained from 7- and 13-wk programs of the same intensity consisting of 4 training days/wk. After training, there was a significant increase in maximal aerobic power that was independent of both training frequency and duration. Maximal heart rate was significantly decreased following training. Submaximal aerobic power did not change with training, but submaximal heart rate decreased significantly with greater decreases the more frequent and the longer the training. S.J.M.

A75-26519 Estimation of alveolar pressure during forced oscillation of the respiratory system. K. E. Finucane and J. Mead (Harvard University, Boston, Mass.). *Journal of Applied Physiology*, vol. 38, Mar. 1975, p. 531-537. 27 refs. Grant No. NIH-HE-13843.

A method for obtaining a continuous estimate of alveolar pressure (Palv) during periodic flow is described which was developed to improve the precision of measurements of airway and respiratory tissue impedance using the increased resolution of relatively high-frequency (approximately 5 Hz) signals. The method permits control of frequency and flow amplitude during Palv measurement and calibration of Palv in the absence of an active chest wall. S.J.M.

A75-26522 * Hot hydrogen in prebiological and interstellar chemistry. C. Sagan (Cornell University, Ithaca, N.Y.). *Science*, vol. 188, Apr. 4, 1975, p. 72, 73. 7 refs. Grant No. NGR-33-010-101.

Two articles discuss the recent experimental work of Hong et al. on the production of amino acids and gas-phase organic compounds from the ultraviolet irradiation of simple gases, with hot hydrogen atoms used as the principal energy conversion agent. The reaction possibilities involving frozen ices are mentioned in both articles, as well as the significance of three-body collisions in this situation. S.J.M.

A75-26547 * Regulation of body mass in rats exposed to chronic acceleration. G. C. Pitts, L. S. Bull, and J. Oyama (Virginia University, Charlottesville, Va.; NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.). *American Journal of Physiology*, vol. 228, Mar. 1975, p. 714-717. 16 refs. Contract No. NAS2-1554; Grant No. NGR-47-005-213.

Female rats approximately 6 mo old were chronically centrifuged for up to 30 days at 2.76 G or 3.18 G and sacrificed at intervals for body-composition study. Both fat and the fat-free body mass (FFBM) were reduced during the 1st wk of centrifugation, with the fat showing considerably more variation both within and between groups. The FFBM was reduced below control level to the same extent in rats fed commercial chow, a high-fat diet, or a high-protein diet or in rats prefasted to produce a body-mass deficit at the start of centrifugation. There were no centrifugation-associated changes in body water content. It was concluded that body fat showed no evidence of regulation, FFBM is regulated at any constant level of acceleration between 1 and 4.15 G, and the change in FFBM induced by a change in acceleration is probably not regulated. (Author)

A75-26548 * Increased uptake and utilization of glucose by diaphragms of rats exposed to chronic centrifugation. B. C. Daligcon and J. Oyama (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *American Journal of Physiology*, vol. 228, Mar. 1975, p. 742-746. 20 refs.

A75-26549 Lung vascular smooth muscle as a determinant of pulmonary hypertension at high altitude. A. Tucker, I. F. McMurtry, J. T. Reeves, A. F. Alexander, D. H. Will, and R. F. Grover (Colorado University, Denver; Colorado State University, Fort Collins, Colo.). *American Journal of Physiology*, vol. 228, Mar. 1975, p. 762-767. 36 refs. Research supported by the Colorado Heart Association; Grant No. NIH-HL-14985.

A comparative study of the hypertensive responses of seven animal species to chronic hypobaric hypoxia at the same simulated high altitude (4500 m). An examination of such cardiopulmonary response factors as arterial hypoxemia, polycythemia, tachycardia, and amount of medial vascular smooth muscle in the small pulmonary arteries suggests that the greater the amount of vascular smooth muscle at the start of the altitude exposure (i.e., depending on species), the greater the pulmonary pressor response to high altitude. S.J.M.

A75-26550 Thermoregulation of myocardial protein synthesis. H. Taegtmeier, A. G. Ferguson, and M. Lesch (Peter Bent Brigham Hospital; Harvard University, Boston, Mass.). *American Journal of Physiology*, vol. 228, Mar. 1975, p. 884-889. 37 refs. Grants No. PHS-HL-11306; No. PHS-HL-05890.

A75-26660 * Ca⁺⁺ induced hypothermia in a hibernator /*Citellus beechyi*. J. L. Hanegan and B. A. Williams (NASA, Ames Research Center, Environmental Control Research Branch, Moffett Field, Calif.). *Comparative Biochemistry and Physiology*, vol. 50A, 1975, p. 247-252. 13 refs.

Results of perfusion of excess Ca⁺⁺ and Na⁺ into the hypothalamus of the hibernating ground squirrel *Citellus beechyi* are presented. The significant finding is that perfused excess Ca⁺⁺ causes a reduction in core temperature when ambient temperature is low (12 C). Ca⁺⁺ also causes a rise in rectal temperature at high ambient temperature (33 C). Thus hypothalamic Ca⁺⁺ perfusion apparently causes a nonspecific depression of thermoregulatory control. S.J.M.

A75-26722 # The user looks at digital avionics. P. Roitsch (Pan American World Airways, Inc., Greenwich, Conn.). *American Institute of Aeronautics and Astronautics, Digital Avionics System Conference, Boston, Mass., Apr. 2-4, 1975, Paper 75-554*. 5 p.

Areas of pilot concern and interest in digital avionics are examined. Aspects of digital systems discussed include safety, system integrity and performance, reduction of workloads, improved air/ground communications, maintainability, and better operating economies. It is concluded that pilots will accept digital systems only if such systems are sophisticated and simple and if they meet the needs and expectations of pilots. F. G. M.

A75-26824 Coronary blood flow in rats native to simulated high altitude and in rats exposed to it later in life. Z. Turek, M. Turek-Maischeide, R. A. Claessens, B. E. M. Ringnalda, and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv*, vol. 355, no. 1, 1975, p. 49-62. 37 refs.

A75-26825 Dynamic characteristics of heart-rate responses to sine-function work-load patterns in man. N. Tiedt, B. Wohl-gemuth, and P. Wohl-gemuth (Leipzig, Universität, Leipzig; Ilmenau, Technische Hochschule, Ilmenau, East Germany). *Pflügers Archiv*, vol. 355, no. 2, 1975, p. 175-187. 17 refs.

A75-26924 Influences of exercise and endurance training on the oxygen dissociation curve of blood under in vivo and in vitro

conditions. D. Böning, U. Schweigart, U. Tibes, and B. Hemmer (Deutsche Sporthochschule, Cologne, West Germany). *European Journal of Applied Physiology*, vol. 34, no. 1, 1975, p. 1-10. 34 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A75-27081 * Peripheral visual response time and retinal luminance-area relations. R. F. Haines (NASA, Ames Research Center, Man-Machine Integration Branch, Moffett Field, Calif.). *American Journal of Optometry and Physiological Optics*, vol. 52, Feb. 1975, p. 85-95. 39 refs.

Experiments were undertaken to elucidate the stimulus luminance-retinal area relationship that underlies response time (RT) behavior. Mean RT was significantly faster to stimuli imaged beyond about 70 deg of arc from the fovea when their luminance was increased by an amount equal to the foveal stimulus luminance multiplied by the cosine of the angle between the peripheral stimuli and the line of sight. This and additional data are discussed in relation to previous psychophysical data and to possible response mechanisms. S.J.M.

A75-27188 # One method of synthesis of regular legged motion. M. Vukobratovic and D. Hristic. *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 15 p. 10 refs.*

In the paper the method is displayed for the synthesis of artificial gait with statically unstable locomotion robots. Special attention has been dedicated to the synthesis of biped gait. In the ranks of this approach the construction of a series of active exoskeletons has been carried through, the application of which had to enable the establishing of basic locomotion activities, like gait upon relatively flat terrain and over obstacles of the staircase type. In the paper the latest version of such exoskeletons is presented, which has been built mainly with the aim of establishing stable gait with persons without any, or insufficient muscular motor action of the lower extremities. (Author)

A75-27191 # On the problem of selecting a gait for a legged vehicle. R. B. McGhee and S.-S. Sun (Ohio State University, Columbus, Ohio). *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 10 p. 32 refs. NSF Grant No. GK-25292.*

The present paper summarizes and extends earlier work concerned with the design of legged vehicles. The problem considered is that of selecting a particular vehicle gait: the number of legs to be used and their manner of deployment. Vehicle stability, duty factor, and leg-motion cycles are considered in the discussion of choosing the number of legs. The paper deals only with constant-speed locomotion for idealized vehicles traveling in a straight line over perfectly flat terrain. It is concluded that work on the realization of useful legged vehicles should for the near future concentrate on six- and eight-legged machines. They should be computer-controlled such that dynamic stability results from the static stability of all gait phases. Wave gaits are seen to be the most desirable class of gaits for achieving this purpose. A.T.S.

A75-27197 # Control of an integral mobile robot (Upravlenie integral'nym lokomotsionnym robotom). D. E. Okhotsimskii, A. K. Platonov, G. K. Borovin, I. I. Karpov, E. I. Kugushev, Iu. M. Lazutin, V. E. Pavlovskii, and V. S. Iaroshevskii. *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 15 p. In Russian.*

Theoretical studies were made concerning the control system for a six-legged vehicle capable of autonomous motion. The system through which the vehicle gathers information on the surface it must traverse is assumed to contain a range-finding system with a variable-direction beam. The control system includes a system which collects and analyzes information on the surroundings and interacts indirectly with a motion-plotting system which plans the motion of

the vehicle, choosing the points at which the feet are placed and assuring static stability. The process of gathering information on the surroundings has three levels: measurement and formation of a detailed model of the surroundings; preliminary analysis and construction of a rough model; and identification of the types of obstacles and their parameters. Control algorithms for the vehicle were devised and modeled on a computer with visual displays. A.T.S.

A75-27198 # Investigation of a biotechnical system for the control of a master-slave manipulator of bidirectional action (Issledovanie biotekhnicheskoi sistemy upravleniia kopiruiushchim manipulatorom dvustoronnego deistviia). A. K. Alabian, V. L. Afonin, V. S. Kuleshov, and A. S. Iushchenko. *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 10 p. 5 refs. In Russian.*

The efficiency of a biotechnical system for the control of a bidirectional master-slave manipulator operating under extremal conditions depends primarily on the extent to which the technical characteristics of the system are consistent with the physiological characteristics of the human operator. The operator's neuromuscular behavior is studied experimentally for specified operations, where the operator is considered a nonlinear component of the control system owing to perception thresholds for the sense organs, limitations in the efforts exerted and in human motion rate, and nonlinear characteristics of nervous system feedbacks. In addition to a proposed physiological model for the human operator, a mathematical model is developed using Hermite-Laguerre series. The mathematical model is suggested to be used in the design of bidirectional master-slave manipulators in which each joint of the organ is associated with the corresponding joint of the human operator's arm. S.D.

A75-27199 * # Free-flying teleoperator for space missions. J. C. Hung (Tennessee University, Knoxville, Tenn.), J. D. Irwin (Auburn University, Auburn, Ala.), and F. B. Moore (NASA, Marshall Space Flight Center, Astrionics Laboratory, Huntsville, Ala.). *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 14 p. 6 refs.*

The design of a free-flying teleoperator (FFTO) intended to assist the Space Shuttle in performing its various missions is discussed, where FFTO is to be carried into earth orbit and returned to earth by the Shuttle. The FFTO system is described as to configuration, major subsystems, and mechanization concept. The kinematics of the manipulator and methods of sedating a satellite are discussed. Satellite equations of motion are provided, and cases of zero tumbling rate and non-zero tumbling rate are examined. Cases for which use of FFTO is compulsory are indicated, and the FFTO contributions to the Shuttle missions are analyzed. S.D.

A75-27200 # Design of control systems for robots by means of dynamic models of manipulators (Postroenie sistem upravleniia robotami s ispol'zovaniem dinamicheskikh modelei manipuliatsionnykh ustroistv). E. P. Popov, A. F. Vereshchagin, A. M. Ivkin, A. G. Leskov, and V. S. Medvedev. *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 21 p. 9 refs. In Russian.*

When designing high-quality control systems for manipulators, it is necessary to develop methods for the dynamic investigation of manipulator control systems on a digital computer, thus permitting machine-aided design of control systems for the actuating unit of the manipulator. A mathematical technique is proposed, whereby the dynamic equations for different movements of the actuating unit are expressed by special partitioned matrices; an equation expressed in partitioned matrix form can readily be linearized, using a digital computer program. An easily programmable algorithm is outlined which requires a nonextensive memory and provides modeling of the dynamic behavior of mechanical systems of varying kinematic configuration. S.D.

A75-27201 # Control systems for master-slave manipulators (Sistemy upravleniia kopiruiushchikh manipulatorov). V. S. Kuleshov, N. A. Lakota, Iu. I. Rassadkin, and V. N. Shvedov. *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 12 p.* In Russian.

The control system considered is devised for a master-slave manipulator whose actuating unit constitutes a multilink mechanism with 6 to 9 degrees of freedom. The following problems are examined: (1) dynamic analysis of a master-slave manipulator control system so as to reveal the criteria necessary for the evaluation of the manipulator and to develop a technique for an optimal power-distribution according to the degrees of freedom; (2) study of the actuating control systems of a master-slave manipulator; (3) design of manipulators provided with force feedback systems that inform the human operator about the magnitude of the load applied to the actuating unit. A control system is discussed which permits alternation of reversible and irreversible characteristics, so that such a system is applicable to master-slave manipulators of bidirectional action, with extension of their operational capabilities. S.D.

A75-27202 * # On-orbit performance of the Skylab astronaut maneuvering research vehicle. T. B. Murtagh, B. McCandless, II (NASA, Johnson Space Center, Houston, Tex.), C. E. Whitsett (USAF, Houston, Tex.), and J. T. Josephson (Martin Marietta Aerospace, Denver, Colo.). *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 14 p.*

The present work evaluates the results of flight tests of the Astronaut Maneuvering Research Vehicle (AMRV) conducted inside the Skylab Orbital Workshop. The vehicle is an autonomous mobility aid which allows the pilot to control his position and orientation in space without the necessity of reacting against the spacecraft. The purpose of the tests was to obtain operation experience and engineering/human performance data in a zero gravity environment, to correlate on-orbit data with simulation data, and to recommend a design configuration for future operational maneuvering units. Four different techniques for controlling AMRV dynamics were tested: hand-held maneuvering unit, direct, rate gyro, and control moment gyro operating modes. P.T.H.

A75-27203 # Structural features of and several means of optimizing the operational activity of an astronaut during control of the vehicle and its systems (Osobennosti struktury i nekotorye puti optimizatsii operatorskoi deiatel'nosti kosmonavta po upravleniiu korabl'em i ego sistemami). L. S. Khachatur'ants and E. V. Khrunov. *International Federation of Automatic Control, Symposium on Automatic Control in Space, 6th, Tsakhkadzor, Armenian SSR, Aug. 26-31, 1974, Paper. 26 p.* 18 refs. In Russian.

The present work discusses some general conclusions regarding astronauts' psychophysiological state during missions. Some results of tests carried out on orbit regarding visual acuity, reflex activity, operative memory and activity, and the emotional state of astronauts are discussed. Two phases of the level of crew working capacity are identified. The first is a period of decreased capability during the first few orbits. The second is one of stable adaptation in which normal work capacity is maintained. When longer flights than have been conducted up to now are realized, a possible third phase, characterized by a drop in working capacity, may be expected. P.T.H.

A75-27318 The biology of loneliness (La biologie de la solitude). F. V. DeFeudis (Madrid, Universidad Autónoma, Canto Blanco, Spain). *La Recherche*, vol. 6, Apr. 1975, p. 344-356. 38 refs. In French.

A general theory is formulated to explain the depression, aggressiveness, and biochemical changes due to solitude. The necessity of sensory stimulation is pointed out, and past experiments with mice and monkeys are discussed. Fear of new situations engendered by social isolation is described. Decrease in glucose

uptake by the brain demonstrated by radioactive tracer experiments correlates with solitude. Abnormal reaction to certain pharmacological agents is also connected with social isolation; and loneliness has been shown to relate to a decrease in concentration or renewal of neurotransmitters, such as acetylcholine. Female monkeys show abnormal maternal behavior toward their own offspring after prolonged isolation. The work concludes with a critical discussion of contemporary psychiatric practice. S.J.M.

A75-27323 The evaluation of left ventricular function in man - A comparison of methods. T. H. Kreulen, A. A. Bove, M. T. McDonough, M. J. Sands, and J. F. Spann (Temple University, Philadelphia, Pa.). *Circulation*, vol. 51, Apr. 1975, p. 677-688. 50 refs. Grants No. PHS-3-T01-HL-05712-08S1CAR; No. PHS-RR-05-417.

Comparisons of the sensitivities of parameters for assessing left ventricular performance in man were made in 38 patients. Parameters tested comprised ejection fraction, ventriculographic contraction patterns, left ventricular end-diastolic pressure, and contractile indices, including the contractile element velocity at 10 mm Hg and the maximal contractile element velocity. It is concluded that several methods are required to identify all patients with left ventricular dysfunction and that the contractile indices are the least sensitive indicator of left ventricular dysfunction. S.J.M.

A75-27324 Echocardiographic determination of left ventricular stress-velocity relations in man - With reference to the effects of loading and contractility. M. A. Quinones, W. H. Gaasch, J. S. Cole, and J. K. Alexander (Baylor College of Medicine; Ben Taub General Hospital, Houston, Tex.). (*American Federation for Clinical Research, Annual National Meeting, 31st, Atlantic City, N.J., May 4, 5, 1974.*) *Circulation*, vol. 51, Apr. 1975, p. 689-700. 19 refs. Research supported by the American Heart Association.

A75-27397 * The medical story. R. S. Johnston, L. F. Dietlein, and E. L. Michel (NASA, Johnson Space Center, Houston, Tex.). In: *Skylab and Pioneer report; Proceedings of the Twelfth Goddard Memorial Symposium, Washington, D.C., March 8, 1974.* Tarzana, Calif., American Astronautical Society, 1975, p. 75-102.

The paper discusses the medical program of the Skylab missions. The major medical systems discussed include the food system, the waste-management system, the personal-hygiene system, and the inflight medical support system. The life-sciences experiments conducted on Skylab are reviewed. These dealt with the cardiovascular system, mineral balance and bioassay of fluids, sleep, blood, metabolic activity, vestibular function, and time and motion studies. The medical operations were accomplished with only minor problems. A.T.S.

A75-27547 * Vertex evoked potentials in a rating-scale detection task - Relation to signal probability. K. C. Squires, N. K. Squires (Illinois, University, Champaign, Ill.), and S. A. Hillyard (California, University, San Diego, Calif.). *Behavioral Biology*, vol. 13, 1975, p. 21-34. 26 refs. Grants No. NGR-05-009-083; No. NIH-07454; No. NIH-1-RO1-MH-25594.

Results of vertex-evoked potential studies conducted to determine how decision confidence level and decision probability interact to determine P3 amplitude for both signal-present and signal-absent decisions. They support the contention that the form of the vertex-evoked response is closely correlated with the subject's psychophysical response regarding the presence or absence of a threshold-level signal. S.J.M.

A75-27589 Reliability of human visual signal detection in the presence of noise. M. J. Nahvi (Arya Mehr University of Technology, Teheran, Iran). *IEEE Transactions on Reliability*, vol.

R-23, Dec. 1974, p. 326-331. 12 refs. Research supported by the Ministry of Sciences and Higher Education and Arya Mehr University of Technology.

This report is concerned with the reliability of human detection of certain classes of signals of simple shape embedded in low-pass filtered white Gaussian noise recorded on paper. Results are compared with performance of an optimum matched filter detector which operated on the same set of data. The signal-to-noise ratio obtained at the output of such a filter can be used to predict the reliability of detection and the false alarm rate in subjects' performance. For signal-to-noise ratio greater than one, subjects make fewer errors (i.e., misses plus false alarms) than the optimum filter, and the difference is a monotonically decreasing function of the signal-to-noise ratio. Factors concerned with these two observations are discussed. (Author)

A75-27704 EEG alpha rhythm, ocular activity and basal skin resistance. M. N. Verbaten, J. N. R. Beaujon, and W. Sjouw (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). *Acta Psychologica*, vol. 39, Apr. 1975, p. 153-160. 10 refs.

The influences of eye movement frequency and extreme upward deviation of the eyeballs on occipital alpha activity and basal skin resistance (BSR) were experimentally investigated. Eye movement frequency was found to be unimportant, but upward eye movement resulted in alpha activity enhancement and BSR increase. Two factors probably account for this latter finding: (1) a direct effect from the eyes, along a low-conductance pathway to the occipital region (after Ennever); (2) inhibitory impulses from extra-ocular muscle receptors sent down to the reticular formation which lead to cortical arousal decrease. S.J.M.

A75-27705 Alterations in coronary sinus pO₂ and O₂ saturation resulting from pCO₂ changes. R. B. Case (St. Luke's Hospital, New York, N.Y.), H. Greenberg, and R. Moskowitz. *Cardiovascular Research*, vol. 9, Mar. 1975, p. 167-177. 31 refs.

The ability of coronary sinus pO₂ to remain constant in the face of a shift in the O₂ dissociation curve was tested in a series of anaesthetized dogs during respiratory-induced alterations in blood pH, resulting from either hyperventilation or CO₂ inhalation. Coronary sinus pO₂ was not constant, but logarithmically related to coronary sinus pCO₂. Therefore it is hypothesized that myocardial pCO₂ is a primary agent in controlling coronary flow. S.J.M.

A75-27706 The effects of lower body negative pressure on the cardiovascular system of the anaesthetized rabbit. J. M. Yates and P. H. Fentem (Nottingham University, Nottingham, England). *Cardiovascular Research*, vol. 9, Mar. 1975, p. 190-200. 31 refs. Research supported by the British Heart Foundation and Medical Research Council.

The technique of lower body negative pressure has been adapted for use with the anesthetized rabbit. Exposure of the pelvis and hind limbs to suction causes a fall in cardiac output, which is linearly related to suction pressure, and also hypotension, which elicits vasopressor and cardiac reflex responses. The percentage of total blood volume pooled by this procedure in the rabbit appears to be of the same order as in man. The preparation appears to provide a satisfactory animal model for the study of the effects of blood pooling on cardiovascular hemodynamics. (Author)

A75-27772 Shuttle orbiter atmospheric revitalization system and Freon coolant loop system trade studies. R. B. Trusch (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *SAE, ASME, ASMA, and AIAA, Intersociety Conference on Environmental Systems, Seattle, Wash., July 29-Aug. 1, 1974, SAE Paper 740921*. 18 p.

The present paper describes key tasks and accomplishments of the orbiter ARS and FCL requirements definition phase. Systems approaches used to accommodate the heat loads placed on these

subsystems by the vehicle and its payloads, including the European Space Laboratory, are discussed. Total equivalent weight trade studies and preliminary designs conducted lead to the establishment of firm requirements for the detailed design phase. S.J.M.

A75-27775 * Thermal alteration of blue-green algae and blue-green algal chlorophyll. J. H. Oehler, J. W. Schopf (California, University, Los Angeles, Calif.), and Z. Aizenshtat (Jerusalem, Hebrew University, Jerusalem, Israel). (*American Association of Petroleum Geologists, Symposium on Accumulation and Diagenesis of Organic Matter in Sediments, Anaheim, Calif., May 15, 1973.*) *American Association of Petroleum Geologists, Bulletin*, vol. 58, Jan. 1974, p. 124-132. 26 refs. NSF Grants No. GA-23741; No. GP-3672; Grants No. NGR-05-007-221; No. NGR-05-007-292.

A75-27776 * The origin of life. N. H. Horowitz and J. S. Hubbard (California Institute of Technology, Pasadena, Calif.). *Annual Review of Genetics*, vol. 8, 1974, p. 393-410. 134 refs. Grant No. NGR-05-002-308.

Research in the areas of precambrian paleontology, chemical evolution of genetically important monomers, prebiotic dehydration-condensation reactions, organic compounds in meteorites and interstellar space, and biological exploration of the planets is summarized. Fossils in precambrian cherts and findings of eukaryotic cells are described, and recent investigations of prebiotic conditions, energy sources, and starting materials for genetic molecules are outlined. Studies of homogeneous and heterogeneous dehydrations and of nonaqueous thermal dehydrations are described. The detection of amino acids, purines, and pyrimidines in meteorites and of biologically significant molecules in interstellar clouds is discussed, as well as the possibilities of life on Jupiter, Mars, and Titan. F.G.M.

A75-27800 # Statistical analysis of heart rhythm and hemodynamic indices in physiological studies (Statisticheskii analiz serdechnogo ritma i pokazatelei gemodinamiki v fiziologicheskikh issledovaniyakh). A. D. Voskresenskii and M. D. Venttsel'. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 26), 1974. 224 p. 495 refs. In Russian.

The methods of digital filtration and autocorrelation functions are applied in a study of oscillations in the duration of the cardiac cycle in healthy human subjects in the ranges of respiratory frequencies and the so-called 'slow waves' of first and second order. A formalized scheme of the normal cardiac cycle is proposed, based on patterns and regularities found. The characteristics of heart rhythm under resting conditions and their change under the effect of certain extremal actions are investigated. Facts are presented, throwing light on the relationship between the slow waves of the heart rhythm with oscillations of other cardiovascular parameters. P.T.H.

A75-27871 Sinus nodal function in the intact dog heart evaluated by premature atrial stimulation and atrial pacing. A. R. Ticzon, H. C. Strauss, J. J. Gallagher, and A. G. Wallace (Duke University Medical Center, Durham, N.C.). *American Journal of Cardiology*, vol. 35, Apr. 1975, p. 492-503. 34 refs. Research supported by the Walker P. Inman Fund; Grants No. PHS-HL-08845; No. PHS-HL-05736; No. PHS-HL-15190.

A75-27872 The omniscardiogram - New approach to detection of heart disease in patients with a normal resting electrocardiogram. L. E. Teichholz, P. F. Cohn, and R. Gorlin (Peter Bent Brigham Hospital; Harvard Medical School, Boston, Mass.). *American Journal of Cardiology*, vol. 35, Apr. 1975, p. 531-536. 17 refs. Research supported by the Women's Aid for Heart Research; Grant No. PHS-5-PO1-HI-11306.

The usefulness of the omniscardiogram in the detection of heart disease was studied in 121 male patients with normal resting 12-lead electrocardiograms who underwent selective coronary cineangiography for a chest pain syndrome. Results indicate that the omniscardiogram is superior to the Master test: 81% of those with three-vessel disease, 67% of those with two-vessel disease, and 41% of those with one-vessel disease showed abnormal omniscardiograms, whereas only 67%, 31%, and 14%, respectively, gave a positive Master test. S.J.M.

A75-27873 Effect of transducer placement on echocardiographic measurement of left ventricular dimensions. R. L. Popp, K. Filly, O. R. Brown, and D. C. Harrison (Stanford University, Stanford, Calif.). *American Journal of Cardiology*, vol. 35, Apr. 1975, p. 537-540. 14 refs. Research supported by the Bay Area Heart Research Association; Grants No. NIH-HL-5709; No. NIH-HL-5866.

A75-27874 Pathogenetic mechanisms in atherosclerosis. K. W. Walton (Birmingham, University, Birmingham, England). *American Journal of Cardiology*, vol. 35, Apr. 1975, p. 542-558. 140 refs.

Four theories of atherogenesis are briefly reviewed and criticized: the degenerative, the thrombogenic, the platelet aggregation, and the insudative theory. Evidence favors the last of these. It is proposed that atherosclerotic plaques arise because altered endothelial permeability allows certain reactive macromolecular plasma proteins to permeate endothelium and to interact with charged components of the connective tissue gel of the arterial wall or of other tissues. The effects of hyperlipidemia, hypertension, arterial disease, and injury on this process, and the manner in which these factors interact, are examined in relation to experimental findings and clinical observations. S.J.M.

A75-27875 Lipid metabolism in perfused human and dog coronary arteries. J. S. M. Sarma, H. Tillmanns, S. Ikeda, A. Grenier, E. Colby, and R. J. Bing (Huntington Memorial Hospital, Pasadena; Southern California, University, Los Angeles, Calif.). *American Journal of Cardiology*, vol. 35, Apr. 1975, p. 579-587. 55 refs. Research supported by the Kenneth and Eileen L. Norris Foundation, Margaret W. and Herbert Hoover, Jr. Foundation, Robert E. and May R. Wright Foundation, and Council for Tobacco Research-USA.

In vitro perfusion experiments, both atherosclerotic and normal human coronary arteries incorporated C-14-labeled acetate into lipids but failed to synthesize either cholesterol or cholesterol esters. Similar results were obtained in human saphenous veins. Cholesterol uptake from the perfusion fluid was demonstrated in atherosclerotic and normal human coronary arteries as well as in human saphenous veins. CO increased permeability of the arterial wall to cholesterol uptake. In dog arteries exposed to collagenase, marked increases in cholesterol uptake were found, but total lipid synthesis was reduced; the relative synthesis of individual lipids remained unchanged. The addition of 7-ketocholesterol to the perfusate reduced cholesterol uptake by the vessel by 90%. Results therefore show that human coronary arteries and saphenous veins synthesize lipids but not cholesterol. The derepressive role of CO and collagenase in cholesterol flux and the inhibitive effect of 7-ketocholesterol on cholesterol uptake were thus demonstrated.

S.J.M.

A75-27897 Characteristics of stereomovement suppression. C.W. Tyler (Northeastern University, Boston, Mass.). *Perception and Psychophysics*, vol. 17, no. 3, Mar. 1975, p. 225-230. 11 refs. Research supported by the Foundations Fund for Research in Psychiatry.

The suppression of visibility of stereomovement was investigated for sinusoidal depth movement of a test line with an antiphase reference line. Suppression occurred above a rate of oscillation of 1 Hz, whereas enhancement was observed below 1 Hz. Suppression was also found for vertical movement of horizontal stimulus lines. Suppression must therefore result from the processes of fusion rather than stereoscopic depth perception. Suppression was reduced with peripheral observation of the stimulus. (Author)

A75-27898 Eye movements in auditory space perception. B. Jones (Waterloo, University, Waterloo, Ontario, Canada) and B. Kabanoff (Queensland, University, Brisbane, Australia). *Perception and Psychophysics*, vol. 17, no. 3, Mar. 1975, p. 241-245. 15 refs.

The hypothesis tested was that reports of auditory position are in part determined by target-directed eye movement. Using a signal recognition paradigm, it is shown that sensitivity to the position right or left of a tone decreases when the subject keeps his eyes fixed (Experiment I). It is also shown (Experiments II and III) that sensitivity declines considerably if the subject's eye movement is cued away from the tone either by a light source or by an instruction to the subject. Since providing the subject with a tactile spatial cue does not bias reports of auditory position (Experiment III), it is argued that eye movement serves to update and stabilize auditory position memory. Finally, voluntary movement rather than a visual map (Warren, 1970) is assumed to be likely to provide the framework for spatial judgements. (Author)

A75-27899 Eye movements during search for coded and uncoded targets. S. M. Luria and M. S. Strauss (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, Conn.). *Perception and Psychophysics*, vol. 17, no. 3, Mar. 1975, p. 303-308. 32 refs.

Eye movements and search time of four subjects were studied as they searched for a target dial in a 4 x 4 array of 16 dials which were differentiated by (1) color, (2) shape, (3) a combination of color and shape, or (4) were uncoded. Subjects did not exhibit a characteristic scanpath, and method of scanning did not relate to search time. Search time varied reliably among conditions; it was generally shortest in the color condition, followed by color shape, shape, and the uncoded condition. Subjects were capable of using both shape and color simultaneously. Search time was strongly associated with the average number of fixations required for target detection but not with other measures of eye movements. Fixation duration was a particularly inconsistent measure. (Author)

A75-27900 * Thresholds for the perception of angular acceleration as indicated by the oculogyral illusion. E. F. Miller, II and A. Graybiel (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.). *Perception and Psychophysics*, vol. 17, no. 3, Mar. 1975, p. 329-332. 12 refs. NASA Order T-81633; NASA Order T-5904-B.

A motorized chair (with precise servo controls) accelerated the observer in a clockwise (CW) or counterclockwise (CCW) direction at rates that ranged in logarithmic progression from 0.02 to 6.00 deg/sq sec. The target, a narrow collimated line of light, was contained within a goggle device worn by the observer and therefore fixed in relative position to him. The illusion, appearing as rightward or leftward movement of the visual target in the direction of acceleration, was determined by a double staircase procedure among 300 normal and 4 labyrinthine-defective observers. None of the latter perceived the illusion. The majority of normal observers revealed no substantial directional difference (CW vs. CCW threshold). Threshold frequency distributions ranged in rate (deg/sq sec) from 0.020 to 0.950; the threshold of response in more than half the normal observers was less than 0.10, in over three-fourths was less than 0.20, in over 90% less than 0.30, and 100% less than 1.00. (Author)

A75-27907 A one-dimensional viscoelastic model of cat heart muscle studied by small length perturbations during isometric contraction. L. Loeffler, III and K. Sagawa (Johns Hopkins Uni-

versity, Baltimore, Md.). *Circulation Research*, vol. 36, Apr. 1975, p. 498-512. 31 refs. Grant No. NIH-HL-14903.

A75-27908 **In vitro acetylcholine biosynthesis in normal and failing guinea pig hearts.** R. Roskoski, Jr., P. G. Schmid, H. E. Mayer, and F. M. Abboud (Iowa, University; U.S. Veterans Administration Hospital, Iowa City, Iowa.). *Circulation Research*, vol. 36, Apr. 1975, p. 547-552. 15 refs. Research supported by the U.S. Veterans Administration; Grants No. PHS-NS-11310; No. PHS-HL-02644; No. PHS-HL-014388.

A75-28189 **P wave abnormalities in the orthogonal electrocardiogram - Correlation with ventricular overload in pulmonary and aortic valvular heart disease.** C. R. Brohet, C.-E. Liedtke, and N. Tuna (Minnesota, University, Minneapolis, Minn.). *Journal of Electrocardiology*, vol. 8, Apr. 1975, p. 103-112. 38 refs. Grants No. NIH-HL-08527-09; No. NIH-RR-267.

A75-28190 **A cellular model for the simulation of activation in the ventricular myocardium.** W. J. Eifler (Dalhousie University, Halifax, Canada) and R. Plonsey (Case-Western-Reserve University, Cleveland, Ohio). *Journal of Electrocardiology*, vol. 8, Apr. 1975, p. 117-128. 26 refs. Grant No. PHS-5101-GM-01090-08-10; Grant No. NIH-HL-10417.

A digital computer model of cardiac activation was used to investigate the relationship between cellular orientation and conduction and propagation of the ventricular activation wave front under normal and simplified pathological conditions. Myocardial cells were represented by an array of elongated rhombic dodecahedrons. Results are given concerning propagation velocity and propagation orientation or direction. S.J.M.

A75-28191 **The QRS phasic characteristics of right ventricular hypertrophy in precordial leads.** T. Y. Lee. *Journal of Electrocardiology*, vol. 8, Apr. 1975, p. 129-133.

The QRS apparent phase in some electrocardiograms (ECGs) progresses in opposite directions in the two halves of the precordial leads. The genesis of the waveforms leading to such bidirectional phase properties may be given in terms of the particular shapes of the horizontal vector loops. Such phasic properties associate themselves with right ventricular hypertrophy (RVH) of type A and type C although the reverse is not necessarily true. Schematic diagrams are generally used in this article for clarity in illustration, but the method has been tried on some well-documented cases of RVH, reported by Chou and Helm, with promising results. (Author)

A75-28192 **Semi-automated ECG processing - A simple method to improve efficiency in ECG laboratories.** J. C. Rios, M. Shaffer, R. Rose, M. Wilbur, and J. Whiteman (George Washington University, Washington, D.C.). *Journal of Electrocardiology*, vol. 8, Apr. 1975, p. 147-151. 8 refs.

A method to expedite processing of electrocardiograms (ECGs) is described. The hardware configuration utilizes conventional equipment, and the ECG data is stored in magnetic data cards. The electrocardiographer's interpretation is made using a specially developed code of 253 diagnostic statements of 2 to 9 words each. A minicomputer converts the code into full alphanumeric description and 2 characters into English statements. The diagnostic print-out appears in the same page as the reproduction of the original ECG data. This system has significantly reduced the ECG processing time, freed manpower to increase availability of technicians and decreased the size of permanent files. (Author)

A75-28275 # **Review of RF and microwave hazard standards in the United States and research on the biological effects of microwaves at PINY.** S. W. Rosenthal (New York, Polytechnic Institute, Farmingdale, N.Y.). In: Colloquium on Microwave Com-

munication, 5th, Budapest, Hungary, June 24-30, 1974, Proceedings. Volume 3. Budapest, Akademiai Kiado, 1974, p. ET-295 to ET-303. 9 refs.

A75-28426 **Cerebral blood flow and energy metabolism and acid-base equilibrium of the cerebrospinal fluid in residents at high altitudes (Débit sanguin et métabolisme énergétique du cerveau et équilibre acido-basique du liquide céphalo-rachidien chez les résidents en altitude).** J.-P. Marc-Vergnes (Institut National de la Santé et de la Recherche Médicale; Centre Chirurgical Marie Lanelongue, Paris; Paris XI, Université, Orsay, Essonne, France; Institut Bolivien de Biologie d'Altitude, La Paz, Bolivia), G. Antezana, J. Coudert, J. Durand (Institut Bolivien de Biologie d'Altitude, La Paz, Bolivia; Centre Chirurgical Marie Lanelongue, Paris; Paris XI, Université, Orsay, Essonne, France), and D. Gourdin (CNRS; Centre Chirurgical Marie Lanelongue, Paris; Paris XI, Université, Orsay, Essonne, France; Institut Bolivien de Biologie d'Altitude, La Paz, Bolivia). *Journal de Physiologie*, vol. 68, Feb. 1975, p. 633-654. 73 refs. In French. Research supported by the Ministère des Affaires Étrangères, Centre National de la Recherche Scientifique, Commissariat à l'Énergie Atomique, and Organisation Mondiale de la Santé.

Cerebral blood flow (Qcb) was measured in subjects born and reared at an altitude of 4000 m; the cerebral arterio-venous ratios of O₂ and CO₂ were also determined, as well as the pH and O₂ and CO₂ partial pressures in the artery, jugular vein, and cisternal cerebrospinal fluid. The measurements were made at rest and after modifications of arterial O₂ and CO₂ pressures by hyperventilation or inhalation of gaseous mixtures of differing compositions. Findings concerning high-altitude trends in Qcb are reported and explained. S.J.M.

A75-28434 **Occlusion pressure as a measure of respiratory center output in conscious man.** W. A. Whitelaw, J.-P. Derenne, and J. Milic-Emili (McGill University, Montreal, Canada). *Respiration Physiology*, vol. 23, Mar. 1975, p. 181-199. 32 refs. Research supported by the Defence Research Board and Medical Research Council of Canada.

The static pressure generated by the inspiratory muscles at FRC against an obstructed airway is suggested as a useful alternative to other methods of estimating the output of the respiratory centers. Ten conscious, normal, sitting human subjects were subjected to CO₂ rebreathing, and their airways were occluded at end-expiration at intervals without warning. The inspiratory pressure waves so generated were distorted by conscious or unconscious responses to the occlusion having a minimum latency of 0.15 sec. The pressure generated at 0.1 sec after the onset of inspiration (P-0.1) was easy to measure and was reproducible from subject to subject. The CO₂ response obtained by plotting P-0.1 against P-CO₂ was curvilinear, with P-0.1 increasing more rapidly at high P-CO₂. P-0.1 is independent of pulmonary mechanics and mechanisms that alter the respiratory pattern by affecting inspiratory duration (in particular, the vagal volume-related inspiratory-inhibitory reflex). S.J.M.

A75-28435 **Breath holding and rebreathing at low and high altitude.** H. Gautier (Faculté de Médecine St. Antoine, Paris, France), R. Lefrançois, and P. Pasquis. *Respiration Physiology*, vol. 23, Mar. 1975, p. 201-207. 23 refs.

Breath holding and rebreathing have been carried out at sea level in lowlanders and at high altitude in acclimatized lowlanders and in highlanders. It has been shown that the values of gasping time, breath-holding time, rebreathing time and the composition of the alveolar gases at the breaking point are modified by chronic hypoxia, especially in highlanders. The modifications observed can be explained by different sensitivities to humoral stimuli of the different groups of subjects. The importance of nonhumoral factors, as studied by comparing apnea and rebreathing, seems modified at altitude, especially in highlanders, although the mechanism of this change is unknown. (Author)

A75-28438 On equation of gas transport in the lung. C. P. Yu (New York, State University, Buffalo, N.Y.). *Respiration Physiology*, vol. 23, Mar. 1975, p. 257-266. 21 refs. NSF Grant No. K-040794.

Based upon Weibel's lung model, an equation which describes one-dimensional gas transport in the lung is derived. It is shown in this equation that the gas transport in the airways is due simultaneously to bulk motion and longitudinal diffusion. The longitudinal diffusion consists of the usual molecular diffusion and an apparent diffusion which arises from nonuniform distribution of the gas to the airways and a profile-interaction effect of the gas due to Taylor's mechanism in each individual airway. Expressions for the apparent diffusion coefficient are obtained. This apparent diffusion, which has been neglected in almost all previous studies of gas transport in the lung, is shown to be of dominant importance in the upper airways. (Author)

A75-28516 * Growth and reproduction of microorganisms under extremely alkaline conditions. K. A. Souza, P. H. Deal, H. M. Mack, and C. E. Turnbull (NASA, Ames Research Center, Moffett Field, Calif.). *Applied Microbiology*, vol. 28, Dec. 1974, p. 1066-1068. 8 refs.

A75-28715 Theoretical analysis of detection of monaural signals as a function of interaural noise correlation and signal frequency. E. Osman, H.-Y. Tzuo, and P.-F. L. Tzuo (Brooklyn College, Brooklyn, N.Y.). *Acoustical Society of America, Journal*, vol. 57, Apr. 1975, p. 939-942. 18 refs. Grant No. PHS-1-R01-NS-10843-01A1.

A75-28716 Speech reception with low-frequency speech energy. R. D. Rosenthal, H. Levitt (New York, City University, New York, N.Y.), J. K. Lang (Brooklyn College, Brooklyn, N.Y.). *Acoustical Society of America, Journal*, vol. 57, Apr. 1975, p. 949-955. 38 refs.

The aim of the present experiment was to determine the relative contribution to consonant reception of auditory cues contained in the low frequencies of the speech signal. Results indicated that, in comparison with presentation of a high band (1100-2200 Hz) only, presentation of the high band in conjunction with any of three low bands (55-110, 110-220, and 220-440 Hz) significantly increased articulation scores. This increase decreased in magnitude with the width of the low band presented, being greatest for the 220-440 band. An analysis of the data in terms of articulatory features showed the greatest improvement in the reception of voicing. Of the various consonants sampled in the rhyme test, the nasals benefited most from the additional low-frequency information. The relevance of these findings to the design of speech reception aids for the hearing-impaired is discussed. S.J.M.

A75-28775 # Measurement of a helicopter crewman's low-level target acquisition performance. J. A. Barnes (U.S. Army, Human Engineering Laboratory, Aberdeen Proving Ground, Md.). In: International Aerospace Instrumentation Symposium, 8th, Cranfield, Beds., England, Mar. 24-27, 1975, Proceedings. London, Royal Aeronautical Society, 1975. 10 p.

Flight tests were performed to determine whether a two-man OH-58 scout crew working together at a detection/acquisition task performed better than one observer alone. Results showed little difference concerning ordnance targets, but the crews did significantly better in detecting/acquiring the high-visibility boxes. S.J.M.

A75-28784 # An active noise reduction system for use with ear defenders. A. P. Dorey, S. F. Pelc, and P. R. Watson (Southampton, University, Southampton, England). In: International Aerospace Instrumentation Symposium, 8th, Cranfield, Beds., England, Mar. 24-27, 1975, Proceedings. London, Royal Aeronautical Society, 1975. 10 p. Research sponsored by the Ministry of Defence (Procurement Executive) and Royal Aircraft Establishment.

An active noise reduction (ANR) system utilizing a small antiphase microphone in the headset cavity is discussed. A model of the system, the electro-acoustic response, equalization philosophy, and implementation and results are considered. The feasibility of the system for attenuation of frequencies below 1000 Hz is demonstrated, although certain problems remain under 100 Hz and some studies remain to be carried out. S.J.M.

A75-28910 Arterial blood gases in conscious rats exposed to hypoxia, hypercapnia, or both. W. E. Peipelko and G. A. Dixon (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 38, Apr. 1975, p. 581-587. 22 refs.

Adult male rats were anesthetized and catheters were implanted in the caudal artery. Soon after recovery from short-lasting anesthesia, a total of 20 groups of six each were individually exposed to five different oxygen levels varying from 21.0 to 9.0% combined with four CO₂ levels ranging from 0 to 12.9% at a mean barometric pressure of 744 Torr. Arterial blood samples were collected and analyzed for pH, O₂ partial pressure, and CO₂ partial pressure before and near the end of 20-min exposures. During an air-breathing control period, pH averaged 7.466 SD, alveolar CO₂ pressure 41.2 Torr and alveolar O₂ pressure 91.8 Torr. During hypoxia, alveolar O₂ pressure levels were similar to that of acutely hypoxic humans. (Author)

A75-28911 Thermoregulatory, metabolic, and cardiovascular response of rats to microwaves. R. D. Phillips, E. L. Hunt, R. D. Castro, and N. W. King (Battelle Pacific Northwest Laboratories, Richland, Wash.). *Journal of Applied Physiology*, vol. 38, Apr. 1975, p. 630-635. 40 refs. Contract No. N00014-70-C-0332.

A75-28912 Hormonal and electrolyte response to exposure to 17,500 ft. R. Frayser, I. D. Rennie, G. W. Gray, and C. S. Houston (South Carolina, Medical University, Charleston, S.C.; Arctic Institute of North America, Klauene Lake, Yukon Territory, Canada). *Journal of Applied Physiology*, vol. 38, Apr. 1975, p. 636-642. 29 refs. Research supported by the Defence and Civil Institute of Environmental Medicine; Grant No. NIH-HL-14102.

Hormone, electrolyte, and body fluid compartment changes were studied in subjects who either spent time at 10,000 ft before flying to 17,500 ft or were premedicated with acetazolamide and flown directly to 17,500 ft. In the former group, at 10,000 ft, renin and aldosterone were not different from control. Cortisol increased significantly from 9.8 to 19.5 micrograms/100 ml on the third day. At 17,500 ft, renin, aldosterone and cortisol were significantly elevated on day 3 but had returned to control levels by day 5. Sodium and potassium excretion was significantly reduced at both altitudes. Total body water, extracellular and plasma volume were reduced at 17,500 ft. Subjects pretreated with acetazolamide and flown directly to 17,500 ft had significant increases in plasma renin, aldosterone, and cortisol levels during the first 4 days at altitude. (Author)

A75-28913 Blood flow during 2-Torr exposures at different decompression rates. J. P. Cooke and R. M. Olson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 38, Apr. 1975, p. 643-646. 15 refs.

Central and peripheral blood flow of denitrogenated dogs, measured in the femoral artery and aorta, declined rapidly and ceased within mean times of 28, 35, 70, or 90 s after 1-, 10-, 30-, or 60-s decompressions from 258 Torr to 2 Torr, respectively. Neither arterial nor venous hypoxemia was seen after 1-s decompressions since the hypoxic blood did not reach the aorta. In contrast, arterial and venous O₂ saturation levels dropped as low as 12 or 6% following 10- to 60-s decompressions since circulation continued. A severe and transient decerebratellike rigidity and subsequent temporary flaccid paralysis of the hind legs was seen during recovery from decompressions slower than 1 s, whereas only a mild temporary

flaccid paralysis was frequently present after 1-s decompression. The more severe responses following 10- to 60-s decompressions are associated with the greater hypoxemia after slow decompressions, indicating tissue hypoxia is more severe when decompression rate is slow. (Author)

A75-28914 Total work rate of breathing optimization in CO₂ inhalation and exercise. S. M. Yamashiro, J. A. Daubenspeck, T. N. Lauritsen, and F. S. Grodins (Southern California, University, Los Angeles, Calif.). *Journal of Applied Physiology*, vol. 38, Apr. 1975, p. 702-709. 24 refs. Grants No. NIH-GM-16437-05; No. NIH-GM-52936-01; No. NIH-HL-16586-01.

A75-28933 # Some manipulator-control algorithms (O nekotorykh algoritmakh upravleniia manipulatorami). N. K. Maslova and A. S. Iushchenko. *Mashinostroenie*, no. 2, 1975, p. 58-62. 5 refs. In Russian.

The present paper discusses the problem of semiautomatic control of a manipulator through the use of a digital computer. An algorithm for control with respect to the force vector is given. A system is also considered in which the external forces exerted on the slave are reflected at the master controls. A.T.S.

A75-28960 An introduction to perception. I. Rock (Rutgers University, Newark, N.J.). New York, Macmillan Publishing Co., Inc., 1975. 592 p. 469 refs. \$13.95.

A fundamental review of current knowledge in various aspects of the field of perception is presented. The perception of size, the third dimension, direction, movement and events, form, and neutral color, as well as the phenomena of illusions and orientation, are explained. Emphasis is placed on the central phenomena of perception and clarification of the problems to which they give rise. The work does not refer to the different neural feature detector units in present use, as it contends that it is premature to seek to explain perceptual events in terms of neurophysiological mechanisms. S.J.M.

A75-28996 A study of the vector magnetocardiographic waveform. A. Rosen and G. T. Inouye (TRW Systems Group, Redondo Beach, Calif.). *IEEE Transactions on Biomedical Engineering*, vol. BME-22, May 1975, p. 167-174. 31 refs.

A description of the measurement techniques for obtaining vector magnetocardiograms (MCG) and a discussion of the significance of the MCG is presented. A map of vector MCG is shown in terms of its three components on a plane above the chest for both the magnetic analog of the QRS wave and the T wave. The waveform of the vector MCG is described and contrasted with the electrocardiogram (ECG). Studies of the variation of MCG patterns with age and weight are performed on twelve separate subjects. The data reveal a correlation between the MCG QRS amplitude and weight, and in the younger subjects a large T wave relative to the QRS amplitude. It is concluded that further studies of MCG waveforms are required to establish the nature and extent of the correlation. (Author)

A75-28997 * The Choroidal Eye Oximeter - An instrument for measuring oxygen saturation of choroidal blood in vivo. R. A. Laing, L. A. Danisch (Boston University, Boston, Mass.), and L. R. Young (MIT, Cambridge, Mass.). *IEEE Transactions on Biomedical Engineering*, vol. BME-22, May 1975, p. 183-195. 12 refs. Contract No. NAS12-2018.

The Choroidal Eye Oximeter is an electro-optical instrument that noninvasively measures the oxygen saturation of choroidal blood in the back of the human eye by a spectrophotometric method. Since choroidal blood is characteristic of blood which is supplied to the brain, the Choroidal Eye Oximeter can be used to monitor the amount of oxygen which is supplied to the brain under

varying external conditions. The instrument consists of two basic systems: the optical system and the electronic system. The optical system produces a suitable bi-chromatic beam of light, reflects this beam from the fundus of the subject's eye, and onto a low-noise photodetector. The electronic system amplifies the weak composite signal from the photodetector, computes the average oxygen saturation from the area of the fundus that was sampled, and displays the value of the computed oxygen saturation on a panel meter. (Author)

A75-28998 * MITNYS-II - A digital program for on-line analysis of nystagmus. J. H. J. Allum (Neurologische Universitäts-Klinik, Freiburg im Breisgau, West Germany), J. R. Tole (MIT, Cambridge, Mass.), and A. D. Weiss (MIT, Cambridge; Massachusetts Eye and Ear Infirmary, Boston, Mass.). *IEEE Transactions on Biomedical Engineering*, vol. BME-22, May 1975, p. 196-202. 10 refs. Grants No. NGR-22-009-025; No. NGR-22-009-156; No. NGR-22-009-701.

A digital computer program, MITNYS-II, has been developed for on-line analysis of nystagmus which results from visual, vestibular or caloric stimulation. The program accepts sampled records of eye position and yields cumulative slow phase position, slow phase velocity, instantaneous fast phase frequency and other parameters in 25 ms. In this paper the algorithms by which fast phases are detected, and by which slow phase cumulative eye position is extrapolated across the fast phase interval are described. Extensive tests with vestibular, optokinetic and caloric nystagmus yield reliability figures of the order of 2% for false identification of fast phases and missed fast phases. MITNYS-II has been successfully employed to interpret clinical EOG records, examples of which are presented. (Author)

A75-29017 # Steady state fluid flow in viscoelastic tubes - Application to blood flow in human arteries. Y. Kivity (Technion - Israel Institute of Technology, Haifa, Israel) and R. Collins (Paris VII, Université, Paris, France). *Archiwum Mechaniki Stosowanej*, vol. 26, no. 5, 1974, p. 921-931. 11 refs.

A method is proposed for determining the strain-rate dependent viscoelastic properties of the great vessels. A mathematical model is formulated for shock propagation in a fluid-filled distensible tube, and resulting changes in intraluminal pressure and cross-sectional area are related directly, in closed analytical form, to the material properties of the tube wall. Shock experiments are proposed which would yield the viscoelastic properties of arteries and veins on the basis of this analysis. P.T.H.

A75-29167 # Intensity determination of focused ultrasonic beams by means of electrodynamic and capacitance methods. L. Filipczynski, G. Lypacewicz, and J. Salkowski (Polska Akademia Nauk, Instytut Podstawowych Problemow Techniki, Warsaw, Poland). *Proceedings of Vibration Problems*, vol. 15, no. 4, 1974, p. 297-305. 8 refs.

A procedure is described for determining the intensity of ultrasonic waves in an ultrasonograph designed for the examination of the abdomen. Two independent absolute methods (electrodynamic and capacitance) were applied; wave intensity measurements were thus performed in transformer oil and water, respectively, with both liquids having their acoustic impedance nearly equal to that of the soft tissues of the human body. Measurements obtained agreed with theoretical distributions. It is concluded that high ultrasonic intensities may be achieved in ultrasonographs by using focusing systems. S.J.M.

A75-29186 Sleep physiology at high altitude. M. Reite, D. Jackson, R. L. Cahoon, and J. V. Weil (Colorado, University, Denver, Colo.; U.S. Army, Natick Laboratories, Natick, Mass.). *Electroencephalography and Clinical Neurophysiology*, vol. 38, May 1975, p. 463-471. 21 refs. Grant No. NIH-HL-14985.

Respiration, sleep level, and heart rate data were collected on a group of subjects during sleep at sea level and at high altitude

(14,000 ft). There was a significant increase in number of arousals and in periodic respiration at altitude (there was no PR at sea level). Subjects reported a large increase in sensation of sleeplessness, but this was not commensurate with total sleep time recorded. The disruption observed is believed to be related to hypoxemia and/or alkalosis.
S.J.M.

A75-29187 **A combined left ventricular/systemic arterial model.** P. D. Corey, R. R. Wemple (Colorado State University, Fort Collins, Colo.); and T. J. Vander Werff (Colorado, University, Denver, Colo.; Cape Town, University; Groote Schuur Hospital, Cape Town, Republic of South Africa). *Journal of Biomechanics*, vol. 8, Jan. 1975, p. 9-15. 24 refs. NSF Grants No. GK-32647; No. GK-41010.

A model mathematically coupling left ventricular performance and systemic arterial dynamics is described. Pressure and velocity waveforms at different parts of the arterial tree derived from the model are shown. The model is particularly applicable to arterial and ventricular anomalies, to the estimation of ventricular oxygen consumption from contractile element work, and to analysis of the effectiveness of heart assist devices.
S.J.M.

A75-29188 **Two-dimensional finite amplitude theory of arterial blood flow.** Y. S. Lou (Delaware, University, Newark, Del.). *Journal of Biomechanics*, vol. 8, Jan. 1975, p. 57-63. 18 refs.

The present study models the problem of blood flow in large elastin arteries in the mammalian circulatory system. The continuity and Navier-Stokes equations describe the motion of the blood; the mathematical model is chosen to include the large-amplitude forced oscillatory motion of the blood vessel. Results obtained may be reduced to an identical expression given by the linearized theory of Womersley (1955) for oscillatory motion of infinitesimally small amplitude.
S.J.M.

number of blunders by other aircraft were included in the simulations with a significant, but not entirely satisfactory, improvement in blunder detection attributed to the TSD. Author

N75-19136* Systems Technology, Inc., Hawthorne, Calif.
HANDLING PROPERTIES OF DIVERSE AUTOMOBILES AND CORRELATION WITH FULL SCALE RESPONSE DATA

Roger H. Hoh and David H. Weir *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 103-118 refs

(Contract DOT-FH-11-7570)
 CSCL 05E

Driver/vehicle response and performance of a variety of vehicles in the presence of aerodynamic disturbances are discussed. Steering control is emphasized. The vehicles include full size station wagon, sedan, compact sedan, van, pickup truck/camper, and wagon towing trailer. Driver/vehicle analyses are used to estimate response and performance. These estimates are correlated with full scale data with test drivers and the results are used to refine the driver/vehicle models, control structure, and loop closure criteria. The analyses and data indicate that the driver adjusts his steering control properties (when he can) to achieve roughly the same level of performance despite vehicle variations. For the more disturbance susceptible vehicles, such as the van, the driver tightens up his control. Other vehicles have handling dynamics which cause him to loosen his control response, even though performance degrades. Author

N75-19139* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
PILOT PERFORMANCE DURING A SIMULATED STANDARD INSTRUMENT PROCEDURE TURN WITH AND WITHOUT A PREDICTOR DISPLAY

John G. Kreifeldt (Tufts Univ.) and Thomas Wampe *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 147-162 refs

CSCL 05E

A simulator study was conducted to measure the effectiveness of predictor information incorporated into a CRT display of a computer simulated aircraft's horizontal and vertical situation. Professional pilots served as subjects for the task of executing a standard instrument procedure turn at constant altitude in constant crosswinds with and without their predicted ground track displayed. The results show that the display with the predicted ground track was markedly and significantly superior to the display without this information and that the subjects were generally satisfied with this type of information. Mean rms lateral path error was independent of the crosswind velocity with the predictor information, and increased without it with increasing wind velocity. Rms stick activity decreased with the predictor display which also uncoupled aileron and elevator activity. Author

N75-19142* Massachusetts Inst. of Tech., Cambridge, Man-Vehicle Lab.

VISUALLY INDUCED SENSATIONS OF MOTION

L. R. Young, J. M. Dichgans, and C. M. Oman *In its* Proc. of the 9th Ann. Conf. on Manual Control 1973 p 193-195 refs

CSCL 05E

Modeling the visual and vestibular information integration process in humans was studied to determine the implications of these models with respect to requirements for flight simulation. The interaction between visual circularvection and vestibular responses is discussed. F.O.S.

STAR ENTRIES

N75-19127* Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.

EFFECTS OF VISUAL FLIGHT DISPLAY DYNAMICS ON ALTITUDE TRACKING PERFORMANCE IN A FLIGHT SIMULATOR

E. F. Weener, R. M. Howe, and R. W. Pew *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 3-8

CSCL 05E

The effects were studied of visual display dynamics on pilot tracking performance in a simulator. The tracking task consisted of maintaining the piloted aircraft at the same altitude as two aircraft positioned three-hundred feet ahead; as would be required in level formation flying. The two leading aircraft were represented symbolically along with the horizon on a CRT display. Vertical position of these aircraft with respect to the horizon indicated the altitude of the subject's aircraft, which was disturbed by atmospheric turbulence. Various bandwidths of second-order dynamics were interposed between the true aircraft altitude and the displayed altitude, whereas no dynamics were interposed in the attitude display. Experiments were run using two experienced pilots and two substantially different longitudinal dynamics for the piloted aircraft. Preliminary results indicate a significant decrease in altitude tracking performance for display dynamics with natural frequencies below ten radians per second. Author

N75-19129* Massachusetts Inst. of Tech., Cambridge, Man-Vehicle Lab.

THE EFFECT OF COMMUNICATIONS AND TRAFFIC SITUATION DISPLAYS ON PILOTS AWARENESS OF TRAFFIC IN THE TERMINAL AREA

D. Melanson, R. E. Curry, J. D. Howell, and M. E. Connelly *In its* Proc. of the 9th Ann. Conf. on Manual Control 1973 p 25-39 refs

CSCL 05E

The Air Traffic Control (ATC) system is evolving under a general plan specified by the Federal Aviation Administration. Among the developments being considered is the Discrete Address Beacon System (DABS). The use of this system, although relieving congestion on the communications frequencies, would eliminate information about other aircraft because the party line communications now in use would be lost. One alternative to restore this lost information is an Airborne Traffic Situation Display (TSD). Experienced airline and military pilots participated in a factorial design to evaluate two types of communication (discrete address, party line) and two types of displays (TSD, no TSD). A stop-action quiz was used to evaluate their knowledge of other aircrafts' position, altitude, speed, heading, rate of climb, identity, and landing sequence number. Significant differences between conditions were detected, primarily in the position variables. Workload, as measured by a spare capacity side-task, showed a main effect of displays and a significant interaction between displays and communications. The data are summarized by plotting each display/communication condition configuration in the plane defined by information and workload index. A limited

N75-19143* General Motors Corp., Detroit, Mich.
SENSITIVITY OF A CRITICAL TRACKING TASK TO ALCOHOL IMPAIRMENT

Jean A. Tennant and Richard R. Thompson /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 201-213 refs

CSSL 05E

A first order critical tracking task is evaluated for its potential to discriminate between sober and intoxicated performances. Mean differences between predrink and postdrink performances as a function of BAC are analyzed. Quantification of the results shows that intoxicated failure rates of 50% for blood alcohol concentrations (BACs) at or above 0.1%, and 75% for BACs at or above 0.14%, can be attained with no sober failure rates. A high initial rate of learning is observed, perhaps due to the very nature of the task whereby the operator is always pushed to his limit, and the scores approach a stable asymptote after approximately 50 trials. Finally, the implementation of the task as an ignition interlock system in the automobile environment is discussed. It is pointed out that lower critical performance limits are anticipated for the mechanized automotive units because of the introduction of larger hardware and neuromuscular lags. Whether such degradation in performance would reduce the effectiveness of the device or not will be determined in a continuing program involving a broader based sample of the driving population and performance correlations with both BACs and driving proficiency. Author

N75-19144* Systems Technology, Inc., Hawthorne, Calif.
MEASUREMENT OF DRIVER/VEHICLE MULTILoop RESPONSE PROPERTIES WITH A SINGLE DISTURBANCE INPUT

Duane T. McRuer, David H. Weir, Henry R. Jex, Raymond E. Magdaleno, and R. Wade Allen /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 217-232 refs

CSSL 05E

Multiloop response properties of controllers are, in general, very difficult to obtain because an independent forcing function is needed for each describing function to be measured, and interpolation procedures may be required to obtain intermediate describing functions at common frequencies. Two examples are provided for the measurement of driver/vehicle multiloop response properties using a single disturbance input. The validity of the procedure is based on current multiloop operator adjustment rules and is made plausible by comparison with experimental data. Author

N75-19145* Michigan Univ., Ann Arbor. Highway Safety Research Inst.

AN EXPERIMENTAL STUDY OF THE MOTORCYCLE ROLL STABILIZATION TASK

David J. Eaton /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 233-243 refs

CSSL 05H

The work of Sharp represents the most complete theoretical analysis of the uncontrolled motorcycle presently available, and serves as a theoretical basis for the study described. Sharp's analysis included roll, yaw, lateral translation, and steering degrees of freedom, and the resulting equations are linear with constant coefficients. Tire aligning moments due to tire sideslip were added to Sharp's equations. Experimental results are presented, and related to the theoretical studies of Sharp and Weir. Author

N75-19146* Systems Technology, Inc., Hawthorne, Calif.
COMPARISONS OF POPULATION SUBGROUPS PERFORMANCE ON A KEYBOARD PSYCHOMOTOR TASK

Robert L. Stapleford /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 245-255

CSSL 05E

Response time and pass/fail data were obtained from 163 subjects performing a psychomotor task. The basic task comprised a random five digit number briefly displayed to the subject at

the start of each trial, and the keyboard on which the subject was to enter the number as fast as he could accurately do so after the display was extinguished. Some tests were run with the addition of a secondary task which required the subject to respond to a displayed light appearing at a random time. Matched pairs of subjects were selected from the group to analyze the effects of age, sex, intelligence, prior keyboard skill, and drinking habits. There was little or no effect due to age or drinking habits. Differences in response time were: average IQ subjects faster than low IQ subjects by 0.5 to 0.6 sec; subjects with prior keyboard skill faster by 0.4 to 0.5 sec; and female subjects faster by 0.2 to 0.3 sec. These effects were generally insensitive to the presence of the secondary task. Author

N75-19148* Wright State Univ., Dayton, Ohio.
THE EFFECTS OF DISPLAY VARIABLES AND SECONDARY LOADING ON THE DUAL AXIS CRITICAL TASK PERFORMANCE

George M. Swisher and S. Nataraj (Sinclair Community Coll., Dayton, Ohio) /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 265-278 refs

CSSL 05E

The effects of scanning displays for separated instruments, separated versus combined displays, and the effects of secondary loading are investigated. An operator rating scale for handling qualities is established analogous to the Cooper Harper Scale. Author

N75-19149* Technische Hogeschool, Delft (Netherlands). Man-Machine Systems Group.

PARAMETER ESTIMATION IN LINEAR MODELS OF THE HUMAN OPERATOR IN A CLOSED LOOP WITH APPLICATION OF DETERMINISTIC TEST SIGNALS

A. VanLunteren and H. G. Stassen /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 289-297 refs

CSSL 05E

Parameter estimation techniques are discussed with emphasis on unbiased estimates in the presence of noise. A distinction between open and closed loop systems is made. A method is given based on the application of external forcing functions consisting of a sum of sinusoids; this method is thus based on the estimation of Fourier coefficients and is applicable for models with poles and zeros in open and closed loop systems. Author

N75-19150* Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

IDENTIFICATION OF HUMAN OPERATOR PERFORMANCE MODELS UTILIZING TIME SERIES ANALYSIS

Frank M. Holden and Stanley M. Shinnars (Sperry Rand Corp., Great Neck, N. Y.) /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 301-309 refs

CSSL 05E

The results of an effort performed by Sperry Systems Management Division for AMRL in applying time series analysis as a tool for modeling the human operator are presented. This technique is utilized for determining the variation of the human transfer function under various levels of stress. The human operator's model is determined based on actual input and output data from a tracking experiment. Author

N75-19151* National Aerospace Lab., Amsterdam (Netherlands).
IN-FLIGHT MEASURED HUMAN PILOT DESCRIBING FUNCTION AND REMNANT FOR PITCH ATTITUDE CONTROL

H. A. Mooij /*n* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 311-317 refs

CSSL 05H

Flight tests have been performed with a variable pitch-rate-command/attitude-hold flight control system in a Beechcraft Queen air-80 aircraft. Some results of in-flight measured runs for two pilots controlling typical easy and difficult dynamics are

presented together with the initial results of the same tracking experiment performed on a ground-based flight simulator. Results are compared with results of other investigators using fixed-base flight simulators. Author

N75-19153* Illinois Univ., Chicago. Coll. of Engineering.
A STOCHASTIC MODEL OF THE ELECTROMYOGRAM

Gyan C. Agarwal and Gerald L. Gottlieb *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 327-333 refs
Sponsored in part by NSF
CSCL 06E

The quantitative regularities of interference pattern formation by motor unit action potentials is investigated. The parameters of a single motor unit and how they relate to the Fourier transform analysis of an EMG are considered. The Fourier transform of the simulated electromyogram is compared with the Fourier transform of the actual EMG recorded from various human muscles using surface electrodes. Author

N75-19154* Systems Technology, Inc., Hawthorne, Calif.
MODELING AND MEASURING LIMB FINE-MOTOR UNSTEADINESS

Raymond E. Magdaleno, Henry R. Jex, and R. Wade Allen *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 335-349 refs
CSCL 05E

Fine-motor unsteadiness its properties, conceptual and analytical models, and experimental measurements is examined. Based on a data review, the tentative model derived includes: neuromuscular system, grip interface, and control system dynamic elements. The properties of this model change with muscle tension and match a wide group of extant data. A simple experiment was performed to investigate the amplitude/force relationships of the tremor mode. As the finger-pull force increased from 5 to 20 Newtons, the tremor mode frequency for a given individual stayed within roughly ± 1 Hz over a range from 9-12 Hz, while the average magnitude of the rms tremor acceleration increased tenfold. A standardized test for making such measurements is given and applications in the fields of psychophysiological stress and strain measurements are mentioned. Author

N75-19155* Medical Coll. of Ohio, Toledo. Dept. of Neurosciences.
THE MUSCLE SPINDLE AS A FEEDBACK ELEMENT IN MUSCLE CONTROL

Lee T. Andrews, Anthony M. Iannone, and Donald J. Ewing (Toledo Univ., Ohio) *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 353-363 refs

CSCL 06P

The muscle spindle, the feedback element in the myotatic (stretch) reflex, is a major contributor to muscular control. Therefore, an accurate description of behavior of the muscle spindle during active contraction of the muscle, as well as during passive stretch, is essential to the understanding of muscle control. Animal experiments were performed in order to obtain the data necessary to model the muscle spindle. Spectral density functions were used to identify a linear approximation of the two types of nerve endings from the spindle. A model reference adaptive control system was used on a hybrid computer to optimize the anatomically defined lumped parameter estimate of the spindle. The derived nonlinear model accurately predicts the behavior of the muscle spindle both during active discharge and during its silent period. This model is used to determine the mechanism employed to control muscle movement. Author

N75-19156* Massachusetts Inst. of Tech., Cambridge.
CONTINUOUSLY VARYING SKIN POTENTIALS ELICITED BY SINUSOIDALLY VARYING ELECTRIC SHOCK POTENTIALS

J. W. Senders, V. L. Senders, and B. Tursky *In* its Proc. of the 9th Ann. Conf. on Manual Control 1973 p 365-365.

CSCL 06E

An investigation was carried out to determine whether a form of quasi-linear systems analysis can be applied to electrodermal responses to yield new insights into the nature of the response mechanisms and their interrelationships. The response investigated was the electrodermal response (galvanic skin potential, GSP) as elicited by an electric shock stimulus applied to the skin. The response subsequent to this stimulation was examined and its characteristics measured. A series of experimental runs on three Ss was accomplished, using sinusoidal modulation envelopes of frequencies. Results showed that it was possible to drive the GSP and to achieve relatively high coherence between the driving frequency and the response itself. The analysis was limited to Fourier analysis of the response in order to determine the relative energies at the driving frequency and at successive harmonics of that driving frequency, and correlational analysis in order to determine the degree of linear relationship between the driving frequency and the driven response. Author

N75-19157* Technische Hogeschool, Delft (Netherlands).
MODELING THE BEHAVIOR OF THE HELMSMAN STEERING A SHIP

W. Veldhuyzen and H. G. Stassen *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 367-377 refs

CSCL 05E

A supertanker is considered as a nonlinear system which responds very slowly to changes in the rudder position. Moreover this type of ship is often unstable in loaded condition. In order to model the helmsman's behavior, a number of tests were performed using a ship maneuvering simulator. The trained subjects had to steer a 200,000 tons tanker along a varying course. The results obtained from these trials are presented. Author

N75-19158* Systems Technology, Inc., Princeton, N.J.
FURTHER EXAMINATION OF PILOT INSTRUMENT SCANNING DATA AND DEVELOPMENT OF A NEW LINK VALUE ESTIMATOR

Lee Gregor Hofmann, Warren F. Clement, and Richard E. Blodgett *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 379-387 refs
(Contract F33615-71-C-1349)
CSCL 05E

Pilot instrument scanning data collected during simulated transport instrument landing approaches is examined. Deterministic features of random pilot instrument scanning behavior are confirmed to be: transitions in point of eye fixation which originate and terminate on the same instrument are rare; and transitions in point of eye fixation which originate on one secondary instrument and terminate on another secondary instrument are rare. Link value estimators are developed using statistics and these experimental facts. The result has a special significance when there is but a single primary instrument, a flight director. The result is used to simplify the iterative computational procedure of STI's display theory to a non-iterative procedure for the flight director case. Author

N75-19159* Systems Technology, Inc., Princeton, N.J.
A DIRECT PROCEDURE FOR PARTITIONING SCANNING WORKLOAD IN CONTROL DISPLAY SYSTEM DESIGN

W. F. Clement, L. G. Hofmann, and D. Graham *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 389-400 refs
(Contract F33615-71-C-1349)
CSCL 05E

Experimental eye scanning measurements were made from simulated instrument approaches in a flight-like cockpit representing a contemporary jet transport. The procedure for predicting the partition of the pilot's scanning workload required for monitoring and controlling a task with status displays and a flight director was simplified. When there is but a single director control display, iteration in the preliminary design computations is eliminated. The preliminary design computations are based on predictions of closed-loop input-correlated errors in displayed variables with respect to the trimmed flight values. Methods for

predicting multiloop error coherence, and for correcting the predicted partition of scanning workload when the pilot's scanning remnant contribution is significant are included. Author

N75-19160* Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

A LINEAR STOCHASTIC MODEL OF THE HUMAN OPERATOR

John C. Durrett *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 405-412 refs

CSSL 05E

A linear stochastic model of the human operator is developed and applied to the problem of piloted control of an aircraft. The pilot and aircraft are modeled as linear time-invariant systems containing both process and measurement noise. The loop closure by the pilot is determined by formulating the problem as an optimal stochastic control problem. The solution to the optimal control problem yields not only the pilot's optimal control output which he uses to control the vehicle, but also the optimal combination of his observations of the vehicle states upon which the pilot bases his control. A method is presented so that, using experimental pilot vehicle data, the cost functional which is minimized in the optimal control problem will be numerically equal to the pilot rating that the pilot would associate with the given vehicle and task. Author

N75-19161* Tufts Univ., Medford, Mass. Dept. of Engineering Design.

MODELS OF MAN AS A SUBOPTIMAL PREDICTOR

William B. Rouse *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 413-417 refs

CSSL 05E

Models of man making predictions of future states of discrete linear dynamic systems are considered. The task is forced-pace, but the pace is slow enough to eliminate the effects of reaction time and neuromuscular lag. The best of the several models considered includes the constraints of limited memory and observation noise. Author

N75-19163* Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.

THE PREVIEW CONTROL PROBLEM WITH APPLICATION TO MAN-MACHINE SYSTEM ANALYSIS

Masayoshi Tomizuka and Daniel E. Whitney *In* MIT Proc. of the 9th Ann. Conf. on Manual Control 1973 p 429-441 refs

(Grant NGR-22-009-002)

CSSL 05H

The preview control problem is formulated in a general form and its solution is obtained. The analytical tool used is discrete stochastic optimal control theory. Aiming the application to manual control situations with preview, time delay, observation noise, motor noise, etc. were included in formulating the problem. Manual preview control experiments were performed to qualitatively check the validity of the model, and it was found that the mechanism of the manual control problem was explained by the developed model. Author

N75-19303 Max-Planck-Institut fuer Biochemie, Martinsried bei Muenchen (West Germany).

APPLICATION: GENERAL REVIEW

K. Hannig *In* ESRO Process. and Manufacturing in Space Jul. 1974 p 199-203 refs

A review was made of the basic biological experiments performed in space, and some of the results obtained are discussed. The effects of weightlessness on biological organisms were found at all cellular levels. Preparative separation and purification methods, especially effective under conditions of weightlessness, were stressed. Author (ESRO)

N75-19943# IIT Research Inst., Chicago, Ill.

OXYGEN CONSUMPTION IN FOUR SPECIES OF INVERTEBRATES AND A VERTEBRATE NATURALLY EXPOSED TO SANGUINE ELECTROMAGNETIC FIELDS Final Report Bernard Greenberg Nov. 1974 15 p refs Prepared in cooperation with Ill. Univ., Chicago

(Contracts N00039-73-C-0030; N00039-72-C-0106) (AD-A001925) Avail: NTIS CSCL 06/18

The oxygen consumption and respiratory quotient (RQ) of five species of animals collected adjacent to the Sanguine antenna during summer, 1973, were tested. The species were: wood louse, *Oniscus asellus*; the earthworms, *Lumbricus terrestris* and *L. rubellus*; slug, *Arion* sp.; and redbacked salamander, *Plethodon cinereus cinereus*. Controls were collected on the same day, 6 to 13 miles from the nearest Sanguine antenna, and both test and control groups were tested simultaneously. No significant differences were found in the oxygen consumption or RQ between any test and control group of animals. GRA

N75-19946 + Institut National de la Sante et de la Recherche Medicale, Marseille (France). Unite de Recherche Neurobiologique.

NUMERICAL DATA PROCESSING AS APPLIED TO HUMAN NEUROPHYSIOLOGY: EVOKED ACTIVITY AND TRANSCRANIAL ELECTROENCEPHALOGRAPHY Final Report [APPLICATION DES TECHNIQUES DE TRAITEMENT DE L'INFORMATION PAR ENSEMBLE NUMERIQUE A LA NEUROPHYSIOLOGIE HUMAINE: ACTIVITES EVOQUEES ET ELECTROENCEPHALOGRAMME OBTENU PAR VOIE TRANSCRANIEENNE COMPTE RENDU DE FIN DE CONTRAT]

Henri Gastaut and Henri Regis Oct. 1973 20 p refs *In* FRENCH

(Contract DGRST-67-00-889)

Avail: NTIS HC \$3.25

A data acquisition system including analogue to digital encoding for statistical treatment of human ECG (electroencephalograms) recordings in a hospital neurophysiology unit, was set using existing computer facilities. A program for spectrum analysis methods (correlation functions, cross-correlation, cross spectra, coherence, phase shift) and automatic classification of spectra was prepared. These methods were experimented on ECG study of sleep, central nervous system maturation processes in the child, and drug effects. Results were good for stable components, when studying slow or stepwise variations. ESRO

N75-19946*# Techtran Corp., Glen Burnie, Md.

PATHOGENIC EFFECTS OF THE THERMAL FACTOR

N. A. Fedorov, A. Yu. Tilis, T. Ya. Ar'yev, and B. A. Saakov Washington NASA May 1974 106 p refs Transl. into ENGLISH from the book "Patologicheskaya Fiziologiya Ekstremal'nykh Sostoyaniy" Moscow, Meditsina 1973 p 180-266 (Contract NASw-2485)

(NASA-TT-F-15320) Avail: NTIS HC \$5.25 CSCL 06E

Articles on the following subjects are presented. The pathological physiology and the pathogenesis of the initial period of burn disease, overheating, cold trauma, and hypothermia. Other topics discussed include burn shock, after-effects of acute overheating, cardiovascular system, blood circulation, and the neurological system. Author

N75-19947*# Kanner (Leo) Associates, Redwood City, Calif. **DIURNAL VARIATIONS OF THE ACHILLES REFLEX TIME IN NORMAL MAN**

J.-A. Macarez Washington NASA Mar. 1975 13 p refs Transl. into ENGLISH from *Pathol. Biol.* (France), v. 22, 1974 p 207-212

(Contract NASw-2481)

(NASA-TT-F-16249) Avail: NTIS HC \$3.25 CSCL 06P

The Achilles tendon reflex time was recorded in the morning, at midday, and in the evening during five days in 18 normal sedentary subjects. Every recording measured the following intervals: SD (contraction time), DP (true half-relaxation time), SP (sum of SD and DP). These intervals were significantly longer

in women than in men. Their variations from day to day were not very important. Contrasting with these, their diurnal variations were significant, and showed a lengthening from morning to evening, principally for DP and SP. These findings and their consequences in the clinical use of the Achilles tendon reflex time were discussed. Author

N75-19948*# Kanner (Leo) Associates, Redwood City, Calif. **BICIRCADIAN PERIOD OF SLEEP-WALKING CYCLE IN BEYOND TIME ISOLATION. A POLYGRAPHIC STUDY** G. Chouvet, J. Mouret, J. Coindet, M. Siffre, and M. Jouvet Washington NASA Mar. 1975 27 p refs Transl. into ENGLISH from *Electroencephalogr. Clin. Neurophysiol.* (Canada) v. 37, 1974 p 367-380

(Contract NASw-2481)
(NASA-TT-F-16212) Avail: NTIS HC \$3.75 CSCL 06P

Young male subjects were polygraphically recorded (137 sleep records), while isolated beyond time in caves for five to six months. Control recordings were performed just before and after their isolation. With variable latencies all the subjects reached a bicircadian rhythm (34 hours of wakefulness followed by 14 hours of sleep) which they considered subjectively as 24-hourly. Only one subject was able to adapt completely to this new rhythm and maintain it over more than two months. The use of an external Zeitgeber was effective in reducing the relative variability of this rhythm. The observed variations in sleep are given and the internal organization of sleep is discussed in relation to the adaptability to a bicircadian rhythm. Author

N75-19949# Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy and Materials Science.

BUCKLING STUDIES OF SINGLE HUMAN TRABECULAE Paul R. Townsend, Robert M. Rose, and Eric L. Radin Oct. 1974 20 p refs

(Contract N00014-67-A-0204-0066)
(AD-A000264/2; TR-8) Avail: NTIS HC \$3.28 CSCL 06/16

The nonideal inelastic buckling behavior of single trabeculae from the subchondral region of the human medial tibial plateau was investigated. Wet specimens exhibited ductile buckling, whereas dry specimens buckled in a brittle manner. Extrapolation to ideal slenderness ratios showed Young's modulus to be 1,650,000 psi in the wet state, and 2,050,000 psi in the dry state, reasonably similar to cortical bone. Author (GRA)

N75-19950# Missouri Univ., Rolla. Materials Research Center.

FEASIBILITY STUDY ON A PROCESS FOR ELECTROLESS METAL DEPOSITION IN PITS AND FISSURES OF TEETH FOR USE IN PREVENTIVE DENTISTRY Annual Report

Thomas J. O'Keefe Jul. 1974 55 p refs
(Contract DADA17-73-C-3087)

(AD-A002071; AR-1) Avail: NTIS CSCL 06/12

A feasibility study on the electroless metal plating of teeth has been conducted. The primary purpose of the study was to evaluate the possible use of a chemically deposited metal film as a pit and fissure sealant. All of the work reported was performed on extracted human teeth. The process consists of applications of suitable metal deposition solutions and reducing agents in a sufficient number of sequences to provide the desired coating thickness. Copper and/or silver films in the range of 0.003 inches can be obtained in less than ten minutes. The deposits are adherent and resist scratching when standard dental hand tools are used. The deposits were also characterized by means of scanning electron microscopy, X-ray analysis and Auger analysis. GRA

N75-19951# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE DEGREE OF DANGER OF INDUSTRIAL SUBSTANCES, SPECIFIC SENSITIVITY, AND SAFETY FACTOR IN THE ESTABLISHMENT OF MAXIMUM PERMISSIBLE CONCENTRATION (MPC)

I. P. Ulahova 12 Nov. 1974 19 p refs Transl. into ENGLISH from the book "Printsipy i Metody Ustanovleniya Predelno Dopustimyykh Kонтсentratsii Vrednykh Veshchestv v Vozdukhe

Proizvodstvennykh Promeshenii, but Pub. in *Mezhdunarodnogo Seminara Uchenykh Sotsialisticheskikh Stran, 25-29 Nov. 1968* Moscow, Izd vo Meditsina, 1970 p 65-76

(AD-A001855; FTD-MT-24-994-74) Avail: NTIS CSCL 06/10

The report presents the indicators of potential danger and the indicators of the danger of acute lethal poisoning of several industrial chemicals. Also included are the lethal doses of these chemicals to animals and man. GRA

N75-19952# Florida Univ., Gainesville. Dept. of Physiology. **MECHANICS OF BREATHING AT REDUCED BAROMETRIC PRESSURES OF FLIGHT** Final Report

Arthur B. Otis and Marc J. Jaeger 30 Oct. 1974 63 p refs
(Contract F44620-70-C-0109; AF Proj. 9777)

(AD-A001930; AFOSR-74-1795TR) Avail: NTIS CSCL 06/19

The studies accomplished may be divided into five main categories: studies of the mechanics of forced expiration and coughing at ground level with ambient air as the inspired gas; similar studies at simulated altitudes of 18,000 and 27,000 feet, similar studies at ground level with gas mixtures of different densities as the inspired gas; studies of the effect of gas density, on a mechanical model to simulate clearance of mucous from the respiratory tract; and analog computer modelling of various breathing maneuvers. In addition to purely physical factors, these studies have involved several physiological factors including compliance and resistance of the lung and airways, the pressure-volume relationship of the chest, the force-velocity and relationship of the respiratory muscles, and the contraction and relaxation time of these muscles. This report presents pertinent data and conclusions. GRA

N75-19953# Desmatics, Inc., State College, Pa. **RESEARCH ON HUMAN IMPACT ACCELERATION DYNAMIC RESPONSE AND INJURY, SOME STATISTICAL ASPECTS OF MODELING** Annual Report, Dec. 1973 - Nov. 1974

Dennis E. Smith Dec. 1974 22 p refs

(Contract N00014-74-C-0154; RR04120)

(AD-A002443; TR-102-1) Avail: NTIS CSCL 06/19

The report describes an ongoing research investigation of statistical aspects underlying development of mathematical models of human impact acceleration dynamic response and injury. Particular attention is paid to the requirements and constraints imposed on human accelerator runs. GRA

N75-19954# Aerospace Medical Div., Brooks AFB, Tex. **AIR FORCE TECHNICAL OBJECTIVE DOCUMENT: AMD FISCAL YEAR 1976** Final Report

Thomas D. N. Douthit 16 Dec. 1974 43 p

(AD-A002580; AMD-TR-74-1) Avail: NTIS CSCL 06/2

The document describes the planning methodology used within the Aerospace Medical Division (AMD) laboratories' five technology areas. Efforts were directed in the biotechnology program to man's adaptability, survivability, and performance capabilities within his operational environment. The research and development of AMD's functions is accomplished as disciplinary work by teams of biomedical scientists, engineers and physical scientists within the Air Force laboratories and the industrial and academic research and development communities. GRA

N75-19955# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.

SPINDLE AND RAPID EYE MOVEMENT DETECTORS FOR USE WITH SLEEP ANALYZERS M.S. Thesis

Joseph C. Christian Sep. 1974 86 p refs

(AD-A002665; GE/EE/74-69) Avail: NTIS CSCL 06/2

The purpose of this study is to develop electronic detectors capable of detecting spindles and conjugate rapid eye movements in the human electroencephalogram EEG and EOG electrooculograph. Period analysis is used as the basis for the detection of spindles (defined as rhythmic bursts of EEG activity of 12-14 Hz lasting for at least 0.5 second). A phase detection scheme is used to identify the occurrence of conjugate eye movements. Sixteen hours of EEG and EOG data were analyzed using the detectors. The spindle detector exhibited a 90% detection

accuracy when used to separate sleep stages 2, 3, or 4 and stages 0, 1, or REM. A 68% detection accuracy was achieved by the REM detector. GRA

N75-19956 Maryland Univ., College Park.
THEORETICAL INVESTIGATION OF THE CIRCADIAN RHYTHM Ph.D. Thesis

John William Avitabile, Jr. 1974 128 p
Avail: Univ. Microfilms Order No. 74-29048

An effort is made to show the possible connection between macroscopically observable properties of the circadian rhythm and microscopic theories of chemical processes in the cell. In particular, the Goodwin model for epigenetic oscillations is studied extensively, and it is shown that various properties of this model are analogous to properties of the circadian rhythm. It is determined from these studies that light intensity may affect cells by changing the diffusion and transport rates of mRNA. Characteristics reported by the manufacturer to indicate psychological stress. These scores were analyzed for their empirical relationships with operational variables in Skylab judged to represent varying degrees of situational stress. Although some statistically significant relationships were found, the technique was not judged to be sufficiently predictive to warrant its use in assessing the degree of psychological stress of crew members in future space missions. Author

N75-19957 Florida Univ., Gainesville.
DYNAMICS AND OPTIMIZATION OF A HUMAN MOTION PROBLEM Ph.D. Thesis

Tushar Kanti Ghosh 1974 164 p
Avail: Univ. Microfilms Order No. 74-27873

A particular gymnastic maneuver, namely, the kip-up maneuver is examined experimentally and theoretically. A mathematical model for a human performer is constructed for this maneuver from the best personalized inertia and joint centers model of a human being available today. Experiments with the human performer and photographic data collection methods are discussed. Comparisons of the observed motion with solutions of the mathematical model equations are presented. Discrepancies between the actual motion and the computed motion are explained in terms of principles of mechanics and errors in measurements. Some changes in the model are suggested. Dissert. Abstr.

N75-19958 Michigan Univ., Ann Arbor. Dept. of Aerospace Engineering.

THE MANUAL CONTROL OF VEHICLES UNDERGOING SLOW TRANSITIONS IN DYNAMIC CHARACTERISTICS

Thomas E. Moriarty [1974] 145 p refs
(Grant NSR-23-005-364)
(NASA-CR-132442) Avail: NTIS HC \$5.75 CSCL 05E

The manual control was studied of a vehicle with slowly time-varying dynamics to develop analytic and computer techniques necessary for the study of time-varying systems. The human operator is considered as he controls a time-varying plant in which the changes are neither abrupt nor so slow that the time variations are unimportant. An experiment in which pilots controlled the longitudinal mode of a simulated time-varying aircraft is described. The vehicle changed from a pure double integrator to a damped second order system, either instantaneously or smoothly over time intervals of 30, 75, or 120 seconds. The regulator task consisted of trying to null the error term resulting from injected random disturbances with bandwidths of 0.8, 1.4, and 2.0 radians per second. Each of the twelve experimental conditions was replicated ten times. It is shown that the pilot's performance in the time-varying task is essentially equivalent to his performance in stationary tasks which correspond to various points in the transition. A rudimentary model for the pilot-vehicle-regulator is presented. Author

N75-19959 Kanner (Leo) Associates, Redwood City, Calif.
ACTIVITY PROFILE OF PIRACETAM IN PSYCHOSYNDROMES AND SYMPTOMATIC PSYCHOSES

A. Voelkel Washington NASA Mar. 1975 12 p refs Transl. into ENGLISH from Arzneim-Fosch. (West Germany), v. 24, no. 8, 1971 p 1127-1129
(Contract NASw-2481)

(NASA-TT-F-16217) Avail: NTIS HC \$3.25 CSCL 05J
The encephalotropic effect of 2-oxo-pyrrolidine-acetamide (Piracetam) is observed in patients with different reversible encephalopathic psychosyndromes combined with depressive or paranoid syndromes. This pilot study shows that the most important effect is a remarkable restoration of memory, vigilance, lucidity, and differentiation. Furthermore, Piracetam is able to provoke psychotic reactions with paranoid symptoms and hallucinations in cases with uncertain subclinical psychotic syndromes with dissimulation. Author

N75-19960 Planar Corp., Alexandria, Va.
PSYCHOLOGICAL STRESS MEASUREMENT THROUGH VOICE OUTPUT ANALYSIS

Harry J. Older and Larry L. Jenney Mar. 1975 56 p refs
(Contract NAS9-14146)

(NASA CR 141723) Avail: NTIS HC \$4.25 CSCL 05J
Audio tape recordings of selected Skylab communications were processed by a psychological stress evaluator. Strip chart tracings were read blind and scores were assigned based on characteristics reported by the manufacturer to indicate psychological stress. These scores were analyzed for their empirical relationships with operational variables in Skylab judged to represent varying degrees of situational stress. Although some statistically significant relationships were found, the technique was not judged to be sufficiently predictive to warrant its use in assessing the degree of psychological stress of crew members in future space missions. Author

N75-19961 Defense Documentation Center, Alexandria, Va.
USE OF COMPUTERS IN HUMAN FACTORS ENGINEERING Report Bibliography, Nov. 1958 - Apr. 1974

Nov. 1974 225 p refs
(AD-A001400; DDC-TAS-74-34) Avail: NTIS CSCL 05/5

The bibliography contains 178 references to reports pertinent to the application of techniques for computer handling of human factors data. The indexes included are Corporate Author-Monitoring Agency and Subject. GRA

N75-19962 Naval Training Equipment Center, Orlando, Fla.
TRAINING SITUATION ANALYSIS STUDY FOR THE T-34C EXPANDED PRIMARY FLIGHT TRAINING PHASE Final Report, Sep. 1973 - Nov. 1974

W. M. Komanski, R. E. Picton, and R. W. Camp Nov. 1974 450 p refs
(AD-A002258; NACTRAEQUIPC-IH-238) Avail: NTIS CSCL 05/9

The report provides the methodology and procedures utilized in the conduct of the training situation analysis for the T-34C Expanded Primary Flight Training Phase. It recommends training and simulation media which will provide optimum support for the proposed Expanded Primary Flight Training Phase. GRA

N75-19963 Army Aeromedical Research Lab., Fort Rucker, Ala.

AVIATOR PERFORMANCE DURING LOCAL AREA, LOW LEVEL AND NAP-OF-THE-EARTH FLIGHT Final Report

Kent A. Kimball, Thomas L. Frezell, Mark A. Hofmann, and Allen C. Snow, Jr. Sep. 1974 26 p
(AD-A001683; USAARL-75-3) Avail: NTIS CSCL 05/10

The paper presents baseline data concerning aviator performance and aircraft state variables during local area, low level and nap-of-the-earth flights. Further, information is provided concerning differences in aviator control inputs per unit of time across the three profiles. From the data, it is evident that NOE flight places more demands on both crews and aircraft than the other two types of flight. GRA

N75-19964 Ohio State Univ., Columbus.
AIRCRAFT-SIMULATOR TRANSFER PROBLEMS Final Report, 1 Apr. 1972 - 30 Apr. 1974

Robert L. Wick, Jr., Charles E. Billings, Ralph J. Gerke, and Robert C. Chase Sep. 1974 69 p refs
(Contract F33615-72-C-1308; AF Proj. 7220)
(AD-A002140; AMRL-TR-74-68) Avail: NTIS CSCL 05/10

Five highly experienced instrument-rated pilots flew eight instrument landing system approaches while under the influence of a placebo, 100 mgms and 200 mgms of secobarbital for a total of twenty-four approaches. The aircraft used was highly instrumented to record their performance. The entire series of flights was replicated in a modern, similarly instrumented flight simulator. A comparison of the results indicate the simulator to be more sensitive to drug effects. Some learning effects were noted in the simulator flights indicating that skilled airplane pilots are not necessarily skilled simulator pilots as well. The arousal effects associated with actual flight apparently compensated for some portion of the drug effect leading one to the conclusion that there is still no adequate substitute for inflight studies.

GRA

N75-19965# Dunlap and Associates, Inc., La Jolla, Calif.
PILOT LANDING PERFORMANCE UNDER HIGH WORKLOAD CONDITIONS

C. A. Britson Apr. 1974 16 p refs
(Contract N00014-73-C-0053; NR Proj. 201-146)
(AD-A001802) Avail: NTIS CSCL 05/10

The influence of practice on carrier landings is discussed in relation to high cumulative workload. The performance criterion was used to identify potential night pilots on the basis of landing proficiency. High and low proficiency pilots also were identified and diagnostic training information provided. A statistically significant increase in night landing performance during high cumulative workload may be due to practice effects as well as workload.

GRA

N75-19966# International Business Machines Corp., Yorktown Heights, N.Y. Thomas J. Watson Research Center.

DATA ORGANIZATION Technical Interim Report

Bruce M. Durdin, Curtis A. Becker, and John D. Gould Nov. 1974 43 p refs

(Contract N00014-72-C-0419; NR Proj. 197-020)
(AD-A001769; RC-4956) Avail: NTIS CSCL 05/10

Three word list experiments investigated how people organize data. Sets of 15 to 20 words had pre-defined organizations: hierarchy, networks, lists, table, and random, based on semantic relations. Experiment 1 indicated that college students had these organizational structures available for use. Most subjects used organizations that most easily preserved the relations, but a few organized nearly all sets into lists which maintained the semantic relations. Experiment 3 showed how subjects have difficulty in preserving relations among data if required to organize into inappropriate structures. Results are evaluated for use in computer based information retrieval systems.

GRA

N75-19967# Yale Univ., New Haven, Conn. Dept. of Administrative Sciences.

EFFECTS OF TASK PERFORMANCE STRATEGIES ON GROUP PERFORMANCE EFFECTIVENESS

J. Richard Hackman, Janet A. Weiss, and Kenneth R. Brousseau Oct. 1974 49 p refs

(Contract N00014-67-A-0097-0026; NR Proj. 170-744)
(AD-A001707; TR-5) Avail: NTIS CSCL 05/10

Norms controlling how members deal with performance strategies were altered experimentally in small task-oriented groups. The basic task required assembly of small electrical components. In one task condition (equal information) all task-relevant information was provided to each group member; in another (unequal information) it was spread unevenly among members, requiring exchange of information for optimum group performance. Measures of interaction process and of member reactions to the group were obtained, and were affected substantially by the experimental interventions.

GRA

N75-19968# Naval Aerospace Medical Research Lab., Pensacola, Fla.

MAJOR ORIENTATION-ERROR ACCIDENTS IN REGULAR

ARMY UH-1 AIRCRAFT DURING FISCAL YEAR 1970, ACCIDENT FACTORS

W. Carroll Hixson, Jorma I. Niven, and Emil Spezia 5 Jun. 1974 33 p refs
(MF51524)

(AD-A001710; NAMRL-1202; USAARL-74-12) Avail: NTIS CSCL 05/10

The report is the fourth in a series dealing with the pilot disorientation/vertigo problem in Regular Army UH-1 helicopter operations. Individual case history data extracted from the USAAVS master aircraft accident files are presented on major orientation-error accidents that occurred in UH-1 aircraft during fiscal year 1970. Summary listings involving a variety of operational and pilot-related accident factors are presented for each of the 42 cases. The listings are arranged to distinguish between factors and events before takeoff, i.e., the initial conditions associated with a given accident, and those which occurred or were manifested during the actual airborne phase of the accident flight.

GRA

N75-19969# Air Force Human Resources Lab., Brooks AFB, Tex.

FISCAL YEAR 1975: AIR FORCE TECHNICAL OBJECTIVE DOCUMENT

Sep. 1974 19 p

(AD-A002154; AFHRL-TR-74-81) Avail: NTIS CSCL 05/9

The document provides the academic and industrial R and D community with a summary of the technical area objectives of Air Force research in the field of human resources. The areas covered are: (a) Personnel systems technology and utilization; (b) education and training technology; (c) performance evaluation; and (d) human resources data and systems design and operation.

GRA

N75-19970# Naval Training Equipment Center, Orlando, Fla.
CAPABILITIES IN WIDE ANGLE VISUAL TECHNOLOGY Interim Report

Carl R. Driskell Dec. 1974 111 p

(AD-A002706; NAVTRAEQUIPC-IH-237) Avail: NTIS CSCL 05/9

This report provides a sound technological basis for the specification of advanced visual systems for state-of-the-art aircraft flight simulators. The results of a survey of current and near-term wide angle visual systems are presented. Hardware and training risks are assessed for the application of various image generation sources and wide angle visual systems to specific pilot training tasks. Specification language is provided as a guide for procurement of a wide angle visual system with a full mission capability.

GRA

N75-19971# Naval Submarine Medical Research Lab., Groton, Conn.

SHALLOW HABITAT AIR DIVE SHAD-1 PSYCHOLOGICAL SCREENING OF DIVERS AS SUBJECTS FOR LONG DURATION SATURATION EXPERIMENTATION Medical Research Progress Report No. 31

Benjamin B. Weybrew 31 May 1974 60 p refs

(AD-A002707; NSMRL-776) Avail: NTIS CSCL 05/10

This study was designed to provide some insights as to possible psychological screening criteria for U. S. Navy divers being considered for special operational assignments. Four USN divers who had volunteered for SHAD-1 (Shallow Habitat Air Dive) were administered the DPSS (Depression proneness sentence stems), the MMPI (Minnesota multiphasic personality inventory), the DBI (Diver biographical inventory) and were subjected to a semi-structured clinical interview before and after a 30-day, hyperbaric (50 F.S.W.) experiment. These test and interview data were compared with the same data obtained from an independent sample of 64 USN divers, and provided the basis for selecting two SHAD subjects and two back-up divers.

GRA

N75-19972# Ohio State Univ. Research Foundation, Columbus.
PERCEPTUAL DIFFERENCES AMONG CONSONANTS
 John W. Black May 1974 135 p refs
 (Contract N00014-67-A-0232-0003; NR Proj. 197-004)
 (AD-A002286; OSURF-2928-TR-17) Avail: NTIS CSCL 05/7

The report is a summary of a series of studies that relate to the scaling of the relative similarities-dissimilarities among pairs of syllables that differ in the initial consonants or consonantal clusters. Sixty manners of commencing syllables were assessed. The measures of similarity-dissimilarity were obtained from panels of judges who followed the procedures of magnitude estimation. The panels responded to 576 pairs of consonant-vowel syllables, to these consonants as the first sounds of viewed words, to 3600 pairs of consonants/consonantal cluster-vowel syllables, and to these syllables reproduced backward. The judgments of individual listeners were tested for reliability by analysis of variance. GRA

N75-19973# Fortifikationsfoervaltningen, Stockholm (Sweden).
CALCULATION ROUTINES FOR EVALUATION OF TEST RESULTS

Ulf Keijer 10 May 1974 35 p refs In SWEDISH; ENGLISH summary
 (FortF/F-134:2) Avail: NTIS HC \$3.75

A number of subroutines for reading and evaluating test results obtained at the RSFA research and test station at Marsta are described. Measurements made at every shot and measuring point are collected in real time by means of a tape recorder. By the use of analogue-to-digital conversion and a transient recorder digital values from every test can be stored in a 1 K word MOS memory. From this memory a paper tape punch generates a paper tape, which can be run by a terminal. The tape is also provided with manually punched symbols for identification and parameter values. The various subroutines are compiled into a main program by the user. Additional subroutines can be added by the users, and combined with other parts of the program package. Author

N75-19974# Materials Research Labs., Maribyrnong (Australia).
A NEW METHOD OF MANUFACTURING INFLATABLE LIFE-JACKETS

R. H. E. Huang Nov. 1974 18 p refs
 (Rept-618) Avail: NTIS HC \$3.25

A method is described of manufacturing inflatable rubber bladders for life-jackets by latex dipping. The bladders are encased in fabric covers to produce life-jackets. The advantages of this method of construction, are discussed. Author

N75-19975# National Aeronautics and Space Administration.
 Ames Research Center, Moffett Field, Calif.
TECHNOLOGY AND THE NEUROLOGICALLY HANDICAPPED

Washington 1974 278 p refs Conf. held at Moffett Field, Calif., 8-10 Sep. 1971; sponsored in part by United Cerebral Palsy Foundation
 (NASA-SP-363) Avail: NTIS HC \$8.75 CSCL 06B

Bioengineering approaches to the treatment of neurologically handicapped persons consider neurophysiological aspects of control systems and man machine integration.

N75-19976* New York Univ., N.Y. Dept. of Aeronautics and Astronautics.

THE CONCEPT OF TECHNOLOGY TRANSFER

Lee Arnold In NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 1-2

CSCL 06B

Potential benefits from aerospace technology applications are elaborated that will enable the neurologically handicapped to recapture and upgrade some of their motor and sensor functions. Considered are all individuals whose sensorimotor communication systems have been damaged as a result of disease, trauma, or aging. G.G.

N75-19977* National Aeronautics and Space Administration, Washington, D.C.

NASA AND TECHNOLOGY

DeMarquis D. Wyatt In its Technol. and the Neurologically Handicapped 1974 p 3-6

CSCL 06B

Potential contributions of NASA technology to enable the neurologically handicapped to cope with a normal environment are outlined. Research and development in the area of man's responses and accommodations to environmental stress are closely related to medical aspects of technological assistance devices for the neurologically handicapped. G.G.

N75-19978* National Institutes of Health, Bethesda, Md.

HEW AND THE NEUROLOGICALLY HANDICAPPED

Warren V. Huber In NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 7-16

CSCL 06B

Some of the neurological disorders and therapeutic devices are considered with which the Department of Health, Education, and Welfare (HEW) is most concerned. The organization of the Department, because it is a rather complex one with many different agencies involved, is also described. Author

N75-19979* Veterans Administration, Washington, D.C.

REHABILITATION AND THE VETERANS' ADMINISTRATION

Franklin Meister In NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 17-20

CSCL 06B

The Veteran's Administration health care system provides prosthetic and sensory aids for the rehabilitation of neurologically handicapped veterans. Research and development centers include prosthetic clinic teams, orthopedic shops, restoration clinics, bioengineering services, orthotics, etc. G.G.

N75-19980* Department of Transportation, Washington, D.C. Office of the Secretary.

TRANSPORTATION AND THE HANDICAPPED

Herbert H. Richardson In NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 21-34 refs

CSCL 06B

Some statistics on the handicapped in relation to transportation are considered, and some of the major deterrents to travel in our existing systems are outlined. Some of the benefits of enhanced mobility are identified and examples are given of minimizing travel barriers. Finally, some of DOT's activities that are directed toward improving transportation for the handicapped are outlined. Author

N75-19981* National Academy of Sciences - National Research Council, Washington, D.C.

THE NATIONAL RESEARCH COUNCIL PROGRAM ON AID TO THE NEUROLOGICALLY HANDICAPPED

Colin McLaurin In NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 35-38

CSCL 06B

The multidisciplinary care of neuromuscular disabled patients is reviewed. Described are the activities of occupational and vocational therapists, social workers, clinical psychologists and speech pathologists that are directed toward the major effects of spinal cord injuries, amputations, stroke, cerebral palsy, and rheumatoid arthritis. G.G.

N75-19982* National Inst. of Neurological Diseases and Stroke, Bethesda, Md.

NEURAL CONTROL: LONG-RANGE PROSPECTS

Terry Hambrecht *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 39-44

CSSL 06B

The development of long term connections with the nervous system, are considered for direct transfer of information into the nervous system, and for direct readout of information from the nervous system. The study of basic neurophysiological control mechanisms operating in the nervous system is advocated for the investigation of potential applications of such developments. These applications depend strongly on the successful achievement of the first three objectives. An attempt is made to envision the social consequences of these developments. Author

N75-19983* Rancho Los Amigos Hospital, Inc., Downey, Calif.
CURRENT THERAPEUTIC TECHNIQUES AND REHABILITATION FROM NEUROLOGICAL DISORDERS

Vernon L. Nickel and John D. Hsu *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 45-54

CSSL 06B

Rancho Los Amigos Hospital is a 1100-bed teaching hospital that is primarily oriented toward rehabilitation. The individual services that deal with neuromuscular disorders are categorically disease entity oriented: They are directed toward the major problems, such as spinal cord injuries, amputations, stroke, cerebral palsy, and rheumatoid arthritis. The services at Rancho cross many traditional medical specialty barriers. Author

N75-19984* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

THE USE OF OBJECTIVE MEASUREMENTS IN THE EVALUATION OF THERAPY PROGRAMS

Hugh Chaplin (Irene Walter Johnson Inst. of Rehabilitation) *In its* Technol. and the Neurologically Handicapped 1974 p 55-72

CSSL 06B

The importance of objective measurements is discussed as a means of assessing the efficacy of physical and occupational therapy programs applied to patients recovering from neurological diseases. Considered are three primary categories of neurologically injured patients: patients with hemiplegia, patients with spinal cord injuries, and the heterogeneous group of cerebral palsy patients. Author

N75-19985* Duke Univ., Durham, N.C. Medical Center.

PROBLEMS AND PERSPECTIVES IN PARAPLEGIA

Blaine Nashold *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 73-82

CSSL 06B

Improved clinical treatment of the paraplegic, developed during World War II, has reduced the overall mortality rate from close to 100 percent to 30 percent. Despite major clinical improvements, mainly in treatment of the acute phase of paraplegia, and despite greater rehabilitation efforts, the spinal injured person is never rehabilitated in the sense that he reaches an optimum and stays there. He is always exposed to the constant threat of deterioration of his physiological, sociological, and psychological state. Author

N75-19987* Huntington Memorial Hospital, Pasadena, Calif.
BLINDNESS

Robert H. Pudenz *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 93-106

CSSL 06B

The possibilities are considered that modern electronics and engineering have to offer the individual with a damaged or disordered nervous system, especially the blind person. Discussed are the incidence and principal causes of blindness, past research activities, and a capsule review of some of the more interesting programs designed to provide the blind with the ability to be mobile in their environment and to read printed matter. Author

N75-19988* Massachusetts Inst. of Tech., Cambridge.

CYBERNETIC PROSTHESIS

Robert W. Mann *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 107-120

CSSL 06B

Design and development of a prosthetic device fitted to an above elbow amputee is reported that derives control information from the human to modulate power to an actuator to drive the substitute limb. In turn, the artificial limb generates sensory information feedback to the human nervous system and brain. This synergetic unity feeds efferent or motor control information from the human to the machine, and the machine responds, delivering afferent or sensory information back to the man. G.G.

N75-19989* Rancho Los Amigos Hospital, Inc., Downey, Calif.
THE CURRENT STATUS OF REHABILITATION ENGINEERING

James B. Reswick *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 121-128

CSSL 06B

Mechanical and electrical engineering devices for paralytic patient care are discussed as they are applied to medical problems. These include means of preventing bedsores, mobility aids, upper extremity orthoses, and electrical stimulation. G.G.

N75-19990* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

EXOSKELETAL TECHNOLOGY

Hubert C. Vyukal *In its* Technol. and the Neurologically Handicapped 1974 p 129-140

CSSL 06B

Possible applications are considered of a master-sleeve teleoperator arm system, developed in exoskeletal space suit technology, as therapeutic aid, orthotic device, or for therapy on patients with neurological disorders. G.G.

N75-19991* Stanford Research Inst., Menlo Park, Calif.
Bioinformation Systems Group.

ARTIFICIAL SENSORY SYSTEMS

James C. Bliss *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 141-150

CSSL 06B

Optical-tactile image conversion systems as reading aids for the blind, and teleoperator tactile displays for remotely controlled prosthetic braces are discussed. G.G.

N75-19992* Massachusetts Inst. of Tech., Cambridge.
MODELS OF THE VESTIBULAR SYSTEM AND POSTURAL CONTROL

Laurence R. Young and Alfred Weiss (Mass. Eye and Ear Infirmary) *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 151-168

CSCL 06B

Applications of control theory and systems analysis to the problem of orientation and posture control are discussed, with the possible long range goals of contributing to the development of hardware for rehabilitation of the handicapped. Author.

N75-19993* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MANUAL CONTROL THEORY AND APPLICATIONS
 Melvin Sadoff and Brian Repa (Michigan Univ., Ann Arbor) *In its Technol. and the Neurologically Handicapped* 1974 p 169-188 refs

CSCL 06B

Control theory, including manual control theory, and a review of some previous physiological and neurological applications of control theory and associated engineering concepts are reported. The discussion includes a specially tailored battery of critical control tasks that are being developed to monitor astronaut performance in long term orbital flight. The application of these concepts and tasks to patients with various neurological disorders is considered. Author

N75-19994* Systems Technology, Inc., Inglewood, Calif.
NEUROLOGICAL APPLICATIONS OF MAN-MACHINE SYSTEMS ANALYSIS

Duane T. McRuer *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 189-204

CSCL 06B

Quantitative descriptions of human control properties are formulated that take into account the dynamics of muscle actuation units, neuromuscular sensor units, and sensory feedback mechanics. Detailed dynamic measurements on neurologically disordered patients are correlated with clinical manifestations of various neurological syndromes to quantify operator behavior. G.G.

N75-19995* Grumman Aerospace Corp., Bethpage, N.Y. Life Sciences Section.

NEW ENGINEERING SYSTEMS FOR MOBILITY
 Thomas L. Keller and Allan Kelvin *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 205-218

CSCL 06B

Aerospace technology transfer and a systems integration approach are considered in the development of a transportation system for the handicapped. The basic vehicle design includes a slide-out boarding ramp and wheelchair accommodations. G.G.

N75-19996* General Electric Co., Philadelphia, Pa. Cybernetics Automation and Mechanization Systems Section.

CYBERNETIC ANTHROPOMORPHIC MACHINE SYSTEMS
 Walter E. Gray *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 219-242

CSCL 06B

Functional descriptions are provided for a number of cybernetic man machine systems that augment the capacity of normal human beings in the areas of strength, reach or physical size, and environmental interaction, and that are also applicable to aiding the neurologically handicapped. Teleoperators, computer control, exoskeletal devices, quadruped vehicles, space maintenance systems, and communications equipment are considered. G.G.

N75-19997* Stanford Research Inst., Menlo Park, Calif. Artificial Intelligence Group.

THE ROLE OF INTELLIGENT MECHANICAL AIDS
 John H. Munson *In* NASA. Ames Res. Center Technol. and

the Neurologically Handicapped 1974 p 243-248

CSCL 06B

The general features and the controlling programs for a robot are explained, and its possible extension as aid to the neurologically handicapped is projected. G.G.

N75-19998* Massachusetts Inst. of Tech., Cambridge.

SUPERVISORY CONTROL SYSTEMS
 Thomas B. Sheridan *In* NASA. Ames Res. Center Technol. and the Neurologically Handicapped 1974 p 249-262

CSCL 06B

The various functions of a computer are considered that serve in connecting the man, with his displays and controls, to an external environment, manipulator activators and the interoceptors that are in the actuators, and to the interosensors and the motors or the actuators to drive the sensors. Projected is an improved exoskeleton mechanism with computer control and some supervisory control that may give a quadriplegic the ability to walk and run around. G.G.

N75-19999# Danish Atomic Energy Commission, Risoe.
HUMAN DATA PROCESSOR AS A SYSTEM COMPONENT BITS AND PIECES OF A MODEL

J. Rasmussen May 1974 52 p refs Revised (RISO-M-1722; R-8-74) Avail: ERDA Depository Libraries HC \$5.75

During recent years the systems engineer designing control rooms for industrial process plants has been faced with complex human factors problems. In conventional control rooms the arrangement of meters, recorders, and control keys on the control desk and the choice of properly designed knobs and dials are the chief objectives for human factors consideration. The advent of computer-controlled display systems with the variety of modes for data conditioning and presentation available to support the operators calls for an integrated systems design. For information and results from another professional area to be identified and digested an interdisciplinary working hypothesis or reference frame is needed, and the present report describes such a preliminary model aiming at the support of future reading, discussions, and experiments. Author (NSA)

N75-20000# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

COMPARATIVE EVALUATION OF PROTOTYPE AND STANDARD FIRE FIGHTER'S SUITS UNDER COMBINED HYPERTHERMIC AND EXERCISE STRESS CONDITIONS
 Abbott T. Kissen, Kenneth A. Smiles, Willi J. Buehring, Walter C. Summers, and David C. Smedley Aug. 1974 19 p refs (AD-A002136; AMRL-TR-74-59) Avail: NTIS CSCL 06/17

Tests were conducted in the All Weather Test Facility to comparatively evaluate the standard fire proximity suit with a prototype assembly of half the weight. An exercise regimen of 20 minutes on the treadmill was superimposed on a prior resting exposure of 95 minutes to a hot-humid (36 C DB/ 33 C WB) environment. In terms of thermoregulatory, cardiovascular, and respiratory responses, the prototype and standard fire proximity suits impose similar penalties for the subject seated at rest. The standard assembly did, however, impose greater stress during the exercise portion of the test in terms of elevating heart rate and oxygen uptake. The environmental conditions were severe in that subjects approached tolerance. GRA

N75-20976# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 9, NO. 1, 1975

28 Mar. 1975 157 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosmicheskaya Med. (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 3-88 (JPRS-64427) Avail: NTIS HC \$6.25

Articles are presented on the following topics: the selection and training of cosmonauts; evaluation and analysis of accumulated data to facilitate the transition from orbital to interplanetary

flights; research aimed at guaranteeing safety on long flights and reliability of the human component of the 'man-spacecraft' system; space psychology and physiology; environmental problems and control (spacecraft habitability, effects of radiation, and weightlessness); and telemetry.

N75-20976 Joint Publications Research Service, Arlington, Va. **BIOCHEMICAL CHANGES IN THE SKELETAL MUSCLES DURING HYPOKINESIA AND POSSIBLE WAYS TO RESTORE THEM**

I. V. Fedorov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 1-11 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 3-8

The changes in the metabolism of proteins, carbohydrates, fats, water and minerals, as well as changes in the activity of enzymes of skeletal muscles during hypokinesia are discussed. Methods to be used in reversing metabolic disorders in skeletal muscles are recommended and evaluated. Among the suggested methods physical exercises seem to be the most promising.

Author

N75-20977 Joint Publications Research Service, Arlington, Va. **USE OF ELECTRIC STIMULATION FOR PREVENTING THE DEVELOPMENT OF CHANGES IN ANTIGRAVITATIONAL MUSCLES DURING HYPOKINESIA**

V. V. Portugalov, Ye. I. Ilina-Kakuyeva, and V. I. Starostin *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 12-18 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 9-13

An attempt was made to use electric stimulation of the antigravity muscles of the hind limbs of rats as a method for preventing structural and metabolic disorders which develop in the muscle tissue during diminished motor activity. The electric stimulation was carried out using a Bion device with frequency-amplitude modulation. The favorable effect of electric stimulation was demonstrated in 4 of 12 animals during every experimental run. It is suggested that a higher percentage of the protective effect of the method can be achieved with stimulation ensuring a more intensive influence on the deeply located muscles.

Author

N75-20978 Joint Publications Research Service, Arlington, Va. **PHYSICAL PERFORMANCE AND OXYGEN SUPPLY OF THE RAT BODY DURING PHYSICAL LOADS AFTER PROLONGED HYPOKINESIA**

Ye. A. Kovalenko, Yu. S. Galushko, S. G. Sherashov, and V. L. Popkov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 19-29 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 13-20

White rats exposed to 60 and 100 days of hypokinesia exhibited a substantial and progressive decline in tolerance to a maximum physical load. This was accompanied by disorders in the regulation of the oxygen balance: during loads the oxygen requirements were met mainly by the oxygen debt. The noted changes which followed a period of 100 days of hypokinesia returned to normal levels two months later.

Author

N75-20979 Joint Publications Research Service, Arlington, Va. **EFFECT OF HYPOKINESIA ON THE DEVELOPMENT OF OSTEOPOROSIS**

G. D. Rokhlin and E. P. Levites *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 30-34 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 20-22

A study was made of the skeletal changes in rabbits exposed to 90-day hypokinesia. Osteoporosis was diagnosed by means of an X-ray investigation which included roentgenodensitometry

and roentgenogrammetric methods. The process involved the thinning of the cortical layer and a decrease in bone density. The importance of these methods for an objective evaluation of osteoporosis is discussed.

Author

N75-20980 Joint Publications Research Service, Arlington, Va. **GLYCEMIC INDICES OF ANIMALS AT DIFFERENT TIMES DURING HYPOKINESIA WITH THE INJECTION OF GLUCOSE, ADRENALINE AND INSULIN**

A. V. Chernyy *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 35-42 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 23-27

The sugar content in the blood was measured (and sugar curves were plotted) in healthy rats and in rats exposed to 15, 30, 60 and 90 days of hypokinesia after they were injected with glucose in a dose of 4 g/kg, adrenaline in a dose of 150 mg/kg, and insulin in a dose of 0.5 unit/kg. These glyceemic parameters were determined: (1) the coefficient of maximum hyper and hypoglycemia; (2) the intensity of hyper and hypoglycemia and (3) the hyper and hypoglycemic limit. An analysis of the sugar plots and the above coefficients exhibited an increased sensitivity to insulin, an elevated tolerance to glucose, and a less distinct response to adrenaline.

Author

N75-20981 Joint Publications Research Service, Arlington, Va. **EFFECT OF HYPOKINESIA AND REDUCED BAROMETRIC PRESSURE ON THE TOLERANCE OF ANIMALS TO ETHYLACETATE**

G. P. Tikhonova, G. I. Solomin, Yu. P. Bizin, Yu. V. Shevchenko, and V. A. Shchirskaya *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 43-49 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 27-31

Experiments were carried out to study the tolerance of rats to an acute exposure to ethylacetate vapors. After exposure to hypokinesia and hypoxia the sensitivity of the rats to ethylacetate vapors increased two or threefold. The chronic inhalation of the substance by the hypokinetic animals induced disturbances in the brain microstructure and renal pathology. The poisoned animals which retained normal motor activity exhibited serious pathological changes in the thyroid gland. It is concluded that changes in the reactivity of the animal and human body to chemical agents must be taken into account when formulating standards for a space cabin atmosphere.

Author

N75-20982 Joint Publications Research Service, Arlington, Va. **EFFECT OF ACCELERATIONS ON THE SUGAR CONTENT IN RABBIT LIQUOR**

V. Ye. Koryukin and O. A. Vorobyev *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 50-58 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 31-36

The sugar content in the liquor of rabbits exposed to accelerations was studied. The liquor was sampled by suboccipital puncture and sugar content was measured using the Hagedorn-Jensen method. A statistically significant increase in sugar content was noted after every exposure to accelerations. The type of stimulation influenced the response: it was higher with angular accelerations of alternating signs than with constant accelerations. Experiments on labyrinthectomized animals revealed an effect of the vestibular analyzer on carbohydrate metabolism. However, when the equilibrium function reached compensation, the sugar content returned to the pretest level. Therefore, this reaction involves not only the vestibular system, but also the optic, proprioceptive and interoceptive afferent systems. A comparison of the intracisternal and intramuscular injections of adrenaline indicates a central nature of the sugar content increase during the first minutes of acceleration. Electric stimulation of the anterior and posterior hypothalamus produced the same elevation of liquor sugar as accelerations. It is postulated that afferent impulses

from the analyzer systems reach the hypothalamic centers, thus exciting the autonomic nervous system, and especially the sympathetic system. Author

N75-20983 Joint Publications Research Service, Arlington, Va. **SPIRAL EQUATION FOR THE MOVING APART OF PLANTS IN A SPIRAL-RADIAL CULTIVATOR**

V. V. Begrov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 59-65 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 36-41

Highly effective and compact cultivators move plants apart during the growing season in order to save light energy and the area under crops. Cultivators with a helical method for moving plants apart are already available. Criteria for judging the efficiency of using the area under crops in the cultivator and deformation of the leaf crown of the plants (sigma and delta spectra) are suggested. With these values taken into account the main task of calculating the helix is formulated. An equation for the helix is derived using Chinese cabbage as an illustration. An optimum helix is marked along the circle in polar coordinates. Author

N75-20984 Joint Publications Research Service, Arlington, Va. **PHYSIOLOGICAL AND HYGIENIC SUBSTANTIATION FOR THE DESIGN OF INDIVIDUAL MEANS FOR PREVENTING THE ADVERSE EFFECT OF WEIGHTLESSNESS**

A. S. Barer, A. P. Savinov, G. I. Severin, A. Yu. Stoklitskiy, and Ye. P. Tikhomirov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 66-75 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 41-47

In order to prevent the unfavorable effect of weightlessness it is recommended that individual suits be designed for long wear. These include a preventive pressure suit which imparts an axial pressure on the skeleton and moments of force during movement and a preventive vacuum suit which provides decompression of the lower body. The suits ensure conditions for functioning of the musculoskeletal apparatus and the cardiovascular system which are close to those on the earth. Author

N75-20985 Joint Publications Research Service, Arlington, Va. **ENERGY EXPENDITURES OF THE CREW DURING THE EIGHTEEN-DAY FLIGHT OF THE SOYUZ-9 SPACESHIP**

B. A. Chirkov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 76-81 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 48-51

A method is presented for studying metabolism on the basis of the changes in the partial pressure of CO₂ in a space cabin which takes into account the performance of absorbers: superoxides of the alkali metals. The oxygen consumption by the crew was measured during the flight. The average energy expenditure by crew members was 2,300 cal per day with variations from 2,020 to 3,050 cal per day and the average oxygen consumption was 22.0 nl per hour with variations from 17.6 to 26.6 nl per hour. The level of oxygen consumption by the crew exhibited a certain periodicity which was attributed to the energy expenditures during physical exercises. The oxygen consumption during adaptation to weightlessness (during the first six to seven days) was reduced to 20 nl per hour on the average. No significant changes in basal metabolism were found in crew members at any time during the flight. Author

N75-20986 Joint Publications Research Service, Arlington, Va. **PERCEPTION OF COORDINATES OF TWO-DIMENSIONAL SPACE IN PROLONGED EXPERIMENTAL HYPOKINESIA**

B. B. Bokhov, L. N. Kornilova, and I. Ya. Yakovleva *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 82-89 refs Transl. into ENGLISH

from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 51-56

The effect of hypokinesia on perception of the subjective optical vertical (SOV) was studied. Test subjects who were in an antiorthostatic position (at an angle of 96 deg to the vertical) exhibited the greatest changes in SOV perception and illusive perception of the spatial position of the body. During the first two days of the experiment and ten days thereafter they exhibited an increase by a factor of 1.5 in the error in SOV perception. They exhibited asymmetrical perception of the SOV on the right and left sides. In all cases the direction of SOV displacement from the true line coincided with the body position. Test subjects who were kept at an angle of 84 deg to the vertical (orthostatic hypokinesia) exhibited only illusions of body position during the first day and a unilateral increase in the error in SOV perception after the experiment. Test subjects who underwent preventive treatment following antiorthostatic hypokinesia (at an angle of 94 deg to the vertical) exhibited no asymmetry and an insignificant error in SOV perception. These findings are discussed in relation to changes in functioning of pressure-tension receptors and disorders in skeletal tone during hypokinesia. Author

N75-20987 Joint Publications Research Service, Arlington, Va. **NATURE OF CIRCULATORY AUTOREGULATION AS A CRITERION OF BODY TOLERANCE TO ENVIRONMENTAL AGENTS**

B. L. Apanasenko *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 90-95 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 56-59

Functional shifts in the human body affected by environmental factors were investigated. Test subjects were classified into the three principal types of circulatory autoregulation: mixed, cardiac, and vascular. Changes affected by the environmental factors prevailing in the small test chamber were greatest in subjects with cardiac regulation and least in subjects with mixed regulation. The subjects with a vascular type of regulation exhibited varying tolerance to environmental effects. It is suggested that the type of circulatory regulation be taken into account in occupational screening as an indicator of body tolerance to environmental factors. Author

N75-20988 Joint Publications Research Service, Arlington, Va. **INFORMATION CONTENT OF PULSE BLOOD FILLING OF AURICULAR VESSELS FOR EVALUATING MAN'S TOLERANCE TO +g SUB z ACCELERATIONS**

A. R. Kotovskaya, R. A. Vartbaronov, and L. N. Nikolskiy *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 96-100 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 59-66

The possibility of using photoelectric plethysmography as an objective method for evaluating human tolerance to accelerations was examined. The tolerance test subjects to +G sub z accelerations of 3, 5, 6 and 7 g with an increase in the gradient of 0.4 g/sec and a plateau time of 30 sec was measured. The test subjects induced an arbitrary tension of the abdominal and leg muscles in order to tolerate better the imparted accelerations. When the tolerance reached its limit (as judged by optical disorders) the auricular pulse amplitude decreased fourfold in 84% of the test subjects. The threshold value of the amplitude can be used as an informative indicator of group and individual tolerance to +G sub z accelerations. A portable photoelectric plethysmograph was designed for routine medical monitoring of the in-flight health of pilots. Author

N75-20989 Joint Publications Research Service, Arlington, Va. **INFLUENCE OF INTELLECTUAL EVALUATION OF A SITUATION ON THE EMOTIONAL REACTION OF AIRMEN**

V. A. Ponomarenko and V. V. Lapa *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 107-112 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 66-70

Emotional reactions of pilots to a real emergency were studied during simulations of critical and dangerous situations. Vague information on the situation was shown to be the most important emotional factor. Data were obtained indicating that with a lack of information the level of emotional stress is dependent on a mental evaluation of the signals based on previous training and experience. Author

N75-20990 Joint Publications Research Service, Arlington, Va. **DYNAMICS OF SOME TEMPERATURE RHYTHM PHASES DURING ITS INVERSION**

S. I. Stepanova *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 113-127 ref Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 70-79

Inversion of the diurnal rhythm of body temperature is studied in test subjects during an alternating work-rest regime along with the temperature changes during individual phases. It is concluded that the rate of restructuring of the diurnal rhythm is dependent on the relationship between these phases and the level of the physical and mental activity of the body. The restructuring of the diurnal rhythm of the body temperature is evaluated. Author

N75-20991 Joint Publications Research Service, Arlington, Va. **EXPERIENCE IN DEVELOPING A SYSTEM FOR THE PSYCHOLOGICAL SCREENING OF AERIAL NAVIGATORS**

V. I. Polyanskiy *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 128-132 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 79-81

Methods and organizational measures were developed and tested for psychological screening of navigators for aviation school. The proposed psychological screening method includes group examination utilizing blank methods as well as individual examination. J.M.S.

N75-20992 Joint Publications Research Service, Arlington, Va. **INFLUENCE OF VESTIBULAR AND PROPRIOCEPTIVE STIMULI ON SPINAL CORD NEURONAL REACTIONS**

A. N. Truzhennikov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 133-134 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 82

The reactions of spinal cord neurons in a cat to adequate stimulation of the vestibular receptors and inadequate stimulation of the proprioceptors are investigated. An analysis of the autocorrelation function was performed and the neuronal responses to orthodromic stimulation were studied. Post-stimulation histograms were constructed. Results are presented. J.M.S.

N75-20993 Joint Publications Research Service, Arlington, Va. **ECG CHANGE ACCOMPANYING VENEPUNCTURE IN MAN DURING PROLONGED HYPOKINESIA**

V. V. Tkachev and Ye. N. Kulkov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 135-139 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975

The influence of prolonged hypokinesia on the ECG during venepuncture was investigated. Emotional reactions were compared with emphasis on awaiting venepuncture. The investigations were made during the background period before the onset of hypokinesia, at different times during times during hypokinesia, and during the recovery period. The ECG data were used in analyzing changes in the frequency of cardiac contractions and the amplitudes of the R and T waves. Results are discussed. It is indicated that under the influence of prolonged antiorthostatic hypokinesia the human body becomes less tolerant to emotional stimuli. J.M.S.

N75-20994 Joint Publications Research Service, Arlington, Va. **USE OF AN ELECTRONIC COMPUTER IN INVESTIGATING A THERMODYNAMIC MODEL OF HYDRATION OF CARBON DIOXIDE TO CARBON AND WATER**

A. K. Zhukov, T. N. Pavlova, V. A. Naumov, and V. K. Vasilyev *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 140-142 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 85-86

Computations of a thermodynamic model of the hydration of carbon dioxide into carbon and water were made on an M-220 computer using the formulated ALGOL program. An analysis of the results is presented. J.M.S.

N75-20995 Joint Publications Research Service, Arlington, Va. **PSYCHOBIOLOGICAL TRAINING OF REGULATORY PROTECTIVE-ADAPTIVE MECHANISMS IN MAN**

Yu. S. Nikolayev and Ya. Ya. Rudakov *In its Space Biol. and Aerospace Med.*, Vol. 9, No. 1, 1975 (JPRS-64427) 28 Mar. 1975 p 143-146 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmicheskaya Med.* (Moscow), v. 9, no. 1, Jan.-Feb. 1975 p 86-88

A method for training the regulatory protective-adaptive mechanisms of man involving a combination of psychoregulating and biological factors is proposed. The psychobiological training method is based on unloading-dietetic therapy in combination with psychotherapy and hypnotic suggestion in different stages of therapeutic starvation. The effectiveness of the method was studied. Positive or negative hypnotic suggestions were made in different stages of starvation and during the recovery period, when dietetic therapy was also administered. The color precipitation reaction of the urine was used as an objective index of the influence of these factors on the human body. The results of the investigations are presented and discussed. It is indicated that unloading-dietetic therapy in combination with psychotherapy can serve as a psychobiological training method to increase the tolerance of the cardiovascular and central nervous systems in man. J.M.S.

N75-20996* Kanner (Leo) Associates, Redwood City, Calif. **STABILIZATION OF LOCOMOTOR ACTIVITY RHYTHMS OF PIGLETS INTRODUCED INTO A NEW ENVIRONMENT**

R. Dantzer Washington NASA Mar. 1975 14 p refs Transl. into ENGLISH from *J. Physiol.* (Paris), v. 66, 1973 p 495-503 (Contract NASw-2481) (NASA-TT-F-16251) Avail: NTIS HC \$3.25 CSCL 06C

By means of photocells, it is shown that the general activity of groups of piglets follows a nycthemeral rhythm with two diurnal peaks, a morning peak and a larger afternoon peak. The animals were moved to a new environment, and a systematic study of the changes in the parameters of this rhythm was formed based on the following measurements: rhythm period computed by an autocorrelation function, amount of diurnal activity compared to total daily activity, statistical indices of activity distribution based on the 25 and 75 percentiles, and the median of the hourly activity percentage cumulative curve. The period of adjustment to the new environment was characterized by a progressive decrease in the diurnal activity and an increase in its dispersion during the first three days. There was no modification in the rhythm itself. Author

N75-20997* Scientific Translation Service, Santa Barbara, Calif. **AMBULATORY ACUPUNCTURE TREATMENT OF PATIENTS WITH NOCTURNAL URINARY INCONTINENCE**

N. M. Antonov Washington NASA Apr. 1975 6 p Transl. into ENGLISH from *Urologiya i Nefrologiya* (USSR), v. 39, no. 4, 1974 p 44-46 (Contract NASw-2483) (NASA-TT-F-16248) Avail: NTIS HC \$3.25 CSCL 06E

There were 63 patients with enuresis treated by acupuncture under ambulatory conditions; the duration of the disease was from 1 to 10 years. No other therapeutic methods were used during acupuncture. The course of treatment consisted of 3 - 4 cycles, 12 seances each, at intervals of 7 - 10 days between

the 1st and the 2nd, and 10 - 14 days between the 2nd and 3rd cycles. The fourth cycle was conducted only in those patients in whom the therapeutic effect was poor. In one year, as a result of the treatment, the following was recorded in the group of patients with organic signs of affection of the nervous system: 5 were cured, a considerable improvement was seen in 11, partial improvement - in 4, and no improvement was noted in 6 cases. The following occurred in the group of patients without any organic signs of affection of the nervous system, chiefly with vegetative disturbances: recovery - in 16, a marked improvement - in 17, a partial improvement - in 4 cases.

Author

N75-20998# Oak Ridge National Lab., Tenn.
PREPARATION AND ANALYSIS OF AQUATIC-RELATED SAMPLES

N. M. Ferguson, J. R. Lund, R. R. Rickard, and L. T. Corbin 1974 15 p refs Presented at 7th Materials Res. Symp., Gaithersburg, Md., 7 Oct. 1974 Sponsored by ERDA (Conf-741023-1) Avail: NTIS HC \$3.25

Efforts under way to quantify the resultant environmental impact on receiving waters and forest lands from urban and industrial complexes and from energy production are described. Sample preparation laboratories to fulfill certain needs are in existence. An example of a laboratory used for processing aquatic samples for the analyses of Hg, Se, Cd, Pb, and Zn, and the procedure for processing aquatic insects are described. Representative homogenates are analyzed directly by neutron activation analysis, or they are dissolved and analyzed by other multi-element techniques such as atomic absorption spectrometry or isotope dilution spark-source mass spectrometry. Special mercury analyses are performed by the cold-vapor atomic absorption method. Accuracy and precision of the multi-element methods are enhanced with acquisition and reductions of data with minicomputers.

NSA

N75-20999# Los Alamos Scientific Lab., N.Mex.
PROBE ACTIVITIES Annual Report, 1 Jul. 1973 - 30 Jun. 1974

D. M. Holm and R. J. Payne Oct. 1974 11 p refs (Contract W-7405-eng-36) (LA-5751-PR) Avail: NTIS HC \$3.25

Numerous small scale experiments and feasibility studies were performed for the United States Department of Agriculture. Subjects include: measurement of 7000 R dosimeters for screwworm fly dosage monitoring, tracking of screwworm flies by the use of radar and lasers, development of temperature monitoring, transmitters for ear canal and subdermal temperature monitoring, and identifying birds with fluorescent stains.

Author (NSA)

N75-21000# Institut Franco-Allemand de Recherches, St. Louis (France).

RECORDING WITH THE AID OF HOLOGRAPHIC INTERFEROMETRY BY DOUBLE EXPOSURE OF THE MOTION OF THE TYMPANUM OF GUINEA PIGS UNDERGOING THE ACTION OF 'SHORT-TIME' SOUND EFFECTS

P. Smigielski, F. Albe, H. Fagot, A. Dancer, and R. Franke 11 Feb. 1974 27 p refs In FRENCH; ENGLISH summary (Contract DRME-73/052)

(ISL-8/74) Avail: NTIS HC \$3.75

A holographic setup used for studying the deformation of the tympanum of guinea pigs undergoing sound exposure with intensities ranging from 0.5 to 1 mbar is presented. For each experiment, the first exposure of the hologram was made in the absence of the sound effect, whereas the second one was made at a given instant after the start of the burst. In the image reconstruction process, an industrial television system observes, under good conditions, the interference fringes located close to the tympanum and characterizing the motion of the tympanic membrane. Quantitative analysis of the interferograms is discussed. The strongest motion of the tympanum is found to be located in a crescent-shaped zone opened upwards and enveloping the manubrium mallei. The point of maximum elongation is located between the umbilicus and the annulus fibrocartilagineus, namely along the axis of the manubrium mallei. In

this case, the motion of the umbilicus is approximately 7.5 times weaker than that of the point of maximum elongation.

Author (ESRO)

N75-21001# Institut Franco-Allemand de Recherches, St. Louis (France).

LASER INTERFEROMETRIC STUDIES OF THE GUINEA PIG EARDRUMS DISPLACEMENT UNDER VARIOUS ACOUSTIC EXCITATIONS: PURE SOUNDS, N WAVES, SHOCK WAVES [ETUDE DES DEPLACEMENTS DU TYMPAN PAR INTERFEROMETRIE LASER, CHEZ LE COBAYE EXPOSE A DES SOLLICITATIONS ACOUSTIQUES DIVERSES: SONS PURS, ONDES EN N, ONDES DE CHOC, ETC.]

A. Dancer, R. Franke, and H. J. Pfeifer 31 Jan. 1974 43 p refs In FRENCH

(Contract DRME-73/052)

(ISL-7/74) Avail: NTIS HC \$3.75

The guinea pig eardrum displacement at umbilicus level under various acoustic stimulation was studied by laser interferometry. Pure sound induced displacements of order 2.4 micron/mbar for frequencies between 30 and 1000 Hz. At 10 kHz these displacements are reduced by a factor 10. High amplitude pressure variations induce a reduction of the ratio displacement/overpressure from 4 mbar upwards. This ratio increases for underpressures in excess of 2 mbars. Recordings were performed following N wave stimulations of the sonic boom type and by double positive pulses. The umbilicus is shown to closely follow pressure variations. The overpressure duration has a major influence on umbilicus displacement for values above and below one to eight ms where displacement increases as a function of duration.

ESRO

N75-21002# Institut Franco-Allemand de Recherches, St. Louis (France).

PRESSURE VARIATION EFFECTS ON THE GUINEA PIG MIDDLE EAR UNDER IMPULSE SOUND EXCITATION [ETUDE DES VARIATIONS DE PRESSION DANS L'OREILLE MOYENNE DU COBAYE EXPOSE A DES BRUITS IMPULSIONNELS]

A. Dancer, R. Franke, G. Evrard, B. Adam, L. Oudin, and A. Bubendorf 5 Oct. 1973 33 p refs In FRENCH (ISL-33/73) Avail: NTIS HC \$3.75

Displacements of the eardrum/cochlea in the guinea pig under shock wave and ordnance sounds excitation were studied by middle ear pressure variation measurements. The time to maximum displacement was measured together with the effect of sound intensity and duration of the first positive wave phase. The maximum elongation is dependent only on sound intensity, and its value lies around 15 microns/mbar. For a specific waveform, a frequency analysis was performed showing attenuation of frequencies below 5 kHz and a resonance at 6.7 kHz.

ESRO

N75-21003*# Illinois Univ., Urbana. Bioacoustics Research Lab.

STUDIES ON AUDITORY AND VESTIBULAR END ORGANS AND BRAIN STEM NUCLEI Final Report, Oct. 1966 - Oct. 1974

Harlowe W. Ades Oct. 1974 38 p refs (Grant NGL-14-005-074)

(NASA-CR-142547) Avail: NTIS HC \$3.75 CSCL 06P

Cats were exposed to tones of 125, 1000, 2000, and 4000 Hz at sound pressure levels in the range 120 to 157.5 db, and for durations of one hour (1000, 2000, 4000 Hz) or four hours (125 Hz). Pure tone audiograms were obtained for each animal before and after exposure. Cochleas of animals were examined by phase-contrast microscopy. Extent of inner ear damage and range of frequencies for which hearing loss occurred increased as exposure tone was decreased in frequency. For example, exposure to 4000 Hz produced damage in a restricted region of the cochlea and hearing loss for a relatively narrow range of frequencies; exposure to 125 Hz produced wide-spread inner ear damage and hearing loss throughout the frequency range 125 to 6000 Hz.

Author

N75-21004*# Scientific Translation Service, Santa Barbara, Calif. EYE MOVEMENTS IN HUMAN ACTIVITY AND ITS STUDY

Yu. B. Gippenreyter Washington NASA Apr. 1975 37 p refs Transl. into ENGLISH from Issled. Zritel'noy Deyatel'nosti Cheloveka (Moscow), 1973 p 3-25

(Contract NASw-2483)

(NASA-TT-F-16234) Avail: NTIS HC \$3.75 CSCL 06P

Some preliminary notions concerning eye movement research are briefly set forth. Two types of investigations are discerned: one where eye movements themselves are the object of study, and the other where the analysis of eye movements is used as a method of studying other processes. The concepts of stimulation, visual mechanism, and problem are defined as being the fundamental factors in a study of eye movements. Finally, the development of the study of fixation optokinetic nystagmus is traced.

Author

N75-21005*# Kanner (Leo) Associates, Redwood City, Calif. FIXATION OPTOKINETIC NYSTAGMUS (FOKN) AND ITS MECHANISMS

Yu. B. Gippenreyter, ed. and V. Ya. Romanov Washington NASA Apr. 1975 21 p refs Transl. into ENGLISH from Issled. Zritel'noy Deyatel'nosti Cheloveka (Moscow), 1973 p 26-41

(Contract NASw-2481)

(NASA-TT-F-16235) Avail: NTIS HC \$3.25 CSCL 06P

Experiments in which a subject's eye movements were recorded as he fixed on a stationary point against a moving background are described and evaluated. These involuntary eye movements constitute fixation optokinetic nystagmus (FOKN). The characteristics of FOKN depend on the relation between the direction of the asymmetry of physiological nystagmus and the direction of the moving background. When these directions are the same, FOKN has the form of stimulated physiological nystagmus; when the directions are opposite, it has the form of suppressed physiological nystagmus. Results reveal the subcortical nature of FOKN.

Author

N75-21006*# Kanner (Leo) Associates, Redwood City, Calif. THE PROBLEM OF EQUILIBRIUM IN THE WEIGHTLESS STATE

M. Simonovic and J. Simonovic Washington NASA Apr. 1975 16 p refs Transl. into ENGLISH from 1st Yugoslav Aerocosmonautics Conf. (Belgrade), Commun.-1, 19-20 May 1973 p 43-52

(Contract NASw-2481)

(NASA-TT-F-16246; Commun-1) Avail: NTIS HC \$3.25 CSCL 06S

The effect of weightlessness on the functioning of the vestibular apparatus of the inner ear is studied. It is shown that the absence of gravity, particularly in combination with other accelerations, can lead to a number of physical and psychological disturbances in astronauts, since the organ of balance of the inner ear requires the presence of gravity as a stimulus to its proper functioning. The so-called space sickness can occur.

Author

N75-21007*# Kanner (Leo) Associates, Redwood City, Calif. THE STATE OF WEIGHTLESSNESS AND PROTECTIVE MEASURES

R. Debijadji Washington NASA Apr. 1975 11 p refs Transl. into ENGLISH from 1st Yugoslav Aerocosmonautics Conf. (Belgrade), Commun.-1, 19-20 May 1973 p 43-52

(Contract NASw-2481)

(NASA-TT-F-16247; Commun-1) Avail: NTIS HC \$3.25 CSCL 06Q

Past experience indicates that human stay in weightlessness during space flight induces some changes in the astronaut's body functions. These changes become especially noticeable after return to earth gravity conditions. However, these changes are reversible. In order to prevent the deconditioning of the organism in zero gravity, certain countermeasures are taken. Certain protective techniques can be used to facilitate the readaptation of the human body after landing on earth.

Author

N75-21008*# Kanner (Leo) Associates, Redwood City, Calif. SPONTANEOUS VARIABILITY OF BLOOD PRESSURE IN**PATIENTS WITH HYPERTENSION: RESULTS OF LONG TERM TELEMETRIC BLOOD PRESSURE MEASUREMENTS**

B. Kronig, K. Dufey, P. Reinhardt, J. Jahnecke, and H. P. Wolff Washington NASA Apr. 1975 11 p refs Transl. into ENGLISH from Med. Welt (West Germany), v. 25, no. 27-28, 1974 p 1225-1228

(Contract NASw-2481)

(NASA-TT-F-16250) Avail: NTIS HC \$3.25 CSCL 06E

The method of microcatheter blood pressure telemetry permits deeper insights into spontaneous variability in ordinary blood pressure. In long term measurements on 77 unselected hypertensives, the well known circadian and diurnal rhythms of blood pressure were detected. The patterns have the same form but occurred at different levels in the three WHO categories of hypertonia. Exercise and stress caused considerable modifications in the profile. Regularities were observed in time of day and reaction to exercise.

Author

N75-21009# Westinghouse Electric Corp., Pittsburgh, Pa. Astronuclear Lab.**NUCLEAR-POWERED ARTIFICIAL HEART PROTOTYPE SYSTEM DEVELOPMENT PROGRAM. PHASE 3A: CONCEPTUAL DESIGN INTERMEDIATE SYSTEM**

1 Feb. 1974 101 p refs

(Contract AT(11-1)-3043)

(COO-3043-14) Avail: NTIS HC \$5.25

The overall objective of phase 3 is to develop the nuclear-powered Stirling-mechanical artificial heart system to prototype status. It is planned that the goals for the prototype system by achieved by incorporating improvements resulting from continuing research and development activities into a series of three calf-implantable systems: an implantable version of the phase 2 bench model, the intermediate system, and the prototype system. A conceptual of the intermediate system of phase 3 is presented.

NSA

N75-21010# Oak Ridge National Lab., Tenn. ESTIMATED RADIATION DOSES FROM FOOD COOKED WITH NATURAL GAS FROM NUCLEARLY STIMULATED WELLS

C. J. Barton Dec. 1974 7 p refs

(Contract W-7405-eng-26)

(ORNL-TM-4735) Avail: NTIS HC \$3.25

Published data on the transfer of tritium from nuclearly stimulated natural gas to food during cooking and the average volume of gas used in gas ranges have been combined to provide an estimate of the potential tritium intake by people in the United States eating hypothetically tritiated food. The average whole body dose to an individual is estimated to be 0.02 millirem/year, and the corresponding population dose to 100 million people is $2 \times 1,000$ man-rem, about 1/5000 of the dose received by the same population from natural radiation sources. This exposure pathway appears to be less important than direct exposure to tritiated water vapor in natural gas combustion products.

Author (NSA)

N75-21011# Fraunhofer-Gesellschaft zur Forderung der Angewandten Forschung e. V., Graftschaft (West Germany). Inst. fuer Aerobiologie.**HISTOCHEMICAL AND ELECTRON MICROSCOPICAL INVESTIGATIONS ON LIVERS AND KIDNEYS OF MICE AND RATS AFTER PE INTOXICATION, HYPOXIA, AND HUNGER DIET [HISTOCHEMISCHE UND ELEKTRONENMIKROSKOPISCHE UNTERSUCHUNGEN AN LEBER UND NIERE VON MAUS UND RATTE NACH PE-VERGIFTUNG, NACH O2-MANGEL UND NACH HUNGERDIET]**

H. Hettwer Bonn Bundeswehramt 1974 56 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung

(BMVG-FBWT-74-10) Avail: NTIS HC \$4.25; Bundeswehramt 44.50 DM

Livers and kidneys of female NMRI-mice and Sprague-Dawley rats were subjected to histological, histochemical and electron microscopic investigations following intoxication with Soman (O-pinacoyl-methylphosphonyl-fluoride) in comparison to animals

exposed to starvation or hypoxia. The increased reduction of carbohydrates in the liver was explained by the refused ingestion after Soman application. The fatty degeneration of liver and kidney after PE-intoxication is discussed as a consequence of hypoxia and a reduced transport of fat out of the cells. Activity of lipase and unspecific esterase and formation of phosphatide were not reduced. Author (ESRO)

N75-21012# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
SOME NOTES ON THE INVERSE PROBLEM IN ELECTROCARDIOGRAPHY

A. A. H. Damen Jul. 1974 48 p refs
(TH-74-E-48; ISBN-90-6144-048-3) Avail: NTIS HC \$3.75

The inverse problem in cardiography consists of the estimation of electrical heart activity from body surface measurements. It is shown, that the information contained in the skin potentials (as a function of two dimensions) is not sufficient to define uniquely a volume source distribution (three dimensional). Under some conditions it is possible to constitute a unique equivalent double layer (two dimensions). This simplification of the sources is not as drastic as the discretization by way of dipoles. Furthermore the observability can better be defined for a double layer. Author (ESRO)

N75-21013# Automation Counselors, Inc., Frederick, Md.
SUPPORT OF HYPERBARIC PHYSIOLOGY RESEARCH Annual Report, 1 Sep. 1973 - 31 Aug. 1974

Sue Benitez, William H. Mints, and Arnold Pomerance Oct. 1974 15 p refs
(Contract N00014-72-C-0162)

(AD-A002480; ACI-1009-7; AR-3) Avail: NTIS CSCL 06/19
The report describes advances made in the development of physiological monitoring and analysis systems for use in hyperbaric research. The systems, designed around a mini-computer configuration, are able to monitor up to 16 channels of analog data and 5 channels of data from radio-isotope detectors. Both real-time and non real-time data analysis is included as part of the operational system. Instrumentation and software development in support of nerve pulse, cerebral blood flow and respiration research projects are described. GRA

N75-21014# Army Aeromedical Research Lab., Fort Rucker, Ala.

OXYGEN TOXICITY IN THE MAMMALIAN BRAIN Final Report

Dennis A. Baeyens and Joseph O. Bonnett Dec. 1974 13 p refs
(AD-A003229; USAARL-75-8) Avail: NTIS CSCL 06/1

The lactate dehydrogenase (LDH) activity of mouse brain homogenates was examined after exposure to hyperbaric oxygen (5763.8 mm Hg PO₂) and compared to room air controls (158.8 mm Hg PO₂). The effect of reduced glutathione on LDH activity after hyperbaric oxygen exposure was also examined. The activity of LDH after treatment with hyperbaric oxygen was significantly diminished when compared with controls. In the presence of reduced glutathione, homogenates exposed to hyperbaric oxygen demonstrated higher activity than did homogenates incubated without glutathione. It is concluded that oxygen induced inhibition occurs through the oxidation of essential free sulfhydryl groups and that this oxidation can either be prevented by reduced glutathione or the disulfide bridges may be reduced to free sulfhydryl groups by the glutathione after oxidation. GRA

N75-21015# National Bureau of Standards, Washington, D.C.
SUMMARY OF THE OFFICE OF TOXIC SUBSTANCES REQUIREMENTS RESULTING FROM THE TOXIC SUBSTANCES CONTROL ACT AND A PRELIMINARY SPECIFICATION FOR A DATA MANAGEMENT SYSTEM Final Report

John L. Berg, Josephine Walkowicz, Dennis Branstad, and Michael Keplinger Aug. 1974 143 p refs

(Contract EPA-IAG-D4-0404)
(PB-238088/9; EPA-560/3-74-001) Avail: NTIS HC \$5.75 CSCL 06T

A requirements analysis and feasibility study are reported for the data management system needed to use effectively industrial reporting data resulting from the proposed toxic substances control act. The study finds that the Office of Toxic Substances requires a system with flexibility, extensibility of data content, ability to handle a wide and confidential nature of the reports, and suitability for immediate installation on a production basis. In the study both a manual system that minimally satisfies the basic requirements and a computerized system with much extended capabilities are found technically feasible. GRA

N75-21016# Battelle Columbus Labs., Ohio.
IDENTIFICATION SYSTEMS FOR SELECTING CHEMICALS OR CHEMICAL CLASSES AS CANDIDATES FOR EVALUATION Final Report

James E. Flinn, Theodore J. Thomas, and Milo D. Bishop Nov. 1974 153 p refs

(Contract EPA-68-01-2108)
(PB-238196/0; EPA-560/1-74-001) Avail: NTIS HC \$6.25 CSCL 06T

The report summarizes the state of the art on systems, either existing or conceptual, that can be used or adapted for use to select, assess, and prioritize chemicals for their health or environmental effects. It is found that, while numerous systems can be identified, none were formulated with sufficient breadth to permit accomplishing all the functions which include: identification of chemical hazards to man and his environment, selecting chemicals not already in use, assessing potentially hazardous degradation products or synergistic effects, and assessing hazards to plants, animals, and the nonliving environment. GRA

N75-21017# Indiana Univ., Bloomington.
THE GASEOUS ENVIRONMENT AND TEMPERATURE REGULATION Final Report, 1 Jan. 1972 - 31 Aug. 1973

Reynaldo S. Elizondo Nov. 1974 116 p refs

(Contract DADA17-68-C-8006)
(AD-A003128) Avail: NTIS CSCL 06/16

The greater sweating capacity of the acclimatized man has been attributed to either changes in the sensitivity of the central thermoregulatory center or to local changes in sweating capacity of the glands. In the present study resistance hygrometry was used to further elucidate the nature of the increased sweating capacity following short term heat acclimation. Results indicate that the higher sweating output following acclimation is due essentially to an amplification of the thermoregulatory function at the periphery, possibly at the neuroglandular junction or at the level of the gland itself. A physiological warm skin temperature seems to be a necessary condition in this functional modification, but a higher skin temperature does not affect significantly in the modification of the sweat gland function during the acclimation. The changes in the ionic concentrations of extracellular fluid, in enzymatic systems, or in the levels of hormones may enhance the capacity of sweat secretion. GRA

N75-21018# Scientific Translation Service, Santa Barbara, Calif.
SLEEP PATTERNS OF WORKERS ON ROTATING SHIFTS

J. Foret and O. Benoit Washington NASA Apr. 1975 17 p refs Transl. into ENGLISH from Electroencephalog. Clin. Neurophysiol. (Montreal), no. 37, 1974 p 337-344

(Contract NASw-2483)
(NASA-TT-F-16211) Avail: NTIS HC \$3.25 CSCL 05E

Workers who were on rotating shifts for several years served as subjects for the recording of the EEG during nocturnal and diurnal sleep. It was found that the duration of sleep is reduced when it must take place during the daytime, or at times other than usual sleep periods. It is also shown that the later the subject goes to sleep, the shorter is the duration of daytime sleep. The amount of daytime paradoxical sleep (PS) is less than during the night but the amount of slow wave sleep is practically the same in these two conditions. The amount of PS increases as a function of time in a period of sleep during the night as well as during the day, but it increases more rapidly during the first cycles of daytime sleep. Author

N75-21019* Scientific Translation Service, Santa Barbara, Calif.
NIGHT AND SHIFT WORK OF LOCOMOTIVE ENGINEERS. SECOND REPORT: INVESTIGATIONS ON THE ORGANIZATION OF DAILY SERVICE SCHEDULES

W. Rohmert, G. Hildebrandt, and J. Rutenfranz Washington NASA Apr. 1975 25 p refs Transl. into ENGLISH from Int. Arch. Arbeitsmed. (Germany), v. 33, 1974 p 99-114 (Contract NASw-2483)

(NASA-TT-F-16229) Avail: NTIS HC \$3.25 CSCL 05E

Analyzing the present regulation of work for engine drivers of the German railroad demonstrates that discontinuity is the outstanding characteristic of their work schedule. All shifts are changed daily so that the driver is subject to an alternation in route, starting time, working time, and in the particular engine driven. For discussion of negative physiological and social effects of today's shift work we analyzed the structure of the shift. Specific time tables of engine drivers in two German stations are discussed. Practical suggestions are given, aimed at avoiding negative effects of work schedules that put intolerable strain on engine drivers. Author

N75-21020* Scientific Translation Service, Santa Barbara, Calif.
STUDY OF THE CHARACTERISTICS OF THE VISUAL PERSPECTIVE PROCESS BY THE FOKN METHODS

V. Ya. Romanov Washington NASA Apr. 1975 37 p refs Transl. into ENGLISH from the book "Issledovaniye zritel'noy deyatelnosti cheloveka" Moscow, Moscow State Univ. Press, 1973 p 42-68

(Contract NASw-2483)

(NASA-TT-F-16236) Avail: NTIS HC \$3.75 CSCL 05E

Experiments were performed to determine whether the various characteristics of the visual process are reflected in fixation optokinetic nystagmus (FOKN). Subjects were to solve various classical visual perspective problems while their FOKN were recorded. Investigations show that FOKN is an indicator of the tonic system of the eyes, and explains properties and forms of visual activity. It was found that this type of eye micromovement depends on the directional effect of the subject's activity, and that a suppression of FOKN activity takes place during visual problems. Author

N75-21021* Scientific Translation Service, Santa Barbara, Calif.
FIXATED OPTOKINETIC NYSTAGMUS AS AN INDICATOR OF THE ROLE OF VISION IN MOVEMENTS

Yu. B. Gippenreyter and G. L. Pik Washington NASA Apr. 1975 22 p refs Transl. into ENGLISH from the book "Fiksatsionnyy optokineticheskiy nistagm kak pokazatel' uchastiya zreniya v dvizheniyakh" Moscow, Moscow Univ. Press, 1973 p 69-83

(Contract NASw-2483)

(NASA-TT-F-16237) Avail: NTIS HC \$3.25 CSCL 05E

An attempt was made to extend the investigation of FOKN (Fixation Optokinetic Nystagmus) to a new category of problems, hand movements. The purpose of this work was to elucidate whether FOKN responds to the extent of visual participation in motor acts. Author

N75-21022* Civil Aeromedical Inst., Oklahoma City, Okla.
MULTIPLE TASK PERFORMANCE AS A PREDICTOR OF THE POTENTIAL OF AIR TRAFFIC CONTROLLER TRAINEES, A FOLLOWUP STUDY

W. Dean Chiles and Georgetta West Nov. 1974 8 p refs (AD-A002920; FAA-AM-74-10) Avail: NTIS HC \$3.25

The current professional status of 229 air traffic controller trainees tested in an earlier series of complex performance studies was determined by reference to the official FAA personnel roster some 2 to 2 1/2 years later. Point-biserial correlations between the previously obtained performance measures and the retention/termination status of the trainees were computed; correlations were also computed between the criterion used in the earlier study (instructor ratings of trainee potential) and the retention criterion and between the Civil Service Commission (CSC) air traffic control specialist (ATCS) aptitude screening battery scores and the retention criterion. Twelve of the fourteen correlations between the instructor ratings and the retention criterion were significant at the 0.05 level of confidence or better, but none of

the correlations between the CSC test scores and the retention criterion were significant. Author

N75-21023* Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.

A REVIEW OF THE MOST IMPORTANT AND SUFFICIENTLY FOUNDED KNOWLEDGE ABOUT THE VISIBILITY OF AIRCRAFT (MAXIMUM DETECTION RANGE)

Hans-Eberhard Hoffmann 3 Sep. 1974 33 p refs In GERMAN; ENGLISH summary

(DLR-Mitt-74-33) Avail: NTIS HC \$3.75; DFVLR, Porz, West Ger. DM 13

An aircraft becomes visible for an observer as soon as the differences of brightness between the aircraft and its background are large enough to reach or to exceed the contrast threshold of the human eye. The results of laboratory tests have shown how dependent the contrast threshold is on size and shape of an object, adaptation brightness, exposure time, and location of an image on the retina. In field experiments it was determined in what manner the maximum detection range depends in horizontal standard visibility, type of aircraft, background, adaptation brightness, and on the observer himself. The maximum detection range is the distance in which an aircraft can just be seen. Author (ESRO)

N75-21024* Columbia Univ., New York. Psychophysics Lab.
TIME AND DISTANCE JUDGMENTS FOR DYNAMIC AND STATIC VISUAL DISPLAYS Final Scientific Report

Eugene Galanter, John A. Owens, and Patricia A. Galanter 1 Sep. 1974 44 p refs

(Contract DADA17-70-C-0077)

(AD-A002290; PLR-37) Avail: NTIS CSCL 05/10

Laboratory experiments are described in which subjects viewed motion pictures of shallow and steep aircraft approaches and made judgments of time to touchdown. Psychophysical functions of these judgments are discussed. Subjects viewed still photographs made during both shallow and steep aircraft approaches and judged distance to touchdown. Psychophysical functions of the judgments are also discussed. A pilot study for a field experiment was then conducted. Results support the laboratory indications that time to touchdown estimates are a linear function of time. GRA

N75-21025* Life Sciences, Inc., Hurst, Tex.
TEST OF A MODEL OF VISUAL SPATIAL DISCRIMINATION AND ITS APPLICATION TO HELICOPTER CONTROL Annual Summary Report, 1 Jun. 1973 - 31 May 1974

J. A. Bynum, E. E. Smart, F. A. Sanborn, and W. G. Matney Jun. 1974 49 p refs

(Contract DADA17-72-C-2110)

(AD-A002624; LSI-TR-74-1) Avail: NTIS CSCL 05/10

This report describes two field studies which tested pilots' abilities to maintain hover control of a helicopter when the visual field was restricted and when referents were specified. Two laboratory studies are also described which tested observer's abilities to detect small displacements in one of a pair of stimulus dots on a CRT display and displacements of real-world visual scenes when only the scene moved or when scene and observer were moved in the pitch dimension. Results of studies are discussed. GRA

N75-21026* Army Foreign Science and Technology Center, Charlottesville, Va.

SCIENTIFIC MANAGEMENT PERSONNEL

K. M. Varshavskii 26 Mar. 1974 26 p refs Transl. into ENGLISH from Nauk. Inform. Resp. Mezhdved. Sb. (USSR), no. 6, 1972 p 12-23

(AD-A002760; FSTC-HT-23-0220-74) Avail: NTIS CSCL 05/9

A study of management personnel in scientific research institutions has been involved with all aspects of the problem. The author states that the very nature of scientific work means that management personnel must be of an exceptionally high standard. He suggests that elderly management personnel could

N75-21027

work on a part-time basis to help scientific output and lend valuable experience to institutions. GRA

N75-21027# School of Aerospace Medicine, Brooks AFB, Tex. **SUBJECT INSTRUCTION MANUAL FOR THE PILOT PERFORMANCE EVALUATION SYSTEM Final Report, Mar. 1971 - Apr. 1974**

Peter H. Henry Oct. 1974 39 p refs
(AF Proj. 7930)

(AD-A003433; SAM-TR-74-40) Avail: NTIS CSCL 05/9

An automated system has been developed to assess pilot performance in a Singer Co. GAT-1 trainer. This report is an instruction manual for subjects which explains the basic functions of the various controls and instruments of the GAT-1 and the test requirements. Included is a set of instruction cards describing the maneuvers to be executed during the course of the hour-long test. Strategies for obtaining low error scores are also discussed. GRA

N75-21028# Herbert H. Lehmann Coll., Bronx, N.Y. Dept. of Family and Consumer Services.

THE ENERGY CRISIS AND DECISION MAKING IN THE FAMILY Final Report, Jun.-Dec. 1974

Rovena Kilkeary Jan. 1975 57 p

(Contract NSF GY-11543)

(PB-238783/5; NSF/SOS-GY-11543) Avail: NTIS HC \$4.25 CSCL 05J

The exploratory study in the Queens and Bronx sections of New York City was designed to obtain information about family use of energy during the energy shortage of 1974. The Queens community had experienced an extended power failure the previous summer; the Bronx community had not. A questionnaire which recorded family characteristics, the respondent's energy knowledge, and the respondent's actual practices was used to determine whether exposure to such a crisis situation had resulted in different energy consumption practices. GRA

N75-21029*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

EFFECTS OF EXPOSURE TIME DURING FLIGHT MANEUVERS ON PASSENGER SUBJECTIVE COMFORT RATING

Valerie J. Brown Apr. 1975 28 p refs

(NASA-TM-X-72660) Avail: NTIS HC \$3.75 CSCL 05E

The effects were investigated of length of exposure time to a flight maneuver environment on subjective passenger evaluation of ride comfort. Four statistical analysis tests were performed on ride comfort ratings obtained during one two-hour test flight wherein eleven test subjects were exposed to two identical programmed sequences of twenty four flight segments which covered a wide range of maneuver conditions. The results of the analysis indicate that, for over ninety five percent of the segments, there is no significant change in the test subjects comfort ratings of identical segments spaced one hour apart. These results are in contrast to those found in previous studies involving a vibration environment, rather than flight maneuver environment, where increased exposure-time was found to cause a degradation of ride comfort ratings. Author

N75-21030*# Essex Corp., Alexandria, Va.

MAN-SYSTEMS EVALUATION OF MOVING BASE VEHICLE SIMULATION MOTION CUES

Mark Kirkpatrick and Ronald G. Brye Apr. 1974 113 p refs

(Contract NAS8-29914)

(NASA-CR-120706) Avail: NTIS HC \$5.25 CSCL 05E

A motion cue investigation program is reported that deals with human factor aspects of high fidelity vehicle simulation. General data on non-visual motion thresholds and specific threshold values are established for use as washout parameters in vehicle simulation. A general purpose simulator is used to test the contradictory cue hypothesis that acceleration sensitivity is reduced during a vehicle control task involving visual feedback. The simulator provides varying acceleration levels. The method of forced choice is based on the theory of signal detect ability. G.G.

N75-21031# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

AIRCREW PROTECTIVE CLOTHING AND DEVICES SYSTEM ROTARY WING AIRCRAFT

Stan J. Winsko and Alan S. Hellman 1 Nov. 1974 67 p refs
(AD-A002423; NADC-74215-40) Avail: NTIS CSCL 06/17

A study was conducted to portray the major mission profiles in which the helicopter community is engaged, and by so doing, to identify the problem areas associated with the current inventory of helicopter aircrew protective equipment toward fulfilling the requirements of these missions. The ultimate objective of this effort is to provide a sound basis from which a series of separate but coordinated engineering developments will be conducted to provide a new generation of mission-specific protective systems for the helicopter community. The net effect of the program will be to enhance the inflight performance and effectiveness of all helicopter aircrewmembers with little or no sacrifice to their safety in the event of an emergency situation. GRA

N75-21032# Uniroyal, Inc., Naugatuck, Conn.

PRODUCTION OF ELECTRICALLY HEATED GLOVES Technical Report, Jun. 1973 - Sep. 1974

Richard J. VanTwisk Sep. 1974 59 p refs

(Contract DAAG17-73-C-0242; DA Proj. 1T7-64713-DL-40) (AD-A003327; USA-NLABS-TR-75-39-CE) Avail: NTIS CSCL 06/17

The report describes two methods of fabricating electrically heated gloves; one using a patented hand constructed unique method and the other being a low cost easily reproducible automated technique. Both of these methods use wire as the heating elements. GRA

N75-21033# New Mexico State Univ., University Park. Dept. of Psychology.

COLOR RESEARCH FOR VISUAL DISPLAYS Final Report, 1 Aug. 1973 - 31 Jul. 1974

Richard E. Christ, Ara L. Stevens, and Donna J. Stevens Jul. 1974 38 p ref

(Contract N00014-70-A-0147-003; NR Proj. 213-102)

(AD-A003049; NMSU-JANAIR-FR-74-1; JANAIR-741103) Avail: NTIS CSCL 05/5

A multiple displays-multiple task system has been developed for testing the efficacy of color as a coding variable in visual displays. The rationale for this particular system is provided and the hardware and software subsystems are briefly described. The general procedures to be employed in a two-track program of research are also provided. GRA

N75-21034*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AMINO ACIDS IN A FISCHER TROPSCH TYPE SYNTHESIS

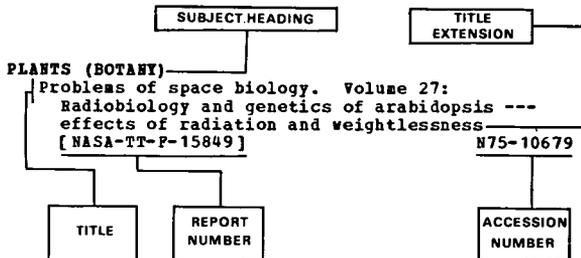
Donald L. Brown (Santa Clara Univ.) and James G. Lawless Aug. 1974 10 p refs

(NASA-TM-X-62411; A-5909) Avail: NTIS HC \$3.25 CSCL 06C

One postulation is described for the presence of organic compounds in meteorites which states that they were formed during the condensation of the solar nebula. A viable laboratory simulation of these conditions can be modeled after the industrial Fischer Tropsch reaction, which is known to produce organic compounds called hydrocarbons. In this simulation, a mixture of carbon monoxide, hydrogen and ammonia is heated in the presence of iron meteorite. The reaction products for amino acids, a class of organic compounds important to life, were examined. A large number of these compounds is found in meteorites and other chemical evolution experiments, but only small quantities of a few amino acids were found in the present simulation work. These results are at odds with the existing literature in which many amino acids were reported. Author

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Typical Subject Index Listing



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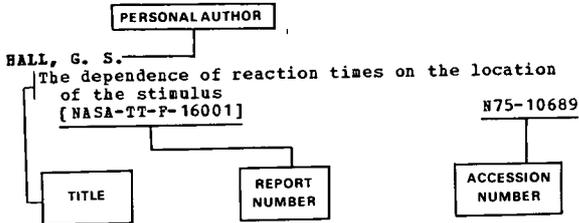
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