AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 146)

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AERO SPACE MEDICINE
AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 146)

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 September 1975 in

- Scientific and Technical Aerospace Reports (STAR)
- International Aerospace Abstracts (IAA)
NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.
INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 223 reports, articles, and other documents announced during September 1975 in *Scientific and Technical Aerospace Reports* (*STAR*) or in *International Aerospace Abstracts* (*IAA*). The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

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An annual index will be prepared at the end of the calendar year covering all documents listed in the 1975 Supplements.
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TYPICAL CITATION AND ABSTRACT FROM STAR

N75-10689* Scientific Translation Service, Santa Barbara, Calif.
The Dependence of Reaction Times on the Location of the Stimulus
G.S. Hall, Washington, NASA, Oct 1974, 16 p. refs. Translated into English from Arch Anatomie Physiol (West Germany) 1879 p 1-10
(Contract NASw-2483) (NASA-TT-F-16001) Available at NTIS HC $3.25 CSCL 06P

Reaction times to stimuli were measured using simple apparatus in the upper arm, index finger and retina. It is found that reduced reaction times are not noticeably different for various parts of the body. In the case of the eye the reaction times are similar to other functions. Therefore the reaction method cannot be used to determine the sensible and motor conduction velocity and at the present time the conduction velocity in the long paths of the spine are unknown.

TYPICAL CITATION AND ABSTRACT FROM IAA

A75-12823* Brain stem auditory evoked responses in human infants and adults.
K. Hecox and R. Galambos (California University, La Jolla, Calif.). Archives of Otolaryngology, vol 99, Jan 1974, p 30-33, 17 refs. Research supported by the Sloan Foundation, Grants No. PHS-NS-10482-01, No. NGR 05-009 198

Brain stem evoked potentials were recorded by conventional scalp electrodes in infants (3 weeks to 3 years of age) and adults. The latency of one of the major response components (wave V) is shown to be a function both of click intensity and the age of the subject. This latency at a given signal strength shortens postnataally to reach the adult value (about 6 msec) by 12 to 18 months of age. The demonstrated reliability and limited variability of these brain stem electrophysiological responses provide the basis for an optimistic estimate of their usefulness as an objective method for assessing hearing in infants and adults.
IAA ENTRIES

A75-35900 * The effects of malnutrition on the developing brain stem of the rat - A preliminary experiment using the lateral vestibular nucleus J E Johnson, Jr and R A Yoestle (NASA, Ames Research Center, Neurosciences Branch, Moffett Field, Calif.) Brain Research, vol 21, no 3, 1975, p 252-262 13 refs

A75-35901 * Soil sterilization effects on in situ indigenous microbial cells in soil D P Labeda, D L Balkwill, and L E Casida, Jr (Pennsylvania State University, University Park, Pa.) Canadian Journal of Microbiology, vol 21, no -3, 1975, p 263-269 27 refs

A75-35902 * Simplified procedures for releasing and concentrating microorganisms from soil for transmission electron microscopy viewing as thin-sectioned and frozen-etched preparations D L Balkwill, D P Labeda, and L E Casida, Jr (Pennsylvania State University, University Park, Pa.) Canadian Journal of Microbiology, vol 21, no 3, 1975, p 252-262 13 refs

A75-35979 # Motion of pendulum-type biped systems (Peredvizhenie dvynogikh sistem maatnikovogo typa) V B Larn Akademia Nauk SSSR, Izvestna, Mekhanika Tverdogo Tela, Mar-Apr 1975, p 58-61 6 refs In Russian

Vukobratovich et al (1972) have studied biped mechanisms in which the motion of the compensating mass is a major element of the system dynamics. The dynamic processes involved in the motion of biped walking mechanisms without a compensation mass are analyzed, and problems associated with controlling and stabilizing the motion of such mechanisms are examined

A75-36070 Conduction cardiograph-bundle of His detector. L Siegel, E B Mahoney, J A Manning, and S Stewart (Rochester, University, Rochester, N Y) IEEE Transactions on Biomedical Engineering, vol BME-22, July 1975, p 269-274 8 refs

Heart block is a potential complication in the surgical repair of several congenital cardiac defects. The proximity of the bundle of His to these defects makes their repair particularly hazardous. Earlier workers devised a method for the anatomic localization of portions of the conduction system at the time of cardiotomy. This method is inefficient and time-consuming and therefore has not received general acceptance. This paper describes an instrument which expands upon that method to facilitate and expedite the localization process. This should enhance the overall utility of the method. The instrument is self-contained, reduces the signal complexity arriving from the exploring probe, analyzes the waveforms and responds instantly with an audible tone when the probe overlies the bundle of His

A75-36071 Miniaturized electrode for on-line PO2 measurements. G Eden, G F Inbar (Technion - Israel Institute of Technology, Haifa, Israel), I Timor-Tritsch (Rambam Government Hospital, Haifa, Israel), and H I Bicher (Arkansas, University, Fayetteville, Ark.) IEEE Transactions on Biomedical Engineering, vol BME-22, July 1975, p 275-280 7 refs

A new method of constructing miniaturized Clarke-type electrodes that can be fabricated en masse is described. These electrodes, which have typical Clarke electrode characteristics, are very small, thus allowing on-line monitoring, they are also very easy and inexpensive to manufacture. Real-time monitoring of PO2 is essential since continuous information about this parameter is often necessary in operating theaters, open-heart surgery, postoperative care units, coronary care units, intensive care of premature babies, and research

S J M

A75-36072 A computerized system for optimal filtering of left ventricular pressure data H Broman (Chalmers Tekniska Hogska, Sahlgren Hospital, Goteborg, Sweden), J Kwasnicka (Karowa Unversita, Hradec Kralove, Czechoslovakia), B Lander, and E Varnauskas (Sahlgren Hospital, Goteborg, Sweden) IEEE Transactions on Biomedical Engineering, vol BME-22, July 1975, p 287-292 5 refs

Research supported by the Swedish National Association against Heart and Chest Diseases.

On account of noise, considerable errors appear in standard and pressure-record estimates of left ventricular performance. These errors can be reduced by adequate data processing. A clinically useful criterion of such processing of left ventricular pressure is presented. The reproducibility and clinical usefulness of the method are demonstrated by application to a number of experimental records as well as to a series of simulated pressure waves.

A75-36073 * Continuous cardiac output measurement – Aspects of Doppler frequency analysis. R S. MacKay and H B Hechtman (Boston University, Boston, Mass.) IEEE Transactions on Biomedical Engineering, vol BME-22, July 1975, p 346-350 12 refs

Grants No NGR-22-004-024, No NIH-7-915-00659

V P
From the suprasternal notch blood flow velocity in the aorta can be measured non-invasively by a Doppler probe. Integration over systole after frequency analysis gives a measure of stroke volume if a separate diameter observation is incorporated. Frequency analysis by a zero crossing counter or by a set of parallel phase lock loops was less effective than a set of bandpass filters. Observations on dogs, baboons and humans before and after exercise or surgery suggest the indications to be useful. Application to judging heart failure by the effect of introducing a volume load is indicated. Changes in output also are measured in freely moving subjects.

A75-36074


This work is directed toward reducing the number of parameters necessary to describe the electrical activity of the heart. The approach taken is one of template matching using a linear combination of a set of template waveforms to fit a set of pattern waveforms. Using selected electrocardiogram (EKG) waveforms as a template results in a great reduction in the number of parameters necessary to match other EKGS.

A75-36175


Experiments are conducted to study the possibility of preventing decompression sickness during accidental depressurization of an aircraft cabin at altitudes above 7 km by means of desaturation performed in flight. Desaturation is carried out using oxygen-respiratory equipment in conjunction with a high-altitude gear, i.e., under conditions of a moderately rarefied atmosphere while inhaling oxygen or air with increased oxygen content. Experimental results show that breathing oxygen followed by an air-oxygen mixture or inhaling one mixture for 2-4 hr at altitudes of 4-4.5 km is an effective means of preventing decompression sickness during a long stay (24 hr) at altitudes of 11-12 km.

A75-36326


The effects of weightlessness, cosmic radiation, and other space environment factors on human metabolism and organ function are investigated. Studies reported concern characteristics of metabolism during prolonged water immersion, changes in vestibular function during space flight, otolithonarological problems in medical support of space flights, effects of muscle electrostimulation during simulated weightlessness, postmission plasma volume and red-cell mass changes in the crews of the first two Skylab missions, and Skylab task and work performance (experiment M-151 - time and motion study).

S. J. M.

A75-36327


The renal function and regulation of the water-salt balance were investigated in cosmonauts postflight and in earth-bound simulation experiments with the aid of water loading and hormonal injections. Water- and ion-release were also studied during LBNP and physical exercises. The cosmonauts who performed space flights of 2 to 5 days showed water retention and increased urine excretion of salts during the first postflight days in response to a water load. After the 18-day flight water excretion remained unchanged whereas salt excretion increased. The study of the hormonal effect in simulation experiments demonstrated a normal renal response to the hormonal excretion. After the LBNP tests and physical exercises the water- and salt-excretion declined. The data on the blood- and urine-ionic composition, excretion of nitrogen metabolites, and hormones postflight as well as the results of load and functional tests suggest that changes in the renal function of cosmonauts in weightlessness are associated with regulatory effects on the kidney rather than disturbances in the function of nephron cells.

A75-36328


Translation

Twelve-day water immersion in a horizontal position was studied as a simulation of weightlessness in order to determine its effects on metabolism. Parameters of protein metabolism, carbohydrate metabolism, acid-base equilibrium, enzyme activity, and steroid hormonal activity were studied. Immersion was accompanied by increased residual blood N2, reduced blood creatine, increased urine creatinine and creatine, increased blood glucose and lactate, respiratory and metabolic acidosis, increased creatine phosphokinase and lactate dehydrogenase isoenzyme activity, and intensified glucocorticoid and androgenic function (indicating stress).

A75-36329


Several studies in animals over the past decade have shown that prolonged exposures to pressures within the range 226 mm Hg to 160 mm Hg (30,000 to 37,500 ft) are likely to lead to brain damage. This often results in neurological and behavioral disturbance, which may be subtle and reversible or gross and ultimately fatal. The appearance of these impairments is often delayed until several hours or even days after exposure. Immediate survival does not necessarily ensure recovery. In contrast, decompression to pressures below 160 mm Hg or above 226 mm Hg are unlikely to have adverse effects if the exposure is survived. The most probable outcomes of such decompressions are death or irreversible injury.

A75-36330


Past observations on vestibular-vegetative and vestibular-sensory disorders encountered during space flight are analyzed. Disorders discussed include spatial illusions, vertigo, and kinetosis exacerbated by sudden head movements. It is concluded that decision factors in the development of motion sickness are the disturbance of the function of analyzers responsible for spatial orientation which take the form of sensory conflicts and the altered reactivity of the organism due to the hemodynamic rearrangement. The vestibular problem as a whole and its various aspects, particularly those concerning selection, training, and medical support during flight, remain as urgent as before and require attentive investigation.

A75-36331

Otolithonarological problems in medical support of space flights. I. I. Branon, E. I. Matsnev, and I. I. Lakovleva (Institute of Biomedical Problems, Moscow, USSR) (International Symposium on Basic Environmental Problems of Man...

Postural and motor events during REM (desynchronized) sleep and neurophysiological and neurochemical mechanisms involved in the control of these events are discussed. It is concluded that the postural atonia typical of desynchronized sleep is due to post-synaptic inhibition of spinal motoneurons resulting from tonic activation of a bulbospinal inhibitory mechanism. Evidence indicates that during REM sleep, cholinergic reticular neurons fire asynchronously, thus being able to trigger the bulbospinal inhibitory system responsible for the atonia.

S J M


In a 45-day experiment, test subjects were exposed to bed rest with their heads down at -4 deg. Twice a day their stomach, back, femur, and shin muscles were stimulated with electric current for 25 to 30 min. The value of muscle tension was close to the maximum voluntary contraction. The main objective was to prevent muscle atrophy and to maintain their trophic and functional states. Physiological measurements were carried out together with morphological, cytochemical, and biomechanic evaluations. The tissue removed during biopsy from M. soleus 7 days before the test and on the 30th hypokineti day was used as substrate. Electrostimulation favorably affected the tone and strength of muscles as well as their static and dynamic endurance. Morphological studies showed a positive effect of electrostimulation on the muscle tissue, preventing the development of atrophic processes. Orthostatic tolerance increased during the first hypokineti day.

S J M


The Bioassay I and II experiments, undertaken to determine the fluence and spectra of high-energy particles in space and to ascertain their biological effects, are described. The degree of damage depended on whether the hit cell was replaceable or not. A cosmic radiation dose of up to 500 or more times that on atmosphere-protected earth, present in spacecraft, could have severe effects on man, especially in conjunction with weightlessness.

S J M

The vestibular, auditory, and clinical otolaryngological aspects of otolaryngology in space flight are separately reviewed. The principal recent vestibular finding is the correlation of space sickness resistance with innate tolerance to ground stimulation and with special vestibular ground training. In audiology, the effects of prolonged noise from the craft and from continuous two-way radio communication, particularly as regards predicting the reliability of the auditory analyzer in order to preserve high work capacity in crew members, take precedence. Disorders of the mucous membrane and allergic lesions are the most important problems in the clinical ENT (ear, nose and throat) area, moreover, specialized crew training in the ENT field is vital, since immediate aid may have to be administered.

S J M

The Biostack I and II experiments, undertaken to determine the ventilation, heart rate, and percentage increase in leg volume were continuously recorded for the Inflight Lower Body Negative Pressure (LBNP) experiment conducted during the first manned Skylab mission. Data were collected over a 5-month preflight period as well as at approximately 3-day intervals throughout the mission. Individual variations in cardiovascular responses to LBNP during the preflight period continued to be demonstrated, and measurements of the calf showed that a large volume of fluid was shifted out of the legs early in the flight. A much greater increase in leg volume occurred during inflight LBNP than in preflight tests. Resting heart rates tended to be low early in the flight and to increase slightly as it progressed, while resting blood pressure varied. The LBNP protocol was a greater stress inflight, and the tests had to be stopped early on three occasions due to impending syncopal reactions. Inflight LBNP responses seemed to predict the degree of postflight orthostatic intolerance. Postflight responses to LBNP during the first 48 hours were characterized by marked elevations in heart rate, instability in blood pressure, and considerably elevated systolic and diastolic pressures both at rest and during stress.

F G M


The prediction that various stresses of flight, particularly weightlessness, would bring about significant derangements in the metabolism of the musculoskeletal system has been based on various balance-study observations of long-term immobilized or inactive bed rest. The three astronauts of Skylab II consumed a planned dietetic intake of major metabolic elements in mixed foods and beverages and provided virtually complete collections of excreta for 31 days preflight, 28 days inflight, and 17 days postflight. Analyses showed that on varying days among the crewmen, urine calcium increased gradually during flight in a pattern similar to that observed in bed-rest studies. Fecal calcium excretion did not change significantly, but calcium balance, owing to the urinary calcium rise, became either negative or less positive than in preflight measurement. Increased excretion and negative nitrogen and phosphorus balances inflight indicated appreciable loss of muscle tissue in all three crewmen. Significant losses also occurred inflight in potassium, sodium, and magnesium. Based on the similarity in pattern and degree between these observations of calcium, phosphorus, and nitrogen loss, musculoskeletal integrity would not be threatened in space flights of up to at least 3 months. However, if similar changes occur in the planned Skylab flights for considerably more than 28 days, concern for capable musculoskeletal function should be serious for flights of very many months' duration.

F G M

Postmission plasma volume and red-cell mass changes in the crews of the first two Skylab missions P C Johnson, S L Kimzey, and T B Driscoll (Baylor College of Medicine, Methodist Hospital, NASA, Johnson Space Center, Cellular Analysis Laboratory, Houston, Tex.) (International Symposium on Basic Environmental Problems of Man in Space, 5th, Washington, D.C., Nov 27-30, 1973) Acta Astronautica, vol 2, Mar-Apr 1975, p 311-317 12 refs

Red-cell mass determinations were performed before and after the first two Skylab missions. The data showed a 14% mean decrease in red cell mass after the 28-day mission and a 12% mean decrease.
The experiment was performed to ascertain whether man's ability to perform mechanical work would be altered as a result of exposure to the weightless environment. Skylab II crewmen exercised on a bicycle ergometer at loads approximating 25%, 50%, and 75% of their maximum oxygen uptake while their physiological responses were monitored. The results of these tests indicate that the crewmen had no significant decrement in their response to exercise during their exposure to zero gravity immediately postflight, however, all crewmen demonstrated an inability to perform the programmed exercise with the same metabolic effectiveness as they did both preflight and inflight. The most significant changes were elevated heart rates for the same work load and oxygen consumption (decreased oxygen pulse), decreased stroke volume, and decreased cardiac output at the same oxygen consumption level. It is apparent that the changes occurred inflight, but did not manifest themselves until the crewmen attempted to readapt to the 1-G environment.

(Author)

A75-36358  Perceived distance and the perceived speed of self-motion - Linear vs angular velocity E R Wist, H C Diener, J Dichgans, and T Brandt (Neurologische Universitatsklinik, Freiburg im Breisgau, West Germany) Perception and Psychophysics, vol 17, no 6, June 1975, p 549-554 18 refs Research supported by the Alexander von Humboldt Foundation and Deutsche Forschungsgemeinschaft

Experiments are reported in which it was found that, with the angular speed of a visual surround held constant, the perceived speed of rotary self-motion increased linearly with increasing perceived distance of this surround. This finding was in agreement with a motion constancy equation derived from a consideration of object-reflected motion perception. Since information concerning distance is necessary for the perception of linear but not angular speed, this finding supports the conclusion that visually perceived rotary self-motion perception is dependent upon perceived linear surround motion at least in the horizontal plane. The visual motion constancy mechanism which operates for object-reflected motion cannot apparently be switched off for the special case of self-motion perception.

(Author)

A75-36359  Fragmentation of fixated line stimuli as a function of gravitational orientation S R Ellis (McGill University, Montreal, Canada) Perception and Psychophysics, vol 17, no 6, June 1975, p 601-606 43 refs National Research Council Grant No A-7891

The differential propensity of fixated line stimuli to fragment and disappear from view was studied as a function of the gravitational orientation of the stimuli. The propensity to fragment was measured in terms of three intercorrelated dependent variables - the number of fragmentations per fixation period, the total duration of fragmentation per fixation period, and the latency to the first fragmentation. Unlike some anisotropic visual phenomena, which may reflect orientation independent aspects of pattern perception, the observed anisotropy of propensity to fragment can be attributed overwhelmingly to the retinal orientation of the stimuli. Accordingly, this property of fragmentation need not be ascribed to higher order aspects of pattern perception.

(Author)

A75-36391  # Individual features in the reaction to hypoxia (Riss individual'nosti v reaktsii na gipoksiu) V la Berezhkov'skiy (Akademia Nauk Ukrain'koi SSR, Institut Fiziologich, Kiev, Ukrainian SSR) Fiziologichnii Zhurnal, vol 21, May-June 1975, p 371-376 11 refs In Ukrainian

In individual study of 220 albino rats under the vacuum bell with rarefaction equivalent to an altitude of 12,000 m, survival time (ST) of the individuals varied within a more than 10-fold limit. By means of the repeated tests with month interval, animals were selected which manifest a high stability to hypoxia (HSH). It is shown that the relation of ST to time of restitution for the HSH animals is 1.21.5, whereas for those low stable to hypoxia (LSH) it does not exceed 0.5. Under conditions of growing hypoxic hypoxia...
the HSH and LSH animals manifest different changes in external respiration and rhythm of heart beating. The reason for the changed sensitivity of certain individuals to hypoxia may be a phenomenon of a partial genetic blockage which determines peculiarities in the energetic processes in cells at low partial pressure of oxygen. 

Author: G. Hoffmann

A75-36712 Influence of bicycle ergometer work and oral glucose-gabe in man K C Hayes (Waterloo, University, Waterloo, Ontario, Canada) European Journal of Applied Physiology, vol 34, no 2, 1975, p 121-130 26 refs

Experiments are reported showing that stronger power absorption by biological bodies occurs for waves with electric field polarized parallel to the long dimension of the bodies. It is also shown that maximum absorption correlates with wavelengths one-quarter as long as the lengths of the bodies. Thus, for adult humans, highest whole-body absorption is anticipated at 40-55 MHz.

Author: S. J. M.

A75-36713 Venous and capillary blood hematocrit at rest and following submaximal exercise T D Fahey and R Rolph (San Jose State University, San Jose, Calif.) European Journal of Applied Physiology, vol 34, no 2, 1975, p 109-112 13 refs

Significant variations in tissue properties vis-a-vis radiation were observed after death when compared to life. Measurements were performed over the 40-54 and 85-90 GHz frequency ranges. S. J. M.


Photogrammetric measurements of the surface topography of the aortic valves obtained from silicon rubber molds of freshly excised human aortic valves are presented. The data are part of an investigation into the design of a new prosthetic valve which will be a central flow device, like the real valve and unlike previous central occluding prostheses. Since the maximum stress on the heart valve is induced when the valve is closed and subject to diastolic backing pressure, it was decided to determine the valve geometry during diastole. That is, the molds were formed by pouring the rubber down the excised aorta, causing the valves to close. The molds were made under different pressures (20-120 torr). photogrammetry served as a vehicle for the assessment of the mold topography through the following outputs digital models, surface profiles, and contour maps.

Author: S.J. M.

A75-36993 Methods of electronic simulation of flight sounds (Methoden der elektronischen Fluggerauschsimulation) K Hilmann and K-P Gartner (Forschungsinstitut fur Anthropotechnik, Meckenheim, West Germany) Zeitschrift fur Flugwissenschaften, vol 23, June 1975, p 203-209 8 refs

An overview of methods for electronically synthesizing sounds is presented. A given amount of hardware and computer capacity places an upper limit on the degree and fidelity of realism which is attainable. Good sound realism for aircraft simulators can be especially expensive because of the complexity of flight sounds and their changing patterns with time. Nevertheless, a flight simulator shows that it is possible to design an inexpensive sound simulator with the required acoustic properties using analog computer

Author: K-Hilmann and K-P Gartner

A75-36726 Consequences of social isolation on blood pressure, cardiovascular reactivity and design in spontaneously hypertensive rats M Hallback (Goteborg, University, Goteborg, Sweden) Acta Physiologica Scandinavica, vol 93, Apr 1975, p 455-459 28 refs

Research supported by the Swedish National Association Against Heart and Chest Disease and University of Goteborg. Swedish Medical Research Council Grant No B74-14X-16-10C

Author: M. Hallback

A75-36711 Effects of fatiguing isometric exercise upon Achilles tendon reflex and plantar flexion reaction time components in man K C Hayes (Waterloo, University, Waterloo, Ontario, Canada) European Journal of Applied Physiology, vol 34, no 2, 1975, p 9196 15 refs

In the field of peripheral vision of 32 young men was studied at an initial height of 710 m, at 3700 m, and at 5043 m (at the top of the Kazbek mountain). Each man carried a load of 17 to 20 kg. The ascent was accomplished, without preliminary training, in the course of three days. At a height of 3700 m, the field of vision of left eye narrowed down by 6.9%, and that of the right eye, by 10.4%. The changes are attributed to an increase in the vascular tonsus of the retina

Author: V. P.

A75-36992 Effects of fatigue on isometric exercise upon the force constant of excised human aortic valves are presented. The data are part of an investigation into the design of a new prosthetic valve which will be a central flow device, like the real valve and unlike previous central occluding prostheses. Since the maximum stress on the heart valve is induced when the valve is closed and subject to diastolic backing pressure, it was decided to determine the valve geometry during diastole. That is, the molds were formed by pouring the rubber down the excised aorta, causing the valves to close. The molds were made under different pressures (20-120 torr). photogrammetry served as a vehicle for the assessment of the mold topography through the following outputs digital models, surface profiles, and contour maps.

Author: S.J. M.
elements. The characteristics of the infrasound elements produced by this sound simulator for take-off, cruise, and approach are discussed.

Pflugers Archiv, vol 357, no 3-4, 1975, p 267-273; 9 refs

Possible mechanisms of corona discharge involved in biogenesis. J. Latham (University of Manchester Institute of Science and Technology, Manchester, England). Nature, vol 258, July 3, 1975, p 34, 35. 5 refs

A brief description is presented of experiments which demonstrate how corona discharges involved in biogenesis can be produced at or near the ocean surface. It is noted that electric discharges can synthesize amino acids and other organic compounds under conditions simulating the atmosphere of the primitive earth, and that corona discharges in the vicinity of an ocean surface can result from drop splashing, bubble bursting, and raindrop collisions in the presence of strong electric fields associated with thunderclouds. The described experiments show that corona discharges can occur when bubbles burst at a water surface in fields with values of at least 260 kV/m.

F. G. M.

Dynamic properties of eye position cued neurons in the alert monkey during saccades. R. Eckmiller (California, University, Berkeley, Calif.; Berlin, Freie Universität, Berlin, West Germany). Pflugers Archiv, vol 357, no 3-4, 1975, p 253-265. 29 refs. Research supported by the Deutsche Forschungsgemeinschaft, Grant No. PHS-EY-00692.


The ergonomic aspects of the work of airliner crews are discussed, with particular reference to the adaptation of aircraft systems to the human operator. An attempt is made to model the decision making by the pilot on the basis of prescribed criteria and of the flow of information from ATC and onboard instruments.

V. P. and A. Bleichert.

Role of histamine in the hypoxic vascular response of the lung. C. A. Hales (Massachusetts General Hospital, Boston, Mass.) and H. Kazemi (Harvard University, Boston, Mass.). Respiration Physiology, vol 24, June 1975, p 81-98. 20 refs. Grants No. NIH HL 08664, No. NIH HL 05767.

Studies were undertaken to determine the contribution of histamine to the localized pulmonary vasoconstrictor response to hypoxia. One lung in each of several anesthetized dogs was ventilated with nitrogen, after 10 minutes, perfusion (Q) to the lung was decreased by 32%. When chlorpheniramine maleate, a potent antihistamine, was intravenously infused, no change in Q was observed. Therefore, no significant role was demonstrated for histamine in the regional lung vascular response to hypoxia in the absence of systemic hypoxemia.

S. J. M.


A multiple-input single-output linear state variable model is used to determine the extent to which a human controller involved in a compensatory tracking task uses cues other than the visual error signal to improve his tracking performance. The control system used in this study is a roll axis chair designed to simulate roll in a high performance aircraft. The additional cues studied are the angular position and angular velocity of the human controller.

Advances in clinical vectorcardiography A Benichemol and K B Desser (Good Samaritan Hospital, Phoenix, Ariz.) American Journal of Cardiology, vol 36, July 1975, p 76-87 72 refs Research supported by the Nihos and Segsworth Memorial Funds

Experiments are reported that demonstrate the clinical superiority of the vectorcardiogram over the conventional 12 lead scalar electrocardiogram. Vectorcardiograms were taken along with performance of complete right and left heart catheterization and selective coronary cineangiography in 5,000 patients. Disorders observed included atrial and ventricular hypertrophy, coronary artery disease and myocardial infarction, conduction abnormalities, and cardiac arrhythmias S J M

Left ventricular volume measurement by electrocardiography - Fact or fiction J W Linhart, G S Mintz, B L Segal, N Kawai, and M N Kotler (Chicago Medical School, Chicago, III., Hahnemann Medical College and Hospital, Philadelphia, Pa.) American Journal of Cardiology, vol 36, July 1975, p 114-118 11 refs

A critical evaluation of echocardiographic measurement of left ventricular volume is presented. Errors in measuring minor axes, in measuring distance, and in translating minor axis dimension into volume determination are discussed, along with correlation of echocardiographic with angiographic measurements and the clinical status of echocardiography. It is concluded that the method is not adequate as a means of absolute measurement, but that it has value in relative measurements over time in the same patient S J M


Recent attempts have been made to develop electroencephalographic (EEG) pattern recognition systems for a variety of diagnostic and monitoring applications. However, intersubject EEG variation has proven to be a major source of difficulty in the development of reliable EEG pattern recognition systems. Several aspects of the problem of estimating and reducing the effect of intersubject EEG variation are discussed with reference to a specific EEG pattern recognition system (Author)


The cost-effectiveness of flight training simulators is discussed as it relates to procedural fidelity and training objectives. The law of diminishing returns on simulator transfer effectiveness is described, if a simulator costs almost as much as its counterpart airplane, then when an hour of simulator time saves less than an hour of flight training time, the simulator will cease to be cost-effective. Moreover, recent studies have shown that simulators without moving cockpits are more transfer-effective in training pilots for aircraft than are ones with moving cockpits. Procedural fidelity, involving easily forgotten cognitive skills, is deemed more important than perceptual-motor fidelity, and more difficult to achieve S J M


Selected illustrations of human factors research, ergonomic developments in the field of highway safety, the influence of aging on pilot performance and safety, and the need for developing airport medical programs are discussed. Specific topics treated include early developments in air transportation, private flying and neglected areas of study, new design features in automobiles, the role of the drinking driver, medical conditions and accidents among drivers, the changing nature of the age composition in our population, age distributions of airline pilots, and medical services needed for passengers and airport employees S J M


This report is a brief description of research being undertaken by the National Aeronautics and Space Administration. The project is designed to seek out factors in the aviation system which contribute to human error, and to search for ways of minimizing the personal threat posed by these factors. The philosophy and assumptions underlying the study are discussed, together with an outline of the research plan (Author)


Qualitative data are discussed which indicate that an increased frequency of favorable or unfavorable changes in an ongoing lifestyle is often connected with an aircraft accident. Such a correlation is especially strong in the case of the accident-prone personality. This person is adventuruous, impulsive, and hard on himself, when personal changes begin to accumulate, he feels he is losing control and becomes depressed. The depression lowers his mental and physical reactivity, but he continues to fly to the limits of his personal envelope, which is often demanding because he is a high achiever. Eventually a mistake is made, and a mishap results S J M

Workload reduction on the flight deck J LeRoy (Air Line Pilots Association, International, Washington, D C) In Human factors in safe flight operations, Proceedings of the Twenty-seventh Annual International Air Safety Seminar,
Williamsburg, Va., November 10-14, 1974  

Workload, crew capacity, and accident occurrence are discussed as they relate to each other Data concerning the DC-9 and the B-727 are compared, and the three-man crew of the B-727 is found to have a 50-100% greater capacity than the two-man crew of the DC-9 A more even distribution of critical tasks among three-member crews is recommended, so that cognitive and decision-making capability can be preserved for the captain  

S J M

A75-37618  
Adaptive pattern processing in the visual system A Trehub (U S Veterans Administration Hospital, Northampton, Mass.)  

Proposed is a neuronal network capable of learning pattern discrimination Basic characteristics of the component neurons largely reflect well-established physiological principles and their individual plastic properties are consistent with recent findings concerning visual experience and synaptic changes detected by electron-microscopy Pattern discrimination within the network is robust under rather severe input-pattern degradation  

(Author)

A75-37620  
Influence of receptor-receptor fibres on the spontaneous afferent activity from semicircular canals in the frog /Rana esculenta/ J Caston and A Gribenski (Rouen, Universite, Mont-Saint-Aignan, Seine-Maritime, France) Pflugers Archiv, vol 358, no 1, 1975, p 81 88 13 refs  

A75-37691  
Color coding for air traffic control displays R J Cahoon (United Aircraft Corp, Norden Div, Norwalk, Conn.)  
NAECON '75, Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, June 10-12, 1975  
New York, Institute of Electrical and Electronics Engineers, Inc, 1975, p 537-540  

This paper discusses the use of color in air traffic control displays Various methods of color coding to enhance and declutter the air traffic display are presented, together with results of evaluation of human performance using color and monochrome displays Particular emphasis is placed on the current state of the art of color cathode ray tubes Special circuit design considerations for the voltage penetration CRT are presented, including switching high voltage power supplies, deflection and focus correction circuits, and video amplifiers Additional topics are projected development in color CRT display and multipersistence voltage penetration CRTs for simultaneous display of radar and computer graphics Photographs of high density color and radar displays rao air traffic control will be discussed  

(Author)

A75-37692  
Advanced speech technology applied to problems of air traffic control M W Grady (Logicon, Inc., San Pedro, Calif.) and M B Herscher (Threshold Technology Inc, Cinnaminson, N J.)  
NAECON '75, Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, June 10-12, 1975  
New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p 541 546  

Speech, since it is a natural means of communicating, offers significant advantages as a means of man/machine interface Techniques currently exist for enabling the computer to understand spoken commands, as well as for computer generation of speech This paper describes application of these techniques to the problems of air traffic control in (1) training applications and (2) the operational environment For training, a system currently used to train Ground Controlled Approach (GCA) controllers, developed for and in conjunction with NTEC, is described A combined speech recognition and synthesizing system for application to the operational environment is also described  

(Author)

A75-37693  
Computer-generated voice in air traffic control applications A F Beck and D E Anderson (Sperry Rand Corp, Sperry Univac Div, Blue Bell, Pa.)  
NAECON '75, Proceedings of the National Aerospace and Electronics Conference, Dayton, Ohio, June 10-12, 1975  
New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p 547-551 14 refs  

Many automated functions that are to be added to the National Airspace System (NAS) could benefit from the addition of computer-generated voice In fact, some may require its addition to ensure that controller voice communications workloads do not become excessive This paper describes several future air traffic control automation functions that are likely to be added to the NAS and the benefit that could be derived from adding computer-generated voice to these functions In addition, it provides a summary review of computer-generated voice techniques, the rationale for the selection of a technique (digitally encoded prerecorded voice), and a description of two experimental computer-generated voice systems used in the air traffic control environment  

(Author)

A75-38004  

The article investigates the orientational effect observed in terms of amplitude, latency and variability of the average evoked potential (AEP) produced by stationary grating of high dark-bright contrast The method and materials used in the experiment are discussed in detail The occipital EEG and the horizontal and vertical EOG of the four male subjects were recorded during the experiments Resulting data are analyzed It was concluded that the AEP was less in amplitude when the stimulus was oriented obliquely than when it was oriented horizontally or vertically, and the amplitude was more variable for the oblique orientation No orientational effect was observed upon the AEP latency  

M G

A75-38031  

This paper presents the operation of a digital computer program, VECTAN II, for the spatial analysis of the vectorcardiogram (VCG)  

A75-38046  

This paper presents the operation of a digital computer program, VECTAN II, for the spatial analysis of the vectorcardiogram (VCG)
The simulation study of coronary circulation focuses on a few key points:

1. Developing an electromagnetic flow meter to measure coronary venous flow accurately.
2. Finding that flow in the extramyocardial portion of coronary vessels and blood supply to the heart are well-agreed upon.
3. Incorporating variable resistances in the model for forward flow patterns in systolic and diastolic phases.
4. The heart rate and rhythm, arterial oxygen saturation, performance, intrathoracic (esophageal) pressure, arterial oxygen pressure, and subject comfort are all affected by acceleration.
5. The interest patterns of air traffic controllers were surveyed using a questionnaire method. The results showed that controllers with lower satisfaction scored lower on the overall air traffic controller scale.

A75-38409 Cardiopulmonary effects of combined exercise and +Gz acceleration S A Nunneley and D Shindell (New York, State University, Buffalo, N Y). Aviaton, Space, and Environmental Medicine, vol 46, July 1975, p 878-882 17 refs Contracts No N00014-68-A-0216, No F44620-72 C 0009, Grants No NIH-NL 14414-02, No PHS-5 T01 GM-03341

Experiments were conducted to evaluate the effects of leg exercise on cardiopulmonary function in men exposed to + 1, + 2, and + 3 Gz at ergometer settings of 0, 300, and 600 kpm/min. It was found that acceleration raised resting oxygen uptake, minute volume of expired gas, and heart rate, but it lowered oxygen pulse and end tidal CO2 tension. At higher workloads, the combination of G with exercise caused a divergence from control measurements. Cardiac output increased with G and decreased with work, which indicates that exercise improves the homogeneity of alveolar ventilation/lung perfusion at all G-levels.

A75-38410 Articular and tissue gas tensions in rats during development of pulmonary oxygen poisoning M Valimaki (Turku, University, Turku, Finland). Aviaton, Space, and Environmental Medicine, vol 46, July 1975, p 883-886 23 refs Support supported by the Emil Aaltonen Foundation

A75-38411 Physiologic effects of seatback angles less than 45 deg /from the vertical/ relative to G R R Burton, P F Lampietro, and S D Leverett, Jr (USAF, School of Aerospace Medicine, Brooks AFB, Tex). Aviaton, Space, and Environmental Medicine, vol 46, July 1975, p 887-897 18 refs

Eight experimental subjects and four YF 16/17 test pilots were exposed to a simulated aerial combat maneuver (SACM) which included a maximum G exposure of 6 s at 8 G. The following physiologic parameters were examined relative to seatback angles of 23, 28, and 40 deg: heart rate and rhythm, arterial oxygen saturation, performance, intrathoracic (esophageal) pressure, arterial pressure, and subject comfort. Relaxed and strained high sustained G (HSG) tolerances (6 G for 60 s) were also determined using only experimental subjects. The advantages of the 40 deg seatback angle during the SACM included increased subject comfort, less fatigue and effort, greater pilot acceptance and a statistically significant reduction in the increased mean heart rate associated with G exposure. On the other hand, a statistically significant reduction in arterial oxygen saturation was obtained during the SACM at 40 deg compared with the 23 deg back angle. An increase in relaxed G tolerance was found with the 40 deg seatback angle statistically significant only when compared with the 28 deg seatback angle.
A75-38413

Effects of prolonged weightlessness on the swimming pattern of fish aboard Skylab 3. (Author)

A75-38414 * Changes in exercise heart rate in lowlanders after prolonged stay at high altitude (4000 m). (Author)

A75-38415 Effects of hypoxia on early pregnancy and embryonic development in the mouse. (Author)

A75-38416 Variations in the activity of some brain and plasma enzymes under the influence of Gz acceleration. (Author)

A75-38417 Rat operant responding - An indicator of nitrogen narcosis. (Author)

A75-38418 Prevention of decompression sickness during a simulated space docking mission. (Author)

A75-38419 Algorithm for the multi-parameter analysis of nystagmus using a digital computer. (Author)
user-adjusted criteria for accepting or rejecting minmax points. The treatment of noisy or irregular data can be improved by adjusting the values of these criteria.

A75-38420  Use of the "ERG and EOG in evaluating the effect of sleep deprivation on visual function in flying personnel D I Tasker, S G Kinell, and T J Tredici (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) Aviation, Space, and Environmental Medicine, vol 46, July 1975, p 943-945 7 refs.

The electroretinogram (ERG) and electrooculogram (EOG) are electrophysiological tests employed in ophthalmology to diagnose degeneration or injury to the outer half of the retina, including the rods and cones of the visual system. This pilot study was undertaken to determine if sleep deprivation of more than 24 h in rated flying personnel may show any abnormality in retinal function as measured by the ERG and/or EOG. This may give insight to the visual function in flying personnel on deployment or other long missions where uninterrupted sleep may be a problem. The results of this study showed that some subjects deprived of sleep exhibited a statistically significant variance in their EOG ratios as compared to a nondeprived control group. No significant changes in ERG were detected. Principles and theory of electrophysiological testing in ophthalmology are presented.

A75-38421  Amplitude/frequency differences in a single-lead ECG of normal versus coronary heart diseased males M T Lategola (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.) and P J Layne (MarDen Enterprises, Las Cruces, N Mex.) Aviation, Space, and Environmental Medicine, vol 46, July 1975, p 946-952 34 refs.

A resting "normal" ECG can coexist with known coronary heart disease (CHD). Combined sensitivity and specificity errors of at least 10% in exercise ECGs are not unusual. Improved screening for CHD was attempted using amplitude/frequency analysis of ECG recordings. Thirty normal males and 30 with documented CHD were selected. The ECGs were recorded on electromagnetic tape during supine rest. Analytical digital data reduction, selection of four ECG segments, time-normalization and amplitude/frequency analysis provided one digital, plot per each segment and one per each 30-s subject average. The results from one ECG lead are presented. Significant differences (p less than or equal to 0.05) appeared in the comparisons between the normal and CHD groups. Retrospectively, amplitude criteria individually screened normal from CHD males to an improved degree compared with exercise ECGs.

A75-38422  Medical flying fitness - a routine affair - but who examines and assesses psychic health H P Goerres (Bundesministerium der Verteidigung, Flugmediznisches Institut, Furstenfeldbruck, West Germany) Aviation, Space, and Environmental Medicine, vol 46, July 1975, p 953-957 12 refs.

The regular medical examination of pilots is presently accepted as a thorough diagnosis of flying fitness, although the psychological aspects are sometimes almost completely ignored. Computer-aided procedures for the best possible appraisal of flying fitness are discussed. It is shown that the flying fitness examination procedure presently oriented towards the somatological status is by no means sufficient to determine the actual degree of flying fitness and may be detrimental to the flight safety and health of the individual pilot.


Experimental injury of the arterial wall, leading to restoration by intimal proliferation, was induced on the common carotid artery of Wister rats in order to study the cellular components of the reparative thickening of the arterial intima. Three different cell types were found in the thickened arterial intima: (1) monocytes which migrated from the blood flow, (2) modified smooth-muscle cells showing marked increase in the amount of mitochondria, and (3) cells of star-like configuration with long and thin cytoplasmic processes whose identification as modified smooth-muscle cells or as fibroblasts is not certain. The difference in the ultrastructure of the cellular elements from the different layers of the intimal thickening is most likely only a manifestation of a different functional state of the same cell type, the smooth muscle cells.


Estimates of peak systolic and diastolic rates of left ventricular wall movement were made in 23 patients by echocardiography and angiography. Echocardiographic measurements were calculated as the rate of change of the transverse left ventricular dimension, derived continuously throughout the cardiac cycle. These were compared with similar plots of transverse left ventricular diameter, in the same patients, derived from digitized cineangiograms taken within 10 minutes of echocardiograms. The results indicate close correlation between the two methods, and suggest that either can be used to measure peak rates of left ventricular wall movement in patients with heart disease.

A75-38538  Hybrid calculators for the analyses of cardiac arrhythmias (Hybrid-Rechner zur Analyse cardialer Arrhythmien) R Mauser and H Schwinghackl Elektronik, vol 24, July 1975, p 61-64 In German

A hybrid computer is described that quantitatively detects both normal and pathological heart rhythms and makes them accessible to the physician in digital form. The device is very helpful in cardiac therapy, where it enables a far more exact prescription of antiarrhythmic substances to be made than do conventional methods, such as the electrocardiogram. During the acute phase of a myocardial infarction, it can detect most of the early symptoms of the often fatal final ventricular fibrillation.


Experiments are described which indicate that the basic information provided by the senses comes from a distribution of events over a fairly substantial number of sensitive points, and not solely from an isolated transmission of information about a single point as classically assumed in the case of the eye, the traditional discrete stimulus or 'typewriter' model could be fit to individual receptors (rods and cones) in the retina, as for the ear, each hair cell along the basilar membrane responds to a particular frequency. Moreover, the
simple Fourier components of a complex wave can often be heard as if separate by the listener. Evidence for difficulties with the discrete model is the finding that difference frequencies (sidebands) can be detected by the ear which have for all practical purposes no sonic energy, this phenomenon is not due to nonlinear distortion by the inner ear, but to stimulation of a particular set of receptors. Similarly, the eye has been shown to respond to specific spatial frequencies distributed over the entire visual field.

Origin of life - Clues from relations between chemical compositions of living organisms and natural environments.

When elemental enrichment factors in living organisms are plotted against the ionic potential of the elements, a strikingly similar pattern is found for different groups of organisms, the pattern is also similar, in its general features, to that found in seawater. These relationships support the idea that life began in a water-rich environment interfacing with the primitive atmosphere of the earth.

The visual aptitude of inspection personnel for magnetic-particle and penetrant testing (Visuelle Eignung des Prufpersonals fur Magnetpulver- und Eindringverfahren) F. Michalski (Stahlwerke Rochling Burbach GmbH, Volkingen, West Germany), D. Kaiser (Mannesmannrohren-Werke AG, Dusseldorf, West Germany), and M. Stadthaus (Bundesanstalt fur Materialprufung, Berlin, West Germany) (Deutsche Gesellschaft fur Zerstorungsfreie Prufverfahren, Vortragstagung uber Zerstorungsfreie Materialprufung, Berlin, West Germany, May 5-7, 1975) Materialprufung, vol 17, July 1975, p 233-235 13 refs In German

The requirements regarding the visual capacities of persons who are to be employed with the conduction of magnetic-particle inspection tests or tests involving the use of a penetrant are considered. Directions for testing the vision of the inspection personnel are discussed, giving attention to international, American, and British specifications.

Central inhibitory interactions in human vision
V. Virsu and H. Taskinen (Helsinki, University, Helsinki, Finland) Experimental Brain Research, vol 23, July 11, 1975, p 65-74 19 refs Research supported by the Academy of Finland

Experiments are reported in which contrast threshold and perceived orientation of one line segment were found to alter with both monoptic and dichoptic masking by a second line segment. The masking increased contrast threshold, and the largest change in perceived orientation due to masking was observed at a 15-deg masking angle. Results support the hypothesis that there are lateral inhibitory interactions between central neural units in the human visual system.

The fractional rate of change of ventricular power during isovolumic contraction - Derivation of haemodynamic terms and studies in dogs P. D. Stein, G. G. McBride, and H. N. Sabbah (Oklahoma, University, U. S. Veterans Administration Hospital, Oklahoma City, Okla.) Cardiovascular Research, vol 9, July 1975, p 456-467 16 refs Research supported by the U. S. Veterans Administration and American Heart Association, Grant No PHS-NHII-72-2921-B
conducted using atmospheric concentrations of each solvent which had individually produced minimal measureable effects on livers of animals to dichloromethane and 1,1,1-trichloroethane was combined effect of 90-day continuous exposure of animals to

APPLICATION OF LUCIFERASE ASSAY FOR ATP TO ANTIMICROBIAL DRUG SUSCEPTIBILITY TESTING Patent Application

Emmett W Chappelle Grace L Piccoliolo Michael J Barza (New Engl Med Center) Louis Weinstenn (New Engl Med Center), Stephanie A Tuttle (New Engl Med Center) and Hillar Vellend, inventors (to NASA) (New Engl Med Center) Filed 30 Apr 1975 29 p

A method is described for measuring the susceptibility of bacteria to antimicrobial agents by utilizing the bioluminescent reaction between adenosine triphosphate (ATP) and luciferase-lucifern mixtures. The bacteria is cultured in a growth medium and the amount of ATP in a sample of the bacteria is determined by measuring the amount of luminescent light emitted when the bacterial ATP is reacted with a luciferase-lucifern mixture. A fresh sample of the bacterium is then subjected to an antibiotic agent and the amount of bacterial ATP is assayed after the antibiotic treatment in the same manner. The ATP index is determined from the values obtained from the assay procedures.

N75-26830*/# Massachusetts Inst of Tech, Cambridge Dept of Nutrition and Food Science

MECHANISMS OF DETERIORATION OF NUTRIENTS Annual Report, 13 Mar 1974 - 13 Mar 1975
Marcus Karel and James M Fink 13 Mar 1975 215 p ref
(NASA-CR-141866) Avail NTIS HC S725 CSCL 06H

The retention of flavor during freeze drying was studied with model systems. Mechanisms by which flavor retention phenomena is explained were developed and process conditions specified so that flavor retention is optimized. The literature is reviewed and results of studies of the flavor retention behavior of a number of real food products, including both liquid and solid foods are evaluated. Process parameters predicted by the mechanisms to be of greatest significance are freezing rate, initial solids content, and conditions which result in maintenance of sample structure. Flavor quality for the real food showed the same behavior relative to process conditions as predicted by the mechanisms based on model system studies.

N75-26831*/# California Univ Los Angeles

CONTINUOUS ANIMAL EXPOSURE TO A MIXTURE OF DICHLOROMETHANE AND 1,1,1-TRICHLOROETHANE Final Report 1975 25 p ref
(NASA-CR-141889) Avail NTIS HC S325 CSCL 06C

An investigation of the effects of combined exposure of animals to dichloromethane and 1,1,1-trichloroethane was conducted using atmospheric concentrations of each solvent which had individually produced minimal measureable effects on livers. Previously established spacecraft threshold limit values for the individual solvent compounds were studied to determine validity when both were present in an astronaut's breathing environment under continuous exposure conditions. Results show that the combined effect of 90-day continuous exposure of animals to 100 ppm dichloromethane and 1000 ppm 1,1,1-trichloroethane, is no greater than the effect of each alone. While the exposed livers of mice appeared to contain slightly more fat the degree of increased liver weight and the liver-to-body ratios are slightly lower than those measured for each solvent alone.

N75-26832*/# Scientific Translation Service, Santa Barbara, Calif

RELATIONSHIP BETWEEN ADMINISTRATION TIME OF DRUGS AND ACUTE TOXICITY IN MICE
(Contract NASw-2483)
(NASA-TT-F-16411) Avail NTIS HC S325 CSCL 06L

Drugs were injected into dd-strain mice every four hours at 0200, 0600, 1000, 1400, 1800 and 2200 hours and the cumulative mortality rate was calculated for 72 hours through periodic observations. The following results were obtained: (1) With respect to central stimulants specifically, N-methyl-D-aspartic acid, picrotoxin, pentetrazol, and strychnine-H2SO4, the mortality rate of mice injected at 2200 hours was the lowest, while a generally high rate was registered for mice injected at 0200, 1000, and 1800 hours. At least two or more peaks in the mortality rate were noted. (2) In the case of central depressants such as chlorpromazine and Na-methylhexabitel mice injected at 1000 hours registered the lowest mortality rate, while the highest mortality rate was at 1400 and 1800 hours, with one peak.

N75-26833*/# California Univ Davis

EVALUATION OF THE EFFECTS OF HYPERGRAVITY EXPOSURE AND CAGING RESTRAINT ON BONE MINERALIZATION IN THE BEAGLE BY IN VIVO PHOTON ABSORPTIOMETRY Final Progress Report
Gerald L Fisher Karen L Berding, and Marvin Goldman May 1975 29 p ref
(NASA Order A-98313-A)
(NASA-CR-137710) Avail NTIS HC S375 CSCL 06S

Photon absorptiometry was used to evaluate bone mineral kinetics associated with normal development and the possible perturbations to bone development resulting from hypergravity exposure over a period of six months in developing Beagles. A series of seven measurements were performed at specific times with the first measurement prior to treatment and subsequent measurements at 2, 5, 9, 14, 20 and 26 weeks from the onset of the experiment. Four groups of six male Beagle pups, ranging in age from 85 to 92 days were studied. Two groups were chronically exposed to hypergravity treatments by centrifugation of 2.0 G (180 RPM, 11.7 ft radius) and 2.6 G (180 RPM, 18.8 ft radius) for the 26 week period. A third group of six dogs served as a caged control to evaluate possible changes due to confinement in small plexiglass cages similar to those of the centrifuge. Thus this control group was subjected to limited exercise due to caging restraint. The fourth group of animals was housed in open runs to allow exercise without the spatial confinement of the smaller plexiglass cages. Results showed significant differences in body weight, bone length, increase in bone density of control group relative to other groups, and a decrease in bone mineral content in the two gravity treated groups.

N75-26834*/# Kanner (Leo) Associates, Redwood Cty, Calif

A MONTH ALONE WITH CHLORELLA
S Starikovich Washington NASA Jul 1975 8 p ref Transl into ENGLISH from Khimya i Zhizn (USSR), no 5, 1974 p 58-63
(Contract NASw-2481)
(NASA-TT-F-16463) Avail NTIS HC S325 CSCL 06F

A subject lived in a hermetically-sealed, 4.5 cu m room for 30 days. During this time his oxygen was completely supplied by the plant. After a time, the system achieved a degree of stability and the subject's skin and lungs as well as from waste matter 50 g of dried chlorella were included in the subject's diet. The life-support system showed no sign of change at the end of the experiment, additional plants and especially animals would improve the system, e.g., make it a 100% closed CO2 cycle system.
N75-26635

N75-26635# Advisory Group for Aerospace Research and Development, Paris (France)

A REVIEW OF ANTHROPOMETRIC DATA OF GERMAN AIR FORCE AND UNITED STATES AIR FORCE FLYING PERSONNEL, 1967 - 1968

H J Grunhofer, ed (German Air Force) and G Kroh ed (German Air Force Inst of Aviation Med.) Apr 1975 180 p refs (AGARD-AG-205, AGARDograph-205) Avail NTIS HC S7 00

Standardized equipment, definitions and procedures were used according to Hertzberg for each program. Both data collections were obtained from preselected personnel and are not representative of the whole male population of the respective country, however, the results are representative of the reference collectives. For each body dimension the following detailed information is given: the definition written and context of body dimensions to be measured, the frequency of certain ranges a breakdown of GAF and USAF data in percentile essentials on the statistics to be measured, the frequency of certain ranges a breakdown of data distribution. The correlation matrix of GAF data is also included.

N75-26636# Public Health Service Hospital Staten Island, N Y

RENAL EFFECTS OF CONTINUOUS NEGATIVE PRESSURE BREATHING Final Report


Continuous negative pressure breathing (CNPB) was utilized to simulate the thoracic vascular distension of zero g or space, in 11 anesthetized rats. The animals underwent renal clearance and micropuncture renal nephron studies before, during, and after CNPB. Rats were pretreated with a high salt diet and 1-M desoxycorticosterone (DOCA) in excess. None of these rats diuresed with CNPB. In contrast, 5 of the remaining rats increased the fraction of the filtered sodium excreted (C sub Na/GFR, p < 05) end their urinary flow rate (V p < 05) Potassium excretion increased (U sub k V, p < 05) End proximal tubular fluid specimen's TF/Pmulin ratios were unchanged. Whole kidney and single nephron glomerular filtration rates fell 10% CNPB, a mechanism for atrial distension, appears to cause in rats, a decrease in distal tubular sodium water and potassium reabsorption. Exogenous mineral-corticoids prevents the diuresis, saluresis, and kaliuresis.

N75-26637# Scientific Translation Service, Santa Barbara, Calif

REDOX TRANSFORMATIONS OF NICOTINAMIDE-ADENINEdINUCLEOTIDE IN SKELETAL MUSCLES DURING WORK AND AT REST


The determination of beta-hydroxy butyrate dehydrogenase substrate content in rat skeletal muscles is described as a means of more closely evaluating redox transformation of free nicotinamide-adenine-dinucleotide (NAD) in muscle mitochondria both at rest and after intense work (15 minutes swimming). During work, muscle NAD reduction uses glycogen, at rest, NAD reduction takes place using free mitochondrial NAD. The dynamics of pyruvate (lactate and acetoacetate) beta-hydroxy butyrate ratios in the blood are the same as that in the skeletal muscles, and can be used as an index to skeletal muscle energy metabolism.

Author

N75-26638# Scientific Translation Service, Santa Barbara, Calif

HOW'S YOUR HEALTH, COSMONAUT?


The function of medical specialists during spaceflights is to compare the cosmonaut's current physical state with his previous one, and to predict future health. The concepts (current, past and future physical state), and methods for determining them are discussed. Heuristic, mathematical, and clinicophysical approaches to predicting the physical state are described. The Selye adaptation syndrome is discussed along with a way of monitoring the cosmonaut's approach to the 'over-exertion zone' by mathematical analysis of cardiac rhythm.

Author

N75-26639# Scientific Translation Service, Santa Barbara Calif

EFFECT OF LUMISTEROL-3 ON THE CALCIUM ABSORPTION IN THE GUT AND ON THE CALCIFICATION OF BONE TISSUE

H J Grunhofer, ed (German Air Force) and G Kroh ed (German Air Force Inst of Aviation Med) Apr 1975 180 p refs (AGARD-AG-205, AGARDograph-205) Avail NTIS HC S7 00

The effect of lumisterol-3 on calcium transport in the intestines and on bone tissue calcium absorption was examined in vitro on the large tubal bone of white leghorn chicks. Four groups of animals were kept on a rachitogenic diet for one month after which one group was administered 400 IU of vitamin D sub 3, the third was administered a mixture of 200 IU of vitamin D sub 3 and 200 IU of lumisterol-3. The latter mixture proved to be the most effective, in increasing calcium absorption in the intestines. Results indicate that lumisterol-3 by itself stimulates more calcium absorption in bone tissue than vitamin D sub 3.

Author

N75-26640# Naval Postgraduate School, Monterey, Calif

EFFECTS OF FREQUENCY ANALYSIS ON THE PDP LAB 8/E COMPUTER SYSTEM M S Thesis

Lawrence Morrison Goehm Sep 1974 42 p refs (AD-A003522) Avail NTIS CSCL 06/6

This thesis describes the analysis, method and computer programs used to obtain the Fast Fourier Transformation (FFT) of an electroencephalogram (EEG) using a small laboratory computer like the PDP Lab 8/E. The EEG power spectrum was then computed from this transformation. The information contained in this thesis is intended to enable the user to compute the Fourier coefficients of a set of data points or compute the power spectrum of a real waveform such as the EEG.

GRA

N75-26641# Institute for Behavioral Research, Inc., Silver Spring, Md


David McK Roch 20 Nov 1974 12 p refs (Contract DASHO-74-4-C-0004) (AD-A004024, Rept-151, ARO-11739 1-1) Avail NTIS CSCL 06/18

Several groups of dated pregnant rats were exposed starting on the 13th day of gestation in the anechnal chambers or in a calibrated oven. All the exposures to microwave irradiation were conducted after 0700 and before 1500 hours. The rats were sacrificed on the 13th day of gestation, the fetuses weighed and their brains fixed and serially sectioned. No differences were found between the irradiated fetuses and the controls which had been similarly handled but not irradiated. In a final experiment, rats were exposed to irradiation from 1700 to 1900 hours or overnight (from 1800 to 0800 or 1000 hours) at 1700 MHz and 5 or 10 mw/sq cm, on the 6th to the 9th and the 12th to the 16th days of gestation. The exposed fetuses were heavier than the controls and the brains larger. The difference was approximately 10 percent. This finding suggests that the effect may be due to some factor which varies with the circadian rhythm. It may also have resulted from the repeated irradiation.

GRA

N75-26642# Pennsylvania Univ., Philadelphia

STUDY OF TISSUE MECHANICAL PROPERTIES OF THE BLOOD VESSELS AND THEIR REGULATION Final Report

Lysie H Peterson 1975 31 p refs
The general objective of the program was to increase and improve knowledge and understanding of the properties and behavior of the circulatory system under normal operating and diseased conditions. The diseased condition being emphasized was hypertension, although the study related to other abnormal states such as shock and also provided insight into the arteriosclerotic process. The study dealt extensively with the chemical metabolic and physical characteristics of blood vessels and with how nervous, endothelial and renal functions control cardiovascular properties and behavior. An important aspect of the study was the approach being taken, i.e., the system's approach.

N75-26644\# Center for Blood Research Boston Mass

FROZEN BLOOD CELL CHANGES Final Report, 1 Sep 1969 - 30 Nov 1974

Fabian J Lionetti 15 Jan 1975 9 p refs (Contract N00014-69-C-0128. NR Prog 105-440)

The report describes biophysical studies of the etiology of decompression sickness and methods for its early detection. The authors have made an extensive study of bubble detection in the precordial region of humans divers by means of the Doppler ultrasound bubble detector. Results indicate that only a fair correlation exists for premontitory detection of decompression sickness if this is the sole monitoring site. Gas uptake and elimination in the skeletal muscle of rabbits for nitrogen and argon were studied. Within the limits of accuracy, no difference between the halftimes for argon or nitrogen could be detected. Elimination was found to be slower than uptake for both gases. These measurements were made simultaneously for both gases by means of in situ probes and a mass spectrometer analyzer.

N75-26648\# Environmental Health Lab Kelly AFB Tex

INDUSTRIAL HYGIENE SURVEY 123RD TACTICAL CONTROL SQUADRON (CRP), OH ANG, BLUE ASH OH 46242 Final Technical Survey Report

Lawrence W Grauvogel Dec 1974 27 p refs (AD-A003491 EHL(K)-74-29) Avail NTIS CSCL 06/10

A hazardous noise and industrial hygiene survey was conducted 23-26 September 1974. Personnel exposed to potentially hazardous noise and sources and areas of potentially hazardous noise are identified by shop ventilation is discussed for the shops and recommendations made. Comprehensive listing by shop of chemicals used and composition are included to aid the physician in identification of the possible source of occupational illnesses.

N75-26649\# School of Aerospace Medicine Brooks AFB, Tex

PRINCIPLES OF BIODYNAMICS INTRODUCTION TO GRAVITATIONAL BIOLOGY, 1


Gravity and other acceleration fields affect exposed organisms through the induced weight-to-mass ratio which is generally indicated as G. Biological response to such fields and to changes in field strength is the subject matter of gravitational biology. Immediate response to increases in the ambient acceleration...
field includes the greater energy requirement for mechanical work and displacement of materials in nonrigid systems. There also are secondary changes such as an increased nutritional requirement and blood volume increase. A particularly important condition to gravitational biology is weightlessness. Here the effects of earth-gravity are removed and the intensities of the remaining biological functions are mass determined. This review deals with the physical bases of gravitational biology and the descriptive terminology available. GRA

N75-26650# National Bureau of Standards, Boulder, Colo Cryogenics Div
EFFLUX OF GASEOUS HYDROGEN OR METHANE FUELS FROM THE INTERIOR OF AN AUTOMOBILE Final Technical Note
Gasoline-powered automobiles are being converted to operate on gaseous fuels such as H2 or CH4. These fuels are commonly stored in containers located in the trunk of the car. Potential leakage of these gaseous fuels into the passenger compartment of the vehicle constitutes a safety threat. Definitive experiments were performed to identify the explosion hazards, establish venting criteria, and obviate general safeguards for H2 or CH4 fueled passenger vehicles. GRA

N75-26651# Essex Corp. Huntsville, Ala
EARTH ORBITAL TELEOPERATOR MANIPULATOR SYSTEM EVALUATION PROGRAM
The performance of an orbital teleoperator system which includes small dextrous servicing manipulators to be used in satellite servicing was examined. System/operator performance testing was implemented and the results of a fine positioning control test using two different manipulator systems varying widely in manipulator configuration and control systems are presented. Fine position control is viewed as representing a fundamental requirement placed on manipulator control. The relationship of position control to more complex tasks which directly represent on-orbit servicing operations are also presented. Author

N75-26652# Essex Corp., Huntsville, Ala
EARTH ORBITAL TELEOPERATOR VISUAL SYSTEM EVALUATION PROGRAM
Empirical tests of range estimation accuracy and resolution via television under monoptic and stereoptic viewing conditions are discussed. Test data are used to derive man machine interface requirements and make design decisions for an orbital remote manipulator system. Remote manipulator system visual tasks are given and the effects of system parameters of these tasks are evaluated. E H W

N75-26653# Civil Aeromedical Inst., Oklahoma City, Okla A REALISTIC VIEW OF THE PEOPLE IN AIR TRAFFIC CONTROL
Roger C Smith Dec 1974 6 p refs (AD-A006789 FAA-AM-74-12) Avail NTIS HC $3.25 CSCL 05/5
An overview of research findings on air traffic controllers is presented. Results of personality aptitude motivation interest and attitude studies are considered in terms of the general pattern of characteristics found to be associated with success in the air traffic profession. The implications of these findings for managerial programs are discussed. Author
N75-26658# Illinois Unv Savoy Aviation Research Lab
ENHANCEMENT OF HUMAN EFFECTIVENESS IN SYSTEM DESIGN, TRAINING, AND OPERATION Annual Progress Report, 1 Jul 1973 - 30 Jun 1974
Jun 1974 20 p refs
(Contract F44620-70-C-0105)
(AD-A004149 ARL-74-19 AFOSR-74-13 AFOSR-75-0073TR)
Avail NTIS CSCL 05/10

The Progress Report is concerned with research performance and results on the contract during the period 1 Jul 1973 - 30 June 1974. On a very general classification level the tasks are of two general types, those dealing with human resources research and those dealing with manned systems research. More specifically four tasks (2, 4, 5 and 8) deal primarily with pilot selection and training performance assessment and the prediction of future operational effectiveness three tasks (1, 3 and 7) deal with human perceptual and decision processes and with principles of aviation display, control and computer-assisted manned system design. Task 6 bridges both major research categories. Furthermore several of the tasks (particularly 1, 4, 6, 7 and 8) are aimed at advancing human factors research methodology and theory.

N75-26659# Naval Postgraduate School, Monterey, Calif
PREDICTION OF PERFORMANCE AND SATISFACTION OF AERONAUTICAL ENGINEERING STUDENTS AT THE NAVAL POSTGRADUATE SCHOOL M S Thesis
Charles Theodore Solge Sep 1974 79 p refs
(AD-A003539) Avail NTIS CSCL 05/10

The major purpose of this research was the development of predictors of academic performance and satisfaction for aeronautical engineering students. Three basic types of data used to develop predictors were biographical (historical) academic aptitude (grade point average) and individual interests (strong vocational interest blank). Data Several successful predictors of performance were developed but further research is required to successfully predict student satisfaction.

N75-26660# Naval Postgraduate School, Monterey, Calif
PERIODIC VARIATIONS IN HUMAN PERFORMANCE M S Thesis
Francis Leroy Sink Sep 1974 50 p refs
(AD-A003517) Avail NTIS CSCL 05/10

This paper investigates the periodic variation in human performance predicted by Biorhythm theory. Fourier analysis was performed on performance data of three subjects. The results indicated that the postulated basic biorhythmic cycles exist. Comparison of the phase of predominate experimental frequency with the phase predicted by biorhythm indicated that the frequencies may not be as stable as the theory suggests.

N75-26661# Air Force Inst of Tech Wright-Patterson AFB, Ohio
A STUDY OF THE PERSONAL VALUE SYSTEMS AND JOB SATISFACTIONS OF UNITED STATES AIR FORCE OFFICERS M S Thesis
John A Madia Oct 1974 105 p refs
(AD-A003602 GSM/SM-74D-7) Avail NTIS CSCL 05/10

The primary objectives of this research were to gain insights into the personal value systems and job satisfactions of Air Force Officers. Prior to analyzing data, the paper discusses the role of values in human behavior and outlines the major job satisfaction theories currently in the literature. Using an adaptation of England's methodology, the primary orientations (POR) of 1321 officers, as well as the behavioral relevance of 77 personal values (PV) concepts were determined. A modification of Hoppock's general job satisfaction blank was used to measure the satisfactions of the officers. Through tests of means and analysis of distributions, the satisfactions of the various officer subgroups were then compared.

N75-26662# Naval Postgraduate School, Monterey, Calif
VISUAL SEARCH PROCESSES OF COAST GUARD AIRCREWMAN M S Thesis
David Allen Jones Dec 1974 61 p refs
(AD-A004252) Avail NTIS CSCL 05/10

The thesis presents the various components of the visual search process as it applies to Coast Guard lookouts. It begins with a description of the human eye and follows with an introduction to detection lobe theory. Next, the most distinct region of daylight vision, the fovea vision area, is discussed.

N75-26663# Yale Univ, New Haven, Conn School of Organization and Management
HUMAN BEHAVIOR IN PROBLEM SOLVING ENVIRONMENT Final Report
Robert B Fetter 24 Jan 1975 11 p refs
(Contract N00014-67-A-0097-0010, NR Proj 121-408)
(AD-A004305) Avail NTIS CSCL 05/10

The major purpose of this study was to study human behavior in problem solving environments involving the use of computers. It was assumed that a major determinant to effective use of computer technology in problem solving was the lack of knowledge concerning the interaction between man and machine. By giving structure to this aspect of problem solving behavior and studying it experimentally, it was felt that knowledge useful in the design and development of decision support systems could be obtained. While the study of user behavior was a consistent theme of work accomplished and resulted in some fundamental additions to knowledge, the largest part of the effort was devoted to developing the computer systems technology necessary to provide the experimental environment.

N75-26664# Stanford Univ, Calif
FACTORS AFFECTING CONTROL ALLOCATION FOR AUGMENTED REMOTE MANIPULATION PhD Thesis
Douglas Edward McGovern 1975 236 p
Avail Univ Microfilms Order No 75-13556

A method for predicting the effectiveness of an augmented remote manipulator system is presented. Such a system represents the combination of a manipulator with a human operator and a small computer. Both the human and the computer have the capability for generating commands to control the manipulator. The performance of the integrated man-machine system can be predicted through the combination of manual control data with a model of the augmentation scheme. This involves the description of human behavior in a form which allows comparisons of the time required by the human to perform a task with and without augmentation. A set of experiments was conducted to generate the necessary human performance data. Results from these experiments are used to investigate some aspects of task description and manipulator rating as well as establishing the form of human performance. The experimentally derived manual control data can be used to predict the performance of an augmented remote manipulator system.

N75-26665# Minnesota Unv Minneapolis
PERSONNEL TECHNIQUES NECESSARY TO MAXIMIZE BIO-BARRIER INTEGRITY AT A MARTIAN RECEIVING LABORATORY Annual Report, 1 Jul 1974 - 30 Jun 1975
G S Michaelson and Thomas A Mahoney 30 Jun 1975 13 p refs
(Grant NGL-24-005-160)
(NASA-CR-142963) Avail NTIS HC S3 25 CSCL 08B

The planning of biological isolation measures for the Mars Surface Sample Return Mission is discussed in terms of personal and organizational management. Deficiencies in past operation of the Lunar Receiving Laboratory are analyzed. It was found that the failure to clearly define relationship among the government

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agencies involved and to effectively integrate their objectives and responsibilities was a major cause of laboratory deficiencies. Possible solutions to these problems are presented for application to future missions.

N75-26666

The MODULAR ANTI-EXPOSURE SYSTEM

Richard L Bell 25 Jun 1974 27 p
(AD-A003603, NADC-74139-40) Aval NTIS CSCL 06/17

The components of the system are a lightweight, constant-wear, liquid loop garment, an encapsulating life raft, and a thermoelectric portable power plant. The full length liquid loop garment, worn integrally with a lightweight coverall will be essentially the basic clothing configuration required by the airman for a normal mission. In the event of ejection the encapsulating life raft will deploy and completely enclose the airman during parachute descent. The portable power plant called the Downed Airman Power Source (DAPS), requires no batteries for its operation. It will simultaneously provide heat energy for warming the downed survivor and electrical energy for operation of a survival radio. Subjective tests have demonstrated that the Modular Anti-Exposure System performs adequately in maintaining a survivor for up to 24 hours in an extremely low temperature environment.

N75-26667

THE MODULAR ANTI-EXPOSURE SYSTEM

Boeing Computer Services, Inc Seattle, Wash
Space and Military Applications Div

PROMETHEUS, A USER ORIENTED PROGRAM FOR HUMAN CRASH DYNAMICS Computer Program User Manual

David W Twigg and Richard N Karnes Nov 1974 270 p
(refs
(Contract N00014-72-C-0223) Aval NTIS CSCL 13/12

PROMETHEUS is an efficient user oriented interactive simulation program to study the effects of vehicle crashes on human occupants. A vehicle occupant is modeled as a two dimensional seven link, mass-spring dynamic system restrained by seat belt and shoulder harness subject to an arbitrary impulsive force. An arbitrary energy absorbing seat interacts with the occupant. Detailed descriptions of how to use the program along with a sample example are presented. The program is designed to operate on the CDC 6600 computer in either a batch or interactive mode.

N75-27684


Wolfgang Steigemann 25 Jul 1974 270 p

In GERMAN


Wolfgang Steigemann 25 Jul 1974 270 p refs
In GERMAN

Aval NTIS HC $5 25

Structural analysis of the complex between trypsin and the trypsin inhibitor by crystallographic calculations establishes heavy atom positions in isomorph derivatives and phases of the native protein. A Fourier synthesis of the complex structures at 2.8 A is provided. An atomic model for the trypsin inhibitor is formulated from experimental data up to 1.9 A resolution. Crystallographic proof for the tetrameric substructure of L-asparaginase is developed that shows molecular pseudo positions at a 222 point symmetry. A probable packing scheme is developed in combination with Patterson functions. Presented at the Aerospace Medicine Panel Specialists Meeting Oslo 22-23 Apr 1974.

N75-27685

Advisory Group for Aerospace Research and Development

VIBRATION AND COMBINED STRESSES IN ADVANCED SYSTEMS

Henning E VonGienke ed (AFSC) Mar 1975 272 p refs In ENGLISH, partly in FRENCH
Presented at the Aerospace Med Panel Specialists Meeting Oslo 22-23 Apr 1974

AGARD-CP-145) Aval NTIS HC $8 50

Operational vibration environments and their psychophysiological effects on performances of crews of aircraft (land vehicles, and ships are studied.
A survey of military helicopter crews was carried out to determine the scope and nature of problems due to vibration. Three hundred questionnaires were completed. The chief consequences of vibration were discomfort and difficulty in reading displays. The occurrence of these effects was associated with significant increases in reported fatigue. The major effects were, mainly confined to the larger aircraft. Most of the reports from Royal Navy helicopters were associated with hovering or transition to or from the hover. Turbulence was found to increase the number of reports of vibration effects. Loading of the aircraft was not found to cause any increase in the number of reports.

The vibration strain of soldiers and test drivers in military vehicles concerns mainly those reactions which, by the way of influencing the sensation and motoric coordination, can decrease the human performance when operating vehicles and carrying out military tasks. So especially visual sensation will be influenced by vibration stress. Furthermore, vibration at high amplitude in certain frequency ranges may lead to injuries to health. Results of vibration measurements in 13 wheeled vehicles, 3 tanks, and 2 ambulances show that the vibration stress under certain conditions may be very high. By the use of national and international standards, the measured vibration stress is evaluated as consequences of these results. Technical improvements and daily exposure time limits are proposed.

Basic requirements and habitability standards are studied for designing surface effect ships employing a self generated cushion of air for lift support with vertical motion centering in the human performance when operating vehicles and carrying out military tasks. So especially visual sensation will be influenced by vibration stress. Furthermore, vibration at high amplitude in certain frequency ranges may lead to injuries to health. Results of vibration measurements in 13 wheeled vehicles, 3 tanks, and 2 ambulances show that the vibration stress under certain conditions may be very high. By the use of national and international standards, the measured vibration stress is evaluated as consequences of these results. Technical improvements and daily exposure time limits are proposed.

The human centrifuge was used to evaluate the relative influences of sustained normal accelerations, combined vertical and lateral buffet loads, and basic aircraft flying qualities on air-to-air tracking performance in air combat maneuvering flight. Performing the simulation in an actual F-4B cockpit, 11 pilots were tasked with tracking a moving target with a fixed reticle sight presented in visual displays. Sustained accelerations from 1.3 to 5 g, buffet intensity levels from buffet-free to + or - 5 g, and lateral directional flying qualities were varied independently in several combinations to assess their individual and combined influences on tracking precision. Results show that for the buffet frequency used (10 cps), intensities up to + or - 5 g have negligible effects on performance. Sustained accelerations up to 5 g have appreciable effects degrading tracking by 10 m/s over the 1 g level. Flying qualities' influences were substantial, and greater than those of either buffet or acceleration. Decreased dutch roll frequency and/or damping adverse aileron yaw and proverse aileron yaw were seen to have degrading effects on performance.

Transient vibrations and impact forces represent possible hazards in underground personnel shelters when subjected to pressure waves from nuclear blasts. Calculated and simulated acceleration time relationships are compared to safety limits for humans. By way of an existing nonlinear model for supine humans, the application of a general model for transient and steady state conditions is proposed. Performance limits for transient conditions are scarce. Some information may be gained by applying the results from steady state experiments to transient conditions.

Cardiac variability in subjects exposed to low frequency mechanical vibrations was studied. Vascular response to these vibrations was also measured. Particular attention was given to physiological disorders, especially in the case of vibration effects on sick or wounded subjects. Measurements were made of circulation and human performance after exposure to the vibrations. Some subjects were required to perform complex tasks.

Transl by E H W.

EFFECTS OF VIBRATION STRESS ON THE CARDIOVASCULAR SYSTEM OF MAN [ACTION DES VIBRATIONS DE BASSES FREQUENCES SUR LE SYSTEME CARDIO-VASculaire DE L'HOMME]

J. Demange R. Auffret and B. Vettes In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 5 p refs

Cardiac variability in subjects exposed to low frequency mechanical vibrations was studied. Vascular response to these vibrations was also measured. Particular attention was given to physiological disorders, especially in the case of vibration effects on sick or wounded subjects. Measurements were made of circulation and human performance after exposure to the vibrations. Some subjects were required to perform complex tasks.
DIOVASCULAR SYSTEM OF ANIMALS

Results from a recent series of investigations on the mechanisms and pathways involved in the two major types of psychological responses to mild to moderate levels of vibration exposure are reported. The majority of these studies are based on the chronically instrumented animal preparation. In addition to representative cardiovascular and mechanical variables many of the studies include hormonal metabolic hematological, and psychological measurements in order to quantify the vibration parameters estimate the overall stress level identify specific response patterns and evaluate the relative dependence of cardiovascular changes on these factors. Author

N75-27694 Aerospace Medical Research Labs Wright-Patterson AFB, Ohio

LABORATORY STUDIES ON CHRONIC EFFECTS OF VIBRATION EXPOSURE

Rhesus monkeys were chronically exposed to sinusoidal vibration in the Z axis. Gastrintestinal bleeding and lowered hemoccults were noted during exposure. Multiple lesions of the gastric mucosa were seen at necropsy. The impression is one of early erosive hemorrhaging gastric lesions with subsequent adjustment to the stress and resultant healing of the lesions. Author

N75-27695 National Inst for Occupational Safety and Health Cincinnati Ohio

SERUM AND URINE CHANGES IN MACACA MULATTA FOLLOWING PROLONGED EXPOSURE TO 12 Hz, 15 g VIBRATION

Serum and urine changes in male rhesus monkeys were measured before and after exposure to 12 Hz, 15 g vibration 5 hours daily for 130 hours. Marked erythrocyte loss occurred in 10 exposed animals within 3 weeks probably as a result of extensive gastrointestinal lesions. Serum albumin globulin ratios decreased. Similar values for 13 controls were unchanged during this time. No evidence of renal impairment was seen since serum creatinine was unchanged and hematuria increased. Protena and urine sediment morphology were either absent or not changed. Author

N75-27696 Centre d'Essais en Vol. Bretigny-sur-Orge (France) Lab de Medecine Aerospatiale

RAPID FLIGHT VIBRATION PHENOMENA AND SPINE FRACTURES [PHENOMENES VIBRATOIRES RAPIDES EN VOL ET FRACATURES DU RACHIS]
R Auffret R P Delahaye and J Salvagnac In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 5 p refs In FRENCH

Severe vibrations leading to vertebral fractures to pilots of high performance jet aircraft are examined. Specifically two cases were studied. Sudden intensive accelerations causing ejection from seats, and aircraft malfunctions or sudden movements as caused by turbulence pilot correction procedures, aircraft control, or servomechanism malfunctions Trans 1 by E H W

N75-27697 Army Aeromedical Research Lab Fort Rucker Ala

EFFECTS OF VIBRATION ON THE MUSCULOSKELETAL SYSTEM
Walter M. Braunohler. In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 7 p refs

No significant change occurs in bone mineral density after short term helicopter flying. However, the impact conditions of basic physical training induce 10% demineralization of the distal ulna. It is our impression that this is a transient phenomenon. Long term follow-up of helicopter pilots flying 6.5 hours/week over two years reveals no evidence of musculoskeletal strain however there appears to be a trend towards demineralization of the distal radius. Continued monitoring of this population group is recommended to determine when pathological changes may be expected to occur. Author

N75-27698 Royal Air Force Inst of Aviation Medicine Farnborough (England)

THE RESPIRATORY AND METABOLIC EFFECTS OF CONSTANT AMPLITUDE WHOLE-BODY VIBRATION IN MAN
G R Sharp, G A Patrick and W R Withey In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 6 p refs

Nine human subjects were exposed to constant amplitude whole body Z vibration for 10 minutes, at frequencies of 2, 4, 6, 8, and 10 Hz. It was found that at 2 and 4 Hz, pulmonary ventilation oxygen uptake, and tidal carbon dioxide tension and heart rate were unchanged. At frequencies of 6, 8 and 10 Hz, however, there was an increase in pulmonary ventilation and in oxygen uptake. Pulmonary ventilation was increased in excess of the oxygen uptake resulting in hyperventilation. There were no qualitative or quantitative differences in values of pulmonary ventilation or oxygen uptake between subjects which were unrestrained and which were fully restrained on the vibrator. Most subjects experienced discomfort or pain during exposure to frequencies of 6, 8, and 10 Hz. It is considered that this pain induced the observed hyperventilation. The increase in oxygen uptake is thought to be related to the tensing of musculature. Author

N75-27699 Southampton Univ (England) Human Factors Research Unit

A STUDY OF VIBRATION, PILOT VISION AND HELICOPTER ACCIDENTS
Michael J Griffin In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 16 p refs

A series of experiments has been conducted to investigate the hypothesis that the occurrence of helicopters flying into wires is related to vibration having a detrimental effect on pilot visual acuity. The research commenced with an investigation of the evidence for the problem by surveying the incidence of wire strikes and determining the conditions in which they occur. The second study measured pilot visual acuity during flight in two different helicopter types. It was concluded that under normal conditions the loss of visual acuity in these two helicopters was unlikely to be a major cause of wire strikes. The third investigation resulted in the detailed specification of the vibration experienced in the Scout AH Mk 1 helicopter. Particular emphasis was placed on the changes in vibration with the various flight conditions and the differences between pilots and between aircraft of the same type. The final series of experiments were designed to determine the minimum levels of vibration which would affect visual acuity. Author

N75-27700 Aerospace Medical Research Labs Wright-Patterson AFB, Ohio

MECHANISMS OF VIBRATION EFFECTS ON AIRCREW PERFORMANCE

The effects of vibration on a variety of human performance tasks are reviewed. Research is categorized with respect to the predominant performance requirements of the tasks investigated and results are evaluated in order to determine which aspects of task performance (sensory input, central processing and motor output) are affected by vibration interference. This procedure reveals that the vast majority of vibration effects occur for tasks which require fine sensory discrimination or precise motor response or both only a few studies show effects which can be attributed to interference with intellectual or cognitive
functions. On the basis of logical analyses of differential vibration effects on various types of tasks it is suggested that the predominant mechanism for vibration performance effects is direct mechanical interference with functions occurring in the input and output stages of operator performance tasks. Vibration effects on tasks which are primarily intellectual in nature and have minimal sensorimotor requirements are discussed in relation to generalized stress mechanisms. Recent research is described in which analytical decomposition of reaction time measures made it possible to definitively isolate vibration effects on peripheral and central performance functions within a single task.

N75-27701 Dayton Univ Research Inst Ohio
PERFORMANCE AND PHYSIOLOGICAL EFFECTS OF COMBINED STRESSES INCLUDING VIBRATION
J C Guignard In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 6 p refs

Whole body vibration affects human task performance by two main mechanisms: peripherally by mechanical interference at the point of contact between the brain and the task and centrally, by burdening the brain with irrelevant sensory information. In the latter regard the action of vibration is in some ways akin to that of noise. Any particular effect of vibration on performance depends on many factors including the physical characteristics of the vibration, the nature of the task and the skill and motivation of the performer. Vibration is a powerful force or other stressful agents or circumstances. Unfortunately our ignorance of the psychophysiological mechanisms by which vibration degrades particular kinds of task performance is still profound and our knowledge for the most part qualitative in nature. That is mainly because much laboratory based research into the psychophysiological actions of vibration suffers from the lack of an appropriate standardized methodology and of complete and proper measurements of the vibratory forces affecting the man at the time when his performance is being evaluated.

N75-27702 Medical Research Council, Cambridge (England)
EFFECTS OF DURATION OF VERTICAL VIBRATION BEYOND THE PROPOSED ISO "FATIGUE-DECREASED PROFICIENCY" TIME: ON THE PERFORMANCE OF VARIOUS TASKS
R T Wilkinsen and R Gray (RAE Farnborough England) In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 5 p refs

Six subjects carried out four 3-hour sessions of performance tasks two with continuous 5 Hz 1.2 m/s squared rms vertical vibration and two under static conditions. There was no general support for a prediction from the proposed ISO curves of fatigue-decreased proficiency (FDP) that vibration can lower proficiency as a function of duration of exposure. However, vibration associated with a 1-hour vigilance task and knowledge of results decreased proficiency towards the end of the 3-hour work period.

N75-27703 Advisory Group for Aeronautical Research and Development, Paris (France)
PERIPHERAL VISION ARTIFICIAL HORIZON DISPLAY
R Malcolm K E Money, and P Anderson In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 3 p ref

The artificial horizon instrument currently used in aircraft suffers from two shortcomings: the pilot cannot obtain continuous information from it since he must also look at other instruments and second, during episodes of heavy vibration, turbulence or disorientation, a small instrument becomes extremely difficult to read. This paper describes a device which projects a line or bar of light from beside the pilot's head forward onto the instrument panel. The line is approximately one to four inches wide and subtends 160 - 170 deg of arc from the pilot's head, so that it extends well into his peripheral vision. The light source is driven by servomotors which are controlled from the aircraft's inertial gyros such that the bar of light seen by the pilot duplicates the pitch and roll motions of the real horizon outside the cockpit.

The advantages of this display are visibility during turbulence and vibration visibility while looking at other instruments and reduction of the pilot's workload by making use of the neural programming which naturally orients us with the horizon.

N75-27704 Federal Inst for Occupational Safety and Accident Research Dortmund (West Germany)
A REVIEW OF BIOMECHANICAL MODELS FOR THE EVALUATION OF VIBRATION STRESS
Wolfgang Lange In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 8 p refs

Physical resonances of the human body or of its parts under vibration correlate with subjective responses. Biodynamic models can be calculated from data of vibration investigations. Several such models are discussed. The models differ in their degrees of freedom in their mass, elasticity and damper elements and in the way these elements are coupled. A further important parameter is the linearity or nonlinearity of the model. For the evaluation of vibratory stress it is necessary to establish physiological and/or psychological criteria which correlate with biomechanical responses that can be simulated by models. Several methods for evaluating vibration stress are discussed and compared.

N75-27705 National Aeronautics and Space Administration Langley Research Center, Langley Station Va
AN ELEMENTARY PSYCHOPHYSICAL MODEL TO PREDICT RIDE COMFORT IN THE COMBINED STRESS OF MULTIPLE DEGREES OF FREEDOM
Ralph W Stone Jr In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 7 p refs

The quality of airplane rides probably will become increasingly important to passengers, particularly in terminal area operations and short haul trips. The development of models to predict ride comfort is considered. An elementary model concept is presented herein and compared with subjective ride comfort response ratings measured on actual scheduled airline flights and simulated flights.

N75-27706 Kentucky Univ Lexington
MODELS OF THE CARDIOVASCULAR SYSTEM UNDER WHOLE BODY VIBRATION STRESS
Charles F Knapp In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 13 p refs

Five major mechanisms can be listed as the main factors responsible for producing alterations in the circulatory system exposed to vibration. The mechanisms important for vibration stress of a given waveform frequency displacement acceleration transferred force axis and duration are (1) reaction of the fluid and vessel system (2) reaction of large body organ systems and the musculoskeletal system (3) reaction of the mechanoreceptors (4) reaction of the hormonal metabolic and hematomatological systems and (5) reaction modification through the central nervous system and the psychophysiological pathways. Analytical efforts are reviewed as they relate to the five mechanisms listed above and current efforts in modeling the hydrodynamic aspects of the cardiovascular system are discussed in order to estimate its relative contribution to the total changes in arterial pressures and flows measured in animals exposed to whole body sinusoidal vibration.

N75-27707 Systems Technology Inc Hawthorne Calif
EVALUATING BIODYNAMIC INTERFERENCE WITH OPERATIONAL CREWS
Henry R Jex and R Wade Allen In AGARD Vibration and Combined Stresses in Advan Systems Mar 1975 18 p refs

A review is made of operational situations in which biodynamic interference with aircrews is a problem and it is shown that there is a large contrast between the information needed to evaluate these problems in operational situations versus that available from existing laboratory research. A structure and means
for extrapolating the large and growing empirical data base is discussed. Some progress in work along these lines is presented Including systems performance models for interrelating the many variables refined biomechanical models for analyzing vibration feedback to controls in closed loop manual tasks and procedures for including habitability or ride ratings in the overall evaluations.

Author

N75-27708 Advisory Group for Aeronautical Research and Development Paris (France)

THE ISO GUIDE FOR THE EVALUATION OF HUMAN WHOLE BODY VIBRATION EXPOSURE

G Bobbert In its Vibration and Combined Stresses in Advanced Systems Mar 1975 6 p refs

It exists a demand for regulations to evaluate the vibration exposure of human beings. Although the knowledge of the human reaction is not sufficient for all cases of vibration exposure experts from ten countries discussed a standard which gives a guide for the evaluation. As this standard is agreed by the ISO-Council and it is now going to be printed the background of this standard and the most important details are reported.

Author

N75-27709 Royal Aircraft Establishment Farnborough (England) Human Engineering Div

PROPOSED LIMITS FOR EXPOSURE TO WHOLE BODY VERTICAL VIBRATION, 0.1 TO 1.0 Hz

Geoff Allen In AGARD Vibration and Combined Stresses in Advanced Systems Mar 1975 11 p refs

The need for design standards for civil and military vehicles to cover human reaction to vibration below 1 Hz is outlined. Limits are proposed against two criteria: the first to prevent severe discomfort merges at 1 Hz with the D2631 exposure limit, the second to prevent reduced comfort merges at 1 Hz with the D2631 reduced comfort boundary. Because of lack of information, limits have been given for 25 minute and 8 hour durations only and it has not been possible to suggest values for the preservation of working efficiency. The information on which the proposals are based is outlined namely some twenty laboratory and field investigations and critical reviews. Yielding about fifty data points. Considering the approximate nature of some of the information it is relatively consistent and reinforces previous assertions that the critical frequency range for motion sickness is below 0.5 Hz.

Author

N75-27710 Boeing Co Wichita Kans

RIDE QUALITY OF CREW MANNED MILITARY AIRCRAFT

Stanley H Brumaghim In AGARD Vibration and Combined Stresses in Advanced Systems Mar 1975 7 p refs

Ride quality criteria are compared in terms of both short term and extended term crew performance decrement thresholds. Flight test data are included which illustrate the capability to modify aircraft response to gusts through ride control systems. Requirements for strength application of existing criteria to design of airplane ride control systems are given. Chief among these areas is the need for improved ability to handle human response to frequencies of vibration below 1 Hz and in validation of thresholds for extended exposure to vibration. Test data are also discussed which show the need to consider impact of ride environment on time to complete crew tasks, in addition to the more frequent concern with impact on performance errors.

Author

N75-27711 Centre de Recherches de Medecine Aeronautique, Paris (France)

STUDY OF MAN'S PHYSIOLOGICAL RESPONSE TO EXPOSURE TO INFRA-SOUND LEVELS OF 130 dB [ETUDE CHEZ L'HOMME DES EFFETS PHYSIOLOGIQUES D'UNE EXPOSITION A DES NIVEAUX INFR-SONORES DE 130 DB]

P Boiron J Nathie and A Gilbert In AGARD Vibration and Combined Stresses in Advance Systems Mar 1975 13 p refs In FRENCH

Infrasound effects on the physiological functions of man after a 50 minute exposure period were investigated. Special efforts were made to observe circulatory reactions and summarize totally the action of aerial infrasonic vibrations. Measurements were made of the reaction to a luminous solicitation cardiac frequency and maximum and minimum arterial pressure. An audiogram was made of the aerial luminous tones. Detailed results are given in tabular form.

Author

N75-27712 Centre de Recherches de Medecine Aeronautique Paris (France)

EFFECT OF LOW FREQUENCY AERIAL VIBRATIONS ON NOCTURNAL ACTIVITY OF A RAT [EFFET D'UNE EXPOSITION A DES VIBRATIONS AERIENNES DE BASSE FREQUENCE SUR L'ACTIVITE NOCTURNE DU RAT]

P Pesquies and J Nathie In AGARD Vibration and Combined Stresses in Advanced Systems Mar 1975 4 p refs In FRENCH

Observations were made of rat nocturnal activity after exposure to general aerial vibrations. The rats were exposed for eight hours to sinusoidal vibrations at a pressure of 147 dB and at frequencies of 8 16 and 32 Hz. Results indicate the vibrations were not loud enough to severely influence nighttime activity, however some increases and decreases were noted depending on exposure level.

Author

N75-27713 Erlangen-Nuremberg Univ (West Germany)

VIBRATESE LANGUAGE

Wolf D Kedel In AGARD Vibration and Combined Stresses in Advanced Systems Mar 1975 9 p refs

A brief review of the work done to develop vibratese languages is given. A special type of vibratese language is described using the v Bekesy model of the cochlea. Here the frequency range of speech is adapted to that of the vibratsctile system without changing the time domain so that the speech communication by means of a mechanical stimulation of the skin of the human forearm can be performed in real time. A highly sophisticated computer program for the LIN 8 or PDP 12 has been written for this purpose.

Author

N75-27714*# Scientific Translation Service Santa Barbara Calif

ON THE DIRECTED MONITORING OF STERILIZATION


The magnitude and the causes of failures in sterilization are evaluated and the effectiveness of an additional indicator to strengthen sterilization monitoring is tested. The spore-earth test is evaluated for the hot air and steam sterilization separately for the period from 1971 to 1973. A glucose-plasma indicator is shown to increase the effectiveness of the biological control when used in conjunction with the standard spore-earth test.

Author

N75-27715*# Kanner (Leo) Associates Redwood City Calif

Ca SALTS OF THE SACCUS ENDOLYMPHATICUS AND PROCESSES OF CALCIFICATION OF BONES DURING NORMAL AND EXPERIMENTAL METAMORPHOSIS IN TADPOLES OF BUFO VULGARIS, RANA DALTAMINA AND RANA ESCULENTA


The feeding of tadpoles with thymus was found to have no significant effect on the size of the animals. The development of the saccus endolympathicus its Ca salt content or bone calcification Experiments on exposure to thyroxine seem to indicate that the calcium salts in the saccus endolympathicus can gradually be mobilized during normal metamorphosis to compensate for any calcium deficiency in the surrounding medium.

Author
the tadpoles exposed to thyroxine was accelerated and the bones were unable to calcify completely. 

N75-27716# Mississippi Valley State Univ Itta Bena BIOLOGICAL INDICATORS FOR MONITORING WATER QUALITY OF MTF CANALS SYSTEM Semiannual Status Report, 26 Apr 1974 - 25 Apr 1975 S L Sethi 25 Apr 1975 16 p refs (Grant Nsg-B009) (NASA-CR-143178) Avail NTIS HC $25 CSCL 06B Biological models, diversity indexes were developed to predict environmental effects of NASA's Mississippi test facility (MTF) chemical operations on canal systems in the area. To predict the effects on local streams a physical model of unpolluted streams was established. The model is fed by artesian well water free of background levels of pollutants. The species diversity and biofilm composition of unpolluted MTF stream was determined resulting information will be used to form baseline data for future comparisons. Biological models were accompanied by adding controlled quantities or kinds of chemical pollutants and evaluating the effects of these chemicals on the biological life of the stream. 

N75-27718# Armed Forces Radiobiology Research Inst Bethesda Md CEREBRAL TEMPERATURE CHANGES IN THE MONKEY (MACACA MULATTA) AFTER 2500 RADS IONIZING RADIATION W L McFarland and J A Willis Apr 1974 15 p refs (DNA Dqo MWED-QAXMA905) (AD-A004854 AFFRI-SR-74-7) Avail NTIS CSCL 06/18 To determine the temperature response of the brain to radiation thermistor temperature sensing probes were implanted into thalamic and cortical areas of eight monkeys and the area of the aorta. After securing base-line temperature recordings the monkeys were exposed to 2500 rads whole-body pulsed mixed gamma-neutron radiation in the AFFRI-TRIGA reactor. Temperature at all measured sites generally dropped briefly immediately after the pulse then rose and stayed elevated 1-2°C for the remainder of the 3-1/2-hour observation period. There did not appear to be any regional differences in brain temperature response and brain temperature followed core (aortic) temperature changes. 

N75-27719# Armed Forces Radiobiology Research Inst Bethesda Md TEMPORAL CHANGE IN RADIOSENSITIVITY OF MINIATURE SWINE AS EVALUATED BY THE SPLIT-DOSE TECHNIQUE J F Taylor J L Terry M E Ekstrom and J E West Jul 1974 26 p refs (DNA Dqo MWED-QAXMC903) (AD-A004597 AFFRI-SR-74-14) Avail NTIS CSCL 06/18 Using the split-dose technique recovery was measured in miniature swine exposed to whole-body 60Co gamma radiation delivered at 34-35 rads/minute. The initial conditioning dose (150 rads) was approximately two-thirds of the normal LD50/30 (237 rads). The redetermined or challenge LD50/30 measured 28 days after the conditioning dose was 477 rads, indicating 260 percent recovery from the initial sublethal dose. Histopathological examinations of three animals euthanatized 28 days after 150 rads revealed no histologic evidence that could account for the radiosensitive state at that time. 

N75-27720# Franklin Inst Research Labs Philadelphia, Pa SCIENCE INFORMATION SCIENCES DEPT STRUCTURE-ACTIVITY CORRELATION BIBLIOGRAPHY, W/ SUBJECT AND AUTHOR INDEX Interim Report Frank D Kover Mar 1975 74 p refs (Contract EPA-68-01-2657) (PB-240658/5, EPA-S60/1-75-001) Avail NTIS HC $25 CSCL 06B References are provided to the literature on two principle methods of chemical structure-biological activity correlation which employ multiple regression, the multiple parameter approach (Hansch) and the additive model (Free-Wilson) Papers employing factor analysis discriminant analysis pattern recognition, and cluster analysis to correlate chemical structure to biological activity are cited. As these techniques and new ones are published in the literature, they are being included in the compilation. This edition of the bibliography covers the literature to November 1974. 

N75-27721 Wisconsin Univ Madison THERMOCURRENT DOSIMETRY WITH HIGH PURITY ALUMINUM OXIDE Ph D Thesis Gary Dodson Fullerton 1974 145 p Avail Unw Microfilms Order No 75-9971 The application of thermocurrent (TC) to ionizing radiation dosimetry was studied. It was shown that TC in alumina has properties that are suited to personnel dosimetry and environmental monitoring. The TC dosimeters were made from thin disks of alumina. Aluminum electrodes were evaporated on each side on one face a high voltage electrode and on the opposite face a measuring electrode encrusted by a guard ring. Exposure to ionizing radiation resulted in stored electrons and holes in metastable trapping sites. The signal was read-out by heating the dosimeter with a voltage source and picocammeter connected in series between the opposite electrodes. The thermally remobilized charge caused a transient TC. The thermogram TC versus time or temperature is similar to a TL glow curve. Either the peak current or the integrated current is a measure of absorbed dose. 

N75-27722 Pennsylvania Univ Philadelphia DEVELOPMENTAL PROGRAMMING FOR RETINOTECTAL PATTERNS Ph D Thesis Richard Kevin Hunt 1974 100 p Avail Unw Microfilms Order No 75-14573 Embryonic development of the retinal axes was studied. It was found that before a certain stage these axes may be realigned but then they are irreversibly specified as the permanent reference axes for retinotectal mapping. Axial specification is triggered by the eye itself. When eye cell differentiation was blocked by the thymidine analog 5-bromodeoxyuridine the time of specification was shown to correlate with the onset of cytodifferentiation of the ganglion cells in the central optic cup. These results indicate that the control mechanisms for axial specification are local in the gangliogenic precursor cells in the neuroepithelium and are activated as a lineage-dependent differentiative event. In earlier embryonic stages the capacity to undergo axial replacement is an advantage enabling the eye to compensate for spontaneous misalignments or distortions of the retinal axes. Later the specified permanent axes may make possible a fixed plan for position-dependent differentiation of the ganglion cells. 

N75-27723 Colorado State Univ, Fort Collins THE EFFECT OF HYPOXIA ON THE PULMONARY CAPILLARIES Ph D Thesis Wiltz Walter Wagner Jr 1974 77 p Avail Unw Microfilms Order No 75-14682
To facilitate study of the effect of hypoxia on pulmonary capillaries, windows were inserted in the chest wall of nine dogs. The total length of all perfused capillaries in the field of observation was then determined for various arterial oxygen tensions. Total perfused capillary length was nearly constant between arterial oxygen tensions of 160 and 70 torr. As the tension fell below 70 torr, recruitment of previously unperfused capillaries occurred. At 40 torr, the total length of perfused capillaries was about four times greater than during normoxia. There was no correlation between the recruitment of capillaries and alterations in left atrial pressure, only a weak correlation with cardiac output changes, but a very strong correlation with increased pulmonary artery pressure. This implies that recruitment is caused by constriction within the lung. This response increases the surface area for gas exchange and therefore could be advantageous during airway hypoxia. Dissert Abstr.


The influence of environmental temperature on physiological loads to sleeping men are studied by evaluating sleep motor movements, moisture loss, skin temperature measurements and multiple temperature measurements on mattress surface. An environmental temperature of 25 C and 70 percent air humidity increases significantly evaporation of the human body and mattress temperature. A correlation between pressure distribution of the human body with mattress surface properties and sleep movements is postulated. Transl by G G

N75-27727# Technische Universitat Munich (West Germany) ON THE CLASSIFICATION OF MULTIVARIATE TIME DEPENDENT PATTERNS IN VIEW OF THEIR PROCESS STRUCTURE Ph.D Thesis [Zur Klasseifikation multivariater, zeitabhaengiger Muster im Hinblick auf ihre Prozessstruktur] Siegfried Poepl 1974 266 p refs In German Avail NTIS HC $8.50 CSCL 066

The most important part of a classification system is optimal feature extraction. A system for automatic evaluation of sleep EEG's is developed that includes a zero ranging procedure, a transformation matrix, and an Euclidean classifier process. Automatic classification results agree with visual classifications even if patterns are time dependent and their realization is multivariable. Transl by G G


Relative motion and fluid flow effects in hydromechanical oscillations of the cochlea are studied in order to develop a mechanism of selective augmentation for the inner ear. It is shown that the gap width between corti organ and covering membrane determines cochlear hydrodynamics and thus effects striae inclination as well as basilar membrane and covering membrane oscillations as function of frequency. Transl by G G

N75-27729* National Aeronautics and Space Administration Lyndon B Johnson Space Center Houston, Tex BIOCHEMICAL OBSERVATION DURING 28 DAYS OF SPACE FLIGHT Carolyn S Leach and Paul C Kambaut In its Proc of the 1973 JSC Endocrine Program Conf Jun 1975 38 p refs CSCL 06A

With the completion of the 28-day flight of Skylab 2, the sum of biochemical data on human reaction to the weightless environment was significantly extended both quantitatively and qualitatively. The biochemical studies were divided into two broad categories. One group included the more routine blood studies similar to those used in everyday medical practice. The second category encompassed those analyses used to investigate more thoroughly the endocrinological and fluid changes first seen in the crewmembers following the Gemini-Apollo and Soviet missions. Significant biochemical changes were observed that vaned in magnitude and direction, but all disappeared shortly after return to earth. Most of changes indicate successful adaptation by the body to the combined stresses of weightlessness. Results of the biochemical observation are presented in the form of data tables and graphs. Author

N75-27730* National Aeronautics and Space Administration Ames Research Center Moffett Field, Calif MODULATING THE PITUITARY-ADRENAL RESPONSE TO STRESS Joan Vernikos-Danelis In its Proc of the 1973 JSC Endocrine Program Conf Jun 1975 10 p refs CSCL 06S

Serotonin is believed to be a transmitter or regulator of neuronal function. A possible relationship between the pituitary-adrenal secretion of steroids and brain serotonin in the rat was investigated by evaluating the effects of altering brain 5-hydroxytryptamine (HT) levels on the daily fluctuation of plasma corticosterone and on the response of the pituitary-adrenal system to a stressful or noxious stimulus in the rat. The approach was either to inhibit brain 5-HT synthesis with para-chlorophenylalanine or to raise its level with precursors such as tryptophan or 5-hydroxy tryptophan. Author

N75-27731* National Aeronautics and Space Administration Ames Research Center Moffett Field, Calif SIGNIFICANCE OF BIORHYTHMS IN SPACE FLIGHT Charles M Winget In its Proc of the 1973 JSC Endocrine Program Conf Jun 1975 11 p refs CSCL 06P

Evidence is presented that the most important factor in the maintenance of optimal health and performance is the stability of the relationship of one body rhythm to another. The effect of social interaction on performance, well-being and physiological rhythm synchrony was investigated. Three groups of healthy males, ages 21 to 25, were confined in rooms (3 x 4 by 5.2 meters (11

 naar de Tweede Wereldoorlog. Het is zeer waarschijnlijk dat de V.S. de Nederlanders voor de aanleg van de Schelde kreeg.
THE IMPORTANCE OF THE RENIN-ANGIOTENSIN SYSTEM IN NORMAL CARDIOVASCULAR HOMEOSTASIS

Edgar Haber In NASA Johnson Space Center Proc of the 1973 JSC Endocrine Program Conf Jun 1975 8 p refs

Studies were carried out on adult mongrel dogs (20 to 30 kilograms) to investigate the importance of the renin-angiotensin system. Results indicate that the renin-angiotensin system plays a major role in the maintenance of circulatory homeostasis when extracellular fluid volume is depleted. It was also found that angiotensin II concentration, in addition to renal perfusion pressure, is a factor in the regulation of renin release.

The effects of water immersion on acid-base homeostasis were investigated under carefully controlled conditions. Studies of renal acidification were carried out on seven healthy male subjects each consuming a diet containing 150 meq sodium and 100 meq potassium. Control and immersion studies were carried out on each subject on the fourth and sixth days respectively of dietary equilibration by which time all subjects had achieved sodium balance. The experimental protocols on study days were similar (except for the amount of water administered).

The role of parathyroid hormone, calcitonin, and vitamin D in the control of calcium and bone metabolism was studied. Particular emphasis was placed on the physiological adaptation to weightlessness and as a potential model for this purpose, on the immobilization characteristic of space flight or prolonged bed rest. The biosynthesis of control secretion, and metabolism of these hormonal agents is considered.

The effect of unknown endocrine changes on blood volume of crewmembers was investigated. The results are presented in tabular form. The fact that some of the changes were in the wrong direction suggests that changes in endocrine function were not the primary cause of the decreases in the plasma volume and red cell mass.
N75-27741
The data on the unne and focial composition were determined and processed statistically for young healthy male examinees. The experiments were conducted under controlled conditions with the maintenance of standard diet. It was found that for the given category of people the normal values of the component parts of both unne and focial waves fluctuate. Author

N75-27741## California Univ La Jolla Dept of Neurosciences
CUTANEOUS RESPONSES TO AUDITORY STIMULI
N75-27743## California Univ La Jolla Dept of Neurosciences
THE AUDITORY NEURAL NETWORK IN MAN
N75-27742## California Univ La Jolla Dept of Neurosciences
CUTANEOUS RESPONSES TO AUDITORY STIMULUS
N75-27743## California Univ La Jolla Dept of Neurosciences
THE AUDITORY NEURAL NETWORK IN MAN
N75-27742## California Univ La Jolla Dept of Neurosciences
CUTANEOUS RESPONSES TO AUDITORY STIMULUS
N75-27743## California Univ La Jolla Dept of Neurosciences
THE AUDITORY NEURAL NETWORK IN MAN
N75-27742## California Univ La Jolla Dept of Neurosciences
CUTANEOUS RESPONSES TO AUDITORY STIMULUS
A summary of the conceptual design of the Skylab sleep monitoring experiment and a comprehensive compilation of the data-analysis results from the three Skylab missions is presented. One astronaut was studied per flight, electroencephalographic, electro-oculographic and head-motion signals acquired during sleep by use of an elastic recording cap containing sponge electrodes and an attached miniature preamplifier/accelerometer unit are shown. A control-panel assembly mounted in the sleep compartment, tested on the space shuttle, preserves the data automatically analyzed in real time (providing a telemetered indication of sleep stage). Results indicate that men are able to obtain adequate sleep in regularly scheduled eight-hour rest periods during extended space missions.

OLJUDESS ENHANCEMENT IN MAN 1 BRAINSTEM EVOKED RESPONSE CORRELATES
Avail NTIS HC S 3 25
Electrophysiological responses and psychophysical judgments in subjects performing in a loudness enhancement task were correlated. Subjects received a tone burst followed after an interval by a signal whose loudness they were required to match by adjusting the intensity of another signal presented 1.5 seconds later. They judged the loudness of the first signal to be enhanced by 15 db or more when the interval was small. Analysis of the electrophysiological brainstem responses evoked by both signals revealed no changes in the electrophysiological response to the first signal that could explain this loudness enhancement. Results show the brainstem response to reflect stimulus intensity changes accurately, and perceived (enhanced) loudness change poorly or not at all. It appears that the mechanisms mediating loudness enhancement operate at levels central to the brainstem.

TWO PROGRAMS FOR SPEECH RECOGNITION AND SYSTEM IDENTIFICATION RESEARCH
J T Cordaro Aug 1974 29 p refs
(Grant AF-AFOSR-2178-72 AF Pro") 9769)
Author (GRA)

A program used to research automatic speech recognition and system identification is described. Two programs used for research in automatic speech recognition and in system identification are described in this report.

TWO PROGRAMS FOR SPEECH RECOGNITION AND SYSTEM IDENTIFICATION RESEARCH
J T Cordaro Aug 1974 29 p refs
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Two programs used for research in automatic speech recognition and in system identification are described in this report.
MEASUREMENT OF FLIGHT PERFORMANCE IN A FLIGHT SIMULATOR. INTERIM REPORT

Brian D. Shipley, Vernon S. Gerlack, and Fritz H. Brecke

Oct 1974 147 p. refs

(Grant AF-AFOSR-2128-71. AF Proj. 9778)

Three related lines of endeavor are reported. Central to all activity was continued research concerning the effect of cues and feedback on transfer type tasks. Because questions arose on the effect of practice during the cognitive pre-training phase of skill acquisition, an experiment was designed to study this variable. A second research thrust was the continued effort to discover more effective and efficient methods of measuring student pilot performance. The third line of research centered on the study of algorithms as a tool for the instructional designer whose responsibility it is to improve flying training procedures and techniques.

CUES, FEEDBACK, AND TRANSFER IN UNDERGRADUATE PILOT TRAINING, PHASE 3

Vernon S. Gerlack

Oct 1974 20 p

(Grant AF-AFOSR-2128-71)

N75-27765# Arizona State Univ. Tempe Dept. of Educational Technology

COOPERATIVE MULTIAxis SENSOR FOR TELEOPERATION OF ARTiCLE MANIPULATING APPARATUS

Patent

Alexander R. Johnston, inventor


N75-27758# National Aeronautics and Space Administration Pasadena Office Calif

HEAT STERILIZABLE PATIENT VENTILATOR

Patent

Alexander S. Irons (JPL), Paul P. Muehter (JPL), and Willie D. Kent, inventors

(to NASA) Issued 8 Jul 1975. 9 p. Filed 7 Mar 1974

N75-27761* National Aeronautics and Space Administration Pasadena Office Calif

N75-27759* National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex

MULTIPARAMETER VISION TESTING APPARATUS

Patent

Stacy R. Hunt Jr. (GE Philadelphia), Robert J. Homkes (GE Philadelphia), and Byrnie P. Poteat (GE Philadelphia)


Compact vision testing apparatus is described for testing a large number of physiological characteristics of the eyes and visual system of a human subject. The head of the subject is inserted into a viewing port at one end of a light-tight housing containing various optical assemblies. Visual acuity and other refractive characteristics and ocular muscle balance characteristics of the eyes of the subject are tested by means of a retractable phoroptor assembly carried near the viewing port and a film cassette unit carried in the rearward portion of the housing (the latter selectively providing a variety of different visual targets which are viewed through the optical system of the phoroptor assembly). The visual dark adaptation characteristics and absolute brightness threshold of the subject are tested by means of a projector assembly which selectively projects one or both of a variable intensity fixation target and a variable intensity adaptation test field onto a viewing screen located near the top of the housing.
An improved heat-stabilizable patient ventilator is disclosed. The device is characterized by a ported center-body a shell formed of heat-stabilizable material mounted on the center-body and defining a hermetically sealed reservoir for confining under positive pressure a mixture of bacteria-free gas and a pneumatic circuit including an oxygen delivery set coupled with an absolute filtration system for delivering bacteria-free mixture of gases to the reservoir.Official Gazette of the U.S. Patent Office.

**N75-27762**# IIT Research Inst., Chicago, Ill Techno/Economic Studies Group

**MARKET STUDY BIOLOGICAL ISOLATION GARMENT**
May 1975 16 p ref
(Contract NASw-2645)
(NASA-CR-144350) Avail NTIS HC $3.25 CSCL 06K

The biological isolation garment was originally designed for Apollo astronauts to wear upon their return to earth from the moon to avoid the possibility of their contaminating the environment. The concept has been adapted for medical use to protect certain patients from environmental contamination and the risk of infection. The nature and size of the anticipated market are examined with certain findings and conclusions relative to clinical acceptability and potential commercial viability of the biological isolation garment.

**N75-27763**# Scientific Translation Service, Santa Barbara Calif

**THE INTERNATIONAL ORBITAL LABORATORY**
(Contract NASw-2483)
(NASA-TT-F-16442) Avail NTIS HC $3.25 CSCL 06S

The problems encountered in space flights such as visual signaling contrast sensitivity and motor reactions are discussed. The psychophysiological mechanisms are described and the problems to be solved in the Apollo-Soyuz flight are analyzed.

**N75-27764**# Royal Aircraft Establishment Farnborough (England)

**THE DRIVING SEAT ITS ADAPTATION TO FUNCTIONAL AND ANTHROPOMETRIC REQUIREMENTS**
R. Rebiffe May 1975 22 p refs Transl. into ENGLISH from the French
(RAE-Lb-Trans-1841 BR48031) Avail NTIS HC $3.25

The relationship of the driver's seat with the various functions to be carried out from the driving position was considered. The study included (1) analysis of the driver's task (2) determination of the body posture which best meets the task requirements, and (3) definition of the seat characteristics giving optimum support to the driver in this posture. The main characteristics of the seat obtained were the seating height, the location and extent of the adjustment zone, the seat back inclination, the cushion inclination and the static consistency of the cushion.

**N75-27765**# Scientific Translation Service, Santa Barbara Calif

**THE SPACE WATCH IN SALYUT AS ON THE EARTH**
N. Zhelezov Washington NASA Jul 1975 6 p Transl. into ENGLISH from Gudok (USSR) 9 Jul 1975 p 4
(Contract NASw-2483)
(NASA-TT-F-16468) Avail NTIS HC $3.25 CSCL 06S

Medical-biological experiments carried out onboard Salyut space station are described. The equipment used to train the cosmonauts is briefly discussed.

**N75-27766**# Aerospace Medical Research Labs Wright-Patterson AFB, Ohio

**EVALUATION OF A WATER-COOLED HELMET LINER**
Final Report, Mar.-Jun. 1974
(AF-Proj. 7222)
(AD-A004776 AMRL-TR-74-135) Avail NTIS CSCL 06/17

Five subjects completed four 80-minute heat exposures (46C (115F), 40% relative humidity). Twice wearing the water-cooled helmet liner and twice without for a total of 20 heat exposures. During the thermal exposure, the subjects accomplished psychomotor performance tests. Physiological measurements included mean skin rectal and body temperatures, mean heart rate, body heat storage, heat loss, and Physiological Index of Strain. The performance measurements included tracking mental arithmetic, visual-motor response time, and auditory differentiation tasks. Head cooling significantly reduced the magnitude of all the physiological responses. The effect of head cooling on psychomotor performance was less impressive. The overall results indicate a lack of performance decrement as a result of the heat loads used here and no differential effect of head cooling on a subject's performance.

**Gra**

**N75-27767**# Aerospace Medical Research Labs Wright-Patterson AFB, Ohio

**BREATHING AIR QUALITY UNDER THE FIRE PROXIMITY SUIT HOOD**
Abbott T. Kissen, Walter C. Summers, Willi J. Buehnng and David C. Medley Nov 1974 14 p refs
(AD-A004770 AMRL-TR-74-76) Avail NTIS CSCL 06/17

Four subjects wearing the fire fighters proximity suit (except for gloves) were exposed to low and moderate exercise regimens on a treadmill. These exercise levels plus a resting condition were combined with auxiliary air ventilation flow rates of 5 or 10 liters/minute and nonventilated conditions. A continuous sample of the breathing atmosphere under the hood was evaluated for CO2 and O2 content throughout the ten-minute exposure periods. The increases in heart rate are solely related to the level of exercise and were not influenced by the presence or magnitude of auxiliary air ventilation. Under the most severe conditions of this study, O2 and CO2 values did not attain levels of clinical significance. Increased activity in operational situations is a distinct possibility and CO2 levels could be elevated an additional 2-3% generating undesirable symptoms. The added weight and cost penalties of an auxiliary air ventilation system must be balanced against the possible development of an undesirable breathing environment of questionable operational significance.

**Gra**

**N75-27768**# Massachusetts Inst. of Tech., Cambridge Artificial Intelligence Lab.

**A MECHANICAL ARM CONTROL SYSTEM**
Richard C. Waters Jan 1974 43 p
(Contract N00014-70-A-0362-0005)
(AD-A004672, AI-M-301) Avail NTIS CSCL 06/4

The paper describes a system for controlling the motion of a mechanical manipulator primarily through software rather than hardware. In addition, much attention is paid to what characteristics such a system should have so that the manipulator can be conveniently directed to perform complex tasks.

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