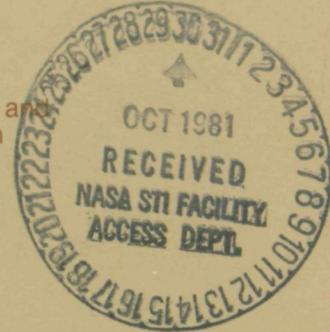


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(NASA-SP-7011 (223)) AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY (SUPPLEMENT 223) (National Aeronautics and Space Administration) 42 p HC A03 CSCL 06E N82-10709 Unclas 00/52 39048

Aerospace Medicine and Biology

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ACCESSION NUMBER RANGES

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

STAR (N-10000 Series) N81-24019 – N81-26026

IAA (A-10000 Series) A81-33953 – A81-37632

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 223)

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 August 1981 in

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

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 92 reports, articles and other documents announced during August 1981 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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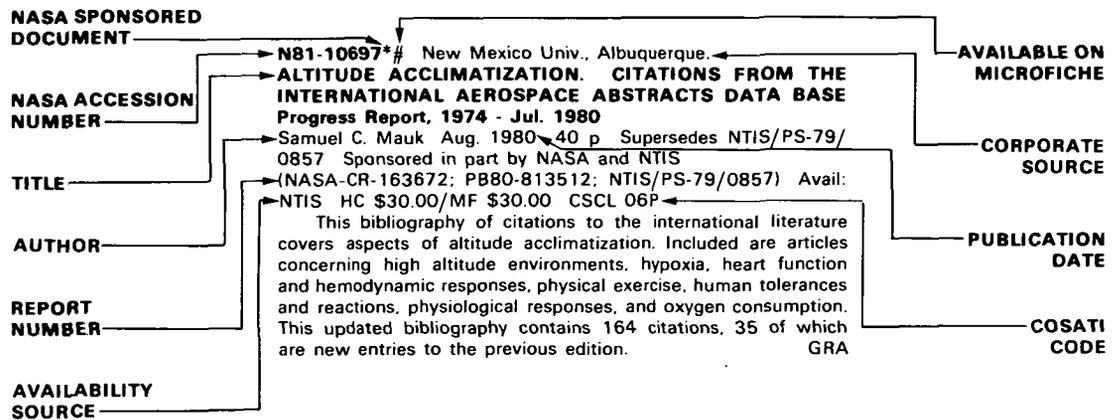
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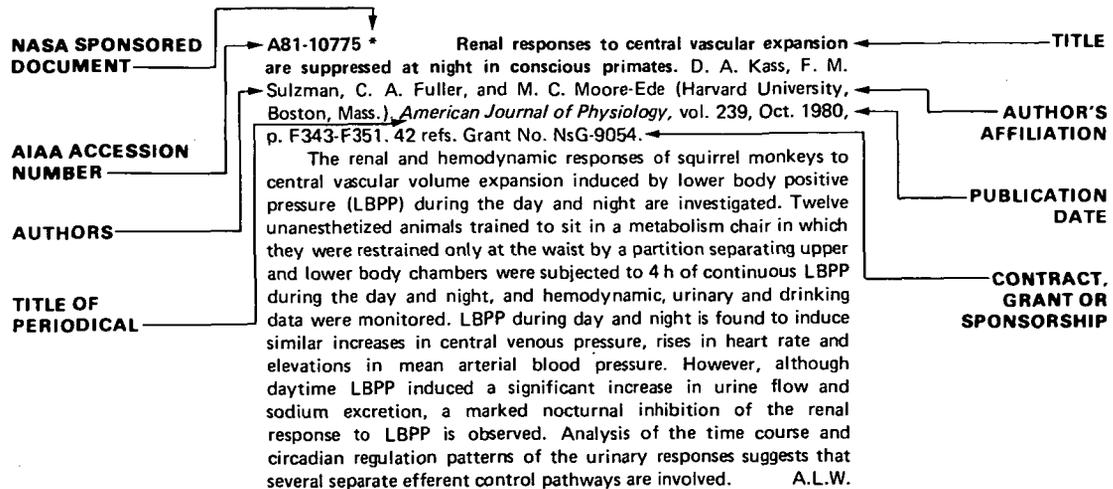
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TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 223)

SEPTEMBER 1981

IAA ENTRIES

A81-33999 * Influence of combined visual and vestibular cues on human perception and control of horizontal rotation. G. L. Zacharias and L. R. Young (MIT, Cambridge, Mass.). *Experimental Brain Research*, vol. 41, 1981, p. 159-171. 18 refs. Grants No. NsG-2032; No. NsG-2230.

Measurements are made of manual control performance in the closed-loop task of nulling perceived self-rotation velocity about an earth-vertical axis. Self-velocity estimation is modeled as a function of the simultaneous presentation of vestibular and peripheral visual field motion cues. Based on measured low-frequency operator behavior in three visual field environments, a parallel channel linear model is proposed which has separate visual and vestibular pathways summing in a complementary manner. A dual-input describing function analysis supports the complementary model; vestibular cues dominate sensation at higher frequencies. The describing function model is extended by the proposal of a nonlinear cue conflict model, in which cue weighting depends on the level of agreement between visual and vestibular cues. (Author)

A81-34000 * Sensation of rotation about a vertical axis with a fixed visual field in different illuminations and in the dark. J. Huang and L. R. Young (MIT, Cambridge, Mass.). *Experimental Brain Research*, vol. 41, 1981, p. 172-183. 33 refs. Grants No. NsG-2012; No. NsG-2230.

The effects of the oculogyro illusion of the relative motion of a spot fixed with respect to the subject during subject rotation and of a fixed striped peripheral visual field under different levels of illumination on perceptions of rotation about a vertical axis are investigated. Subjects were seated in a rotatable flight trainer cockpit with visual fields consisting of darkness, a dim peripheral field, and a bright peripheral field, all fixed with respect to the subject, and subject perceptual thresholds, frequency responses and sensations of displacement and velocity were measured during trainer rotation at constant and varying angular accelerations. The perception of angular acceleration is found to exhibit a significantly lower threshold and a reduced latency time in the illuminated visual fields which was independent of the level of illumination. Subjective frequency responses showed a higher gain in the illuminated presentations, while subjective displacements during triangular velocity stimuli exhibited no difference for the different visual cues. Finally, magnitude estimations of the after-rotation associated with deceleration from a constant velocity showed a greater rising speed, larger velocity and longer duration under illumination. Results show that, for low accelerations, the visual input enhances sensitivity to self-motion, an effect explained by the oculogyral illusion. A.L.W.

A81-34040 Archaeobacteria. C. R. Woese (Illinois, University, Urbana, Ill.). *Scientific American*, vol. 244, June 1981, p. 98-100, 104, 106 (8 ff.).

Archaeobacteria are genealogically neither prokaryotes nor eukaryotes. Phylogenetic evidence suggests that they are at least as old as the other groups, and some archaeobacteria have a form of metabolism that seems particularly well suited to the conditions believed to have prevailed in the early history of life on earth. Hence it seems possible that this newest group of organisms is actually the oldest. The defining characteristics of all three proposed primary organisms are distinguished in detail, and known archaeobacterial forms are classified. Implications on evolution of life are also examined. T.M.

A81-34050 * Heart rate, multiple body temperature, long-range and long-life telemetry system for free-ranging animals. G. F. Lund, R. M. Westbrook, and T. B. Fryer (NASA, Ames Research Center, Moffett Field, Calif.). *Biotelemetry and Patient Monitoring*, vol. 7, no. 3-4, 1980, p. 137-177. 33 refs. Grant No. NsG-2293.

The design details and rationale for a versatile, long-range, long-life telemetry data acquisition system for heart rates and body temperatures at multiple locations from free-ranging animals are presented. The design comprises an implantable transmitter for short to medium range transmission, a receiver retransmitter collar to be worn for long-range transmission, and a signal conditioner interface circuit to assist in signal discrimination and demodulation of receiver or tape-recorded audio outputs. Implanted electrodes are used to obtain an ECG, from which R-wave characteristics are selected to trigger a short RF pulse. Pulses carrying heart rate information are interrupted periodically by a series of pulse interval modulated RF pulses conveying temperature information sensed at desired locations by thermistors. Pulse duration and pulse sequencing are used to discriminate between heart rate and temperature pulses as well as radio frequency interference. The implanted transmitter may be used alone for medium and short-range tracking, or with a receiver-transmitter collar that employs commercial tracking equipment for transmissions of up to 12 km. A system prototype has been tested on a dog. A.L.W.

A81-34072 # Medical studies aboard Soviet manned spacecraft (Meditsinskii issledovaniia na sovetskikh pilotiruemykh kosmicheskikh korabliakh). O. G. Gizenko, A. M. Genin, and A. D. Egorov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Priroda*, Apr. 1981, p. 42-47. In Russian.

The paper reviews studies on the effects of weightlessness, vestibular disturbances, and disturbances of the cardiovascular and motor systems among Soviet cosmonauts, particularly on prolonged flights. Results show that physiological disturbances manifested in short-term flights (one month or less) present no problem for longer-term flights (up to six months) if proper conditions of exercise, work, and life support are maintained. B.J.

A81-34195 Application of performance based feedback to air combat training. A. P. Ciavarelli and A. M. Williams (Dunlap and Associates, Inc., La Jolla, Calif.). *Society of Automotive Engineers, Aerospace Congress and Exposition, Los Angeles, Calif., Oct. 13-16, 1980, Paper 801182*. 15 p. 9 refs. Contracts No. N61339-77-C-0167; No. N61339-78-C-0136.

The U.S. Navy's Tactical Aircrew Combat Training System (TACTS) measures performance of combat pilots. Aircraft carry out simulated combat or other missions for training purposes and the system continuously records data for quantitative assessment. The data measure criteria defined as important for the activity which are statistically related to combat events. It was found that successful outcomes depend upon performance at critical points such as radar contact, sighting and first shot. A Performance Assessment and Appraisal System (PAAS) was designed to utilize TACTS data so as to structure feedback information in relation to critical points in the engagement. The system memory contains previous mission data and training progress can be followed. D.B.

A81-34197 Trends in Air Force simulation - Perspective from the Air Force Human Resources Laboratory Operations Training Division. R. C. Needham and B. J. Edwards (USAF, Human Resources Laboratory, Williams AFB, Ariz.). *Society of Automotive Engineers, Aerospace Congress and Exposition, Los Angeles, Calif., Oct. 13-16, 1980, Paper 801184.* 9 p.

A81-34301 Effects of severe heat stress on respiration and metabolic rate in resting man. C. Saxton (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 281-286. 37 refs.

The effects on metabolic gas exchange, pulmonary ventilation, respiratory rate, heart rate, and end-tidal carbon dioxide tension of increases in deep body temperature of 2 C were studied in adult male human subjects at rest. The increase in pulmonary ventilation (49%) was accompanied by a reduction in end-tidal carbon dioxide tension (17%). Heart rate rose by 85%. The increase in oxygen consumption expressed as a function of body surface area was found to be similar in all experiments (19%), irrespective of the value of the resting oxygen consumption in the control period. There was an associated 16% increase in carbon dioxide production. The results support a hypothesis that the increase in metabolism occurring during heat stress is limited solely to that part of the metabolism defined as basal. (Author)

A81-34302 Heat stress in front and rear cockpits of F-4 aircraft. S. A. Nunneley, R. F. Stribley, and J. R. Allan (USAF, School of Aerospace Medicine, Brooks AFB, Tex.; RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 287-290. 12 refs.

The thermal stresses encountered in the front and rear cockpits of F-4 aircraft flying low-level missions in warm, moderately humid weather and physiological responses to these stresses are investigated. Measurements of ground and cockpit environmental temperatures and subject skin and core temperatures were acquired for the preflight taxi, low-level flight, ordnance delivery and postflight taxi phases of 36 flights of F-4E aircraft performed to simulate low-level ground attack missions. Cockpit dry-bulb temperatures are found to exceed those on the ground during ground operations, and to decrease in flight in the front, but not the rear, cockpit. A linear relationship between cockpit dry bulb and temperatures is also found in each of the mission phases, along with increases in skin and core temperatures with cockpit temperatures and sweat rates depending both on cockpit temperatures and the amount of clothing worn. Adverse physiological effects related to nausea and acceleration tolerances are also noted. It is concluded that the cockpit cooling system of the F-4 allows the development of operationally significant heat stress, which may be corrected by better design and testing of the cooling system. A.L.W.

A81-34303 Influence of ambient and core temperatures on auditory canal temperature. L. F. Morgans, S. A. Nunneley, and R. F. Stribley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 291-293. 10 refs. Contract No. F49620-79-C-0038.

The effects of ear coverings and their interactions with wind and ambient temperatures on body temperatures measured in the

auditory canal are investigated in order to determine the suitability of this measurement as an indicator of core temperature in aircrew studies. Measurements of both auditory canal and rectal temperatures were performed at ambient temperatures of 35 and 22 C in the presence and absence of wind directed at the head at a velocity of 3 m/sec and a helmet covering the ear, and with exercise performed on a bicycle ergometer to stabilize rectal temperatures at 22 C. In all conditions, ear temperature is always found to be lower than rectal temperature, but by different amounts in warm and cool environments. Auditory canal temperature is also observed to rise when a helmet is donned, and fall markedly in the presence of wind without helmet protection. Auditory canal temperature is thus seen to reflect both core and local skin temperatures, and have limited usefulness in field studies unless subjects wear a protective helmet throughout the period of data collection. A.L.W.

A81-34304 Early pulmotoxic effects of oxygen on the rat alveolar type II epithelial cell. M. E. Heino, L. A. Laitinen, and T. Tervo (Central Military Hospital 1; Finnish Navy, Medical Office; Helsinki, University, Helsinki, Finland). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 294-298. 12 refs. Research supported by Tampereen Tuberkuloosisaatio.

Adult male rats were exposed to pure oxygen at atmospheric pressure for 12 and 24 h in order to examine the early pulmotoxic signs in alveolar type II epithelial cells. Lung specimens were processed for both light and electron microscopical examination. All changes were obvious, but less pronounced than in previous reports, and appeared only after 24 h of exposure. The type II cells showed dilation of the Golgi apparatus and changes in mitochondria. This experiment indicates that exposure to pure oxygen at atmospheric pressure for as short as 24 h, but not for 12 h, is adequate to induce subtle pulmotoxic changes in alveolar type II epithelial cells. (Author)

A81-34305 Avoidance learning and mechanism of the protective effect of apomorphine against hypoxia. F. Boismare, C. Saligaut, N. Moore, and J. P. Raoult (Hôtel-Dieu, Rouen; Rouen, Université, Mont-Saint-Aignan, Seine-Maritime, France). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 299-303. 27 refs.

A conditioned avoidance response (CAR) in rats, under both normoxia and hypobaric hypoxia (300 torr), was analyzed to try to elucidate the mechanism of apomorphine's protective effect against hypoxia. The resistance to hypoxia is markedly increased by apomorphine (1 mg/kg i.p.) and, to a lesser degree, by an alpha-adrenergic pre-synaptic (yohimbine 1 mg/kg i.p.) or post-synaptic (phenoxybenzamine 1 mg/kg i.p.) blocker. The anti-hypoxic property of apomorphine is not altered when associated with domperidone (0.5 mg/kg i.p.), a peripheral blocker of the dopaminergic receptors. Resistance to hypoxia is decreased by propranolol (1 mg/kg i.p.) and pimozone (1 mg/kg i.p.). It is not modified by tyliciprine (2 mg/kg i.p.) or by metergoline (2.5 mg/kg i.p.), a blocker of the 5-hydroxytryptamine (5 HT) receptors. However, the association of any of the above pharmacological agents with apomorphine destroys apomorphine's anti-hypoxic effect. (Author)

A81-34306 Visual-vestibular interactions - The directional component of visual background movement. F. E. Guedry, Jr., J. M. Lentz, J. W. Norman (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.), and R. M. Jell (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.; Manitoba, University, Winnipeg, Canada). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 304-309. 14 refs.

The legibility of a head-fixed display and visual suppression of the vestibulo-ocular reflex (VOR) were found to be superior when vestibular stimuli and optokinetic stimuli were of like direction (i.e., would produce the same direction of nystagmus) and inferior when they were opposite in direction. Velocities (relating to the head) of peripheral optokinetic stimuli ranging between -18 and +180 deg/s interacted effectively with vestibular stimuli to influence the

visibility of a head-fixed display. This indicates that peripheral optokinetic stimulation can influence visual suppression of the VOR at velocities that far surpass effective production of optokinetic nystagmus. (Author)

A81-34307 Evaluation of the Hewlett-Packard ear oximeter for use during routine air transport of patients. J. H. Cissik, C. C. Yockey, and R. B. Byrd (USAF, Medical Center, Scott AFB, Ill.). *Aviation, Space, and Environmental Medicine*, vol. 52, May 1981, p. 312-314. 13 refs.

The Hewlett-Packard 47201 A ear oximeter was evaluated to determine the feasibility of its use aboard aircraft. At altitudes up to 2438 m (8000 ft), there was no significant difference between the mean predicted percent saturation of hemoglobin and the measured percent saturation in 25 nonsmokers (94.6 + or - 1.9 vs 94.1 + or - 2.4; p greater than 0.10) and 20 smokers (94.9 + or - 1.8 vs 94.2 + or - 2.5; p greater than 0.10). The accuracy of the oximeter readings on five individuals was further confirmed with a blood gas analyzer aboard the aircraft. It is concluded that the ear oximeter is accurate and reliable for monitoring patients during flights. (Author)

A81-34871 # The physical and clinical bases of the determination of tympanic impedance, and its usefulness in the accurate evaluation of the tympano-tubular system efficiency of flight personnel /Jet pilots/ (Basi fisico-cliniche dell'impedenzometria timpanica e sue indicazioni per una corretta valutazione dell'efficienza del sistema timpano-tubarico nel personale di volo /Pilotti di aviogetti/). R. Balli, S. Galli, and A. Ottalevi (Modena, Università, Modena; Aeronautica Militare, Nucleo Psico-Fisiologico, Villafranca di Verona, Italy). *Rivista di Medicina Aeronautica e Spaziale*, vol. 43, Jan.-June 1980, p. 104-127. 18 refs. In Italian.

An exhaustive survey of the physical and technical aspects of medical examinations of the tympano-tubular system based on impedance determination shows the accuracy of the method in the diagnosis of physiological and pathological problems of the middle ear. An especially useful application of the method is in the study of functional changes caused by pressure variations during flight. In view of the ease with which the test can be performed, it is recommended that it be adopted in the medical examination of flight personnel. O.C.

A81-34919 Oligouridylylates as a template for nonenzymatic synthesis of oligoadenylates. H. Sawai (Tokyo, University, Tokyo, Japan). *Journal of Molecular Evolution*, vol. 17, May 1981, p. 108, 109. 8 refs.

A chemical polymerization of adenosine-5'-phosphorimidazole is conducted in the presence of oligouridylylate templates. Oligo U having a chain length of more than eight serves as a template and facilitates oligoadenylate formation. No template activity is observed when oligo U up to a hexamer is used. The results are seen as correlating with thermal transition temperatures of oligo U-pA complexes. C.R.

A81-36561 * # Pilot/vehicle model analysis of visual and motion cue requirements in flight simulation. R. Lancraft, G. Zacharias, and S. Baron (Bolt Beranek and Newman, Inc., Cambridge, Mass.). In: Flight Simulation Technologies Conference, Long Beach, Calif., June 16-18, 1981, Technical Papers. 09) New York, American Institute of Aeronautics and Astronautics, Inc., 1981, p. 49-59. 17 refs. Contract No. NAS2-10145. (AIAA 81-0972)

The optimal control model for pilot/vehicle analysis is used to explore the effects of a CGI visual system and motion system dynamics on helicopter hover simulation fidelity. This is accomplished by expanding the perceptual aspects of the model to include motion sensing and by relating CGI parameters to information processing parameters of the model. Simulator fidelity is examined by comparing predicted performance and workload for flight with that predicted for various simulator configuration. The results of the analysis suggest that simulator deficiencies of a reasonable nature (by current standards) can result in substantial performance and/or workload infidelity. Both CGI and motion system effects are

significant for this task. There is also a distinct interaction between the two sources of pilot cues. In particular, the presence of motion reduces the sensitivity to CGI limitations. (Author)

A81-36571 # A critique of the gravity vector alignment method for motion simulation. H. Jaslow (Gould, Inc., Simulation Systems Div., Melville, N.Y.). In: Flight Simulation Technologies Conference, Long Beach, Calif., June 16-18, 1981, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1981, p. 134-138. 8 refs. (AIAA 81-0985)

Conventional simulators tilt the motion platform to align the gravity vector with the resultant specific force vector of the aircraft. But, false cues can still arise with this gravity vector alignment method. In fact, this method provides real cues only for limited maneuvers. In this paper, a new theory of tilt and motion preception is reviewed. Equations defining the current gravity vector alignment approach and its modification with the new approach are derived. A technical explanation is given of inherent errors and limitations of the conventional approach, along with a quantitative comparison with the new approach. (Author)

A81-36590 Carbon dioxide, ammonia and the origin of life. T. M. L. Wigley and P. Brimblecombe (East Anglia, University, Norwich, England). *Nature*, vol. 291, May 21-27, 1981, p. 213-215. 24 refs.

The early evolution of life places constraints on the chemistry of early aqueous environments and on the atmospheric concentration of ammonia. The 'faint sun paradox', which demands high concentrations of ammonia to counteract the reduced luminosity of the sun, has been resolved by invoking the greenhouse effect of radiatively active gases in the earth's early atmosphere. Upper and lower bounds of aqueous ammonium ion activity are determined as a function of pH, defining a range of amino acid stability. The effect of changing temperature and carbon dioxide pressure on the minimum ammonia partial pressure is plotted. If the earth's atmosphere contained high concentrations of CO₂, the chemical conditions required for life to begin can be maintained by very low ammonia partial pressures. J.F.

A81-36649 Comparative sensitivity and specificity of exercise electrocardiographic lead systems. B. R. Chaitman (Montreal Heart Institute; Montréal, Université, Montreal, Canada) and J. S. Hanson. *American Journal of Cardiology*, vol. 47, June 1981, p. 1335-1349. 120 refs. Research supported by the Canadian Heart Foundation; Medical Research Council of Canada Grant No. MA-7290.

The effects of exercise electrocardiac lead systems on the predictive accuracy of stress test results in diagnosing coronary heart disease, are analyzed. Factors affecting the sensitivity and specificity of S-T segment shifts for obstructive coronary disease are evaluated and it is stated that, in exercise stress testing several variables have been identified that can influence the frequency with which S-T segment shifts will be recorded. The results of studies on 12 different systems are reviewed and the diagnostic value confirmed through the accuracy of data obtained for sensitivity levels ranging from 25 to 71, 38 to 88, and 78 to 97 percent in diagnosing single, two, and three vessel disease, respectively. Aspects of multiple lead recording applied to (1) clinical application, and (2) large population screening are discussed, and charts of angiographic-electrocardiographic correlations in asymptomatic subjects are given, indicating the prevalence of exercise-induced S-T segment depression. While the prognostic value has been established, several variables need further study and the assistance of computer analysis of electrocardiographical signals and subsequent data processing is suggested. E.B.

A81-36650 Toward the optimal lead system and optimal criteria for exercise electrocardiography. M. L. Simoons (Rotterdam, Universiteit, Rotterdam, Netherlands) and P. Block (University Hospital, Jette, Belgium). *American Journal of Cardiology*, vol. 47, June 1981, p. 1366-1374. 41 refs.

Data of the whole body surface potential distribution in 25 normal subjects and 25 coronary artery patients at rest and during

exercise are analyzed, in order to define the optimal lead system for exercise electrocardiography, to make recommendations regarding the choice of lead systems in various clinical settings, and the type of electrocardiographic measurements to be taken during exercise. The diagnostic value of exercise surface maps is established through a comparative analysis of data from other studies. It is shown that a horizontal or downsloping S-T segment depression in the standard chest leads was present in 15 out of 25 patients. 21 patients had abnormal negative precordial potentials greater than 90 microns V 60 ms after the end of QRS complex, which was not recorded for a single normal subject. Four patients had a precordial area between 50 and 90 microns V, also recorded in three normal subjects. The R wave changes like the S-T changes were found to be dependent on the presence and location of a previous myocardial infarction, but further research is suggested to establish the significance in the different changes. It is concluded that presently recorded sensitivity levels of 80-90% at a specificity of 90-95% may further improve by a combination of techniques. E.B.

A81-37251 What is the diplopia threshold. A. L. Duwar and G. van den Brink (Rotterdam, Universiteit, Rotterdam, Netherlands). *Perception and Psychophysics*, vol. 29, no. 4, Apr. 1981, p. 295-309. 16 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

Four experiments were conducted to determine the nature and magnitude of the diplopia threshold, or retinal disparity value at which binocular single vision ends; directed at (1) thresholds for vertical disparity, (2) thresholds for vertical disparity outside the fovea, (3) detectability of optical disparity, and (4) thresholds for horizontal disparity. It was found that the magnitude of the diplopia threshold is highly dependent on (1) the subject tested, up to a factor of 6, (2) the amount of training the subject had received, up to a factor of 2.5, (3) the criterion used for diplopia, and (4) stereoscopic depth, up to a factor of 4.5. These data do not confirm previous findings of interference effects associated with the initial appearance of binocular disparity when test stimuli are presented tachistoscopically. O.C.

A81-37252 Two-dimensional filtering, oriented line detectors, and figural aspects as determinants of visual illusions. E. G. J. Eijkman, H. J. Jongsma, and J. Vincent (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Perception and Psychophysics*, vol. 29, no. 4, Apr. 1981, p. 352-358. 18 refs.

Three different models were used to analyze quantitative data on Muller-Lyer illusions, so that the effect is predicted with different magnitudes and parameter dependencies. A low-pass frequency filter model describing retinal picture blurring seems only partly responsible for the observed illusion; an oriented bar- or line-receptor model is even less effective than the filter in explaining observed length illusions; the model consisting of a size-constancy operator triggered by depth cues predicts larger effects than those actually observed. It is concluded that such figural aspects as depth-inducing cues are mainly responsible for the illusion effects observed in Muller-Lyer figures. O.C.

A81-37253 The rod-and-frame illusion in erect and supine observers. D. R. Goodenough, P. K. Oltman, E. Sigman, and P. W. Cox (Educational Testing Service, Princeton, N.J.). *Perception and Psychophysics*, vol. 29, no. 4, Apr. 1981, p. 365-370. 17 refs. Grant No. NIH-MH-21989.

On the strength of three experiments designed to determine whether an intravisual orientation contrast effect or the effects of visually induced eye torsion are responsible for the rod-and-frame (RF) illusion, it is suggested that the environmental axes are jointly determined by visual and gravitational cues in the erect position. If this view is correct, egocentric RF errors may be lower in the erect position due to a dilution, by gravitational cues, of the role of the tilted frame used in the experiments in defining the environmental axes. It is concluded that environmental and egocentric standards for judging orientation may differ less in the erect than in the supine

position, and that confusion between the two standards may result in smaller egocentric errors in the erect position. O.C.

A81-37254 Towards a behavioral theory of bias in signal detection. D. McCarthy and M. Davison (Auckland, University, Auckland, New Zealand). *Perception and Psychophysics*, vol. 29, no. 4, Apr. 1981, p. 371-382. 55 refs. Research supported by the University Grants Committee.

A behavioral model for performance on signal-detection tasks is presented. It is based on a relation between response and reinforcement ratios which has been derived from both animal and human research on the distribution of behavior between concurrently available schedules of reinforcement. This model establishes the ratio of obtained reinforcements for the choice responses, and not the probability of stimulus presentation, as the effective biaser in signal-detection research. Furthermore, experimental procedures which do not control the obtained reinforcement ratio are shown to give rise to unstable bias contours. Isobias contours, on the other hand, arise only from controlled reinforcement-ratio procedures.

(Author)

A81-37258 * # Pursuit tracking and higher levels of skill development in the human pilot. R. A. Hess (NASA, Ames Research Center, Aircraft Guidance and Navigation Branch, Moffett Field, Calif.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-11, Apr. 1981, p. 262-273. 20 refs.

A model of the human pilot is offered for pursuit tracking tasks; the model encompasses an existing model for compensatory tracking. The central hypothesis in the development of this model states that those primary structural elements in the compensatory model responsible for the pilot's equalization capabilities remain intact in the pursuit model. In this latter case, effective low-frequency inversion of the controlled-element dynamics occurs by feeding-forward derived input rate through the equalization dynamics, with low-frequency phase droop minimized. The sharp reduction in low-frequency phase lag beyond that associated with the disappearance of phase droop is seen to accompany relatively low-gain feedback of vehicle output. The results of some recent motion cue research are discussed and interpreted in terms of the compensatory-pursuit display dichotomy. Tracking with input preview is discussed in a qualitative way. In terms of the model, preview is shown to demand no fundamental changes in structure or equalization and to allow the pilot to eliminate the effective time delays that accrue in the inversion of the controlled-element dynamics. Precognitive behavior is discussed, and a model that encompasses all the levels of skill development outlined in the successive organizations of perception theory is finally proposed.

(Author)

A81-37285 * Hemodilution, vasopressin suppression, and diuresis during water immersion in man. J. E. Greenleaf, L. C. Keil (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.), and E. Shvartz (Douglas Aircraft Co., Long Beach, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 52, June 1981, p. 329-336. 38 refs.

The possible role of hemodilution in the early stages of water immersion in the suppression of antidiuretic hormone (vasopressin) and subsequent diuresis in man is investigated. Parameters characterizing hemodilution as well as water balance and intercompartmental fluid levels were measured before, during and after the immersion of ten subjects in a semireclining position in tap water up to their necks at 34.6 C for 8 hr. Results indicate that hemodilution and the suppression of vasopressin and plasma renin activity were present by the second hour of immersion, with the early hemodilution due to a slight increase in plasma volume with no change in plasma sodium or osmotic contents, even though urine volume and osmotic excretion rates increased significantly. Hyponatremia, hyposmolemia and plasma renin activity suppression are observed to continue to the end of immersion, resulting in final decreases of 15.6% in plasma volume, 18.8% in extracellular volume, 19.6% in interstitial volume and

10.7% in red cell volume. Findings suggest the transfer of hypotonic fluid into the vascular system, which contributes to vasopressin suppression observed during immersion. A.L.W.

A81-37286 * **Experimental motion sickness - Efficacy of transdermal scopolamine plus ephedrine.** A. Graybiel (U.S. Medical Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.), D. B. Cramer (NASA, Washington D.C.; U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.), and C. D. Wood (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.; Louisiana State University, Shreveport, La.). *Aviation, Space, and Environmental Medicine*, vol. 52, June 1981, p. 337-339. 5 refs. NASA Order T-3384-G.

A double-blind, placebo-controlled study compared the efficacy of transdermal therapeutic system-scopolamine administered alone and combined with ephedrine sulfate given orally in doses of 12.5, 25, and 50 mg. Eight normal male students were exposed to stressful accelerations in a slow-rotation room after receiving 10 apparently identical treatments comprising the four drugs and six placebos. Efficacy of the drug was defined in terms of the placebo range and categorized as beneficial, inconsequential, or detrimental. None of the effects was detrimental. Overall beneficial effects were 60% for transdermal therapeutic system-scopolamine (plus placebo) and 57% for the three transdermal therapeutic system-scopolamine plus ephedrine combinations. (Author)

A81-37287 **Acute and chronic propylene glycol dinitrate exposure in the monkey.** J. L. Mattsson, R. W. Young, C. R. Curran, C. G. Franz, M. J. Cowan, Jr., and L. J. Jenkins, Jr. (National Naval Medical Center, Armed Forces Radiobiology Research Institute and Naval Medical Research Institute, Bethesda, Md.). *Aviation, Space, and Environmental Medicine*, vol. 52, June 1981, p. 340-345. 16 refs.

Rhesus monkeys (*Macaca mulatta*) were exposed to propylene glycol 1,2-dinitrate (PGDN) vapors on either an acute (4-h) or chronic (125-d) schedule. During acute exposures, PGDN concentrations ranged from a low 2 ppm (parts per million) to a high of 33 ppm. Free operant avoidance behavior and visual evoked responses were monitored and free operant avoidance was not affected at any dose level. The late positive (100-150 ms) wave of the visual evoked response increased 20% at 2 ppm and decreased 25% at concentrations up to 33 ppm. Although these changes were statistically different from control values, they were within the limits caused by distracting events (+ or - 40%), and might possibly have been caused by the irritating or distracting properties of the vapor. Other monkeys were exposed to successively increasing concentrations of PGDN vapors at 0.3-4.2 ppm, 23 h/d, for 125 d. Daily performance testing included alternating sessions of discrete-trial cued avoidance and free operant avoidance. None of the PGDN concentrations had a discernible effect on either type of avoidance performance. (Author)

A81-37288 **Autonomic responses of high-altitude natives during sojourn at plains and on return to altitude.** W. Selvamurthy, R. K. Saxena, N. Krishnamurthy, and H. S. Nayar (Defence Institute of Physiology and Allied Sciences, Delhi, India). *Aviation, Space, and Environmental Medicine*, vol. 52, June 1981, p. 346-349. 13 refs.

The responses of the autonomic nervous systems of persons native to high altitudes to a two-month sojourn at plains altitude followed by a return to high altitude are investigated. Heart rate, blood pressure, oral temperature, respiratory rate, mean skin temperature, cold pressor response, heart rate response to 70 deg head-up tilt and the alpha index of EEG recordings at the occipital lead were monitored periodically for high-altitude natives and native lowlanders during their stay on the plains and following transfer to an altitude of 3500 m along with the responses at altitude of altitude-acclimatized lowlanders and high-altitude natives who had never been to the plains. Results indicate a gradual decrease in the relative parasympathetic dominance of high-altitude natives during residence on the plains, probably due to an elevation in sympathetic

activity. On return to altitude, the highlanders exhibited a lesser degree of sympathetic excitation compared to lowlanders during the acute exposure phase, with autonomic balance more quickly regained by the relaxation of sympathetic activity in natives. Results suggest that the parasympathetic dominance observed in high-altitude natives may be dependent on their environment. A.L.W.

A81-37289 **Cardiac decompression sickness - Report and discussion of a case.** P. Halpern and A. Greenstein (Naval Medical Hyperbaric Institute, Haifa, Israel). *Aviation, Space, and Environmental Medicine*, vol. 52, June 1981, p. 350-353. 15 refs.

A case of first degree atrio-ventricular block, probably representing cardiac involvement by decompression sickness, is presented. The conduction defect resolved spontaneously 36 h after the initiating decompression insult, and was not accompanied by any other cardiovascular changes. The contribution of a recompression treatment, which alleviated accompanying Type I decompression sickness (DCS) symptoms, to the resolution of cardiac DCS is not certain. Cardiac symptoms of DCS do not receive enough consideration. It is suggested that an electrocardiogram should, whenever possible, form part of the basic evaluation of suspected DCS and of the initial workup of candidates for diving. A flow diagram for management of cardiac DCS is proposed. (Author)

A81-37290 **Periodontal disease in military aircrew members - A clinical and radiographical study.** J. L. Wenstrom, O. G. Carlson, and C. Liljequist (Flygvapnet, Stockholm, Sweden). *Aviation, Space, and Environmental Medicine*, vol. 52, June 1981, p. 354-357. 15 refs.

Results are presented of a clinical and radiographic evaluation of the periodontal conditions of military aircrew members in comparison to an age-matched control group of nonflying individuals with similar sociomedical background. Plaque indexes, gingival indexes, probing depths and loss of attachment were determined and a complete set of intraoral X-rays was taken to determine the height of the interproximal alveolar bone for six specific teeth in each jaw for 70 military pilots ranging in age from 20 to 54 years and a control group of 24 military officers aged 21 to 57 years. Data do not show any major differences between flying and nonflying personnel, although a gradual deterioration of the dentition with increasing age and a significantly higher standard of oral hygiene in older nonflying personnel are observed. It is thus concluded that flying per se does not result in an increased rate of periodontal tissue breakdown. A.L.W.

A81-37349 # **Individual psychological characteristics of pilots which permit erroneous actions (Ob individual'no-psikhologicheskikh kharakteristikakh letchikov, dopuskaiushchikh oshibochnye deistviia).** N. F. Luk'ianova and E. N. Loboda. *Voenna-Meditsinskii Zhurnal*, Apr. 1981, p. 54-56. In Russian.

The personality traits of pilots who perform erroneous in-flight actions are investigated. Comprehensive psychological evaluations including assessments of conversation, medical records, spatial perception, mental comprehension, memory, attention, character and temperament were performed for junior pilots having committed errors in flight as well as cadets admitted to the hospital due to low flight tolerances and personnel discharged from school for lack of success in flight, and a standard group of flight personnel. Individual personality traits are seen to account for the failures of 72% of the subjects, as illustrated for the cases of two pilots characterized by over-emotionalism or rigidity. The importance of screening for and training to overcome undesirable personality traits in pilots is emphasized. A.L.W.

A81-37626 # **The C4N molecular models for the genetic code of E. coli.** M. Shimizu (Tokyo, University, Tokyo, Japan). *Tokyo, University, Institute of Space and Aeronautical Science, Report* no. 586, vol. 45, Dec. 1980, p. 201-230. 6 refs.

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(ISSN-0077-5606; NRC/CNR-TT-1991) Avail: NTIS
HC A02/MF A01

A method based on the enzymatic stoichiometric reduction of oxygen and on the oxidation of ascorbic acid was applied to determine the quantity of oxygen in aqueous solutions. This reaction is oxygen-dependent and under anaerobic conditions the 2,6 dichloroindophenol oxidizes the excess ascorbic acid. The initial oxygen content of the solution is determined from the difference between the total ascorbic acid and the residual ascorbic acid. This method was used for titration of oxygen produced by leaves of *Cichorium endivia* L. immersed in carbonated water and exposed to sunlight. The results indicate that some strains of *Cichorium* exhibit a higher photosynthetic rate than the others. Field tests should confirm whether the increased quantity of oxygen, produced by photosynthetic activity under the same conditions existing during the experimentation, corresponds to an increased net production of organic matter. M.G.

STAR ENTRIES

N81-24706 Oklahoma Univ., Norman.
**VENTRICULAR PERFORMANCE IN HEARTS OF RATS
SUBJECTED TO PRESSURE OVERLOAD AND REPETITIVE
EXERCISE** Ph.D. Thesis

Eileen Mary Hasser 1980 166 p
Avail: Univ. Microfilms Order No. 8107518

The effects of preconditioning with repetitive exercise on the early and late responses to pressure overload due to abdominal aortic constriction (AC) in rats and the effects on ventricular function of exposure to repetitive exercise subsequent to the development of pressure induced cardiac hypertrophy were studied. All groups subjected to AC exhibited significantly elevated left ventricular pressure (LVP) compared to sham operated animals (SHAM). Ventricular contractile functional reserve capacity was unaffected by AC in either sedentary or exercised animals, similar inotropic responses to isoproterenol infusion and to total aortic occlusion were observed. Ventricular contractile functional reserve capacity was unaffected by AC or exercise at the five week time point. Heart pump functional reserve capacity was depressed in SED + AC(L) animals, but was normalized by exercise preconditioning. Exercise conditioning subsequent to the development of cardiac hypertrophy (AC + EX) reduced TPR and normalized CI and SI under control conditions. Ventricular contractile reserve capacity was unaltered in AC animals which remained sedentary or were exercised. It was suggested that the effects of exercise on ventricular performance was not due to alterations in biochemical properties of the myocardium.

E.A.K.

N81-24707 Texas Univ. Health Science Center, San Antonio.
**THERMOREGULATORY AND ARTERIAL BAROREFLEX
CONTROL OF HEART RATE IN THE HEAT-STRESSED
BABOON** Ph.D. Thesis

Andrew John Gorman, III 1981 191 p
Avail: Univ. Microfilms Order No. 8108428

The unanesthetized, chronically instrumented baboon was monitored to determine (1) the effect of a hyperthermia producing environmental heat stress on the reflex heart rate responses to changes in arterial blood pressure; (2) the relative importance of the sympathetic and parasympathetic nervous systems in effecting the elevation in heart rate during environmental heat stress; and (3) the autonomic control of heart rate during changes in arterial blood pressure in the normothermic and hyperthermic states. It is concluded that in the heat-stressed baboon: (1) no significant interaction exists between the thermoregulatory and baroreflex control of heart rate; (2) a change in the autonomic balance to the heart during heat stress occurs which is responsible along with local mechanisms for producing the rise in heart rate; and (3) the autonomic mediation of the reflex tachycardia during hypotensive stimuli is altered during hyperthermia.

Dissert. Abstr.

N81-24708# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
**ENZYMATIC DETERMINATION OF OXYGEN IN AQUEOUS
SOLUTIONS. 1: PHOTOSYNTHESIS RATE IN CULTIVAR
OF CICHORIUM ENDIVIA L**

F. Restaino, S. Scaramucci, G. Interlandi, and A. Marchesini 1981
13 p refs Transl. into ENGLISH from Atti Della Soc. Ital. di Sci. Nat. e del Museo Civico di Storia Nat. di Milano (Italy), 120 (1/2), 1979 p 132-140 Prepared for National Research Council of Canada

N81-24709# Ohio State Univ., Columbus. Dept. of Civil Engineering.

**FULL SCALE FIELD DEMONSTRATION OF UNHEATED
ANAEROBIC CONTACT STABILIZATION** Quarterly Status Report, Jul. - Sep. 1980

Robert M. Sykes Nov. 1980 13 p
(Contract DE-AC02-80CS-24310)

(DOE/CS-24310/2) Avail: NTIS HC A02/MF A01

Gas production data is included. At present, the experimental digester (not heat added) is operating at an SRT of about 17 days and a temperature of 78 F and is performing about the same as the control units operating at an SRT of 10 days and a temperature of 94 F. DOE

N81-24710# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.

**METABOLISM OF FATTY ACIDS IN RAT BRAIN IN
MICROSOMAL MEMBRANES**

E. E. Aeberhard, Minerva Gan-Elepano, and James F. Mead 1980
32 p refs

(Contracts DE-AC03-76SF-00012; DE-AM03-76SF-00012; Grant NIH GM-19177)

(UCLA-12-1289) Avail: NTIS HC A02/MF A01

Using a technique in which substrate fatty acids are incorporated into microsomal membranes followed by comparison of their rates of desaturation or elongation with those of exogenous added fatty acids it was found that the desaturation rate is more rapid for the membrane bound substrate than for the added fatty acid. Moreover, the product of the membrane bound substrate is incorporated into membrane phospholipid whereas the product of the exogenous substrate is found in di and triacyl glycerols and in free fatty acids as well. These and other findings point to a normal sequence of reaction of membrane liquids with membrane bound substrates involving transfer of fatty acid from phospholipid to the coupled enzyme systems without ready equilibration with the free fatty acid pool. DOE

N81-24711* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

URINE COLLECTION DEVICE Patent

Roger B. Michaud, inventor (to NASA) (Martin Marietta Corp., Denver) Issued 27 Jan. 1981 11 p Filed 30 May 1978

Sponsored by NASA

(NASA-Case-MS-C-16433-1; US-Patent-4,246,901;

US-Patent-Appl-SN-910992; US-Patent-Class-128-295;

US-Patent-Class-4-144.3; US-Patent-Class-128-761) Avail: US Patent and Trademark Office CSCL 06B

A urine collection device for females is described. It is comprised of a collection element defining a urine collection chamber and an inlet opening into the chamber and is adapted to be disposed in surrounding relation to the urethral opening of the user. A drainage conduit is connected to the collection element in communication with the chamber whereby the chamber and conduit together comprise a urine flow pathway for carrying urine generally away from the inlet. A first body of wicking material is mounted adjacent the collection element and extends at least partially into the flow pathway. The device preferably also comprise a vaginal insert element including a

N81-24713

seal portion for preventing the entry of urine into the vagina.
Official Gazette of the U.S. Patent and Trademark Office

N81-24713 Illinois Univ. at Urbana-Champaign.
KINEMATIC MODELLING AND OSTEOLOGICAL SCALING OF ANATOMICAL JOINTS AND SKELETAL SYSTEMS Ph.D. Thesis

Henry Joseph Sommer, III 1980 104 p
Avail: Univ. Microfilms Order No. 8108669

Three techniques proposed calibration of instrumented spatial linkages, kinematic modeling of anatomical joints, and osteometric scaling are jointly directed at one of the most prevalent and frustrating, yet basic, problems in musculo-skeletal biomechanics today-the almost total lack of readily available geometric and kinematic models. Singly, each technique may stand alone or may be used in conjunction with other biomechanical or antropometric analyses. Instrumented spatial linkages (ISL's) are finding wide applications in biomechanics for measuring all six degrees of freedom of relative motion between anatomical bodies and for point coordinate digitization. Numerical calibration of the kinematic and electrical parameters describing an ISL can produce superior accuracy for such biomechanical measurements and can statistically estimate this accuracy. Dissert. Abstr.

N81-24714 Utah Univ., Salt Lake City.
MEDICAL APPLICATIONS OF ION SENSITIVE FIELD EFFECT TRANSISTORS Ph.D. Thesis

Bruce Alan McKinley 1980 85 p
Avail: Univ. Microfilms Order No. 8111290

Three studies of the use of ion sensitive field effect transistors (ISFET) are reported. The first study demonstrates in vivo use of prototype K + ISFET probes in several potential clinical applications simulated in animals. The second study involves the use of Ca ++ ISFET probes to monitor Ca ++ activity in blood of dogs during simulated infusion of citrated blood. The third study involves simultaneous continuous monitoring of K+ activity in the interstitial fluid space and in circulating blood during induction of and recovery from hemorrhagic shock in dogs. Results of these studies demonstrate feasibility of using ISFET probes for biomedical monitoring purposes and, in addition, outline specific areas for application of ISFET sensors. These areas include: (1) intravascular continuous monitoring of blood in regions of the physiologic system of interest; (2) tissue monitoring to detect (local) metabolic changes at the cellular level; (3) simultaneous multiple fluid compartment monitoring to assess mass transfer rates in response to therapeutic procedures or disturbance of the physiologic system. Dissert. Abstr.

N81-24715# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SIGNIFICANCE OF CIRCADIAN RHYTHMS IN AEROSPACE OPERATIONS

Karl E. Klein (DFVLR, Bad Godesberg, West Germany) and, Hans M. Wegmann Dec. 1980 64 p refs
(AGARD-AG-247; ISBN-92-835-1378-9) Avail: NTIS HC A04/MF A01

Reviewing experimental research and results from the pertinent literature, the significance of circadian rhythms is discussed under the following aspects: characteristics and interrelationships of environmental and biological circadian systems; circadian rhythms of mental and physical performance, as well as of susceptibility and resistance; modification of circadian cycling through external and internal factors; disturbance of circadian rhythmicity and sleep-wake cycling in air and space operations and shiftwork; consequences for performance efficiency and health; formulas; models and rest duty regulations; and recommendations for the passenger, crew, and management. The Biorhythm Theory is critically reviewed. T.M.

N81-24716# National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.

APPARATUS FOR DETERMINING CHANGES IN LIMB VOLUME Patent Application

P. K. Bhagat (Kentucky Univ., Lexington) and V. C. Wu, inventors (to NASA) (Kentucky Univ., Lexington) Filed 10 Feb. 1981 14 p Sponsored by NASA
(NASA-Case-MS-C-18759-1; US-Patent-Appl-SN-233270) Avail: NTIS HC A02/MF A01 CSCL 06B

A measuring apparatus for determining changes in the volume of limbs or other body extremities by determining the cross-sectional area of such limbs is described. It is comprised of a transmitter including first and second transducers and a receiver for positioning on the surface of the limb. The distances between the receiver crystal and the first and second transducers are represented by respective first and second chords (d sub 1 d sub 2) of the cross-section of the limb and the predetermined distance between the first and second transducers is represented by a third chord (d sub 3). The measuring apparatus also includes a Pinger and associated electrical circuitry for generating acoustic pulses at the transducers. The travel time of the acoustic pulses along the D sub 1, D sub 2 chords is derived. A computer is connected to the receiver for computing the area of the limb cross-section utilizing these signals. NASA

N81-24717*# National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.

BIOMEDICAL FLOW SENSOR Patent Application
H. Eugene Winkler, inventor (to NASA) Filed 16 Apr. 1981 14 p

(NASA-Case-MS-C-18761-1; US-Patent-Appl-SN-254688) Avail: NTIS HC A02/MF A01 CSCL 06B

A biomedical flow sensor for intravenous systems is described. The device includes a packagable unit of a bottle, tubing and hypodermic needle which can be pre-sterilized and is disposable. The tubing has spaced tubular metal segments. The temperature of the metal segments and the fluid flow is sensed by thermistors and at a downstream location heat is input by a resistor to the metal segment by control electronics. The fluid flow and the electrical power required of the resistor to maintain a constant temperature differential between the tubular metal segments is a measurable function of fluid flow through the tubing. The differential temperature measurement is made in control electronics and also can be used to control a flow control valve or pump on the tubing to maintain a constant flow in the tubing and to shut off the tubing when air is present. NASA

N81-24718# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.

AN EXPERIMENTAL DETERMINATION OF THE EFFECT OF IMAGE QUALITY ON EYE MOVEMENT AND SEARCH FOR STATIC AND DYNAMIC TARGETS Technical Report, 9 Nov. 1975 - 6 Nov. 1977

James C. Gutmann, Harry L. Snyder, Willard W. Farley, and John E. Evans, III Wright-Patterson AFB, Ohio AMRL Aug. 1979 93 p refs
(Contract F33615-76-C-5022)
(AD-A077728; AMRL-TR-79-51) Avail: NTIS HC A05/MF A01 CSCL 06/16

The results of two experiments which investigated the effect of the quality of a televised image on eye movements and search related dependent measures are reported. The first experiment search task involved having subjects perform an air to ground search during a simulated flight. The quality of the image presented was varied by either passing, low pass filtering, or attenuating the video signal and by adding electrical white noise to the video signal. The search task of the second experiment consisted of having the subjects search for a designated letter or numeral across a televised picture of randomly positioned letters and numerals. The quality of the picture was varied by either passing, low pas filtering, high pass filtering, or attenuating the video signal and by adding electrical white noise to the video signal. R.C.T.

N81-24719# California Univ., Irvine. Dept. of Community and Environmental Medicine.

TOXIC HAZARDS RESEARCH UNIT Annual Technical Report, Jun. 1979 - May 1980

J. D. MacEwen and E. H. Vernot Aug. 1980 137 p refs
Sponsored in part by the Navy and DOT
(Contract F33615-76-C-5005)

(AD-A091617; AFAMRL-TR-80-79; AR-17) Avail: NTIS HC A07/MF A01 CSCL 06/20

Chronic toxicity or oncogenic studies were carried out with methylcyclohexane, tricyclodecane, purified 1,1-dimethylhydrazine, and bicycloheptadiene. A subchronic inhalation study was conducted with shale derived JP-5 and DFM fuels. Acute toxicity studies were conducted on a variety of chemical agents used by the Air Force and Navy. T.M.

N81-24720# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF CIRCADIAN RHYTHM PHASE ALTERATION ON PHYSIOLOGICAL AND PSYCHOLOGICAL VARIABLES: IMPLICATIONS TO PILOT PERFORMANCE (INCLUDING A PARTIALLY ANNOTATED BIBLIOGRAPHY)

Daniel C. Holley, Charles M. Winger, Charles W. DeRoshia, Michele P. Heinold, Dale M. Edgar, Norman E. Kinney, Susan E. Langston, Carol L. Markley, and Jill A. Anthony Mar. 1981 537 p Prepared in cooperation with San Jose State Univ., Calif.

(NASA-TM-81277; A-8515) Avail: NTIS HC A23/MF A01 CSCL 06P

The effects of environmental synchronizers upon circadian rhythmic stability in man and the deleterious alterations in performance and which result from changes in this stability are points of interest in a review of selected literature published between 1972 and 1980. A total of 2,084 references relevant to pilot performance and circadian phase alteration are cited and arranged in the following categories: (1) human performance, with focus on the effects of sleep loss or disturbance and fatigue; (2) phase shift in which ground based light/dark alteration and transmeridian flight studies are discussed; (3) shiftwork; (4) internal desynchronization which includes the effect of environmental factors on rhythmic stability, and of rhythm disturbances on sleep and psychopathology; (5) chronotherapy, the application of methods to ameliorate desynchronization symptomatology; and (6) biorythm theory, in which the birthdate based biorythm method for predicting aircraft accident susceptibility is critically analyzed. Annotations are provided for most citations. A.R.H.

N81-24721# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

A 14-DAY GROUND-BASED HYPOKINESIA STUDY IN NONHUMAN PRIMATES: A COMPILATION OF RESULTS

L. Kazarian (Wright-Patterson AFB, Ohio), C. Cann (California Univ.), M. Parfitt (Henry Ford Hospital), D. Simmons (Washington Univ.), and E. Morey-Holton Apr. 1981 62 p refs

(NASA-TM-81268; A-8488) Avail: NTIS HC A04/MF A01 CSCL 06S

A 14 day ground based hypokinesia study with rhesus monkeys was conducted to determine if a spaceflight of similar duration might affect bone remodeling and calcium homeostasis. The monkeys were placed in total body casts and sacrificed either immediately upon decasting or 14 days after decasting. Changes in vertebral strength were noted and further deterioration of bone strength continued during the recovery phase. Resorption in the vertebrae increased dramatically while formation decreased. Cortical bone formation was impaired in the long bones. The immobilized animals showed a progressive decrease in total serum calcium which rebounded upon remobilization. Most mandibular parameters remained unchanged during casting except for retardation of osteon birth or maturation rate and density distribution of matrix and mineral moieties. Author

N81-24722# Defence Research Establishment, Ottawa, (Ontario). Radiation Biology Section.

TECHNIQUES FOR CALIBRATING MINIATURE ELECTRIC-FIELD PROBES FOR USE IN MICROWAVE BIOEFFECTS

STUDIES AT 2450 MHz: EVALUATION AND CALIBRATION OF BRH - NARDA PROBES

Douglas A. Hill and George W. Hartsgrove Oct. 1980 44 p refs

(AD-A097764; DREO-TN-80-31) Avail: NTIS HC A03/MF A01 CSCL 06/18

A set of miniature probes for determining electric fields in tissue was evaluated and calibrated for use in microwave bioeffects studies at 2450 MHz. The calibrations in air and tissue-equivalent liquids were carried out using a new S-band waveguide technique. The air calibration using waveguide has an accuracy of + or - 10% compared to + or - 18% for our anechoic-chamber calibration. The average probe sensitivity in air is 1.0 mV/mW per sq cm for the five probes calibrated and varies slightly with power density and probe. To estimate probe sensitivity in tissue, a section of waveguide is filled with a tissue-equivalent liquid and is separated from the air-filled waveguide by a very thin (0.25 mm) planar spacer. The probe response is measured as a function of position on either side of the spacer and extrapolated to the interface. The ratio of probe sensitivity in air to that in test liquid is then determined using the continuity of tangential E field across the spacer. Liquids with dielectric properties simulating both wet and dry tissues were used. For the water-glycerol solution modelling wet tissue the probes are 3.0 + or - 0.6 times more sensitive to E superscript 2 than for air. When used in tissue the total calibration error is estimated to be + or - 30% for E superscript 2 and + or - 40% for the specific absorption rate at the site. One of the problems with this probe design, the mechanical weakness near the tip, has been eliminated in newer designs. The other problem, that the size of the probe tip (approximately 3 mm) is too large for optimal use in small-animal organs, is more difficult to solve. GRA

N81-24723# Lovelace Biomedical and Environmental Research Inst., Albuquerque, N. Mex. Inhalation Toxicology Research Inst.

LOW-Btu-GASIFIER EMISSIONS TOXICOLOGY Status Report, Jun. 1980

George J. Newton, ed. Sep. 1980 36 p refs
(Contract DE-AC04-76EV-01013)

(LMF-77) Avail: NTIS HC A03/MF A01

The experimental low Btu gasifier at METC was sampled to determine aerosol components in gaseous process streams and to assess potential toxicants in liquid and solid effluent streams with the most recent sampling effort in December 1979. Diluting and/or cooling low Btu producer gas, as would happen in fugitive releases, produces a dense, respirable aerosol. Toxic element concentrations are higher in aerosols from clean gas than from raw gas streams at METC. Gasifier operating conditions have little effect on the elemental composition of cleaned gas aerosols. DOE

N81-24724* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

SYSTEM FOR STERILIZING OBJECTS Patent

Coleman J. Bryan, Edward E. Wright, Jr., and Clyde V. Moyers, inventors (to NASA) Issued 10 Feb. 1981 4 p Filed 8 Jun. 1979 Supersedes N79-33848 (17 - 24, p 3263)
(NASA-Case-KSC-11085-1; US-Patent-4,250,143; US-Patent-Appl-SN-046739; US-Patent-Class-422-109; US-Patent-Class-422-3; US-Patent-Class-422-27; US-Patent-Class-422-30; US-Patent-Class-422-34; US-Patent-Class-261-79A) Avail: US Patent and Trademark Office CSCL 06K

A system for producing a stream of humidified sterilizing gas for sterilizing objects such as the water systems of space vehicles and the like includes a source of sterilant gas which is fed to a mixing chamber which has inlet and outlet ports. The level of the water only partially fills the mixing chamber so as to provide an empty space adjacent the top of the chamber. A heater is provided for heating the water in the chamber so as to produce a humidified atmosphere. The sterilant gas is fed through an arcuate shaped tubular member connected to the inlet port of the mixing chamber for producing a vortex type of flow of sterilant gas into the chamber for humidification. A tubular

member extends from the mixing chamber for supplying the humidified sterilant gas to the object for being sterilized. Scrubbers are provided for removing the sterilant gas after use.

Official Gazette of the U.S. Patent and Trademark Office

N81-24725* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

AUTOMATION IN ORGANIZATIONS: ETERNAL CONFLICT

Duncan L. Dietler May 1981 40 p refs Prepared in cooperation with Air Force Human Resources Lab., Moffett Field, Calif. (NASA-TM-81290; A-8574; AFHRL-H-81-808) Avail: NTIS HC A03/MF A01 CSCL 05H

Some ideas on and insights into the problems associated with automation in organizations are presented with emphasis on the concept of automation, its relationship to the individual, and its impact on system performance. An analogy is drawn, based on an American folk hero, to emphasize the extent of the problems encountered when dealing with automation within an organization. A model is proposed to focus attention on a set of appropriate dimensions. The function allocation process becomes a prominent aspect of the model. The current state of automation research is mentioned in relation to the ideas introduced. Proposed directions for an improved understanding of automation's effect on the individual's efficiency are discussed. The importance of understanding the individual's perception of the system in terms of the degree of automation is highlighted.

A.R.H.

N81-24726# Dayton Univ., Ohio.

USER'S GUIDE FOR COMBIMAN (COMPUTERIZED BIOMECHANICAL MAN-MODEL), VERSION 4 Technical Interim Report

P. Bapu, Susan Evans, P. Kikta, M. Korna, and Joe W. McDaniel (AMRL) Wright-Patterson AFB, Ohio AMRL Jan. 1981 293 p refs Supersedes AMRL-TR-78-31

(Contract F33615-78-C-00507; AF Proj. 7184) (AD-A097705; UDR-TR-80-44; AFAMRL-TR-80-91; AMRL-TR-78-31) Avail: NTIS HC A13/MF A01 CSCL 05/8

This User's Guide describes the operational procedures for using the COMBIMAN (COMputerized Blomechanical MAN-Model) programs. The Guide includes an introduction to the man-model and the conventions used to develop and analyze crew stations. It also deals with the operation of the programs which make up the COMBIMAN system. These programs include the interactive graphics program CBM04, and the three key file creation/modification programs, CBMAM, CBMCM, and CBMVM, which maintains the Data Bases of anthropometric surveys, crew station configurations, and visibility contour definitions respectively. It also contains a complete description of the use of CBMOFF, the off-line plot program. The guide to the operation of the four main programs includes descriptions of the processing available with each program, definitions and examples of all input and output data formats used, procedures to follow to load the programs and specify processing for each, and explanations of all diagnostic messages generated by the programs. GRA

N81-24727# California Univ., Los Angeles. Dept. of Physiology and Biophysics.

DIETARY PROTECTION AGAINST PULMONARY OXYGEN POISONING Final Technical Report, 1 Apr. 1974 - 31 Dec. 1980

Christopher L. Schatte and Melvin M. Mathias 31 Dec. 1980 73 p refs

(Contract N00014-76-C-0437) (AD-A097750) Avail: NTIS HC A04/MF A01 CSCL 06/2

This project was designed to determine any influence of dietary composition on susceptibility to pulmonary oxygen toxicity

in rats and mice. Of a variety of vitamins given in supranormal doses, only vitamin E proved efficacious in delaying the onset of toxic symptoms in rats exposed to pure oxygen at one atmosphere absolute. Dietary supplementation with the trace element selenium appeared to be beneficial in some experiments but not others. Alteration of amount and type of dietary fat influenced mortality of rats at 1ATA oxygen. The mechanism by which polyunsaturated fats in the diet might change susceptibility to oxygen toxicity was not elucidated, but a possible relationship with pulmonary prostaglandin metabolism is suggested. GRA

N81-24728# Illinois Univ. at Urbana. Dept. of Psychology. **THE PROCESSING DEMANDS OF HIGHER ORDER MANUAL CONTROL: APPLICATION OF ADDITIVE FACTORS METHODOLOGY**

Christopher D. Wickens and William Derrick Mar. 1981 46 p refs

(Contract N00014-79-C-0658; NR Proj. 196-158) (AD-A098077; EPL-81-1/ONR-81-1) Avail: NTIS HC A03/MF A01 CSCL 05/1

This investigation examines the locus of processing demands of 2nd order manual control, and of tracking a high bandwidth signal, within the framework of multiple resource theory. It is hypothesized that 2nd order tracking may impose greater demands upon perceptual encoding (processing higher error derivatives), central processing (updating a more complex internal model) or response (executing impulse response functions). To assess the locus of demands, in experiment 1, eight subjects performed a Sternberg Memory Search task by itself, and concurrently with a first and a second order compensatory tracking task. Following the procedures outlined by Micalizzi Wickens (1980, Tech. Report EPL-80-2/ONR-80-2), Sternberg variables of perceptual load, central processing load and response load were each systematically manipulated. All three variables were found to produce underradiative effects with the presence or absence of 1st order tracking. That is, their effect was attenuated in the presence of the tracking task. However, the manipulations of perceptual and central processing load were enhanced by 2nd order, as opposed to 1st order tracking, while the manipulation of response load was not. Thus our analyses indicated that the effects of higher order manual control were localized in the perceptual and central processing stages. GRA

N81-24729# Defence Research Establishment, Ottawa. (Ontario). Protective Science Div.

CALCULATIONS OF HEAT AND VAPOUR TRANSPORT IN CLOTHING: TRANSIENT EFFECTS IN HYGROSCOPIC MATERIALS

Brian Farnworth Oct. 1980 29 p refs (AD-A098004; DREO-TN-80-25) Avail: NTIS HC A03/MF A01 CSCL 15/5

A numerical model of heat and water vapor transport through multilayered clothing systems under transient conditions is presented. Taken into account are the condensation and evaporation of liquid water within the clothing layers and changes in the amount of water absorbed by hygroscopic fibers although the hygroscopic properties are taken to be a very simple form. The calculations are compared to experiments reported by Woodcock in 1962, giving good agreement, and used to discuss the so called buffering effect of hygroscopic clothing materials. GRA

N81-24730# Air Force Materials Lab., Wright-Patterson AFB, Ohio.

MALE AND FEMALE STRENGTH CAPABILITIES FOR OPERATING AIRCRAFT CONTROLS

Joe W. McDaniel Mar. 1981 6 p refs (AD-A098256; AFAMRL-TR-81-39) Avail: NTIS HC A02/MF A01 CSCL 05/5

There has long been concern that the resistance of some aircraft controls is too large. Now that the Air Force has both male and female pilots, this concern is greater. The workload and Ergonomics Branch of AFAMRL has just completed a study of the physical strength and endurance capabilities of 61 male and 61 female subjects in a stick-controlled aircraft simulator.

Additionally, 110 of these subjects completed a nine-week exercise training program to strengthen muscles used on aircraft controls. Results show weak males and weak females have similar leg strength. The arm strength of strong females was similar to that of weak males; however, physical training improved leg strength more than arm strength. Males and females had similar increases in strength due to physical training. Most of the females and some males fell below the resistance specification for current aircraft. Author (GRA)

N81-24731# Centre Technique des Industries Mecaniques, St. Etienne (France).

COMPILATION OF A CATALOG OF MANIPULATOR ARMS AND INDUSTRIAL ROBOTS Final Report [CONSTITUTION D'UNE DOCUMENTATION RELATIVE AUX BRAS MANIPULATEURS ET ROBOTS INDUSTRIELS]

J. P. Devimeux Dec. 1979 139 p In FRENCH (CETIM-1-4N-02-0-X) Avail: NTIS HC A07/MF A01

A catalog of mechanical devices which are commercially available for the automation of a wide variety of industrial jobs, is presented. Robotics, the classification of these machines, and functional characteristics of manipulators and industrial robots are considered. Machine learning, (command) and control, is treated. Industrial applications of automation are surveyed. The literature on each machine listed is reviewed, and a machine data sheet for each device are also included. Author (ESA)

N81-24732# Rhode Island Univ., Kingston. Dept. of Electrical Engineering.

GENERAL METHODS TO ENABLE ROBOTS WITH VISION TO ACQUIRE, ORIENT AND TRANSPORT WORKPIECES

J. Birk, R. Kelley, T. Barron, J. Crouch, D. Duncan, J. Hall, F. Kolanko, A. Mak, H. Martins, and R. Mehta Aug. 1980 196 p refs

(Grant NSF DAR-78-27337) (PB81-148934; NSF/RA-800334; Rept-6) Avail: NTIS HC A09/MF A01 CSCL 131

These methods are intended to enhance the range of industrial applications to which robots can be applied. The problem of feeding workpieces that are unoriented in bins was adopted as the focus of research because it is a generic problem in manufacturing industries. The following aspects of this project are discussed: a robot system which can acquire a class of workpieces from a bin and pose them at a goalsite; a robot system which can acquire cylindrical workpieces from a bin; design of a special electronic processor for extracting features based on local gradient direction histograms; and guidelines for the design of robot hands for handling parts that are not preoriented. GRA

N81-24733 Illinois Univ. at Urbana-Champaign.

A MONTE CARLO STUDY: ROBUSTNESS OF ANALYSIS OF COVARIANCE TO VIOLATION OF SELECTED ASSUMPTIONS Ph.D. Thesis

David Samuel Thomson 1980 148 p Avail: Univ. Microfilms Order No. 8108688

A Monte Carlo simulation was used to investigate the robustness of the analysis of covariance (ANCOVA) model relative to violations of some of the model's assumptions and to various experimental conditions. The effect of violating the following assumptions was examined: (1) homogeneity of within-cell population regression coefficients (i.e., slopes); and (2) homogeneity of within-cell population error variances. In addition, the effect of having a contaminated sampling distribution from which the within-cell population error variances were generated (i.e., 10 or 20 percent of the sampling distribution has a proportionately larger variance) was examined as an experimental condition. In addition, analysis of variance was used to analyze the results of the Monte Carlo simulation with heterogeneous within-cell regression coefficients, and heterogeneous within-cell error variances for the two and three group cases. Dissert. Abstr.

N81-25655*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

US PLANT AND RADIATION DOSIMETRY EXPERIMENTS FLOWN ON THE SOVIET SATELLITE COSMOS 1129 Final Report

Milton R. Heinrich, ed. and Kenneth A. Souza, ed. May 1981 194 p refs (NASA-TM-81288; A-8572) Avail: NTIS HC A09/MF A01 CSCL 06C

Experiments included: 30 young male Wistar SPF rats used for wide range physiological studies; experiments with plants, fungi, insects, and mammalian tissue cultures; radiation physics experiments; a heat convection study; a rat embryology experiment in which an attempt was made to breed 2 male and 5 female rats during the flight; and fertile quail eggs used to determine the effects of spaceflight on avian embryogenesis. Specimens for US experiments were initially prepared at the recovery site or in Moscow and transferred to US laboratories for complete analyses. An overview of the mission focusing on preflight, on orbit, and postflight activities pertinent to the fourteen US experiments aboard Cosmos 1129 is presented. T.M.

N81-25656# Colorado Univ. at Boulder. Dept. of Aerospace Engineering Sciences.

MICROWAVE EFFECTS OF LEARNING AND MEMORY IN MICE Final Report

M. W. Luttges 30 Sep. 1980 25 p (Grant AF-AFOSR-0036-80; AF Proj. 2312) (AD-A094788; AFOSR-81-0091TR) Avail: NTIS

HC A02/MF A01 CSCL 06/18

The effects of microwave irradiation were assessed on learning memory in mice. Also, preliminary studies were completed to begin an assessment of underlying physiological mechanisms related to the observed microwave effects on behavior. Using a resonant microwave irradiation chamber in which mice were exposed following daily training to 3 gHA pulsed microwave at approximately 18 mW/sq cm, small but reliable increases in performance were documented. All treatments were delivered posttrial for a 15 min. period. Repeated replications with different aged animals produced the same effects. The modest facilitation effect was observed when the mice were tested at 20 days after original training. Using a different irradiation chamber, the studies were repeated. The new chamber used an impedance matched horn in which the mice were restrained in a constant orientation relative to the microwave fields. Once again, small but reliable amounts of performance facilitation were observed. GRA

N81-25657# Arizona Univ., Tucson. Dept. of Biochemistry. **DIRECT OBSERVATION OF ELECTRON TRANSFER ACROSS A LIPID BILAYER: LASER PHOTOLYSIS OF AN ASYMMETRIC VESICLE SYSTEM CONTAINING CHLOROPHYLL, METHYL VIOLOGEN, AND EDTA**

William E. Ford and Gordon Tollin 1980 14 p refs (Contract DE-AS02-78ER-04927) (DOE/ER-04927/T1) Avail: NTIS HC A02/MF A01

Electron transfer was examined to determine the mechanisms of charge transport across the membrane. The discussion is restricted to vesicles whose walls contain phosphatidylcholine, chlorophyll a, and valinomycin. DOE

N81-25658# Arizona Univ., Tucson. Dept. of Biochemistry. **CHLOROPHYLL-QUINONE PHOTOCHEMISTRY IN LIPOSOMES: MECHANISMS OF RADICAL FORMATION AND DECAY**

John K. Hurley and Gordon Tollin 1980 32 p refs (Contract DE-AS02-78ER-04927) (DOE/ER-04927/T3) Avail: NTIS HC A03/MF A01

Laser flash photolysis has been used to investigate the mechanism of formation and decay of the radical species generated by light-induced electron transfer from chlorophyll a triplet to quinone in egg phosphatidyl choline bilayer vesicles. Chlorophyll triplet quenching by quinone is controlled by diffusion occurring within the bilayer membrane and reflects bilayer viscosity. Radical

formation via separation of the intermediate ion pair is also inhibited by increased bilayer viscosity. Cooperativity is observed in this process due to an enhancement of radical separation by electron transfer from semiquinone anion radical to a neighboring quinone molecule. Two modes of radical decay were observed, a rapid recombination occurring within the bilayer and a much slower recombination occurring across the bilayer. DOE

N81-25659# National Training and Operational Technology Center, Cincinnati, Ohio. Office of Water Program Operations. **BACTERIOLOGICAL METHODS IN WATER QUALITY CONTROL PROGRAMS: INSTRUCTOR'S GUIDE FOR COMPLETING THE COURSE**
Rocco Russomanno Sep. 1980 184 p
(PB81-156697; EPA-430/1-80-015) Avail: NTIS
HC A09/MF A01 CSCL 06L

A manual designed for use by instructors who teach others how to perform analyses for bacteriological parameters is presented. Topics related to the presentation of training courses in which the analyses is taught. They include: the course description; personnel needed to conduct the training; the course agenda; a milestones list for planning and preparing the course; instructional resources available to support the instruction and a list of equipment and supply requirements. Also included are Instructional Package Worksheets (lesson plans) giving details relative to presenting instruction regarding each of the analyses covered in the associated student reference manual. GRA

N81-25660* National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala. **PROSTHETIC URINARY SPHINCTER Patent**
Curtis R. Helms and Harold M. Smyly, inventors (to NASA) Issued 17 Mar. 1981 4 p Filed 12 Oct. 1978 Supersedes N79-14756 (17 - 05, p 0646)
(NASA-Case-MFS-23717-1; US-Patent-4,256,093;
US-Patent-Appl-SN-950877; US-Patent-Class-128-1R;
US-Patent-Class-128-346; US-Patent-Class-128-Dig.25;
US-Patent-Class-137-493) Avail: US Patent and Trademark Office CSCL 06B

A pump/valve unit for controlling the inflation and deflation of a urethral collar in a prosthetic urinary sphincter device is described. A compressible bulb pump defining a reservoir was integrated with a valve unit for implantation. The valve unit includes a movable valve member operable by depression of a flexible portion of the valve unit housing for controlling fluid flow between the reservoir and collar; and a pressure sensing means which operates the valve member to relieve an excess pressure in the collar should too much pressure be applied by the patient.

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N81-25661* National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md. **LOCKING MECHANISM FOR ORTHOPEDIC BRACES Patent**
Jireh I. Chao (Howard Univ.) and Charles H. Epps, Jr. (Howard Univ.) Issued 24 Feb. 1981 7 p Filed 20 May 1977 Supersedes N77-27694 (15 - 18, p 2426) Continuation of abandoned US Patent Appl. SN-676958, Filed 14 Apr. 1976 Sponsored by NASA
(NASA-Case-GSC-12082-2; US-Patent-4,252,111;
US-Patent-Appl-SN-798976; US-Patent-Appl-SN-676958;
US-Patent-Class-128-80F) Avail: US Patent and Trademark Office CSCL 06B

An orthopedic brace locking mechanism is described which under standing or walking conditions cannot be unlocked, however under sitting conditions the mechanism can be simply unlocked so as to permit bending of the patient's knee. Other features of the device include: (1) the mechanism is rendered operable, and inoperable, dependent upon the relative inclination of the brace with respect to the ground; (2) the mechanism is automatically locked under standing or walking conditions and is manually unlocked under sitting conditions; and (3) the mechanism is light in weight and is relatively small in size.

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N81-25662* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

SPINE IMMOBILIZATION APPARATUS Patent
Kenneth H. Lambson (Lambson (Kenneth) and Associates) and Hubert C. Vykukal, inventors (to NASA) Issued 14 Apr. 1981 7 p Filed 13 Jul. 1979 Supersedes N79-30921 (17 - 21, p 2865)
(NASA-Case-ARC-11167-1; US-Patent-4,261,349;
US-Patent-Appl-SN-057526; US-Patent-Class-128-89R) Avail:
US Patent and Trademark Office CSCL 06B

The apparatus makes use of a normally flat, flexible bladder filled with beads or micro-balloons that form a rigid mass when the pressure within the bladder is decreased below ambient through the use of a suction pump so that the bladder can be conformed to the torso of the victim and provide the desired restraint. The bladder is strapped to the victim prior to being rigidified by an arrangement of straps which avoid the stomach area. The bladder is adapted to be secured to a rigid support, i.e., a rescue chair, so as to enable removal of a victim after the bladder has been made rigid. A double sealing connector is used to connect the bladder to the suction pump and a control valve is employed to vary the pressure within the bladder so as to soften and harden the bladder as desired.

Official Gazette of the U.S. Patent and Trademark Office

N81-25663# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

ESTIMATION OF MYODYNAMIC PARAMETER VALUES FROM OBSERVATIONS ON ISOMETRICALLY CONTRACTING MUSCLE GROUPS
H. Hatze May 1980 22 p refs
(CSIR-TWISK-153) Avail: NTIS HC A02/MF A01

A method is presented which makes it possible to estimate from a series of experimental observations of isometric maximum-effort muscle torque, a set of myodynamic parameter values for each of a number of muscles contributing collectively to the total torque output. The parameters that can be estimated are: the individual maximum isometric forces; the spreads of the length tension curves; the relative maximum isometric tendon extension; and the optimum muscle lengths. The method is described for both penniform and fusiform muscles, and is demonstrated using the human triceps muscle as an example. The values obtained by this method are in general agreement with comparable values obtained by in vitro methods. T.M.

N81-25664# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

ANALYSIS OF STRETCH RESPONSES OF A MYOCYBERNETIC MODEL MUSCLE FIBRE
H. Hatze Aug. 1980 14 p refs
(CSIR-TWISK-167) Avail: NTIS HC A02/MF A01

It is found that the model correctly predicts all the peculiar features of the stretch response. The initial rapid force rise; the subsequent slower rise; the slow decay of the force upon termination of the elongation; and the dependence of these phenomena upon stretching velocity and muscle length. The hypothesis explaining these phenomena is discussed in detail.

T.M.

N81-25665* Massachusetts Inst. of Tech., Cambridge. Dept. of Aeronautics and Astronautics.

HABITUATION TO NOVEL VISUAL VESTIBULAR ENVIRONMENTS WITH SPECIAL REFERENCE TO SPACE FLIGHT Final Report, 1974 - 1980
Laurence R. Young, Robert V. Kenyon, and Charles M. Oman Jun. 1981 20 p refs
(Grant NsG-2032)
(NASA-CR-164437) Avail: NTIS HC A02/MF A01 CSCL 06P

The etiology of space motion sickness and the underlying physiological mechanisms associated with spatial orientation in a space environment were investigated. Human psychophysical experiments were used as the basis for the research concerning the interaction of visual and vestibular cues in the development of motion sickness. Particular emphasis is placed on the conflict

theory in terms of explaining these interactions. Research on the plasticity of the vestibulo-ocular reflex is discussed. T.M.

N81-25666*# Wayne State Univ., Detroit, Mich.
DETERMINATION OF IN VIVO MECHANICAL PROPERTIES OF LONG BONES FROM THEIR IMPEDANCE RESPONSE CURVES Final Report

Stephen G. Borders [1981] 262 p refs
 (Grant NsG-2008)
 (NASA-CR-164441) Avail: NTIS HC A12/MF A01 CSCL 06P

A mathematical model consisting of a uniform, linear, visco-elastic, Euler-Bernoulli beam to represent the ulna or tibia of the vibrating forearm or leg system is developed. The skin and tissue compressed between the probe and bone is represented by a spring in series with the beam. The remaining skin and tissue surrounding the bone is represented by a visco-elastic foundation with mass. An extensive parametric study is carried out to determine the effect of each parameter of the mathematical model on its impedance response. A system identification algorithm is developed and programmed on a digital computer to determine the parametric values of the model which best simulate the data obtained from an impedance test. E.D.K.

N81-25667*# Wisconsin Univ., Madison. Biomedical Applications Team.

NASA: BIOMEDICAL APPLICATIONS TEAM Final Report, Jan. 1978 - Jan. 1981
 Jan. 1981 22 p refs
 (Contract NASS-24385)
 (NASA-CR-166672) Avail: NTIS HC A02/MF A01 CSCL 06B

The status of projects involving the adaptation of NASA technologies for medical purposes is reviewed. Devices for the measurement of joint deformation of arthritic hands, the development of an artificial pancreas, provision of an auditory signal to avert epileptic seizures, are described along with the control of medication levels, a compressed air tank to supply power for field dentistry, and an electroencephalogram monitor. The use of the Lixiscope as a portable fluoroscope, thermal laminates for hand and foot warmers for patients with Raynaud's syndrome, and the use of absorptive coatings for instruments for controlling medication levels are described. The applicability of occupation health and safety practices to industry, computerized patient scheduling, impregnation of the common facial tissue with an agent for killing respiratory viruses, commercial applications of anthropometric data, and multispectral image analysis of the skin as a diagnostic tool are reviewed. J.D.H.

N81-25668*# Raines (Jeremy K.), Bethesda, Md.
ELECTROMAGNETIC FIELD INTERACTIONS WITH THE HUMAN BODY: OBSERVED EFFECTS AND THEORIES

Jeremy K. Raines 9 Apr. 1981 123 p refs
 (NASA Order S-75151-B)
 (NASA-CR-166681) Avail: NTIS HC A06/MF A01 CSCL 06R

The effects of nonionizing electromagnetic (EM) field interactions with the human body were reported and human related studies were collected. Nonionizing EM fields are linked to cancer in humans in three different ways: cause, means of detection, and effective treatment. Bad and benign effects are expected from nonionizing EM fields and much more knowledge is necessary to properly categorize and qualify EM field characteristics. It is concluded that knowledge of the boundary between categories, largely dependent on field intensity, is vital to proper future use of EM radiation for any purpose and the protection of the individual from hazard. E.A.K.

N81-25669# Wittenberg Univ., Springfield, Ohio.
HUMAN SENSITIVITY TO HIGH FREQUENCY SINE WAVE AND PULSED LIGHT STIMULATION AS MEASURED BY THE STEADY STATE CORTICAL EVOKED RESPONSE

Glenn F. Wilson and Robert D. O'Donnell (Aerospace Medical Research Lab.) Wright-Patterson AFB, Ohio AFAMRL Feb. 1981 21 p refs

(Grant AF-AFOSR-0156-79: AF Proj. 7184)
 (AD-A097730; AFAMRL-TR-80-133) Avail: NTIS
 HC A02/MF A01 CSCL 06/16

The steady state cortical evoked response shows enhanced amplitude to a visual stimulus which is flickered in the frequency range between 38 Hz and 66 Hz. In this study, amplitude was found to be greatest at one particular frequency of stimulation, with the magnitude of the response to the peak frequency as much as double the amplitude of the surrounding frequencies. While all subjects demonstrated this enhancement, the particular frequency at which it was found varied from subject to subject. The range of peak frequencies was found to be 50 Hz to 56 Hz for the subjects studied. Sine wave modulated light produced this effect, while stroboscopic stimuli in the same frequency range did not produce it as clearly. It is hypothesized that this narrowly tuned response may be related to a subject's performance, as well as to other physiological characteristics of the individual. Since this amplitude increase is narrowly tuned, it is suggested that the advantages and disadvantages of stimulating humans at their peak frequency should be determined. Possible uses of this phenomena for studying brain functioning and behavior are discussed. Author (GRA)

N81-25670# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Vision.

EFFECTS OF MICROWAVE RADIATION ON THE LENS OF THE EYE

Jan. 1981 20 p refs
 (Contract N00014-80-C-0159)
 (AD-A097757) Avail: NTIS HC A02/MF A01 CSCL 06/18

The effects of microwave radiation on the lens of the eye, particularly in regard to potential for cataractogenesis at low exposure levels are examined. The partially understood biophysical mechanism of microwave cataractogenesis is discussed. No evidence was found for cataract induction by microwave fields of less than 10 per sq cm. E.A.K.

N81-25671# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario). Biosciences Div.

A USER GUIDE TO THE DCIEM XDC-1 DIGITAL COMPRESSION CALCULATOR

R. Y. Nishi Oct. 1980 59 p
 (AD-A096746; DCIEM-TC-80-C-58) Avail: NTIS
 HC A04/MF A01 CSCL 09/2

The calculator is a microprocessor-controlled computer based on the DCIEM pneumatic analogue decompression computer for calculating the safe ascent depth of divers. The calculator is a versatile instrument which can be used for planning and analyzing dives in the calculator mode, or for on line dive monitoring in the real time mode. The parameters used in the calculation of the decompression model are accessible from the keyboard and can be changed for investigating theoretical modifications to the model. The XDG-1 and the various ways in which it can be used for calculating decompression profiles and monitoring dives are described. Examples of calculations are presented. T.M.

N81-25672# School of Aerospace Medicine, Brooks AFB, Tex.
E-4B CREW FATIGUE ASSOCIATED WITH 30-HOUR IOT/E MISSION Final Report, 1 Feb. 1978 - 31 Mar. 1980

William F. Storm Oct. 1980 23 p refs
 (AF Proj. 7930)
 (AD-A094839; SAM-TR-80-40) Avail: NTIS
 HC A02/MF A01 CSCL 06/10

The Air Force Test and Evaluation Center (AFTEC) conducted an independent 45-day IOT/E of the Advanced Airborne Command Post (E-4B aircraft) system from 27 December 1978 to 11 February 1979. A 30-hour continuously airborne mission was flown 6-7 February 1979 to demonstrate the extended mission capability of the E-4B system. Using a battery of psychobiological measures, the Crew Technology Division of the USAF School of Aerospace Medicine (USAFSAM/VN) evaluated crew fatigue associated with the extended mission. The battery consisted of sleep surveys, subjective fatigue ratings, and mood surveys, as well as endocrine/metabolic indices derived from urine samples. Data were systematically collected from 66 crewmen at 4-hour intervals during the mission and for 3 1/2 days after the mission.

The data were reduced for six functional crew groups: flightcrew, stewards, radio operators, radio maintenance technicians, aircraft maintenance technicians, and the National Emergency Airborne Command Post (NEACP) battle staff. Fatigue and stress levels that occurred during the 30-hour mission were moderate and not suggestive of compromises in performance and safety. Fragmented sleep acquired in the bunks and passenger seats was of restorative value and contributed to the abeyance of severe fatigue and negative mood states during the mission. Severe levels of subjective fatigue were reported a few hours after mission completion, but after 2 nights of uninterrupted sleep in the home environment, the crews were sufficiently recovered to resume normal ground and flight duties. GRA

N81-25673# School of Aerospace Medicine, Brooks AFB, Tex. **FORTY-EIGHT VERSUS TWENTY-FOUR HOUR DUTY FOR USAF MISSILE CREWS: A FEASIBILITY STUDY USING SUBJECTIVE MEASURES OF FATIGUE** Final Report, Aug. 1978 - Mar. 1980

Stephen F. Gray Nov. 1980 57 p refs
(AF Proj. 7930)

(AD-A094837: SAM-TR-80-39) Avail: NTIS
HC A04/MF A01 CSCL 06/16

The purpose of this study was to assess the feasibility of implementing a 48-hour work schedule for missile launch crews of a United States Air Force operational missile wing. A 90-day field test using two operational Minuteman missile squadrons as test and control groups was accomplished during the winter of 1978-1979 at Grand Forks Air Force Base, North Dakota. Subjective reports of fatigue and the quantity and quality of sleep were recorded daily by crew members during work and while they were off duty. In addition, subjective reports of workload and disruptions of sleep were gathered during alerts. Subsets of data from at most 10 distributed alerts for each crew member were subjected to analyses of variance. The primary analyses were tests for differences between the responses of crew members working a new 48 hour vs. those working the standard 24 hour schedule. Scaled subjective reports of fatigue at the end of alert, after driving back to base, and after 24 hours of recovery indicated no significant differences between the two work schedules. Tests for interactions of the work schedules with activities during alerts, specific control centers, and cumulative or maturational effects over several alerts showed no effects that might have masked real differences between the work schedules. In conclusion, a recommendation was made that the 48-hour work schedule was feasible under the specific circumstances used in this study. GRA

N81-25674# School of Aerospace Medicine, Brooks AFB, Tex. **MISSION CREW FATIGUE DURING RIVET JOINT BLOCK 2 DEMONSTRATION/EVALUATION** Final Report, Jan. 1977 - Feb. 1980

William F. Storm Nov. 1980 20 p refs
(AF Proj. 7930)

(AD-A094822: SAM-TR-80-37) Avail: NTIS
HC A02/MF A01 CSCL 06/19

RIVET JOINT is a USAF Electronic Systems Command (ESC) airborne (RC-135) reconnaissance system. The objectives of an ongoing modernization program are to improve mission capability and manpower utilization through use of state-of-the-art computer technology and surveillance equipment. A prototype modernized system recently underwent testing and evaluation in the real-world operational environment. ESC/SD requested that the USAF School of Aerospace Medicine (USAFSAM/VN) evaluate the impact of the system on operator stress and fatigue. Psychobiological data were systematically collected from 13 operators over 6 consecutive days, including two 8-hour airborne test missions. The subjective fatigue and physiological cost associated with the test missions were moderate and did not suggest compromises in performance and safety. The operators were fully recovered from each of the test missions after an extended postmission night of sleep. GRA

N81-25675# Saint Louis Univ., Mo. School of Medicine. **THE INVESTIGATION OF METABOLIC AND CARDIOVASCULAR RESPONSES TO FATIGUING STATIC EFFORT** Final Report

A. R. Lind, J. S. Petrofsky, C. A. Williams, T. E. Dahms, and G. Kamen 27 Aug. 1980 22 p refs
(Grant AF-AFOSR-3084-76; AF Proj. 2312)
(AD-A094804: AFOSR-81-0085TR) Avail: NTIS
HC A02/MF A01 CSCL 06/19

In the animal experiments a new method of stimulating muscles was developed in the laboratory to mimic voluntary contractions. Cat muscles were stimulated to fatigue at various constant tensions. The soleus muscle (slow twitch) did not fatigue unless the tension exceeded 30% of maximal strength whereas the plantaris muscle (fast-twitch) fatigued at all tensions above 3% of maximal strength. Fatigue was not attributable to failure of the neuromuscular junction. Fatiguing contractions of the soleus muscle did not elicit an increase in blood pressure whereas fast-twitch muscles did so, just as in voluntary contractions in man. In human studies, women held given fractions of maximal strength longer than men. But because men are stronger than women, transposing the same data into absolute tension shows that the men have a longer isometric endurance for any given tension examined. Electromyographic studies show that the integrated amplitude increases as contractions are held to fatigue by about the same amount, irrespective of the tension held. The frequency of the electromyogram fell by an absolute amount all tensions. This kind of analysis may be used as a tool to detect fatigue. Extensive studies of the control of muscle blood flow showed that during intermittent isometric exercise, local metabolites were responsible for dilating the vessels but that the effect could be opposed, in part, by neural vasoconstriction. GRA

N81-25676# Kentucky Univ., Lexington. **RESPONSE OF THE CARDIOVASCULAR SYSTEM TO VIBRATION AND COMBINED STRESSES** Interim Progress Report, 1 Oct. 1979 - 30 Sep. 1980

Charles F. Knapp, J. M. Evans, and D. R. Randall Nov. 1980 59 p refs

(Grant AF-AFOSR-0039-80; AF Proj. 2312)
(AD-A094792: AFOSR-81-0083TR) Avail: NTIS
HC A04/MF A01 CSCL 06/19

Studies of the previous year indicated an inability of cardiac denervated dogs to maintain stroke volume during the positive g sub z portion of sinusoidal plus or minus 2 g sub z acceleration stress across the frequency range of 0.004 to 0.25 Hz. To investigate the inadequacy of stroke volume maintenance in these chronically instrumented animals, three cardiac dimensions have been added to provide heart volume information in addition to our standard instrumentation for measuring aortic flow and left and right ventricular and aortic arch pressures. To date, crystals have been implanted to record heart size in 27 animals (16 normal and 11 cardiac denervated) whose body weights ranged from 17 to 26 Kg. GRA

N81-25677# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Aerospace Medical Div. **RADIOACTIVE MICROSPHERE STUDY OF CEREBRAL BLOOD FLOW UNDER ACCELERATION**

Kevin J. Greenless, James E. Yoder, David M. Toth, Clarence M. Oloff, and Alva Karl (Systems Research Labs., Inc.) Nov. 1980 13 p refs
(AF Proj. 7222)

(AD-A094623: AFAMRL-TR-80-50) Avail: NTIS
HC A02/MF A01 CSCL 06/19

A study using radioactive microspheres for the investigation of cerebral blood flow during acceleration is described. Details of a technique for the blunt dissection of cerebral tissues are included. Results of flow studies at 3 and 5 G sub z acceleration stress indicate there is no selective regional preservation of cerebral tissue. GRA

N81-25678# Princeton Univ., N. J. Dept. of Statistics. **EYE-FITTING OF STRAIGHT LINES**

Frederick Mosteller, Andrew F. Siegel, Edward Trapido, and Cleo Youtz Jan. 1981 12 p refs
(Grants DAAG29-79-G-09295; NSF SOC-75-15702; PHS-5-D04-AH01698-02)

(AD-A096716; TR-183-SER-2; ARO-16669.5-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

An empirical investigation was carried out in which inexperienced students were instructed to locate a line for estimating y from x for four sets of points. They tended to choose slopes near that of the first principal component (major axis) of the data and their lines passed close to the centroids. Students had a slight tendency to choose consistently either steeper or shallower slopes for all sets of data. T.M.

N81-25679# Northwestern Univ., Evanston, Ill. Neuroscience Lab.

ENHANCING SENSITIVITY TO VISUAL MOTION Final Report

Robert Sekuler May 1980 38 p refs
(Grant AF-AFOSR-0064-79; AF Proj. 2313)
(AD-A094793; AFOSR-81-0090TR) Avail: NTIS
HC A03/MF A01 CSCL 06/16

This report reviews a one-year investigation of techniques that might enhance an observer's sensitivity to moving targets. The five experiments reported here cover a broad range of such techniques. Experiment 1 measured direction difference thresholds as a function of target velocity for 39 observers. Despite large (nearly fourfold) individual differences in thresholds, it was clear that ability to tell what direction a target moved in depended strongly on its velocity. In addition, this ability was seriously degraded for an oblique direction compared to performance with upward motion. Experiment 2 showed that this variation in threshold with target velocity was independent of the distance traveled by that target. This finding contradicts one common theory of motion perception. Experiment 3 measured difference thresholds for direction at various points in the course of training with a reaction time task. This task required observers to respond rapidly to moving targets presented after exposure to the broadband or filtered directional noise. The reaction times to motion onset decreased with practice but the direction difference thresholds did not show any comparable change. Experiment 4 examined the effect of practice on the performance deficit produced by an observer's uncertainty about the direction in which a to-be-detected target would travel. GRA

N81-25680# Naval Postgraduate School, Monterey, Calif.
A MODEL TO MEASURE BOMBARDIER/NAVIGATOR PERFORMANCE DURING RADAR NAVIGATION IN DEVICE 2F/14, A-6E WEAPON SYSTEM TRAINER M.S. Thesis

Ted R. Mixon Mar. 1981 302 p refs
(AD-A098776) Avail: NTIS HC A14/MF A01 CSCL 05/9

This thesis modeled a performance measurement system for the Bombardier/Navigator (B/N) Fleet Replacement Squadron student during low level radar navigation flight in the Navy A-6E Weapon System Trainer. The model was designed to determine student skill acquisition measures for the purpose of providing information for decision-making by the squadron instructor and training manager. Model formulation methodology was based on a literature review of aircrew performance measurement from 1962-1980 and an analytical task analysis of the B/N's duties. Over 50 currently accessible candidate measures were listed and a proposal was made for a competitive exercise using A-6E fleet aircrews flying preprogrammed routes to establish performance standards using the candidate measures. Multivariate discriminant analysis was recommended for measure reduction. A sequential sampling decision model selected for evaluation provided fixed decisional error rates for successful training termination decisions and used both objective and subjective performance measures. Several display formats were recommended for use in debriefing. GRA

N81-25681# Baylor Univ., Houston, Tex. Dept. of Dermatology.

EVALUATION OF MATERIALS PROPOSED FOR USE IN SPACE FLIGHT Final Report

W. Christopher Duncan Mar. 1981 4 p
(Contract NAS9-14407)
(NASA-CR-160991) Avail: NTIS HC A02/MF A01 CSCL 11E

The primary irritancy and allergenicity of flame resistant treated cotton knit shirts proposed for use in space flight were evaluated. The knitted shirts were supplied by NASA as follows: knitted shirts with collars were made of two-ply mercerized single-knit cotton jersey. The fabric was treated with tetrakis (hydroxymethyl) phosphonium hydroxide and subsequently cured with gaseous ammonia (THPOH/NH₃). The final treatment comprised adding on diammonium phosphate (DAP)/urea. The treated fabric was process scoured to remove extraneous materials, top softened and mechanically or chemically finished as required for specific needs. Diammonium phosphate is a more efficient flame inhibitor than the phosphonium; thus, the combination treatment served to impart higher resistance to ignition and sustained combustion as required by NASA test standard. S.F.

N81-25682# Dynamics Research Corp., Wilmington, Mass.
HUMAN RESOURCES, LOGISTICS AND COST FACTORS IN WEAPON SYSTEM DEVELOPMENT DEMONSTRATION IN THE FULL SCALE DEVELOPMENT PHASE OF AIRCRAFT SYSTEM ACQUISITION Final Report

Gerard F. King and William B. Askren (Air Force Human Resources Lab.) Feb. 1981 90 p refs
(Contract F33615-77-C-0016; AF Proj. 1959)
(AD-A096731; AFHRL-TR-80-52) Avail: NTIS
HC A05/MF A01 CSCL 05/9

A three part demonstration of the five coordinated human resources technology (CHRT) on an aircraft acquisition program is reported. The five human resource technology categories are: maintenance manpower modeling, human resource in design tradeoffs, instructional system development, job guide development, and system ownership costing. A consolidated data base (CDB), which services the five integrated technologies is also included. The feasibility of applying the CHRT and CDB to the full scale development phase of acquisition in avionics and landing gear systems is demonstrated. E.A.K.

N81-25683# School of Aerospace Medicine, Brooks AFB, Tex. Crew Performance Branch.

FATIGUE AND WORKLOAD IN FOUR-MAN C-5A COCKPIT CREWS (VOLANT GALAXY) Final Report, 1 Oct. 1979 - 1 Feb. 1980

William F. Storm and John T. Merrifield Aug. 1980 46 p refs
(AF Proj. 7930)
(AD-A094498; SAM-TR-80-23) Avail: NTIS
HC A03/MF A01 CSCL 05/9

Triple Inertial Navigation Systems (INS) are being installed on C-5A aircraft. At the request of the USAF Airlift Center, aircrew fatigue and workload were evaluated in 4-man C-5A cockpit crews (aircraft commander, copilot, and 2 flight engineers) performing typical long-range transport missions on triple-INS-equipped aircraft. Most of the navigator's duties were assumed by the pilots with the balance assigned to the flight engineer station. Considering subjective fatigue and workload findings, discussions with crewmen, the workloads reported during emergencies and aerial refuelings, and the operational requirements of wartime conditions, it was recommended that the 4-man C-5A crew concept not be implemented at this time. GRA

N81-25684# Rowland and Co., Haddonfield, N. J.
TRAINING IMPLICATIONS OF AIRBORNE APPLICATIONS OF AUTOMATED SPEECH RECOGNITION TECHNOLOGY Final Technical Report, Jul. - Oct. 1980

Paul E. VanHemel, Susan B. VanHemel, W. Judson King, and Robert Breaux (Naval Training Equipment Center) Oct. 1980 64 p refs Prepared in cooperation with Ergonomics Associates, Inc., Orlando, Fla.

(Contract N61339-80-D-0009)
(AD-A098625; NAVTRAEQUIPC-80-D-0009-0155) Avail: NTIS HC A04/MF A01 CSCL 05/9

Developments in automated voice recognition and synthesis have made feasible the implementation of automated speech recognition (ASR) technology in airborne systems. Research systems using voice technology at the Naval Training Equipment Center and at the Naval Air Development Center were analyzed to determine the human factors of using automated speech

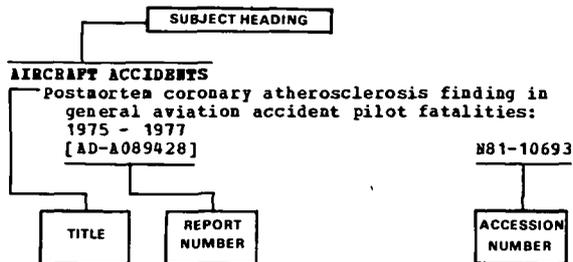
recognition for communication with machines. The human factors identified present some unique training implications. The following specific recommendations were made with respect to Instructional Systems Development and particularly to the development of training media. Instructional systems using ASR should: (1) Be developed by instructional designers who have had hands-on experience with ASR technology; (2) Provide ASR speech behavior models, especially correct ones, for trainees to emulate, with the models chosen to illustrate specific factors in achieving successful recognition; (3) Provide convenient and effective means by which trainees can evaluate their own speech behavior; and (4) Provide convenient voice recognition test and voice reference pattern update capabilities under trainee control. Recommendations are also provided for training for the use of airborne ASR systems. GRA

N81-25685# Science Applications, Inc., Los Angeles, Calif.
**MEASUREMENT OF HEAD ACCELERATIONS OF BOXERS,
FEASIBILITY STUDY Final Report, Mar. 1978 - Oct. 1980**
D. F. Hausknecht, M. Axelrod, and R. Hoard May 1980 85 p
(Contract DOT-HS-8-01893)
(PB81-152191; DOT-HS-805664; SAI-068-81-513) Avail:
NTIS HC A05/MF A01 CSCL 13L

A miniaturized accelerometer transmitter in the boxer's mouthpiece permits blow by blow telemetering of head motion data to ringside for later analyses and correlation with observed responses. The feasibility of performing these measurements was examined by conducting a survey of boxing activities (professional and amateur), performing an assessment of the safety and legal requirements, and improving packaging design to enhance boxer comfort and acceptance of a mouthpiece containing the instrumentation. Acceptability tests with a boxer wearing a mouthpiece with a mockup of the instrument and sparring, were conducted. A three-phased plan for conducting the measurements is described and favorable test sites are given. GRA

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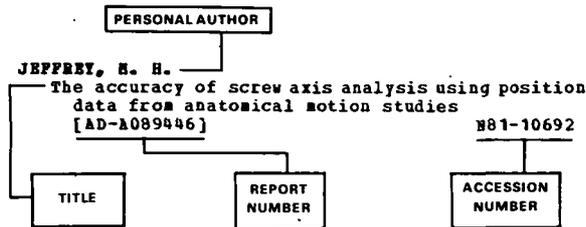
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