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

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# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY  
WITH INDEXES**

**(Supplement 179)**

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 March 1978 in

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



Scientific and Technical Information Office

1978

**National Aeronautics and Space Administration**

Washington, DC

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 171 reports, articles and other documents announced during March 1978 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

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

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

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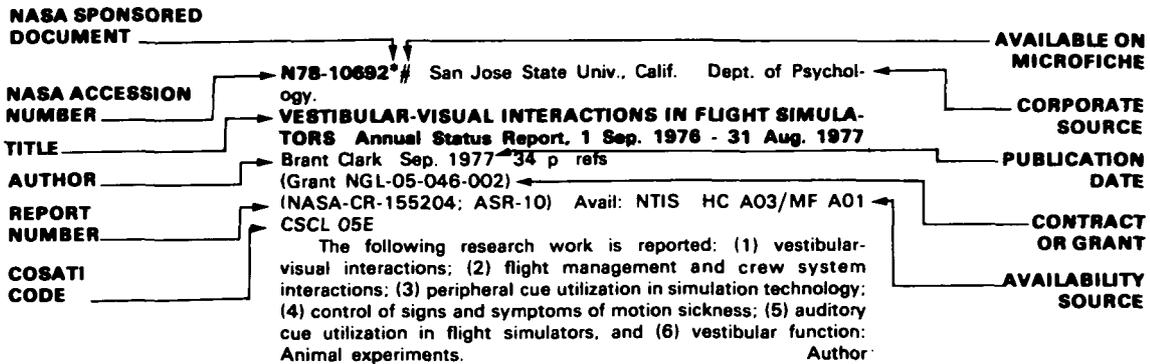
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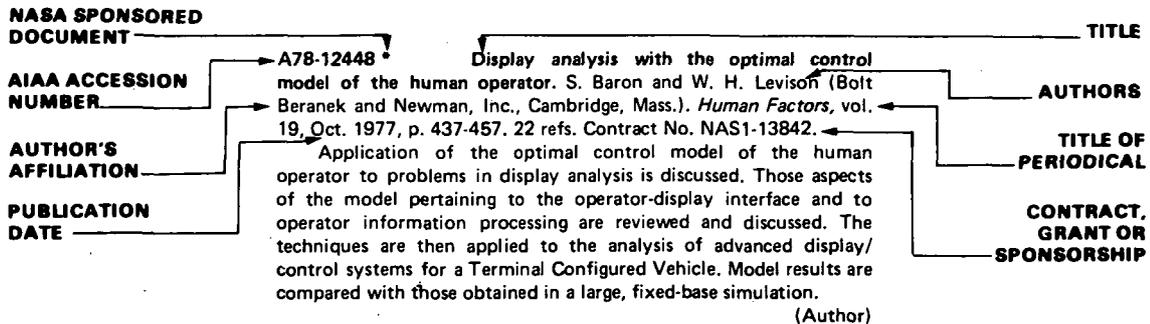
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## TYPICAL CITATION AND ABSTRACT FROM STAR



## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 179)*

APRIL 1978

## IAA ENTRIES

**A78-17192 #** **Observable effects in and human adaptation to rotating environments.** G. K. O'Neill (Princeton University, Princeton, N.J.) and G. W. Driggers (Science Applications, Inc., Huntsville, Ala.). In: *Space-based manufacturing from nonterrestrial materials.* New York, American Institute of Aeronautics and Astronautics, Inc., 1977, p. 173-176.

The basic phenomena which an object experiences in a rotating environment are identified for objects which change distance from the rotation axis and for objects which are dropped or thrown. In terms of human adaptation to such environments, it is observed that for a sample of 32 subjects, about 80% experienced no discomfort at rotation rates of up to 4 rpm, and for a sample of 36 subjects, 98% adapted to the environment and functioned normally after a period of time. It is also noted that the subjects of both samples were able to leave and subsequently return to the rotating environment with no apparent need to readapt. S.C.S.

**A78-17218 \*** **Combined use of autogenic therapy and biofeedback in training effective control of heart rate by humans.** P. S. Cowings. In: *Therapy in psychosomatic medicine.* Rome, Edizioni Luigi Pozzi S.p.A., 1977, p. 167-173. 11 refs. Grant No. UCD301.

Experiments were performed on 24 men and women (aged 20-27 yr) in three equal groups who were taught to control their own heart rates by autogenic training and biofeedback under dark and sound-isolated conditions. Group I was parasympathetic dominant, group II was sympathetic dominant, and group III consisted of parasympathetic-dominant subjects and controls who received only biofeedback of their own heart rates. The results corroborate three hypotheses: (1) subjects with para-sympathetic-dominant autonomic profiles perform in a way that is both qualitatively and quantitatively different from subjects with sympathetic-dominant autonomic profiles; (2) tests of interindividual variability yield data relevant to individual performance in visceral learning tasks; and (3) the combined use of autogenic training, biofeedback, and verbal feedback is suitable for conditioning large stable autonomic responses in humans. S.D.

**A78-17219 \*** **Observed differences in learning ability of heart rate self-regulation as a function of hypnotic susceptibility.** P. S. Cowings. In: *Therapy in psychosomatic medicine.* Rome, Edizioni Luigi Pozzi S.p.A., 1977, p. 221-226. 6 refs. Grant No. UCD201.

Three groups of eight male and female subjects (aged 20-27 yr) categorized by low and high hypnotic susceptibility were taught to control their heart rates by means of an appropriate autogenic therapy/biofeedback technique. The experimental groups were trained by autogenic therapy and biofeedback, while the control group received only biofeedback. Significant differences are observed in all psychological test scores between subjects of high and low hypnotic susceptibility. The results confirm that (1) there are qualitative and quantitative differences between the performance of individuals with high and low hypnotic susceptibility; (2) inter-

individual-variability tests yield data relevant to individual performance in visceral learning tasks; (3) the combined autogenic therapy/biofeedback/verbal feedback technique is suitable for conditioning large stable autonomic responses in humans; and (4) this kind of conditioning is effective in eliminating or alleviating physiological reactions to some environmental stressors. S.D.

**A78-17220** **Learned control of multiple autonomic responses to compensate for the debilitating effects of motion sickness.** P. S. Cowings, J. Billingham, and B. W. Toscano. In: *Therapy in psychosomatic medicine.* Rome, Edizioni Luigi Pozzi S.p.A., 1977, p. 318-323. 9 refs.

A rotating chair was used to provoke the initial symptoms of motion sickness in 24 male adult subjects (aged 18-30 yr) trained by a combined autogenic therapy/biofeedback/verbal feedback technique to simultaneously control their own heart rate, respiration rate, and blood volume pulse of the face and hands. The malaise level experienced by each subject during Coriolis acceleration was determined by the Coriolis sickness susceptibility index. The results indicate that learned control of multiple autonomic responses is possible under resting and stressful conditions in order to suppress the deleterious effects of motion sickness symptoms induced by Coriolis acceleration. S.D.

**A78-17221** **Psychosomatic health: Simultaneous control of multiple autonomic responses by humans - A training method.** P. S. Cowings and B. W. Toscano. In: *Therapy in psychosomatic medicine.* Rome, Edizioni Luigi Pozzi S.p.A., 1977, p. 184-189. 8 refs.

Special exercises of autogenic therapy and biofeedback were applied to 16 subjects, under nonstressful conditions, to train them for the simultaneous control of the following autonomic responses: heart rate, respiration rate, and peripheral blood flow to the face and hands as a function of blood volume pulse. Following completion of training, Coriolis acceleration was used to induce motion sickness symptoms in the experimental and control groups, the levels of the resulting malaise being graded by the Coriolis sickness susceptibility index (CSSI). The significant performance improvement in CSSI tests for the experimental groups, coupled with the apparent inability of the control group to attain comparable results, is assumed to be due to the training technique employed. It is concluded that this training method can be used to teach effective volitional control of multiple autonomic responses under both resting and stressful conditions. S.D.

**A78-17222** **A theory on the evolutionary significance of psychosomatic disease.** P. S. Cowings and B. W. Toscano. In: *Therapy in psychosomatic medicine.* Rome, Edizioni Luigi Pozzi S.p.A., 1977, p. 404-409. 12 refs.

Heart-rate control and Coriolis acceleration test results available in the literature are examined for human subjects with sympathetic- and parasympathetic-dominant profiles in order to develop a theory on the evolutionary significance of psychosomatic disease. This theory proposes that emotional responders with a tendency toward homeostatic imbalance retain adaptive value in present-day society.

In support of this theory, it is shown that sympathetic-dominant individuals exhibit less anxiety and are better able to withstand persistent stress than parasympathetic-dominant individuals. S.D.

**A78-17223 Ethylene oxide sterilization - Monitors and residuals.** R. R. Ernst (Deseret Pharmaceutical Co., Sandy, Utah). In: *Developments in industrial microbiology*. Volume 18. Arlington, Va., American Institute of Biological Sciences, 1977, p. 363-372. 13 refs.

The bacterial spore state is generally the most resistant to lethal action. Lethality to different agents is species variable. The efficiency of a sterilization process usually is given as the inactivation rate of a resistant type of bacterial spore. However, inducements exist which may gravely increase or decrease the lethality. The bacterial spore monitor, properly placed, will provide the greatest assurance of sterilization; whereas the classical sterility test with its associated manipulative hazards and statistical sampling limitations provides little assurance. Toxic residues may adversely affect results. The absorption, formation, and elution of residuals are influenced by thickness and wrapping and other factors. Except where thickness and overwraps are overwhelming, the absorption amounts and elution rates can be calculated. Amount of ethylene oxide absorbed is directly proportional to concentration, and increases logarithmically with time; whereas elution at any temperature is exponential.

(Author)

**A78-17265 Measurement of the human magnetic heart vector.** W. H. Barry, W. M. Fairbank, D. C. Harrison, K. L. Lehrman, J. A. V. Malmivuo, and J. P. Wikswo, Jr. (Stanford University, Stanford, Calif.). *Science*, vol. 198, Dec. 16, 1977, p. 1159-1162. 17 refs. NSF Grant No. APR-72-03447-A04; Grant No. NIH-HL-5866.

A unipositional lead system has been developed to record the human magnetic heart vector and to permit comparison with the electric heart vector recorded with a conventional Frank lead system. Recordings made in five normal subjects showed a remarkably consistent relation between the electric and magnetic heart vectors. However, the angle between electric heart vector R and T waves was markedly different from the magnetic heart vector R-T angle. In addition, recordings made in two patients with bundle branch block showed a different relation between the electric and magnetic heart vectors compared to normal subjects. These data support the hypothesis that magnetic measurements have a different sensitivity to some components of cardiac activation compared with body surface potential measurements.

(Author)

**A78-17407 A detailed performance evaluation of sub-miniature piezoresistive accelerometers.** G. Willems (U.S. Navy, Naval Aerospace Medical Research Laboratory Detachment, New Orleans, La.). In: *International Instrumentation Symposium, 23rd*, Las Vegas, Nev., May 1-5, 1977, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1977, p. 531-540.

The present paper deals with experiments that are being carried out to determine human dynamic response to various stimuli, such as impact and vibration. A pneumatic accelerator is used to generate short duration accelerations, approximating crash situation. Vibration and motion stimuli are imparted by electrohydraulic and electrodynamic motion generators. Extensive experimentally-derived data are presented on such parameters as linearity, sensitivity, long and short term drift, temperature sensitivity, temperature shock sensitivity, axis alignment, warmup characteristics, and hysteresis. The calibration and data acquisition facility is described. V.P.

**A78-17524 Alcohol retards visual recovery from glare by hampering target acquisition.** R. Sekuler and R. D. MacArthur (Northwestern University, Evanston, Ill.). *Nature*, vol. 270, Dec. 1, 1977, p. 428, 429. 11 refs. Research supported by Northwestern University; NSF Grant No. BNS-77-15858; Grant No. NIH-EY-00321.

The first part of the reported investigation was a replication of an experiment conducted by Adams and Brown (1975) who had found that relatively small doses of alcohol produced 'large,

significant, dose-related increases in the time required to recover foveal contrast sensitivity following bright light exposure'. In the second part of the investigation a methodology was used which could discriminate alcohol-induced changes in sensitivity from changes related to a willingness to report. The results of the investigation confirm that ingestion of alcohol causes a loss of visual sensitivity following glare. Nonretinal processes are primarily responsible for the effect of alcohol on glare recovery. It is pointed out that uncertainty about the location of possible targets imposes an inescapable reduction of visual sensitivity of any driver. G.R.

**A78-17525 Visual discrimination between small objects and large textured backgrounds.** R. B. Pinter (Washington, University, Seattle, Wash.). *Nature*, vol. 270, Dec. 1, 1977, p. 429-431. 13 refs. Grant No. NIH-EY-01285.

Palka (1969, 1972) and O'Shea and Fraser-Rowell (1975) have demonstrated that certain higher order insect visual neurons can discriminate between the movement of a small object or target and a large textured background. A windmill pattern was found to be inhibitory to the detection of motion of a small target by this neuron, known as the descending contralateral movement detector (DCMD). The quantitative determination of the spatial frequency at which the effect of the windmill pattern becomes inhibitory is reported. Responses of the DCMD in *Schistocerca gregaria* were obtained by conventional methods. Poststimulus time histograms are shown for a typical experiment to illustrate the nature of the inhibition in time. The inhibition of response to motion in a small disk plotted as a function of the lower limit of the spatial frequency content of the radial grating pattern is shown in a graph. G.R.

**A78-17530 A versatile electromagnetic environmental simulator.** D. G. Burks, E. R. Graf (Auburn University, Auburn, Ala.), and F. E. Cole (Ochsner Medical Foundation, New Orleans, La.). In: *Imaginative engineering thru education and experience; Proceedings of the Southeast Region 3 Conference*, Williamsburg, Va., April 4-6, 1977. New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 72-74.

A small simulator chamber to model the electromagnetic environment of the earth is described. The electromagnetic simulation features a static magnetic field with a small dynamic component superimposed, low-frequency mutually perpendicular magnetic and electric fields to represent low-frequency fields in the earth-ionosphere cavity, and a static electric field with periodic arcing to represent the effect of lightning. The lightning simulation employs water electrodes to model usual terrestrial conditions. J.M.B.

**A78-17583 Review of exposure techniques and dosimetric methods employed in microwave bioeffects research.** C. M. Weil (U.S. Environmental Protection Agency, Health Effects Research Laboratory, Research Triangle Park, N.C.). In: *Imaginative engineering thru education and experience; Proceedings of the Southeast Region 3 Conference*, Williamsburg, Va., April 4-6, 1977.

New York, Institute of Electrical and Electronics Engineers, Inc., 1977, p. 507-510. 20 refs.

**A78-17645 \* Observations in energy balance in man during spaceflight.** P. C. Rambaut, C. S. Leach, and J. I. Leonard (NASA, Johnson Space Center, Space Research and Operations Div.; General Electric Co., Houston, Tex.). *American Journal of Physiology*, vol. 233, Nov. 1977, p. R208-R212. 22 refs.

An investigation was undertaken of the changes in metabolic energy balance which occur in weightlessness. Daily energy intake was determined each day throughout the 28-, 59-, and 84-day flights for each of the nine Skylab astronauts. The energy content of the urine and feces was also measured. Changes in body composition were inferred from measurements of weight, volume, water, and total exchangeable potassium before and after flight. During flight, changes were followed by a daily measurement of body mass and by metabolic balance. Examination of the data reveal losses in body

weight during the 1st and 2nd months of flight, a loss in body water and protein during the 1st month and a loss of fat during the 1st, 2nd, and 3rd months of flight. The energy input was about 41.7 kcal/kg per day on the ground, and 43.7 kcal/kg per day after 3 months in space. The increase in net energy input of about 1.6% per month is significant (P less than 0.05). When the net energy input is expressed on the basis of total body potassium, the increase in the resulting normalized net energy input of about 3.7% per month is also significant (P less than 0.05). (Author)

**A78-17646 \*** **Cortisol-mediated synchronization of circadian rhythm in urinary potassium excretion.** M. C. Moore-Ede, W. S. Schmelzer, D. A. Kass, and J. A. Herd (Harvard University, Medical School, Boston and Southboro; Harvard University, Cambridge, Mass.). *American Journal of Physiology*, vol. 233, Nov. 1977, p. R230-R238. 34 refs. Contract No. NAS9-14249; Grants No. NIH-GN-22085; No. NIH-HL-14150.

Conscious chair-acclimatized squirrel monkeys (*Saimiri sciureus*) studied with lights on (600 lx) from 0800 to 2000 hr daily (LD 12:12) display a prominent circadian rhythm in renal potassium excretion. The characteristics of this rhythm were reproduced in adrenalectomized monkeys by infusing 5 mg cortisol and 0.001 mg aldosterone, or 5 mg cortisol alone, between 0800 and 0900 hr daily. When the timing of cortisol administration (with or without aldosterone) was phase-delayed by 8 hr, the urinary potassium rhythm resynchronized by 80% of the cortisol phase shift, but only after a transient response lasting 3-4 days. With the same daily dose of adrenal steroids given as a continuous infusion throughout each 24 hr, urinary potassium excretion showed free-running oscillations no longer synchronized to the light-dark cycle. These results indicate that the circadian rhythm of plasma cortisol concentration acts as an internal mediator in the circadian timing system, synchronizing a potentially autonomous oscillation in renal potassium excretion to environmental time cues and to other circadian rhythms within the animal. (Author)

**A78-17647 \*** **Renal sodium reabsorption following induction of and recovery from volume expansion.** T. F. Knight (U.S. Veterans Administration Hospital, Houston, Tex.) and E. J. Weinman (Baylor University, Houston, Tex.). *American Journal of Physiology*, vol. 233, Nov. 1977, p. F416-F420. 18 refs. Contract No. NAS9-14715.

**A78-17740 \*** **Detection by pilots of system failures during instrument landings.** A. R. Ephrath (Connecticut University, Storrs, Conn.; MIT, Cambridge, Mass.) and R. E. Curry (NASA, Ames Research Center, Moffett Field, Calif.; MIT, Cambridge, Mass.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-7, Dec. 1977, p. 841-848. 18 refs. Research supported by the National Research Council; Grant No. NGR-22-009-733.

The effects of gust disturbances and the pilot's participation mode in the control task on his work-load level and failure detection performance during a simulated low visibility landing approach are examined. We found that the participation mode had a strong effect on the pilot's work load, the induced work load being lowest when the pilot acted as a monitoring element during a coupled approach and highest when the pilot was an active element in the control loop. The effects of differential work load and participation mode on failure detection were separated. The participation mode was shown to have a dominant effect on the failure detection performance, with a failure in a monitored (coupled) axis being detected significantly faster than a comparable failure in a manually controlled axis. (Author)

**A78-17851 \*** **Endosymbionts and mitochondrial origins.** C. R. Woese (Illinois University, Urbana, Ill.). *Journal of Molecular Evolution*, vol. 10, Nov. 25, 1977, p. 93-96. 19 refs. NASA-NSF-supported research.

In the rat, infusion of a volume of isotonic saline equal to 2% of body weight resulted in an 82% increase in the delivery of filtrate out of the proximal tubule but little or, in some animals, no change in the urinary excretion of sodium. By contrast, further degrees of volume expansion resulted in lesser increases in the distal delivery of filtrate, but were associated with a marked increase in the urinary excretion of sodium. Sixty minutes following completion of volume expansion, while the animals were still in positive sodium balance, the urinary excretion of sodium decreased 52% compared to a decrease of only 24% in the distal delivery of filtrate. During the course of progressive volume expansion and during the recovery phase, there was a dissociation between alterations in sodium reabsorption in the proximal convoluted tubule and in the whole kidney. These studies indicate that although the proximal tubule is more sensitive to changes in the extracellular fluid volume, distal nephron sites are ultimately responsible both for the natriuresis of volume expansion and the relative antinatriuresis of the recovery periods. (Author)

**A78-17853 \*** **Formation of nucleoside 5-prime-phosphoramidates under potentially prebiological conditions.** R. Lohrmann (Salk Institute for Biological Studies, San Diego, Calif.). *Journal of Molecular Evolution*, vol. 10, Nov. 25, 1977, p. 137-154. 21 refs. Grant No. NGR-05-067-001.

**A78-17854** **On the cysteine and cystine content of proteins - Differences between intracellular and extracellular proteins.** R. C. Fahey, J. S. Hunt, and G. C. Windham (California University, La Jolla, Calif.). *Journal of Molecular Evolution*, vol. 10, Nov. 25, 1977, p. 155-160. 35 refs. Grant No. NIH-GM-22122.

Analysis of published data on the cysteine and half-cystine content of proteins indicates that most intracellular proteins may be classified as sulfhydryl (those containing cysteine but little or no half-cystine) and that such sulfhydryl proteins have a low cysteine content. The mean cysteine content found for 32 intracellular mammalian proteins was 1.6%, and intracellular proteins of many bacteria have similar or lower values. Extracellular mammalian proteins are primarily disulfide (those containing half-cystine but little or no cysteine) and have a high half-cystine content, the mean value found for some 34 extracellular mammalian proteins being 4.1%. This is contrasted with many of the extracellular proteins from facultative bacteria which are cyst(e)ine-free proteins, lacking in both cysteine and half-cystine. These and related observations are interpreted in terms of the evolution of life in a reducing atmosphere and the subsequent transition to an oxidizing environment. It is suggested that disulfide proteins evolved primarily after the accumulation of oxygen in the atmosphere. (Author)

**A78-18076** **Effects of training and heat acclimatization on blood plasma contents of exercising men.** L. C. Senay (St. Louis University, St. Louis, Mo.) and R. Kok (Chamber of Mines, Industrial Hygiene Div., Johannesburg, Republic of South Africa). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 591-599. 43 refs.

**A78-18077** **Beta-receptor influence on lung vasoconstrictor responses to hypoxia and humoral agents.** R. J. Porcellii, A. T. Viau, N. E. Naftchi, and E. H. Bergofsky (New York, State University, Stony Brook; U.S. Veterans Administration Hospital, Northport; New York University, New York, N.Y.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 612-616. 7 refs. Research supported by the Edmund Gugenheim Clinical Research Endowment and U.S. Veterans Administration; Grant No. NIH-17711.

Epinephrine injections were administered to the isolated perfused left lower lobe preparation, in the living cat, ventilated by a Harvard piston pump in order to assess the role of the adrenergic receptor in mediating pulmonary vascular responses to gaseous and humoral agents. Epinephrine was chosen as an agent capable of producing graded alterations of pulmonary vascular beta adrenergic

activity; this activity was quantified by measuring the generation rate of 3',5'-adenosine cyclic monophosphate in pulmonary tissue. Both the pharmacological and chemical measurements of beta-adrenergic activity were correlated with the consequent alteration in the pulmonary vasoconstrictor response to the gaseous agents and their potential mediators. A major conclusion is that in addition to using induced alterations in the balance between alpha- and beta-adrenergic activity to discriminate between potential humoral mediators of the hypoxic vasoconstrictor response, the data obtained are useful in appraising the role of the adrenergic system in mediating vasoconstrictor responses to hypoxia and histamine, but not to serotonin.

S.D.

**A78-18078**      **Potentiation of pulmonary vasoconstrictor response with repeated intermittent hypoxia.** M. Unger, M. Atkins, W. A. Briscoe, and T. K. C. King (Cornell University, New York, N.Y.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 662-667. 27 refs. Research supported by the Routh Fund; Grants No. NIH-HL-12530; No. NIH-HL-70357.

Experiments were conducted on anesthetized, catheterized, mongrel dogs (18-22 kg) ventilated alternately with air and 10% oxygen in order to evaluate the stability or reproducibility of the pulmonary vascular response occurring during repeated acute hypoxia. One of the three catheters used was introduced via the jugular vein through the right ventricle to the pulmonary artery for measuring pulmonary pressure, capillary wedge pressure, and cardiac output; the second catheter was placed in the femoral artery for systemic blood pressure monitoring; and the third catheter was threaded in the femoral vein for injection of pentobarbital to maintain anesthesia or for administration of other medications. The study was schemed in such a manner that only the isolated effect of hypoxia on the pulmonary vasculature was evaluated. It is shown that apparently the intermittency of hypoxia is necessary to evoke a progressive rise in mean pulmonary artery pressure. Several existing mechanisms responsible for this progressive increase in pulmonary artery pressure are criticized in terms of data on pulmonary artery wedge pressure, cardiac output, and pulmonary blood volume.      S.D.

**A78-18079**      **Heat acclimation, physical fitness, and responses to exercise in temperate and hot environments.** E. Shvartz, Y. Shapiro, A. Magazanik, A. Meroz, H. Birnfeld, A. Mechtinger, and S. Shibolet (Tel Aviv University, Tel Aviv, Israel). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 678-683. 24 refs. Research supported by the United States-Israel Binational Science Foundation.

The possibility is put forth that the mitochondrion did not originate from an endosymbiosis 1-2 billion years ago involving an aerobic bacterium. Rather, it arose by endosymbiosis in a much earlier anaerobic period and was initially a photosynthetic organelle analogous to the modern chloroplast. This suggestion arises from a reconsideration of the nature of endosymbiosis. It explains the remarkable diversity in mitochondrial information storage and processing systems.      (Author)

**A78-18080**      **Prediction of heat tolerance from heart rate and rectal temperature in a temperate environment.** E. Shvartz, S. Shibolet, A. Meroz, A. Magazanik, and Y. Shapiro (Tel Aviv University, Tel Aviv, Israel). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 684-688. 12 refs. Research supported by the United States-Israel Binational Science Foundation.

**A78-18081**      **Role of brain Ca<sup>2+</sup> in central control of body temperature during exercise in the monkey.** R. D. Myers (Purdue University, West Lafayette, Ind.), C. V. Gisolfi, and F. Mora. *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 689-694. 27 refs. NSF Grant No. BMS-18441; Contracts No. N00014-75-C-0203; No. N00014-75-C-0597.

Experiments were performed on Macaca rhesus or nemestrina monkeys (6-8 kg) - accustomed to primate restraining chairs at a room temperature of 22 C - that were subjected to strenuous exercise on a special rowing machine at a total work output rate of 100 kpm/5 min. The objective was to determine whether the rise in core temperature that occurs as a primate exercise can be altered by excess Ca(2+) infused into the ventricular portion of the brain. The influence of environmental temperature in relation to core temperature rise during exercise was also assessed. The results point to a central physiological mechanism for Ca(2+) effect on exercise; that is, if the hyperthermia of exercise represents an elevated set-point temperature and the action of Ca(2+) ions within the diencephalon is to prevent an upward shift in the set point, then the net effect of adding low-concentration Ca(2+) to the system is to ameliorate the temperature rise without affecting the working capacity of the animal.      S.D.

**A78-18082**      **Kinetics of gas exchange and ventilation in transitions from rest or prior exercise.** L. B. Diamond, R. Casaburi, K. Wasserman, and B. J. Whipp (Harbor General Hospital, Torrance, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 704-708. 25 refs. Grants No. NIH-HL-19410; No. NIH-HL-11907.

**A78-18083**      **Fatty acid profile and cholesterol in skeletal muscle of trained and untrained men.** T. R. Thomas, B. R. Londeree, K. O. Gerhardt, and C. W. Gehrke (Missouri-Columbia, University, Columbia, Mo.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Oct. 1977, p. 709-713. 34 refs.

**A78-18187**      **Interest of balloon flights in biology.** H. Planel (Toulouse III, Université, Toulouse, France). In: Space research XVII; Proceedings of the Open Meetings of Working Groups on Physical Sciences, June 8-19, 1976 and Symposium on Minor Constituents and Excited Species, Philadelphia, Pa., June 9, 10, 1976.      Oxford and New York, Pergamon Press, 1977, p. 827-832. 24 refs.

Some examples of important biological research conducted using balloons are given. These include the effects of cosmic radiation on cell multiplication, using the single cell organism *Paramecium*; and on the skin and brains of animals.      (Author)

**A78-18450**      **Predictive implications of ventricular premature contractions associated with treadmill stress testing.** J. A. Udall (Long Beach Memorial Hospital Medical Center, Long Beach, Calif.) and M. H. Ellestad (California, University, Irvine, Calif.). *Circulation*, vol. 56, Dec. 1977, p. 985-989. 16 refs.

**A78-18501**      **Problems and prospects for aviation psychology (Aufgaben und Perspektiven der Luftfahrtpsychologie).** K. Steininger (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Hamburg, West Germany). *DFVLR-Nachrichten*, Dec. 1977, p. 885-890. In German.

The paper describes the principles of the crew selection strategy used by German airlines. Criteria for selection of the payload specialists for the European Spacelab are discussed.      P.T.H.

**A78-18514**      **Research and technology in the health field (Forschung und Technologie im Bereich des Gesundheitswesens).** F. Unz (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Bereich für Projektträgerschaften, Porz-Wahn, West Germany). *DFVLR-Nachrichten*, Dec. 1977, p. 937-939. In German.

Goals and developments from the three project areas (1) technical aids for the blind, (2) endoprosthetics, and (3) radiology are examined. Brief descriptions are given of a tape recorder for braille writing for fast drawing up and exchanging of braille messages and writings. The development of a new bioactive bone cement is seen as a major goal in endoprosthetic research. A radiographic

technique without the use of silver film is being developed, in which charge carriers are produced in a highly condensed gas by X-rays and subsequently fixed on a foil as an optical image. P.T.H.

**A78-18521 #** The problem of photosynthetic hydrogen (Problema fotosinteticheskogo vodoroda). A. A. Krasnovskii (Akademiiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Sept.-Oct. 1977, p. 650-662. 32 refs. In Russian.

The article reviews photosynthetic hydrogen evolution in *Chlorella* and in model systems. The role of the carbon cycle in *Chlorella* was studied, as was the ability of chloroplast suspensions to reduce viologen and evolve hydrogen. Reduced NAD illuminated at 365 nm was found to be capable of reducing viologen and ferredoxin; in the presence of hydrogenase, hydrogen gas is evolved. This reaction is sensitized to visible light by porphyrins. Photo-evolution of hydrogen gas occurs in solutions of solubilized chlorophyll, electron donor, and hydrogenase when illuminated by red light. The reaction efficiency is comparable to that of chloroplast suspensions, and methylviologen enhances hydrogen photo-production. The ability of inorganic catalysts to reduce viologens and generate hydrogen when illuminated by ultraviolet was also investigated. M.L.

**A78-18523 #** Pine seed germination at zero gravity /A Cosmos-782 experiment/ (Prorastanie semian sosny v nevesomosti /Issledovanie na ISZ 'Kosmos-782'/). R. N. Platonova, G. P. Parfenov, V. P. Ol'khovenko, N. I. Karpova, and M. E. Pichugov. *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Sept.-Oct. 1977, p. 770-776. 5 refs. In Russian.

The orientation of aboveground and underground organs of pine plants, grown from seeds at zero gravity, was found to be determined by seed position on the substrate. Normal plant growth was observed only if seed embryos were orientated towards the substrate. Some differences were detected between experimental and control plants with respect to the amount of nucleoli in root meristem cells and the cell shape in cotyledon leaves. Experiments with plants grown at zero gravity and plants grown at compensated gravity (clinostat horizontal rotation) did not produce completely similar results. M.L.

**A78-18524 #** DNA content in the lymph organs of rats during adaptation to hypoxia (Soderzhanie DNK v limfoidnykh organakh krysa pri adaptatsii k gipoksii). F. T. Guseinov, G. S. Komolova, I. A. Egorov, and Iu. V. Shevchenko (Akademiiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaja*, Sept.-Oct. 1977, p. 783-786. 17 refs. In Russian.

**A78-18526** Symposium on Memory Control Mechanisms, Leningrad, USSR, November 16-19, 1976, Proceedings (Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, November 16-19, 1976, Proceedings). Symposium sponsored by the Akademiiia Nauk SSSR and Akademiiia Meditsinskikh Nauk SSSR. *Fiziologija Cheloveka*, vol. 3, Sept.-Oct. 1977. 190 p. In Russian.

Consideration is given to interneuron relationships as possible mechanisms of memory, models for membranes of brain cells as a substrate for information storage, problems of memory control in experiments, extremely slow bioelectrical processes of the human brain in mechanisms of memory modulation, and the molecular code of memory. Neurophysiological approaches to the brain control of the mnemonic function, the investigation of elementary informational mnemonic fields in the human brain, subcortical links of optimization of intellectual-mnemonic human activity, and the effect of pain. B.J.

**A78-18528 #** Bioelectrical expression of the activation of long-term memory and possible mechanisms of this process (Bioelektricheskoe vyrazhenie aktivatsii dolgosrochnoi pamiati i vozmozhnye mekhanizmy etogo protsesssa). N. P. Bekhtereva (Akademiiia Medi-

tsinskikh Nauk SSSR, Leningrad, USSR). (*Akademiia Nauk SSSR and Akademiiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologija Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 763-773. 48 refs. In Russian.

Results are presented for a study on the impulse activity of neuronal populations in various subcortical structures of patients whose diagnosis and treatment were achieved using implanted electrodes while they were subjected to several psychological tests related to the perception and processing of verbal signals. It is shown that during word perception the impulse activity of neuronal populations exhibits a bioelectrical pattern characterized by changes in the frequency and structure of the impulse flow as well as by changes in the interaction of neurons and their groups within neuronal populations and between widely separated populations. The results obtained are used in discussing the possible mechanisms responsible for the interaction of bioelectrical and biochemical components of memory. A hypothesis is advanced for a dynamic mechanism of the pacemaker type, which arises owing to events in the internal and external environments of the body. S.D.

**A78-18529 #** Models for membranes of cerebral cells as a substrate for information storage (Modeli membran mozgovykh kletok kak substrata dlia khraneniia informatsii). W. R. Adey (California, University, Los Angeles, Calif.). (*Akademiia Nauk SSSR and Akademiiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologija Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 774-788. 48 refs. In Russian.

Neurophysiological and biochemical aspects of the study of information-storage mechanisms are examined. Emphasis is placed on an analysis of modern concepts and models pertaining to the biochemical structure of the membranes of neural cells along with relevant major functions of these membranes in memory mechanisms. The role of slow electrical processes in information-storage mechanisms is pointed out. Data are given on the effect of external electrical fields on learning. S.D.

**A78-18530 #** Problems of memory control in experiments (Problemy upravleniia pamiat'iu v eksperimente). G. A. Vartmanian (Akademiiia Meditsinskikh Nauk SSSR, Leningrad, USSR). (*Akademiia Nauk SSSR and Akademiiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologija Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 789-795. 18 refs. In Russian.

Experimental data are presented in support of the fundamental biophysical and biochemical approaches to the control of dynamic processes of memory. Various methods of micropolarization of cerebral structures are used to describe a few principles underlying the hierarchic self-organization of the memory control system at different levels. Results are given on the mechanisms responsible for the effect of a weak direct current on the cerebral tissue. It is experimentally shown how chemical processes participate in the initial dynamic process of memory, which is reflected by a significant activation of the synthesis of ordinary and neurospecific proteins in the hippocamp and central endings of certain analyzers. The role of neurospecific peptides in the formation of long-term memory is highlighted. The results indicate the possible ways of directional action on memory processes. S.D.

**A78-18531 #** Extremely slow bioelectrical processes of the human brain in mechanisms of memory modulation (Sverkhmedlennye bioelektricheskie protsessy golovnogo mozga cheloveka v mekhanizmakh moduliatsii pamiati). V. A. Iliukhina (Akademiiia Meditsinskikh Nauk SSSR, Leningrad, USSR). (*Akademiia Nauk SSSR and Akademiiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologija Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 796-807. 23 refs. In Russian.

Data are presented on the heterogeneous nature of the extremely slow bioelectrical processes of neuroglial populations (NGPs) in deep structures of the human brain as well as on the ambiguity of

their role in memory modulation mechanisms. It is shown that the functional activity of NGPs, regarded as cerebral units to ensure mental and motor activities, is reflected by the dynamical variety of bioelectrical indicators, which as a whole expresses the unity and integrity of the units as a neurodynamic element of higher order as compared to its constituents parts (neurons, glial cells, etc). Experimental results demonstrate the possibility of optimizing the shape and conditions of a memory-control agent in intimate feedback relation with the control of physiologically fully determined neurodynamic transformations. S.D.

**A78-18532 #** The molecular code of memory (Problema molekuliarnogo koda pamiatii). G. Ungar (Tennessee, University, Memphis, Tenn.). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 808-820. 91 refs. In Russian.

The paper surveys various aspects of molecular coding of information, with special emphasis on isolation of learning-induced peptides and chemical code of memory. Attention is given to the function of specific connectors that facilitate the processes involved in synaptic transmission and to their possible role in the formation of neurone systems. The latter are regarded as the structural-biochemical base of long-term memory. Whatever the mechanisms of coding may be, the available data show that peptides are molecules in which information is recorded and stored. S.D.

**A78-18533 #** Neuropsychological approach to the problem of brain control of the mnemonic function (Neiropsikhologicheskii podkhod k probleme mozgovogo kontroliia mnestichekoi funktsii). J. Barbizet (Bol'nitsa Genri Mondora, Paris, France). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 841-844. In Russian.

Cerebral mechanisms of phenotypical human memory are studied by a variety of approaches such as psychological, biochemical, physiological, and neuropsychological. One of the adequate ways of controlling the cerebral mechanisms responsible for mnemonic processes of what is studied, memorized, and remembered is the neuropsychological level of analysis, which makes it possible to disclose certain characteristics of cerebral mechanisms for the recording and recalling of past experience. The role of neuropsychology in understanding cerebral mechanisms of mnemonic activity is highlighted. S.D.

**A78-18534 #** Neurophysiological analysis of complex forms of verbal memory (Neiropsikhologicheskii analiz slozhnykh form rechevoi pamiatii). A. R. Lurii (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 845-852. 10 refs. In Russian.

A well-defined psychological model is presented for describing deliberate mnemonic activity, and specially verbal memory, which deals with the memorization and reproduction of words, phrases, or texts. The possibility of eliminating the limitations of the psychological approach by using the neuropsychological analysis of the role played by specified cerebral structural units in memorizing and reproducing a text is examined. Experimental results are presented for the problem of determining the type of disorganization of complex processes, particularly processes of verbal memory, that is caused by local lesions to specified local structures. The results suggest that neuropsychology is suitable for studying the processes involved in the reproduction of a closed meaningful message. S.D.

**A78-18535 #** Investigation of elementary informational mnemonic fields in the human brain (Issledovanie elementarnykh informatsionnykh mnestichekikh polei mozga cheloveka). V. M. Smirnov, Iu. S. Borodkin, and N. N. Bogdanov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). (*Akademiia Nauk SSSR and*

*Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 874-880. 10 refs. In Russian.

The theory of artificial stable functional connections - intermediate between conditioned and unconditioned reflexes - in the mnemonic activity of the human brain is discussed. These elementary informational mnemonic fields, associated with mechanisms of brain self-regulation, can play an important role in the optimization of brain function under conditions of pathology. It is allowed that these fields can play the role of antagonists of those matrices of long-term memory which control the stable pathological state that sustains mechanisms of disease. Indicators of the formation and dynamics of the artificial stable functional connections were different physiological and behavioral responses, such as quantitative changes of the plastic muscular tonus recorded in the symmetrical muscles (e.g., the biceps), unapprehended and uncontrolled by the subject. B.J.

**A78-18536 #** Subcortical links of optimization of intellectual-mnemonic human activity (Podkorkovye zven'ia optimizatsii intellektual'no-mnestichekoi deiatel'nosti cheloveka). V. B. Grechin (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 881-890. 20 refs. In Russian.

Electrodes were implanted into the basal ganglia of one of the brain hemispheres of each of 35 subjects, all of them suffering from post-encephalitic Parkinson's disease and complaining of a phantom-pain syndrome. The purpose of the tests was to examine mnemonic activity in three areas: (1) the structure of brain 'points' associated with intellectual-mnemonic activity, reflected in slow nonelectrical processes, (2) the effects of neurotropic agents. B.J.

**A78-18537 #** The use of methods of multivariate statistics for the automatic recognition of anomalies in records of background EEG (Primenenie metodov mnogomernoi statistiki dlia avtomaticheskogo raspoznavaniia anomalii v zapisi fonovoi EEG). M. Chavance (Gruppa po Razrabotke Problem Informatsii i Statistiki, Paris, France) and D. Samson-Dollfus (Laboratoriia Nevrologicheskikh Issledovani, Rouen, France). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 898-905. 24 refs. In Russian.

A computer program, developed for spectral analysis on the basis of the fast Fourier transformation, has been used to process EEG power spectra of two groups of children ranging in age from 10 to 12. One group, consisted of 82 apparently healthy children with EEG records that were normal to visual inspection; the second group consisted of 17 children, suffering from various health problems (e.g., epilepsy, migraine, skull injuries, psychic disturbances, etc), and whose EEG records, upon visual inspection, were judged pathological, except for the case of three subjects. It is found that the use of the proposed recognition algorithm can lead to good results even when visual inspection of background-EEG records is powerless. B.J.

**A78-18538 #** Investigation of the effect of electrical pain stimulation of the skin on the reflex excitation of human alpha-motoneurons (Issledovanie vliianiia boleвого elektrokozhnogo razdrasheniia na reflektornuiu vozбудimost' alpha-motoneironov u cheloveka). A. V. Syrovegin and V. A. Garibdzhanov (Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 906-912. 15 refs. In Russian.

Twenty subjects without pain syndrome were subjected to electrical pain stimulation of their soleus muscles in an effort to investigate the response of spinal motoneurons to skin pain sensa-

tion. Multiphase changes in the reflex excitation of alpha-motoneurons, due to pain stimulation were revealed, reflecting complex descending effects, appearing during the formation of the pain sensation. The phase response of the spinal motoneurons to pain seems to be associated on one hand, with the inhomogeneity of afferent fibers activated by pain stimulation, and with different brain structures which mediate the pain effect, on the other. B.J.

**A78-18539 #** Algorithm for using the square of the correlation ratio in the analysis of the mutual influence of features (Algoritm dlia primeneniia kvadrata korrelatsionnogo otnosheniia v analize vzaimovliianiia priznakov). A. Iu. Panasiuk (Gorodskoe Spetsializirovannoe Otdelenie po Lecheniiu Nevrozov u Detei, Leningrad, USSR). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 924-929. 11 refs. In Russian.

The paper proposes a correlation-analysis algorithm which uses the square of the correlation ratio as an indicator of the mutual influence of features of various kinds of biological, medical, physiological, and psychological systems. The algorithm enables one to determine the effects of each feature on every other, and its dependence on them, as well as to determine those features which have the greatest and least effect on other features. To test the method, a control evaluation was conducted, employing a cause-effect relation of the 'multiplicand-product' type, where age is correlated with a number of psychophysiological functions of children. B.J.

**A78-18540 #** Method for recording the impulsive activity of the cortex of the human brain (Metod registratsii impul'snoi aktivnosti kory golovnogo mozga). Iu. K. Matv'eev, A. D. Anichkov, A. M. Pozhinskii, and K. K. Rodionov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). (*Akademiia Nauk SSSR and Akademiia Meditsinskikh Nauk SSSR, Simpozium po Mekhanizmam Upravleniia Pamiat'iu, Leningrad, USSR, Nov. 16-19, 1976.*) *Fiziologiya Cheloveka*, vol. 3, Sept.-Oct. 1977, p. 930-932. In Russian.

The paper presents a block diagram of and a detailed description of instrumentation for the stable recording of the impulsive activity of brain neurons in implanted-electrode investigations. The recording system consists of an electromechanical micromanipulator, a miniature differential amplifier of biopotentials, and a panel for the remote control of implanted-electrode motion. B.J.

**A78-18562 #** Blood flow velocity in brain capillaries during hypoxia (Skorost' krovotoka v kapilliarakh mozga pri gipoksii). K. P. Ivanov, Iu. I. Levkovich, and M. K. Kalinina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). (*Akademiia Nauk SSSR, Doklady*, vol. 235, Aug. 21, 1977, p. 1449-1452. 10 refs. In Russian.

A technique of contact optics coupled with high-speed cinematography is used to measure the flow velocity of erythrocytes in brain capillaries for trepanned white rats subjected to acute hypoxia by breathing a hypoxic mixture of gases for 3-5 min. Analysis of the data obtained suggests that the variation of the linear velocity of the blood flow in the cerebral capillaries is proportional to that of the volume of capillary blood flow; however, no noticeable widening of the capillaries is observed during hypoxia. Under acute hypoxic conditions, 80% of the investigated capillaries exhibited an average acceleration of blood flow of 38%. Oxygen tension variations are also discussed. It is concluded that the great need for oxygen and the insufficiency of compensatory reactions of the capillary blood flow account for the very high sensitivity of the brain to acute oxygen deficiency. S.D.

**A78-18573 \*** Plasma  $[Na^+]$ ,  $[Ca^{++}]$ , and volume shifts and thermoregulation during exercise in man. J. E. Greenleaf, V. A. Convertino, R. W. Stremel, E. M. Bernauer, W. C. Adams, S. R. Vignau, and P. J. Brock (NASA, Ames Research Center, Laboratory of Human Environmental Physiology, Moffett Field; California, University, Davis, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Dec. 1977, p. 1026-1032. 32 refs. Grant No. NCA2-OR180-401.

Graded-exercise experiments are conducted on six trained male runners (19-23 yr) subjected to ergometer exercise in a program consisting of 30-min resting control period, 60 min of rest or exercise at work loads that resulted in a maximal oxygen uptake equivalent to 6% (resting), 23%, 43%, and 62% of maximal oxygen uptake, followed by 30 min of recovery. The parameters measured and discussed are rectal temperature (T-re), skin temperatures at different spots, maximal oxygen uptake, plasma volume (PV), and various plasma electrolyte and protein concentrations. The objectives are to determine whether the increased T-re during progressively greater work loads are related to plasma sodium ion and calcium ion concentrations, as well as to evaluate the influence of PV shifts on the electrolyte and osmotic concentrations. The results suggest that the shift (loss) in PV accounts for the increases in the plasma constituent concentrations that result in significant correlations with T-re. S.D.

**A78-18574 \*** Insulin and glucose responses during bed rest with isotonic and isometric exercise. C. B. Dolkas and J. E. Greenleaf (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 43, Dec. 1977, p. 1033-1038. 21 refs.

The effects of daily intensive isotonic (68% maximum oxygen uptake) and isometric (21% maximum extension force) leg exercise on plasma insulin and glucose responses to an oral glucose tolerance test (OGTT) during 14-day bed-rest (BR) periods were investigated in seven young healthy men. The OGTT was given during ambulatory control and on day 10 of the no-exercise, isotonic, and isometric exercise BR periods during the 15-wk study. The subjects were placed on a controlled diet starting 10 days before each BR period. During BR, basal plasma glucose concentration remained unchanged with no exercise, but increased (P less 0.05) to 87-89 mg/100 ml with both exercise regimens on day 2, and then fell slightly below control levels on day 13. The fall in glucose content during BR was independent of the exercise regimen and was an adjustment for the loss of plasma volume. The intensity of the responses of insulin and glucose to the OGTT was inversely proportional to the total daily energy expenditure during BR. It was estimated that at least 1020 kcal/day must be provided by supplemental exercise to restore the hyperinsulinemia to control levels. (Author)

**A78-18714** Prediction of realistic visual tasks from image quality data. A. van Meeteren (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Instituut voor Zintuigfysiologie RVO-TNO, Soesterberg, Netherlands). In: Assessment of imaging systems; Proceedings of the International Symposium, City University, London, England, November 16-18, 1976. Symposium sponsored by the Sira Institute and Society of Photo-Optical Instrumentation Engineers. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers (SPIE Proceedings. Volume 98), 1977, p. 58-64. 10 refs.

As a realistic visual task subjects had to recognize military vehicles out of six alternatives. Percentages of correct identifications were determined at three different observation distances in order to interpolate the distance required for 50% correct, which is taken as a measure of performance. The scenery was simulated indoors by slide-projection in favor of better control of conditions and faster procedure. The slides were photographed at the location of an earlier field trial. The performance of a portable image intensifier was measured in this way as a function of luminance and contrast in object space. It appears that recognition of the present set of objects is visually equivalent to the detection of a circular disk, and can be predicted from image quality data (displayed S/N, MTF) along that line. (Author)

**A78-18744 #** Bloodflow measurement by means of a multi-gate ultrasonic Doppler device (Blutflussmessung mit Hilfe eines mehrkanaligen Ultraschall-Doppler-Gerates). P.-A. Doriot. Zurich, Eidgenössische Technische Hochschule, Doktor der Naturwissenschaften Dissertation, 1977. 225 p. 58 refs. In German.

The paper discusses technical problems in the use of a multigate pulse ultrasound Doppler velocity-meter for measuring flow profiles in a blood vessel. It is found that profile distortions, primarily due to the limited spatial resolution of the pulse Doppler technique, can be reduced to a certain extent by an appropriate choice of the transducer diameter. Each measurement situation requires an appropriate pulse dimensions-signal strength choice. Since it is experimentally not possible to vary the pulse dimensions and signal strength independently, a physical-mathematical model was developed. The model indicates that a well-defined position of the two extreme gates represents a better solution than a dubious deconvolution of the registered profile. The approach optimizes the flow measurement independently of the variable pulse dimensions and vessel diameter, although a separate measurement of vessel diameter by an echo-technique is necessary. Experimental studies are reported.

M.L.

**A78-18798 \* #** Airline pilot scanning behavior during approaches and landing in a Boeing 737 simulator. A. A. Spady, Jr. (NASA, Langley Research Center, Hampton, Va.). *NATO, AGARD, Symposium on Guidance and Control Design Considerations for Low Altitude and Terminal Area Flight, 25th, Dayton, Ohio, Oct. 17-20, 1977, Paper. 12 p.*

A series of approaches using airline-rated Boeing 737 pilots in an FAA qualified simulator has been conducted. The test matrices include both manual and coupled approaches for VFR, Category I and Category II conditions. A noninvasive oculometer system was used to track the pilot's eye-point-of-regard throughout the approach. The results indicate that, in general, the pilots use a different scan technique for the manual and coupled (auto-pilot with manual throttle) conditions. For the manual approach 73 percent of the time was spent on the Flight Director and 13 percent on airspeed as opposed to 50 percent on Flight Director and 23 percent on airspeed for the coupled approaches. For the visual portion of approach from less than 100 m (300 ft) to touchdown or when the touchdown point came into view, the pilots tend to fixate on their aim or touchdown area until the flare initiation, at which time they let their eye-point-of-regard move up the runway to use the centerline lights for rollout guidance. (Author)

**A78-18821** An investigation of time-sharing ability as a factor in complex performance. A. E. Jennings and W. D. Chiles (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Human Factors*, vol. 19, Dec. 1977, p. 535-547. 25 refs.

Thirty-nine men were tested on a total of six tasks; performance was measured on each task presented individually and on two complex tasks made up of three-task subsets. A factor analysis performed on the resultant data revealed a factor that showed high loadings for two different monitoring tasks for complex performance but negligible loadings for these tasks for simple performance; separate, orthogonal factors were found for the two monitoring tasks when they were performed under simple-task conditions. The monitoring measures, thus, appear to possess properties that would be expected of measures of a time-sharing ability. (Author)

**A78-18822** A regression approach to generate aircraft predictor information. P. D. Gallaher (Illinois, University, Urbana, Ill.), R. A. Hunt (Logicon, Inc., Redondo Beach, Calif.), and R. C. Williges (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *Human Factors*, vol. 19, Dec. 1977, p. 549-555. 8 refs. Contract No. N00014-76-C-0081.

A contact analog aircraft display is described in which an airplane-like predictor symbol depicts future airplane position and orientation. The standard method for obtaining the predictor information is to use a complete, fast-time model of the controlled vehicle. An alternative approach is presented in this paper in which least-squares regression approximations for each of the six degrees of freedom of aircraft motion were calculated. Thirteen predictor variables representing changes in positions and rates of change of positions were selected as parameters for these prediction equations. The accuracy of the regression approach is evaluated both at various

prediction times and at various control input durations. The advantages and disadvantages of such a regression procedure for generating predictor symbols are discussed. (Author)

**A78-18823 \*** A layout designer's data projection reticle. R. F. Haines (NASA, Ames Research Center, Man-Vehicle Systems Research Div., Moffett Field, Calif.). *Human Factors*, vol. 19, Dec. 1977, p. 567-569. 5 refs.

The designer's projection reticle is a modified surplus weapons sighting device consisting of a 3.5 cm diameter, 8.9 focal length coated objective lens. It is placed 1.5 cm in front of a clear flat glass plate on which the aluminized reflective pattern has been deposited. Reflected light passes through the objective lens, off the front surface of the coating, and off the rear coated surface of the objective lens. Several reticle patterns have been designed and tested, and other patterns are in the planning stage. The device may be used for a variety of applications including determining the optimum locations on a cockpit panel for luminous warning indicators requiring rapid manual responses. S.C.S.

**A78-18824** Manipulating the conditions of training in time-sharing performance. D. Gopher (Technion - Israel Institute of Technology, Haifa, Israel) and R. A. North (Illinois, University, Urbana, Ill.). *Human Factors*, vol. 19, Dec. 1977, p. 583-593. 20 refs. Contract No. F44620-70-C-0105.

A one-dimensional compensatory tracking task and a digit-processing, reaction time task were combined to assess three aspects of training under time-sharing conditions: (1) manipulation of desired levels of dual-task performance; (2) training under equal and unequal task priorities; and (3) repeated sequencing of single/dual-task presentations. Six groups of 10 subjects each participated in the experiment. Larger performance improvements under time-sharing conditions were observed when desired performance indicators were computed relative to a dual-task rather than a single-task reference. Training under unequal task priorities revealed that tracking was more sensitive than the digit-processing task to priority differences. Tracking performance continued to improve during repeated single-task presentation, whereas digit processing improved only in the time-sharing conditions. These findings suggest that improvement on the tracking task is in the specific skill of tracking, while digit-processing improvement results from improved time-sharing ability. (Author)

**A78-18825** Sequential expectancy in visual search. T. H. Monk (Nottingham University, Nottingham, England). *Human Factors*, vol. 19, Dec. 1977, p. 601-607. 20 refs.

An experiment was designed to determine whether there was a sequential expectancy effect in visual search by which subjects carried over an expectation of the duration of the search from one trial to the next and produced a shorter search time on the  $n$ -th trial if the  $(n-1)$ -th trial had had a search time of similar magnitude. Search time was controlled by the surreptitious insertion of lags between the onset of the background (i.e., start of search) and the actual appearance of the target. Post-target search time (total search time minus lag) was then used as the dependent variable. Three lags (0, 7.5, and 15 s) were used in a random order. Two effects emerged. Post-target search time was found to be reduced if the previous trial had used the same lag as the given trial; and post-target search time was found to increase with lag. Both effects were explained by the construction of a sequential expectancy model. (Author)

**A78-18923 #** Clinical and physiological aspects of the evacuation of the wounded and the sick by air transport (Kliniko-fiziologicheskie aspekty evakuatsii ranenyykh i bol'nykh vozduzhnym transportom). I. N. Cherniakov and G. M. Shereshkov. *Voenna-Meditsinskii Zhurnal*, Sept. 1977, p. 59-62. In Russian.

High-altitude decompression disorders are described. The concern is to avoid exacerbating the condition of wounded and sick people during evacuation by air. Conditions considered include high-altitude meteorism, barootitis, barosinusitis, and barodontalgia. Barotraumas caused by sudden decompression and the

effects of reduced air density, reduced air moisture, and reduced temperature are examined. Air sickness is discussed. M.L.

**A78-19033** On some fluid mechanical solutions for long term extracorporeal oxygenators. R. Monti (Napoli, Università, Naples, Italy). In: Associazione Italiana di Aeronautica e Astronautica, National Congress, 3rd, Turin, Italy, September 30-October 3, 1975, Proceedings. Volume 1. Turin, Libreria Editrice Universitaria Levrotto e Bella, 1975, p. 61-72. 11 refs.

The problems of the membrane oxygenators are illustrated and the possible ways of improving the blood oxygen uptake are considered. Basic models are discussed for three solutions: uniform shear oxygenator, multiple pipe system and convective mixing. Some results are shown for the theoretical performances of these devices. (Author)

**A78-19130** The kinetocardiogram during the isoproterenol test for the assessment of coronary heart disease. C. Strozzi and G. Cocco (Ospedale Saint Anna, Ferrara, Italy). *Cardiology*, vol. 62, no. 4-6, 1977, p. 277-290. 22 refs.

50 patients, 20 without heart disease and 30 with coronary heart disease (CHD), were studied by kinetocardiography (KCG) before and after administration of isoproterenol (initial dose 2-microgram/min, maximum dose 6 microgram/min). In the control subjects the KCG was unaffected by the drug. In contrast, in most of the patients with CHD, isoproterenol induced the appearance or the increase of paradoxical systolic bulges, which are regarded as the expression of ventricular dyskinesia resulting from isoproterenol-induced transient region ischemia. This test is recommended as a valuable noninvasive method for the diagnosis of ischemic ventricular dyskinesia. (Author)

**A78-19131 \*** Postural effects on the noninvasive baselines of ventricular performance. V. Q. Lance (St. Vincent Hospital, Worcester, Mass.) and D. H. Spodick (Massachusetts, University, Worcester, Mass.). *Cardiology*, vol. 62, no. 4-6, 1977, p. 296-304. 17 refs. Grant No. NGR-22-012-026.

The effects of posture on time-based noninvasive measurements were determined utilizing the sequence supine-sitting-standing in a formal protocol in which observer biases were eliminated by blinding the measurement and calculation phases. Compared to the supine posture, the sitting and standing postures produced significant increases in heart rate, isovolumic contraction time, pre-ejection period and pre-ejection period/left-ventricular ejection time and significant decreases in ejection time and ejection time index. The response patterns are consistent with the hemodynamic correlates cited in the literature which show increased adrenergic activity and decreased venous return in the sitting and standing postures, the effect on venous return being dominant. (Author)

**A78-19132** Physiological evaluation of pulmonary dilutional and enzymatic activity on blood-borne catecholamines in cardiocirculatory performance. A. F. Salel, F. J. Harris, C. E. Cross, R. Zelis, and D. T. Mason (California, University, Davis; Sacramento, Medical Center, Sacramento, Calif.). *Cardiology*, vol. 62, no. 4-6, 1977, p. 337-346. 19 refs. Research supported by the American Heart Association; Grant No. NIH-HL-14780.

**A78-19143** Glucose delivery - A modulator of glucose uptake in contracting skeletal muscle. T. A. Schultz, S. B. Lewis, D. K. Westbie, J. D. Wallin, and J. E. Gerich (U.S. Navy, Naval Regional Medical Center, Oakland, Calif.). *American Journal of Physiology*, vol. 233, Dec. 1977, p. E514-E518. 28 refs. Navy-supported research.

Isolated hindlimbs of anesthetized male Sprague-Dawley rats (95-140 g) were perfused in the presence of electrically stimulated muscular contractions in order to evaluate perfusate flow (glucose delivery) and neuro-muscular activity as modulators of glucose uptake in skeletal muscle. It is shown that glucose disappearance did not increase with electrically stimulated muscular contractions when

perfusate flow was held constant. However, it did increase when perfusate flow was increased and decreased when perfusate flow was lowered during electrical stimulation. The results suggest that increased glucose delivery to muscle may be an important modulator of the augmented muscle glucose uptake observed during exercise in vivo. S.D.

**A78-19144** Choline acetyltransferase activity in heart - Evidence for neuronal and not myocardial origin. R. Roskoski, Jr., R. I. McDonald, L. M. Roskoski, W. J. Marvin, and K. Hermesmeyer (Iowa, University, Iowa City, Iowa). *American Journal of Physiology*, vol. 233, Dec. 1977, p. H642-H646. 18 refs. Grants No. PHS-NS-11310; No. PHS-HL-16328; No. PHS-HL-14388.

**A78-19145** Myocardial contracture and accumulation of mitochondrial calcium in ischemic rabbit heart. P. D. Henry, R. Shuchleib, J. Davis, E. S. Weiss, and B. E. Sobel (Washington University, St. Louis, Mo.). *American Journal of Physiology*, vol. 233, Dec. 1977, p. H677-H684. 30 refs. Grants No. NIH-1-P17-HL-17646-01; No. NIH-5-R01-HL-16853-02.

**A78-19146** Alterations of postural and Valsalva responses in coronary heart disease. F. E. Tristani, D. G. Kamper, D. J. McDermott, B. J. Peters, and J. J. Smith (Wisconsin, Medical College, Milwaukee; U.S. Veterans Administration Center, Wood, Wis.). *American Journal of Physiology*, vol. 233, Dec. 1977, p. H694-H699. 27 refs. Research supported by the Eagles Heart Fund; U.S. Veterans Administration Grant No. 7945-01.

**A78-19147** Noninvasive analysis of regional myocardial wall motion - Cardiokymography. R. Vas, G. A. Diamond, H. L. Wyatt, P. L. da Luz, H. J. C. Swan, and J. S. Forrester (Cedars-Sinai Medical Center; California, University, Los Angeles, Calif.). *American Journal of Physiology*, vol. 233, Dec. 1977, p. H700-H706. 26 refs. Grant No. NIH-HL-17651-02.

Cardiokymographic experiments were performed on 11 open-chest mongrel dogs (24-41 kg) in order to determine the ability of the cardiokymographic recording as a measure of regional wall motion, at rest and during acute ischemia, by comparison with a direct analog technique known as the epicardial length gauge. It is shown that the cardiokymograph produces a signal analogous to that obtained from a length gauge sutured to the epicardial surface; thus, the onset, duration, and amplitude of wall motion are essentially identical when determined by either method. This close similarity between the two signals persisted during the beat-to-beat progression of ischemic dysfunction following coronary occlusion. It is concluded that the cardiokymograph accurately records regional wall motion, both under control conditions and during the pronounced changes that occur in severe myocardial ischemia. S.D.

**A78-19224** An objective indicant of binocular vision in humans - Size-specific interocular suppression of visual evoked potentials. M. R. Harter, V. L. Towle, M. Zakrzewski, and S. M. Moyer (North Carolina, University, Greensboro, N.C.). *Electroencephalography and Clinical Neurophysiology*, vol. 43, Dec. 1977, p. 825-836. 23 refs. Research supported by the Alfred P. Sloan Foundation and University of North Carolina.

Experiments were conducted on 12 adult subjects to test the hypothesis that subjects with poor binocularity, as measured by stereoacuity, would show reduced size-specific interocular suppression of visual evoked potentials (VEPs). It is shown that VEPs to grid patterns flashed to one eye are suppressed in amplitude when grid patterns are continuously presented to the other eye, the degree of suppression being affected by the stereoacuity of the subjects. Factors responsible for changes in VEP amplitude are identified and discussed. The results support the hypothesis of size-specific interocular suppression of VEPs; continuous presentation of a given grid size to one eye resulted in reduced VEP amplitude to that same grid size flashed to the other eye. The amount of interocular suppression

is found to decrease as the grid size presented to the two eyes become progressively more discrepant. The results are interpreted in terms of centrally located binocular neurons. S.D.

**A78-19363 \*** The evolution of the protein synthesis system. I - A model of a primitive protein synthesis system. H. Mizutani and C. Ponnampuram (Maryland, University, College Park, Md.). *Origins of Life*, vol. 8, Oct. 1977, p. 183-219. 44 refs. Grant No. NGR-21-002-317.

A model is developed to describe the evolution of the protein synthesis system. The model is comprised of two independent autocatalytic systems, one including one gene (A-gene) and two activated amino acid polymerases (O and A-polymerases), and the other including the addition of another gene (N-gene) and a nucleotide polymerase. Simulation results have suggested that even a small enzymic activity and polymerase specificity could lead the system to the most accurate protein synthesis, as far as permitted by transitions to systems with higher accuracy. S.C.S.

**A78-19367** Far UV irradiation of model prebiotic atmospheres. G. Toupance, A. Bossard, and F. Raulin (Paris XII, Université, Créteil, Val-de-Marne, France). *Origins of Life*, vol. 8, Oct. 1977, p. 259-266. 17 refs.

The gaseous phase of model primitive atmospheres subjected to 147 nm UV radiation is studied and the synthesis of various organic compounds is demonstrated. Irradiation of pure CH<sub>4</sub> yields the synthesis of many hydrocarbons, both saturated and unsaturated. Irradiation of CH<sub>4</sub>-NH<sub>3</sub> yields significant amounts of HCN (approximately 0.1 percent) and lesser amounts of CH<sub>3</sub>CN and C<sub>2</sub>H<sub>5</sub>CN as well as hydrocarbons. Unsaturated nitriles (including acrylonitrile and cyanoacetylene) have not been detected. The results suggest that although UV radiation may contribute to HCN synthesis in CH<sub>4</sub>-NH<sub>3</sub> atmospheres, it cannot initiate the synthesis of other compounds such as pyrimidines which appear to be only synthesized by electric discharges. S.C.S.

**A78-19430 \*** Applications of pilot scanning behavior to integrated display research. M. C. Waller (NASA, Langley Research Center, Hampton, Va.). In: Flight test technology; Proceedings of the Eighth Annual Symposium, Washington, D.C., August 10-12, 1977. Lancaster, Calif., Society of Flight Test Engineers, 1977, p. 4-1 to 4-19. 8 refs.

The oculometer is an electrooptical device designed to measure pilot scanning behavior during instrument approaches and landing operations. An overview of some results from a simulation study is presented to illustrate how information from the oculometer installed in a visual motion simulator, combined with measures of performance and control input data, can provide insight into the behavior and tactics of individual pilots during instrument approaches. Differences in measured behavior of the pilot subjects are pointed out; these differences become apparent in the way the pilots distribute their visual attention, in the amount of control activity, and in selected performance measures. Some of these measured differences have diagnostic implications, suggesting the use of the oculometer along with performance measures as a pilot training tool. S.D.

**A78-19734 #** Shadow method of simulating the visual conditions for flight simulators and pilot trainers (Metod tenevoi imitatsii vizual'noi obstanovki dlia pilotazhnykh stendov i trenazherov). A. N. Predtechenskii and V. V. Rodchenko. *TsAGI, Uchenye Zapiski*, vol. 6, no. 6, 1975, p. 66-73. In Russian.

In the method discussed, the image observed by the trainee on a screen is formed by illuminating a fixed environmental mockup by a moving source of light. The principles and laws are formulated for ensuring adequate simulation of linear aircraft displacements. A TV technique for reproducing angular aircraft motions is described, in which the image on the shadow system's screen is transmitted to a television screen by a transmitting camera mounted on a three-degree-of-freedom follow-up platform. V.P.

**A78-19885 #** Disruption of the deamination of monoamines and other nitrogenous compounds under conditions of stimulated peroxidation of endogenous lipids of brain tissue mitochondrial membranes (Narusheenie dezaminirovaniia monoaminov i drugikh azotistykh soedinenii pri stimulatsii perekisnogo okisleniia endogenykh lipidov mitokhondrial'nykh membran mozgovoï tkani). T. G. Garishvili (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 87, Sept. 1977, p. 705-708. 7 refs. In Russian.

**A78-19974** Detectability of motion as a factor in depth perception by monocular movement parallax. W. Hell and R. B. Freeman, Jr. (Konstanz, Universität, Konstanz, West Germany). *Perception and Psychophysics*, vol. 22, no. 6, Dec. 1977, p. 526-530. 23 refs. Research supported by the Universität Konstanz.

A display of two objects at different distances was presented to 10 observers, who were requested in two experiments to match the width of the more distant (comparison) object to the width of the nearer (standard) one under conditions permitting monocular observation and lateral head motion. The matched width of the comparison object was considered a measure of the effectiveness of movement parallax. The effectiveness of movement parallax decreases with increasing angular separation of the objects and with increasing background distance. A background without visible texture leads to a better perception of depth between two objects than a textured background. The results can be explained by postulating that, whenever the detectability of motion is enhanced, i.e., the threshold for the detection of motion is lowered, the effectiveness of movement parallax as a cue to depth is increased. (Author)

**A78-19975** The angle of visual roll motion determines displacement of subjective visual vertical. K. H. Mauritz, J. Dichgans, and A. Hufschmidt (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Perception and Psychophysics*, vol. 22, no. 6, Dec. 1977, p. 557-562. 13 refs.

The effect of full-field sinusoidal visual roll motion stimuli of various frequencies and peak velocities upon the orientation of subjective visual vertical (SV) was studied. The angle of the optokinetically induced displacement of SV was found to be a linear function of the logarithm of the stimulus oscillation angle. Inter-individual slopes of this function varied between 2 and 9. The logarithmic function is independent of stimulus frequency within the range of 0.02 Hz to 0.5 Hz and of peak stimulus velocity from 7.5 deg/sec to 170 deg/sec. It holds for oscillation angles up to 100-140 deg. With larger rotational angles, saturation is reached. With small stimulus angles, a surprisingly high threshold (5-8 deg) was observed in our experiments. This may reflect the unphysiological combination of visual roll stimuli without corroborating vestibular and proprioceptive inputs normally present when body sway produces visual stimulation. Under natural conditions, the visual feedback about spontaneous sway stabilizes body posture by integrating rotational velocity over stimulus duration which is equal to rotational angle. (Author)

**A78-19993** Flow of micropolar fluid through a constricted channel. G. R. Charya (Indian Institute of Technology, Kharagpur, India). *International Journal of Engineering Science*, vol. 15, no. 12, 1977, p. 719-725. 9 refs.

The flow of micropolar fluid through a nonsymmetrical channel with continuous constricted boundaries is investigated. A perturbation scheme of solution in terms of slope parameter is used to solve the resulting nonlinear equations. Consideration is given to expressions for the axial pressure gradient, shear stress, and point of separation. The effects of microrotation, flow field parameters, shear stress, and point of separation are evaluated. S.C.S.

**A78-20150 #** Theoretical considerations on the determining factors of V-O2 max (Considérations théoriques sur le déterminisme de la V-O2 max). D. Lagneaux, J. Juchmes, and J. Lecomte (Liège, Université, Liège, Belgium). *Société Royale des Sciences de Liège, Bulletin*, vol. 46, no. 5-8, 1977, p. 200-209. 8 refs. In French.

The significance of the maximum oxygen uptake, a parameter which represents the maximum oxygen consumption level attained by an exercising human being, is discussed. In particular, it is found that the parameter, taken as a measure of maximum aerobic power, can be influenced by factors related to the processes of oxygen intake and transfer. Thus the maximum oxygen uptake parameter may reflect limitations in the cardiovascular system or in the maximum capacity for the utilization of oxygen by peripheral regions. J.M.B.

**A78-20293 #** The ozone problem associated with technical and health considerations in aviation (Sanitarno-tehnicheskaia problema ozona dlia sovremennoi aviatsii). M. T. Dmitriev, V. V. Osechkin, V. Ia. Gilinskii, G. A. Demidov, L. D. Pribytkov, A. G. Kozlova, V. S. Maslennikova, V. S. Volkova, and A. Ia. Baskin. *Samoletostroenie - Tekhnika Vozdushnogo Flota*, no. 42, 1977, p. 148-153. 6 refs. In Russian.

It is noted that the air conditioning systems of subsonic aircraft do not filter out ozone, which at certain heights and under certain conditions, enters aircraft compartments at concentrations which vary from 0.06-0.8 mg/cu m. Ozone concentrations in aircraft increase with increase of height, with decrease of tropopause height, and vary with vertical flight and turbulent mixing in the atmosphere. A recommendation is made to install ozone filters with nickel catalyzers in the air conditioning systems of (especially supersonic) aircraft. B.J.

**A78-20324** Cortical magnification factor predicts the photopic contrast sensitivity of peripheral vision. J. Rovamo, V. Virsu, and R. Nasanen (Helsinki, University, Helsinki, Finland). *Nature*, vol. 271, Jan. 5, 1978, p. 54-56. 9 refs. Research supported by the Academy of Finland and Finnish National Fund for Research and Development.

A quantitative analysis of the decreased acuity of peripheral vision, as compared with foveal vision, was undertaken using variable light gratings on a white cathode ray screen. Subjects were required to observe the gratings on the screen from a fixed position. As the brightness, contrast, and spatial frequency of the gratings were varied, a computer controlled forced-choice method was employed to determine how well the subjects could see them: two sound signals were given, and a subject had to decide at which signal a grating was presented. The results were said to demonstrate smaller cortical projection area for peripheral vision. D.M.W.

**A78-20339** Exercise-induced changes in blood ammonia levels in humans. J. E. Wilkerson, D. L. Batterton, and S. M. Horvath (California, University, Santa Barbara, Calif.). *European Journal of Applied Physiology*, vol. 37, no. 4, 1977, p. 255-263. 18 refs. Grants No. AF-AFOSR-73-2455; No. NIH-HD-00235-6.

Five male and two female subjects each performed a maximal aerobic capacity (maximal oxygen consumption) test, and two to four submaximal aerobic exercise bouts (requiring approximately 50 and 80% of the individual's measured maximal oxygen consumption) on a motor-driven treadmill. Pre-exercise resting oxygen uptakes and heart rates were determined and a venous blood sample drawn prior to each work session. These same measurements were repeated at 4, 15, 30, and 45 min of the resting recovery period that followed each exercise experiment. Additionally, at the 30th min of each 45-min submaximal exercise, another peripheral venous blood sample was drawn following determination of oxygen uptake and heart rate. In all blood samples, the hematocrit and concentrations of ammonia, lactate, pyruvate, glucose, hemoglobin, and total plasma proteins were measured. A significant exponential relationship was observed between blood ammonia levels and oxygen uptake for all sample periods (pre-exercise rest, exercise, and post-exercise recovery). Peripheral venous blood ammonia levels were significantly correlated with levels of pyruvate and lactate, as these substrates exhibited a similar exponential relationship with oxygen uptake as was observed with ammonia. (Author)

**A78-20340** Temperature-dependent alterations of the surface-EMG and ECG - An investigation of the electrical transfer

characteristics of the human skin (Temperaturabhängige Veränderungen des Oberflächen-EMG und EKG - Eine Untersuchung zum elektrischen Übertragungsverhalten der menschlichen Haut). P. Zipp (Darmstadt, Technische Hochschule, Darmstadt, West Germany). *European Journal of Applied Physiology*, vol. 37, no. 4, 1977, p. 275-288. 8 refs. In German.

**A78-20341** Effect of isometric exercise on catecholamines in the coronary circulation. R. H. Robson and D. C. Fluck (Central Middlesex Hospital, London, England). *European Journal of Applied Physiology*, vol. 37, no. 4, 1977, p. 289-295. 36 refs. Research supported by Ciba-Geigy (UK) and British Heart Foundation.

**A78-20361** The effects of exercise on the amplitude of the first heart sound in normal subjects. L. Hume and S. R. Reuben (Western General Hospital, Edinburgh, Scotland). *American Heart Journal*, vol. 95, Jan. 1978, p. 4-11. 41 refs.

A study was conducted to determine the intensity of first heart sound (S1) in normal subjects during dynamic and isometric exercise, with particular reference to beta-adrenergic sympathetic influences. Heart sound recordings were made with an accelerometer attached to the chest wall, and were measured with an ultra low frequency phonocardiogram. Measurements were made before and after intravenous admission of propranolol, a beta-adrenergic blocking agent. As a rule, heart rate and S1 amplitude were seen to decrease in both dynamic exercise and resting states after administration of the drug; although no change was recorded in cardiac responses to isometric handgrip. These results indicate that cardiovascular response to isometric exercise is largely independent of the beta-adrenergic nervous system. Especially significant is the role of left ventricular contractions in determining S1 amplitude. D.M.W.

**A78-20362** The orthogonal electrocardiogram in normal women - Implications of sex differences in diagnostic electrocardiography. M. Nemat, J. T. Doyle, D. McCaughan, R. A. Dunn, and H. V. Pipberger (U.S. Veterans Administration Hospital, Washington, D.C.). *American Heart Journal*, vol. 95, Jan. 1978, p. 12-21. 30 refs. Research supported by the U.S. Veterans Administration; Grants No. NIH-HL-15047; No. NIH-HL-18850; No. NIH-HL-16403.

A comparison of cardiac function between normal men and women was made emphasizing electrocardiographic and vectorcardiographic variables. Three orthogonal leads were recorded simultaneously on magnetic tape, and a computer was used to obtain measurements of virtually all parameters advocated for electrocardiogram analysis. Scalar and vector measurements are presented, with emphasis on the scalar component because of its applicability to clinical procedure. The sex comparisons showed statistically significant differences: mean maximum QRS, maximum T, and maximum R amplitudes (in millivolts) were found to be less in women than in men. The smaller amplitudes were attributed to women's smaller torsos, higher body fat content, smaller heart size, and smaller mean left ventricular mass. But in both sexes normal ranges for all measurements were said to overlap substantially. D.M.W.

**A78-20536** Latent sickle cell anemia and commercial airline personnel (Trait drépanocytaire et personnel navigant commercial). P. Fourn (Union de Transports Aériens, Paris, France; Air Afrique, Abidjan, Ivory Coast). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 227-232. In French.

Statistical tables are presented giving brief medical histories of African flight personnel. An attempt is made to correlate the incidence of disease, especially sickle cell anemia and latent sickle cell anemia, with flight performance. No adverse effects are noted among carriers of sickle cell anemia; but it is recommended that those with an actual history of the disease be excluded from airline service on grounds of increased susceptibility to the stresses of flight. D.M.W.

**A78-20537** A study of aircraft cabin environment during long range flight (Etude de l'ambiance de la cabine d'avions

long-courriers en vol). H. Vieillefond, P. Fourn, and R. Auffret (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne; Union de Transports Aériens, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 233-236. In French.

Environmental factors such as noise, vibration, temperature, and air pressure in cabins of the DC 8 and DC 10 are considered with regard to their effect on crew performance. Special attention is given to ozone and CO<sub>2</sub> concentration in various sections of the aircraft, especially during high altitude flight. In no factor considered, however, was a danger to the efficient functioning of the crew perceived, thanks largely to the cabin ventilation system. D.M.W.

**A78-20539** A technique for the visual study of aircraft instrument panel utilization by the crew (Technique d'étude de l'utilisation visuelle des instruments du tableau de bord par l'équipage). J. P. Papin, A. M. Asset, D. Batejat, C. Dejours, and D. Viard (Centre de Recherche de Médecine Aéronautique, Laboratoire Central de Biologie Aéronautique, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 245-248. In French.

The way a pilot scans the instrument panel and his vision through the cockpit window can be recorded by equipment which measure eye movements. A Transall aircraft was used in an experiment which analyzed pilots' use of their cockpit instruments during various phases of flight, especially landing. Attention is given to the NAC system of visual measurement noting the time a pilot spent looking at a specific instrument. The system is especially applicable to instrument panel design in fighter aircraft. D.M.W.

**A78-20540** Research on visual acuity in color contrast (Recherches sur l'acuité visuelle en contraste coloré). G. F. Santucci and J. P. Chevaleraud. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 249-252. In French.

A pilot's visual perception is crucial to flight safety. Experiments were undertaken using a Shadow Mask television scanner to measure the effect of color contrast on angular acuity. Images were flashed on a screen at the end of an 8 meter long tunnel; and were varied in terms of brightness, color, and distance from each other. Subjects were requested to identify the images; based on their responses, designs for the best utilization of color schemes can be applied to aircraft instrument displays. D.M.W.

**A78-20541** Attempt at the detection of muscular bubbles through measurement of bioelectric impedance - First experimental results with affected rats and dogs (Essai de détection de bulles musculaires par mesure d'impédance bio-électrique - Premiers résultats expérimentaux chez le rat et le chien chroniques). J. Jossinet, C. Fourcade (Institut National de la Santé et de la Recherche Médicale, Bron, Rhône, France), and B. Gardette (Compagnie Maritime d'Expertise, Marseille, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 263-266. 11 refs. In French.

**A78-20542** Freezing of small animals during hyperbaric exposure - Theoretical and practical considerations (Congélation de petits animaux isolés en ambiance hyperbare - Etude théorique et réalisation pratique). T. Obrenovitch and F. Brue (Hôpital d'Instruction des Armées Sainte-Anne, Toulon-Naval, Var, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 271-274. 17 refs. In French. Direction des Recherches et Moyens d'Essais Contract No. 76/1022.

A cryogenic device small enough to be used in hyperbaric chambers of standard design is described. The device is especially suitable for freezing small experimental animals, e.g., mice, in order to keep their tissues intact during hyperbaric exposure. This is especially important in conducting assays of biochemical responses to high pressure, because it avoids having to first decompress the animals before sacrifice. Liquid nitrogen is chosen as a coolant, and a diagram of the device is presented, together with a brief description of its functioning. D.M.W.

**A78-20543** Modifications of pulmonary surfactant under hyperbaric conditions in rats - Role of oxygen and diluting gas under partial pressure (Modifications du surfactant pulmonaire en hyperbarie chez le rat - Rôle des pressions partielles du gaz diluant et de l'oxygène). H. Burnet, B. Broussolle, P. Michel, C. Lajeune, and R. Hyacinthe (Hôpital d'Instruction des Armées Sainte-Anne, Toulon-Naval, Var, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 15, 4th Quarter, 1976, p. 275-278. 7 refs. In French. Direction des Recherches et Moyens d'Essais Contract No. 76/1022.

**A78-20544** The determination of biomechanical parameters of the vertebro-muscular axis in man (Détermination des paramètres biomécaniques de l'axe vertebro-musculaire de l'homme). P. Quandieu, B. Cailler, L. Pellieux, and P. Borredon (Centre de Recherches de Médecine Aéronautique, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 1st Quarter, 1977, p. 13-18. In French.

A study is undertaken to determine the value of various biomechanical parameters characterizing the human form. These values may then be used to assess the mechanical work provided by the vertebro-muscular axis against body deformations caused by a force or displacement. S.C.S.

**A78-20545** The use of a primate as an experimental model aboard Spacelab (Utilisation du primate comme modèle expérimental à bord de Spacelab). P. Pesquies, C. L. Milhaud, and B. Cailler (Centre de Recherches de Médecine Aéronautique, Laboratoire Central de Biologie Aéronautique, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 1st Quarter, 1977, p. 19-25. 29 refs. In French.

Two macaques, immobilized and catheterized, have been placed in a controlled environment simulating the conditions aboard Spacelab. Studies are made of hydromineral regulations, phosphocalcic metabolism, general and cerebral hemodynamics, energy equilibrium, vestibular physiology, and the waking-sleeping cycle. Consideration is given to animal selection, the set-up of the experimental module, and the specific steps in the investigation. S.C.S.

**A78-20546** The place of psychology and psychiatry in the medical evaluation of navigation personnel in civil aviation - Methodological and practical aspects (Place de la psychologie et de la psychiatrie dans l'expertise médicale du personnel navigant de l'aviation civile - Aspects méthodologiques et pratiques). R. J. Digo (Centre Principal d'Expertise Médicale du Personnel Navigant de l'Aéronautique, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 1st Quarter, 1977, p. 29-32. In French.

The article presents a broad discussion of psychological and psychiatric examinations of navigation personnel, noting those French institutions, both military and civil, which provide such services. Problems encountered in doctor-patient relationships are considered. It has been shown that psychiatric examinations play a significant role in evaluating a subject's potential physical and emotional reactions to many aspects of a spaceflight. S.C.S.

**A78-20547** Psychotherapy and chemotherapy in aeronautical psychopathology (Psychothérapies et chimiothérapies en psychopathologie aéronautique). C.-J. Blanc (Compagnie Nationale Air France, Service Médical, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 1st Quarter, 1977, p. 33-35. 23 refs. In French.

A survey of findings reported in over 10,000 psychotherapy consultations of aviation personnel is briefly presented. Based on these results it is suggested that psychiatric therapy and drug treatment must be specifically geared to navigation personnel and controlled much more strictly than for other patients. S.C.S.

**A78-20548** Study of a new pilotage control (Etude d'une nouvelle commande de pilotage). J. L. Poirier and R. Auffret (Centre

d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 1st Quarter, 1977, p. 36-41. In French.

An electric piloting arm employing a hydraulic actuator has been developed to translate a pilot's commands into electric signals. This lessens the overall energy expenditure required and thus decreases fatigue. Micromanipulators are used to represent the horizontal and vertical axes. Tests made using the device under both vibrating and nonvibrating conditions have shown a decrease in fatigue and accurate control, especially under conditions of low-frequency vibrations. Control of the horizontal micromanipulator is found to require less energy exertion than that of the vertical micromanipulator. S.C.S.

**A78-20549**      **The effect of chronic exposure to pure oxygen at normal pressure in the mucous-ciliary function of air passages (Effet de l'exposition chronique à l'oxygène pur normobare sur la fonction mucociliaire des voies aériennes).** J. Hee, H. Burnet, B. Broussolle, and R. Guillermin. *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 1st Quarter, 1977, p. 51-53. 6 refs. In French.

An increase in alveolar secretions has been observed in rats continuously exposed to pure oxygen. This increase reaches a maximum on the fifth day and decreases after twenty days. As the growth of secretion cannot totally account for the observed behavior, it is suggested that the exposure may cause a reduction in mucous-ciliary drainage. Experimental data has confirmed this hypothesis. It was observed that after five days of exposure rats' ciliary activity in the trachea decreased by 17 parts per hundred, and that activity was restored to normal on the 20th day. It is further noted that the behavior on the fifth day may manifest a decrease of as much as 30 parts per 100 by mucous drainage. S.C.S.

**A78-20550**      **The evaluation and control of the risks of contamination during the course of experiments with animals in the space environment (Evaluation et contrôle des risques de contamination au cours d'expérimentations animales en milieu spatial).** M. J. Klein and C. L. Milhaud (Centre de Recherches de Médecine Aéronautique, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 2nd Quarter, 1977, p. 89-95. 9 refs. In French.

The risks associated with using animals for experiments in spatial environments are evaluated in terms of the similarity between animal and human pathogens and the various aspects of biological experimentation aboard Spacelab. Control measures are outlined, noting food supply, the elimination of body wastes, and the purification of the module atmosphere. More specifically, comments are made regarding the selection of animals, sanitary criteria, and measures to prevent disease. S.C.S.

**A78-20551**      **A study of humoral immunity - /Immunoglobulines IgA, IgG, and IgM/ in the navigation personnel of a civil aviation society as a function of age and the frequency of certain vaccinations (Etude de l'immunité humorale - /Immunoglobulines IgA, IgG et IgM/ chez le personnel navigant d'une société d'aviation civile en fonction de l'âge et de la fréquence de certaines vaccinations).** A. Delescluse and A. Allard (SABENA, S.A., Brussels, Belgium). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 2nd Quarter, 1977, p. 96-103. 11 refs. In French.

**A78-20552**      **Airport hygiene and epidemiology (Hygiène et épidémiologie aéroportuaires).** G. P. Bergot (Aéroport de Paris, Orly-Aérogare, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 2nd Quarter, 1977, p. 104-107. 6 refs. In French.

Airport and aircraft hygiene is discussed in terms of supplying food and drinking water, the removal of body wastes, cleaning sanitary facilities, and the disinfection and decontamination of aircraft. Consideration is given to airport epidemiology, noting that the

assembly of persons and freight from all parts of the world constitutes ideal conditions for the spread of diseases including smallpox, yellow fever, and cholera. S.C.S.

**A78-20553**      **Ultrasonic detection by the Doppler effect of circulating bubbles in humans and animals in altitude (Détection ultrasonore par effet Doppler de bulles circulantes chez l'homme et l'animal en altitude).** R. Guillermin, G. Masarel (Centre d'Etudes et de Recherches Techniques Sous-Marines, Toulon-Naval, France), H. Vieillefond, and R. Auffret (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 2nd Quarter, 1977, p. 108-112. 19 refs. In French.

An ultrasonic detection technique employing the Doppler effect has been applied to monitoring the presence of gaseous emboli circulating in the system at low pressures. An evaluation of such emboli may be used in calculating the risks of air emboli during decompression. Results are presented for both human and animal testing. S.C.S.

**A78-20554**      **Current vaccination regulations for civil aviation navigation personnel (Etat actuel des obligations vaccinales chez le personnel navigant de l'aviation civile).** J. Pasquet and E. Lafontaine (Compagnie Nationale Air France, Service Médical, Paris, France). *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol. 16, 2nd Quarter, 1977, p. 113-116. 10 refs. In French.

The various vaccination requirements governing civil aviation personnel are discussed. These include vaccinations against both nonquarantine diseases and quarantine diseases such as yellow fever and smallpox. Special attention is given to regulations concerning cholera. S.C.S.

**A78-20555**      **Alpha-2-macroglobulin dosage, protamine test, and vascular-risk factors detected in civilian and military flight personnel (Dosage de l'alpha-2-macroglobuline, test à la protamine et facteurs de risque vasculaire détectés dans le P.N. civil et militaire).** J. Hainaut (Hôpitaux des Armées, Clamart, Hauts-de-Seine, France), R. Carre, J. L. Charrieau (Centre Principal d'Expertise Médicale du Personnel Navigant de l'Aéronautique, Paris, France), G. Perrault (Service de Santé des Armées, Paris, France), and P. Moyat. *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 8-12. 19 refs. In French.

**A78-20556**      **Effect of a psychostimulant on the behavior of pilot trainees during training in a flight simulator (Influence d'un psychostimulant sur le comportement d'élèves-pilotes lors d'entraînement sur simulateur de vol).** F. de Lesdain. *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 14-16. In French.

Two groups of pilot trainees subjected to flight simulation training without visibility were compared during a landing-approach drill. A psychostimulant drug referred to as acetyl-amino-succinic acid (normal constituent of CNS), was only administered to the first group for 15 days prior to the test. Comparison of results did not reveal a beneficial effect of the drug on mental operations or on psychomotor coordination. It seems, however, that this drug may have a desirable effect on certain complex operations. S.D.

**A78-20557**      **Asymptomatic coronary double obstruction revealed in a 32-year-old pilot by exercise testing on a bicycle ergometer (Double obstruction coronaire asymptomatique, dépistée par épreuve d'effort, sur cycle ergométrique, chez un navigant de 32 ans).** P. Guern, J. P. Broustet, J. P. Emeriau, H. Bricaud, and H. Marc-Antoine. *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 22-27. 22 refs. In French.

The heart condition of a 32-year-old asymptomatic pilot of supersonic aircraft is studied during exercise testing on a bicycle ergometer and compared to observed coronarographic changes. Coronarography revealed total obstruction of the left circumflex portion and the right coronary vessel, while exercise testing disclosed

certain anomalies in the repolarization section of the EKG recorded during exercise testing. Similar published data on asymptomatic subjects (over 34 years old) subjected to maximal-exertion testing are analyzed and compared to coronarographic results. A major conclusion is that it would be hazardous to permit subjects with significant coronaropathy to fly, as they are statistically liable (25 percent expectancy) to sudden death with all the consequences for flight safety. S.D.

**A78-20558** Influence of radioactivity or sulfur treatment on hyperoxia-induced pulmonary lesions in the rat (Influence du traitement radioactif ou sulfuré sur les lésions pulmonaires d'hyperoxie chez le rat). H. Vieillefond (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Brétigny-sur-Orge, Essonne, France), C. Nogues (Centre de Recherches de Médecine Aéronautique, Paris, France), and R. Grandpierre. *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 29-31. 15 refs. In French.

Homogeneous groups of female rats (average weight 130 g) with pulmonary lesions caused by hyperoxia were subjected to radioactivity treatment and sulfurized-water treatment, respectively, in order to verify the hypothesis that sulfur limits damage at the pulmonary lesion sites, while ionizing radiation aggravates such damage. The results show clearly the combination of deleterious effects of hyperoxia associated with radioactivity, but do not completely demonstrate protection by exposure to thiol radicals. Protection apparently occurs only when sulfur treatment precedes hyperoxia; it is virtually nonexistent when sulfur treatment is associated with exposure to radioactivity. S.D.

**A78-20559** TNO test and dyschromatopsias (T.N.O. et dyschromatopsies). Ch. Corbe and J. P. Chevaleraud (Service de Santé des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 32, 33. In French.

The validity of the TNO test in the diagnosis of dyschromatopsia (green-red axis) is evaluated in 75 abnormal trichromat adult subjects divided into two groups of unequal size. Stereoscopic parallax is also estimated with a Pulfrich-type stereoscope. It is shown that there is a very satisfactory correlation between stereoscope and TNO results. More importantly, the data suggest the TNO test designed for the study of relief vision is suitable for evaluating dyschromatopsias in abnormal trichromats of green-red axis. S.D.

**A78-20560** Problems raised by the discovery of a papillary edema in a pilot trainee (Problèmes posés par la découverte d'un oedème papillaire chez un élève pilote). P. J. Manent and J. Senn. *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 34-37. In French.

Ophthalmoscopic examination of a 23-year-old hypermetropic male pilot trainee with a vertigo syndrome during a flight revealed a bilateral papillary edema with left-eye dominance in conjunction with a visual performance of the left eye slightly inferior to that of the right eye. Evaluation of the etiology of the disorder by complementary tests and neuroradiologic studies is discussed along with the mechanisms responsible for its occurrence. It is concluded that the diagnosis of papillary edemas is a difficult matter and that there is no means for treating the geodes of the papilla. S.D.

**A78-20561** Cabin pressurization and explosive decompression (Pressurisation cabine et décompression explosive). J. Colin (Armée de l'Air, Ecole d'Application, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 38-48. In French.

Studies on the effects of hypoxia on the human body have revealed that a decrease in the oxygen partial pressure in the inspired air should be avoided in order to prevent pathophysiological disorders. Techniques for maintaining the barometric pressure in the cabin within desirable limits and for keeping the oxygen partial pressure at a satisfactory level are examined. A pressurized cabin is used for civil and military transportation aircraft, while oxygen

inhalation and pressurized cabin are employed for fighter aircraft. Pressurized cabin is examined in terms of principles of operation and internal decompression due to component failure. Experimental study of decompression with open and closed respiratory airways in man and in animal is discussed. Other problems raised by pressurized cabins are analyzed relative to secondary utilizations of pressurization (pollutant control, air conditioning) and ozone concentration. S.D.

**A78-20562** Inaugural lecture at the School of Health Service Application for the Air Force (Leçon inaugurale à l'Ecole d'Application du Service de Santé pour l'Armée de l'Air). J. Chevaleraud (Service de Santé des Armées, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 49-53. In French.

Major aspects of aviation ophthalmology in relation to reliable visual retrieval of information in a man/machine system are highlighted. An aviation ophthalmologist is called upon to test and evaluate the different parameters of the visual function, such as visual acuity, field of vision, binocular vision, and alteration of visual performance by sharp enhancement of retinal illumination and by high-altitude effect of anoxemia. The ophthalmologist must cooperate with design engineers to determine whether man can adapt himself to the machine, whether workload is matched to human visual capacity, and whether eye protection is satisfactory. S.D.

**A78-20563** Optimization of crew performance in future aircraft and weapon systems - Experimental methods of objective measurement (Optimisation de la performance des équipages dans les futurs avions et systèmes d'armes - Méthodes expérimentales de mesure objective). S. Gerathewohl. *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 56-61. In French.

The paper examines the following domains in the optimization of integrated man/machine systems for increased human performance: design adjustment and evaluation of perfected electronic flight control systems, determination of performance levels and work-load factors, human factors of error in conjunction with detection and prevention, and role of human factors in approach and landing accidents. The main objective is to define the means allowing objective evaluation of the conditions that the pilot would encounter in future aircraft and weapon systems and to optimize the man/machine interface as a function of these conditions. S.D.

**A78-20564** Investigation of pilot behavior in flight /Analysis of Japanese studies/ (Etude du comportement des pilotes en vol /Analyse de travaux Japonais/). A. M. Asset, D. Batejat, J. P. Papin, and D. Viard (Centre de Recherches de Médecine Aéronautique, Paris, France). *Revue de Médecine Aéronautique et Spatiale*, vol. 15, 1st Quarter, 1976, p. 62-66. In French.

The paper stresses Japanese investigation of the analysis of pilot behavior during air flight with the purpose of estimating pilot workload and performance complexity. Major aspects discussed concern a description of the activity network in the man/machine system, temporal course of pilot behavior in this system, development of measurement techniques for evaluating pilot behavior, and data analysis and workload estimation. S.D.

## STAR ENTRIES

**N78-14773\*** National Aeronautics and Space Administration  
Lewis Research Center, Cleveland, Ohio.

### TISSUE MACERATING INSTRUMENT Patent

Edward F. Baehr and James E. Burnett, inventors (to NASA)  
Issued 6 Dec. 1977 4 p Filed 15 Apr. 1976 Supersedes  
N76-23837 (14 - 14, p 1836)

(NASA-Case-LEW-12668-1; US-Patent-4,061,146;

US-Patent-Appl-SN-677353; US-Patent-Class-128-305) Avail:  
US Patent Office CSCL 06B

A surgical tissue macerating and removal tool is described which has a rotating rod with a cutting member at one end and which is disposed in a tube which is then contained in an extension of the tool handle. A frusto-conical member extends into the extension at the cutter member end of the rotating rod with its small end engaging the tube. The portion of the frusto-conical member outside of the extension forms a tissue engaging member and may be cut off at an angle to the axis of the rod to form a tissue engaging edge. Apertures are provided in the extension adjacent the frusto-conical member so that treatment fluid supplied in the annular space between the tube and the extension may flow to the operative site. An aperture is provided in the frustoconical member between the extension and the tube so that fluid may also flow into the tube where it mixes with macerated tissue being directed through an aperture in the tube to a passageway which may have suction applied to help remove macerated material.

Official Gazette of the U.S. Patent Office

**N78-14774** Pennsylvania Univ., Philadelphia.

### MEASUREMENT OF PASSIVE ELECTRICAL PROPERTIES OF MUSCLE: TECHNIQUES AND APPLICATIONS. Ph.D. Thesis

George Carl Farnbach 1977 120 p

Avail: Univ. Microfilms Order No. 77-19845

Techniques were developed for the measurement of passive membrane properties of excitable tissue. A method was developed for the extraction of estimates of membrane resistance and membrane capacitance from the intracellularly recorded response of a single muscle fiber to a single square current pulse. This time domain analysis used a Gauss-Newton curve fitting technique to achieve a least-squares fit to the recorded response of the muscle fiber. The method is shown to give results equivalent to older methods and has the advantages of reduced experimental time requirements and an increased probability of successful measurement from each fiber penetrated. Dissert. Abstr.

**N78-14775** Washington Univ., Seattle.

### X-RAY PHOTOGRAMMETRIC ANALYSIS OF SKELETAL SPATIAL MOTIONS Ph.D. Thesis

Takenori Takamoto 1976 232 p

Avail: Univ. Microfilms Order No. 77-18425

X-ray images are applied to measuring skeletal spatial motions. Space position and orientation of an X-ray anode are calibrated analytically with a reference frame on which control points are attached. The Reseau method is introduced to correct X-ray image distortions analytically. The accuracy of the method is intensively investigated by a modified transit and a control frame. The method is demonstrated by analyzing patellar motion that occurs on flexion of the knee joint of a patient. Measurements are made on one patient at different time intervals after a medical operation. The stereoscopic observations of anatomical objects

are studied but rather restricted applications are found. For the precise measurements of patellar spatial motions steel balls are implanted in a patient as reference points and targets.

Dissert. Abstr.

**N78-14776\*#** Lockheed Missiles and Space Co., Sunnyvale, Calif.

### STARPAHC SYSTEMS REPORT. VOLUME 1: EXECUTIVE SUMMARY

30 Oct. 1977 46 p

(Contract NAS9-13170)

(NASA-CR-151578; LMSC-D566138-Vol-1) Avail: NTIS  
HC A03/MF A01 CSCL 06E

A joint NASA and Department of Health, Education, and Welfare/Indian Health Services demonstration project entitled Space Technology Applied to Rural Papago Advanced Health Care (STARPAHC) was conducted to develop a solution for delivering quality health care to people in remote geographical areas. The STARPAHC concept verified the feasibility of telemedicine plus physician assistant - under the direction of a physician as a means of delivering quality health care. The two years of operational evaluation have provided considerable medical and engineering data which will be valuable to the designers and planners of future health care systems on earth and in space. Author

**N78-14777\*#** Lockheed Missiles and Space Co., Sunnyvale, Calif.

### STARPAHC SYSTEMS REPORT. VOLUME 2: OPERATIONAL PERFORMANCE

30 Oct. 1977 285 p

(Contract NAS9-13170)

(NASA-CR-151579; LMSC-D566138-Vol-2) Avail: NTIS  
HC A13/MF A01 CSCL 06E

The Space Technology Applied to Rural Papago Advanced Health Care (STARPAHC) demonstrated the value and potential of telemedicine using physician's assistants for providing quality health care delivery to people in a remote area. Generally, the program's achievements were to: (1) establish the feasibility of the STARPAHC concept in the delivery of health care; (2) gain information for developing health care systems for future manned spacecraft; (3) determine the constraints and capabilities involved in the interaction between physicians and non-physician health care personnel; (4) determine effectiveness of the STARPAHC technique; and (5) define the additional developments that are needed and/or most valuable to improving telemedicine and its exportable potential. Author

**N78-14778\*#** General Electric Co., Houston, Tex.

### PHYSIOLOGICAL SPACECRAFT ENVIRONMENT DATA DOCUMENTATION Final Report

15 Dec. 1977 7 p

(Contract NAS9-15094)

(NASA-CR-151589; TIR-741-LSP-7019) Avail: NTIS  
HC A02/MF A01 CSCL 06S

The physiological limits of exposure to environmental parameters encountered during space flight was documented. The environmental limits which have been previously established were described in terms of acceptable physiological changes. The process of coordinating data and assembling the completed data book is described in this report. Author

**N78-14779#** Duke Univ., Durham, N. C.

### THE ORIGIN OF CATARACTS IN THE LENS FROM INFRARED LASER RADIATION Annual Progress Report, 1 Sep. 1976 - 31 Aug. 1977

M. L. Wolbarsht, M. A. Orr, B. S. Yamanashi, J. S. Ziller, and I. B. C. Matheson 24 Oct. 1977 22 p refs

(Contract DAMD17-74-C-4133; DA Proj. 3E7-62772-A-813)  
(AD-A046165) Avail: NTIS HC A02/MF A01 CSCL 06/5

Changes in lens proteins following exposure to IR irradiation have been used to detect the earliest changes possible in cataract formation. Rat lenses maintained in organ culture have been used to determine the temperature which will initiate cataractogen-

esis. Exposures from a CW neodymium laser (1060 nm) were used to determine what energy levels are necessary to produce protein changes. These changes have been characterized by thin layer isoelectric focused electrophoresis and sodium dodecyl sulfate electrophoresis. Author (GRA)

**N78-14780#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).

**A PROCEDURE FOR THE EVALUATION OF PHYSIOLOGICAL MEASUREMENTS [EIN VERFAHREN ZUR AUSWERTUNG PHYSIOLOGISCHER MESSUNGEN]**

Ernst Hoermann 20 Apr. 1977 48 p In GERMAN (DLR-IB-552-77/9) Avail: NTIS HC A03/MF A01

A procedure using digital computers was developed. For the digitalization an EAI 8400 hybrid computer was used and for the final evaluation a Telefunken TR440 computer. The following physiological parameters were evaluated: volume pulse (recorded with a plethysmograph at the ear-lobe), eye movements (electro ophthalmogram), breathing (thermistor at mouth or nose opening), and reaction times. ESA

**N78-14781#** Royal Aircraft Establishment, Farnborough (England), Engineering Physics Dept.

**HEAD AND NECK MOBILITY OF PILOTS MEASURED AT THE EYE**

M. C. Champion and W. G. A. Port London Aeron. Res. Council 1977 33 p refs Supersedes RAE-TR-74158; ARC-36353 (ARC-R/M-3803; RAE-TR-74158; ARC-36353) Avail: NTIS HC A03/MF A01; HMSO £4.25; PHI \$16.45

A study of the head and neck mobility of nine selected pilot subjects was made by measuring the movement envelope of the pilot's eye position as he craned his head and neck up, down, and from side to side. During these movements the subjects looked forward at a target board through a sight aperture. The subjects were strapped into an ejection seat instrumented to monitor harness tension, and were clothed in standard RAF summer and winter aircrew equipment assemblies. The effects of wearing a standard RAF Mark 2/3 flying helmet, and differences between movement with summer and winter flying clothing were assessed. Author (ESA)

**N78-14782** Minnesota Univ., Minneapolis.

**HUMAN PERCEPTION OF MODERATE STRENGTH LOW FREQUENCY MAGNETIC FIELDS Ph.D. Thesis**

Robert Dennis Tucker 1976 102 p Avail: Univ. Microfilms Order No. 77-19068

The effects of moderate magnetic and electric fields on human subjects was investigated and a test was made to determine whether individuals deprived of auxiliary clues can detect these fields by conscious perception. A number of individuals seemed able to detect these fields even when shielded from sound and vibration. With computer feedback reinforcement, this perceptive skill was enhanced, yielding in the most responsive individuals p values as low as 10 to the -30th power against happening by pure chance. By systematic exclusion of trace clues, however, perception was worked down until even the best perceivers fell to performance levels practically those of pure chance. Other tests indicated that reported headaches symptomatic of magnetic fields occurred even when no field was present. Dissert. Abstr.

**N78-14783#** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Inst. fuer Flugmedizin.

**PSYCHOLOGICAL SELECTION OF APPLICATION FOR FLIGHT MECHANIC TRAINING [DIE PSYCHOLOGISCHE AUSWAHL VON BEWERBERN FUER DIE AUSBILDUNG ZUM FLUGINGENIEUR]**

H. Kirsch, S. Fichtbauer, and M. Nordhausen 1977 32 p refs In GERMAN (DLR-IB-355-77/03) Avail: NTIS HC A03/MF A01

A battery of tests is described for the selection of applicants. A short description of the psychological contents of each test method is given. The correlation of test results with selection is outlined. ESA

**N78-14784\*** National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

**IODINE GENERATOR FOR RECLAIMED WATER PURIFICATION Patent**

Richard A. Wynveen (Life Systems, Inc., Beachwood, Ohio), James D. Powell (Life Systems, Inc., Beachwood, Ohio), and Franz H. Schubert, inventors (to NASA) (Life Systems, Inc., Beachwood, Ohio) Issued 6 Dec. 1977 5 p Filed 25 Apr. 1975 Supersedes N75-25594 (13 - 16, p 2021) Sponsored by NASA (NASA-Case-MS-C-14632-1; US-Patent-4,061,570; US-Patent-Appl-SN-571459; US-Patent-Class-210-96M; US-Patent-Class-210-192; US-Patent-Class-204-180P; US-Patent-Class-204-301; US-Patent-Class-23-253A) Avail: US Patent Office CSCL 06K

The system disclosed is for controlling the iodine level in a water supply in a spacecraft. It includes an iodine accumulator which stores crystalline iodine, an electrochemical valve to control the input of iodine to the drinking water and an iodine dispenser. A pump dispenses fluid through the iodine dispenser and an iodine sensor to a potable water tank storage. The iodine sensor electronically detects the iodine level in the water, and through electronic means produces a correction current control. The correction current control operates the electro-chemical iodine valve to release iodine from the iodine accumulator into the iodine dispenser. Official Gazette of the U.S. Patent Office

**N78-14785** Tulane Univ., New Orleans, La.

**MODELING AND CONTROL OF THE HUMAN HEAD-NECK RESPONSE UNDER IMPACT ACCELERATION Ph.D. Thesis**

Maher Labib Rouziek 1975 115 p Avail: Univ. Microfilms Order No. 77-19508

Analytical and computer models of the human head-neck system and a controller design procedure to control the movements of the head-neck high accelerations are presented. In model parameter optimization two different methods are used. Using the discrete gradient technique, the shape of any nonlinear relation must be determined prior to any parameter optimization run. The adaptive technique is superior to the gradient technique in three respects: (1) it allows the model to behave almost exactly like the system which is not always possible with the gradient technique, (2) any nonlinear relations are automatically generated by the adaptive loop to make the mode behave like the system, and (3) it is a continuous single run technique while the gradient technique is iterative. The controller design forces the responses of the human head-neck to be contained within certain pre-specified bounds even in the presence of high impact acceleration. Dissert. Abstr.

**N78-14786\*#** Wintec Corp., Los Angeles, Calif.

**[DESIGN OF HIGH PRESSURE OXYGEN FILTER FOR EXTRAVEHICULAR ACTIVITY LIFE SUPPORT SYSTEM, VOLUME 1] Final Report**

B. A. Wilson 30 Nov. 1977 206 p refs 2 Vol. (Contract NAS9-14466)

(NASA-CR-151571; TR-415-Vol-1) Avail: NTIS HC A10/MF A01 CSCL 06K

The experience of the National Aeronautics and Space Administration (NASA) with extravehicular activity life support emergency oxygen supply subsystems has shown a large number of problems associated with particulate contamination. These problems have resulted in failures of high pressure oxygen component sealing surfaces. A high pressure oxygen filter was designed which would (a) control the particulate contamination level in the oxygen system to a five-micron glass bead rating, ten-micron absolute condition and (b) withstand the dynamic shock condition resulting from the sudden opening of 8000 psi oxygen system shutoff valve. Results of the following program tasks are reported: (1) contaminant source identification tests, (2) dynamic system tests, (3) high pressure oxygen filter concept evaluation, (4) design, (5) fabrication, (6) test, and (7) application demonstration. Author

**N78-14787\*** Wintec Corp., Los Angeles, Calif.  
**[DESIGN OF HIGH PRESSURE OXYGEN FILTER FOR  
 EXTRAVEHICULAR ACTIVITY LIFE SUPPORT SYSTEM.  
 VOLUME 2: TEST DATA] Final Report**  
 B. A. Wilson 30 Nov. 1977 281 p refs 2 Vol.  
 (Contract NAS9-14466)  
 (NASA-CR-151572; TR-415-Vol-2) Avail: NTIS  
 HC A13/MF A01 CSCL 06K  
 For abstract, see N78-14786.

**N78-14788#** IBM Federal Systems Div., Owego, N. Y.  
**PROGRAM DOCUMENTATION FOR THE HEAD SWITCH-  
 ING SOFTWARE PACKAGE**  
 J. J. Miller, Jr. Jun. 1977 114 p  
 (Contract F33615-75-C-5152)  
 (AD-A046175; AMRL-TR-77-41; HESS-77-3) Avail: NTIS  
 HC A06/MF A01 CSCL 05/8

The Head Switching Software Package is a system of programs which provide the capability to study item selection and switch activation by an operator's head line of sight. Data is gathered on the speed and accuracy of accomplishing discrete pointing tasks with the helmet mounted sight and stored on magnetic tape for subsequent data analysis. The programs were written for an IBM System/370, Model 155 computer running under the standard MFT version of the Operating System. Assembler language was used in coding the executive program; and FORTRAN was used for the subroutine programs. The IBM System/370 Operating System Graphic Subroutine Package (GSP) for FORTRAN 4 was utilized for the graphic software support. Author (GRA).

**N78-14789#** Naval Air Test Center, Patuxent River, Md.  
**ANALYSIS OF FLIGHT CLOTHING EFFECTS ON AIRCREW  
 STATION GEOMETRY**  
 H. G. Gregoire 19 Oct. 1977 17 p refs  
 (AD-A046260; NATC-TM-77-1-SY) Avail: NTIS  
 HC A02/MF A01 CSCL 15/5

The purpose of this evaluation was to quantify the effect of flight clothing and equipment on pilot accommodation in ejection seat tactical aircraft. The data derived from this evaluation are applicable to any similarly dressed and equipped aircrewman in tactical or training aircraft. Subjects selected for the study represented the typical range of aircrewmen body sizes within the Naval aviation population. Comparative anthropometric measurements were made between three conditions: (a) unclad, (b) wearing summer flight gear, and (c) wearing winter flight gear. Volumetric quantifications of increased bulk, as well as angular quantifications of decreased mobility, were accomplished. The data describe significant limitations in cockpit reach capability and torso movement as a function of summer and winter flight clothing and equipment. The most restrictive item worn was the CWU-33P anti-exposure garment. An all-encompassing reengineering of the total system of flight clothing and equipment should be undertaken to lighten the weight and reduce the mobility-restricting bulk of such items. When designing crew station geometry and locations of controls and displays, designers should incorporate the maximum available data describing reduction in anthropometric mobility and increase in anthropometric volume, resulting from flight clothing and equipment worn on the body. GRA

**N78-14790#** Michigan Univ., Ann Arbor. Highway Safety  
 Research Inst.  
**VALIDATION STUDIES FOR HEAD IMPACT INJURY MODEL  
 Final Report, 1 Jul. 1973 - 31 Aug. 1975**  
 R. L. Stalnaker, N. M. Alem, and J. B. Benson Sep. 1977  
 541 p refs  
 (Contract DOT-HS-031-3-749)  
 (PB-272285/8; UM-HSRI-76-14; DOT-HS-802-566) Avail:  
 NTIS HC A23/MF A01 CSCL 13F

Experiments were performed involving the heads of sub-human primates and fresh unembalmed cadavers with sufficient precision and reliability so that a validation of an analytical model can be made for the impact situation. Brain injury mechanisms

were determined in the primate test from the pathology and engineering data obtained from the experiments. The static load-deflection response, and the resulting static principal strains on the skulls of two monkeys and one human cadaver, are reported. Thirty-nine live primate head impacts and two human cadaver head impacts are reported in the texts. Techniques for measuring epidural pressure during impact, strains on the skull, and placement of six accelerometers on the skull were developed. GRA

**N78-14791#** Committee on Science and Technology (U. S.  
 House).  
**POSSIBILITY OF INTELLIGENT LIFE ELSEWHERE IN THE  
 UNIVERSE**  
 Washington GPO 1977 131 p refs Rept. for Comm. on  
 Sci. and Technol., 95th Congr., 1st Sess., Oct. 1977 Revised  
 Prepared by Library of Congr., Congressional Res. Service  
 (GPO-98-185) Avail: SOD

The possibility is discussed of life existing beyond the earth. Efforts of the U.S. space program to receive signals from extraterrestrial beings or to contact such beings are outlined, including that of the NASA Study Group for the Search for Extraterrestrial Intelligence. J.H.

**N78-15667\*** National Aeronautics and Space Administration,  
 Washington, D. C.  
**PINE SEED GERMINATION UNDER WEIGHTLESSNESS (A  
 STUDY OF THE KOSMOS 782 SATELLITE)**  
 R. N. Platonova, G. P. Parfenov, V. P. Olkovenko, N. I. Karpova,  
 and M. Ye. Pichugov Dec. 1977 13 p refs Transl. into  
 ENGLISH from Izv. Akad. Nauk, SSSR, Ser. Biol. (USSR), no. 5,  
 Sep. - Oct. 1977 p 770-776 Transl. by Kanner (Leo) Associates,  
 Redwood City, Calif.  
 (Contract NASw-2790)  
 (NASA-TM-75080) Copyright. Avail: NTIS HC A02/MF A01  
 CSCL 06C

Orientation of the above and underground organs of pine plants, grown from seeds under weightlessness, was found to be determined by seed position on the substrate. Normal plant growth was observed only if the seed embryos were oriented toward the substrate. Some differences were noted between the experimental and control plants concerning the amount of nucleoli in the root meristematic cells and the cell shape in cotyledonous leaves. No complete similarity was found in experimental results obtained with plants under weightlessness and under compensated gravity. The seeds were obtained from *Pinus silvestris*, considered to be particularly suitable for this experiment. Author

**N78-15668** British Library Lending Div., Boston Spa (England).  
**CONDITIONS FOR THE TESTING OF DRUGS IN MAN**  
 Aug. 1977 15 p Transl. into ENGLISH from Voraussetzungen  
 für die Prüfung von Arzneimitteln (West Germany) 15 p  
 (BLL-RTS-10883) Avail: British Library Lending Div., Boston  
 Spa, Engl.: £7.50; 2 BLL Overseas, 8 European or 30 UK  
 BLL photocopy coupons

The Drug Act requires that drug preparations are being sufficiently and carefully tested in compliance with up to date scientific standards. The directive about the testing of drugs dated 11.6.1971 provides the definition of the present state of scientific knowledge. This directive consists of the two parts: Pharmacotoxicological testing of drugs and clinical trials of drugs. The second part says that the therapeutic efficacy and the harmlessness in man of a drug has to be assessed by medical, clinical and experimental therapeutic investigations with proper regard to the indications; these investigations have to be preceded by pharmacological and toxicological tests according to the first part of the directive. Author

**N78-15669** Duke Univ., Durham, N. C.  
**A TECHNIQUE FOR THE IN SITU SPECTROSCOPIC  
 ANALYSIS OF SODIUM CONCENTRATIONS IN SWEAT  
 Ph.D. Thesis**  
 Larry Weldon Burton 1977 97 p  
 Avail: Univ. Microfilms Order No. 77-21864

A technique for the in situ spectroscopic analysis of sodium concentrations in sweat is proposed. In this technique, a high intensity electric field is generated on the surface of the sweat ducts of the human forearm which stimulates the sodium to emission of its characteristic optical spectrum. This spectrum is observed by means of a photon counting system, and the intensity of emission is proportional to the concentration of sodium in the sweat. The technique is described mathematically and is verified experimentally. Although the present system as reduced to practice is not a reliable method of detecting elevated sweat sodium concentration characteristic of Cystic Fibrosis, changes to the system which should improve the reliability are discussed. Additional applications of the technique include detection of the presence of materials in sweat, such as mercury and lead, as well as nondestructive chemical analysis of materials.

Dissert. Abstr.

**N78-15670** Clemson Univ., S.C.  
**THE INFLUENCE OF ANATOMICAL VARIATIONS ON VOLTAGE IN THE 12 LEAD ELECTROCARDIOGRAM** Ph.D. Thesis

Richard Bruce Schuessler 1977 123 p

Avail: Univ. Microfilms Order No. 77-20789

Gross body measurements, such as body weight, height, waist circumference, and various measurements from the chest X-ray were used to characterize the anatomy of an individual in order to standardize electrocardiogram readings. The constitutional variables were correlated with voltage levels from all twelve leads of the ECG at various times during the cardiac cycle. In a majority of the leads, the T wave had the highest and most statistically significant correlations with the constitutional variables. In addition, it was shown that it is feasible, using these constitutional variables, to correct the voltage levels to a standard anatomy. The normalization limits the range of normal and makes it easier to separate normal ECG's from abnormal ECG's.

Dissert. Abstr.

**N78-15671** Catholic Univ. of America, Washington, D. C.  
**ANAEROBIC BACTERIOLOGY AND CURRICULUM DESIGN FOR MEDICAL TECHNOLOGY** Ph.D. Thesis

Sylvia Silver 1977 149 p

Avail: Univ. Microfilms Order No. 77-21340

Recent developments in the field of anaerobic bacteriology was reviewed and a curriculum for use in medical technology education was designed. An historical background of anaerobic bacteriology was presented. Stress was placed on various theories concerning the destructive mechanism of oxygen on some anaerobes and research which has been reported in an effort to elucidate this process. The proposed mechanisms of pathogenicity were discussed along with various views of the role of the clinical microbiology laboratory. Anaerobic bacteriology at present was surveyed, including the collection and transport of clinical specimens to the laboratory, present methods of cultivation, and the procedures utilized in identification. New methodologies concerning identification were studied and curriculum recommendations were made for three levels of medical technology; namely medical technologist, medical laboratory technician, and certified laboratory assistant.

Dissert. Abstr.

**N78-15673** Indiana Univ., Bloomington.  
**THE EFFECTS OF MIDDLE EAR MUSCLE CONTRACTION UPON HIGH LEVEL EXPOSURE TO PURE TONES AND UPON THE TRANSMISSION OF LOW LEVEL PURE TONES** Ph.D. Thesis

Claudia Diane Lemon 1977 266 p

Avail: Univ. Microfilms Order No. 77-22697

In three different experiments, subjects were exposed to narrow bands of noise at 20 db, and continuous tones of 500, 1000, and 4000 Hz at 80 db in order to study the effect of middle ear muscle contraction on hearing thresholds. It was found that the 500 Hz narrow band noise elicited the most effective middle ear muscle contraction since it yielded the strongest intra-aural muscle contraction with the shortest latency time and least adaptation over time. Results indicated that the contraction of the middle ear muscles during high level exposure provides some protection for the ear. It was hypothesized that transmission loss induced by voluntary middle ear contraction has different properties than those induced by acoustic stimulation, in that voluntary aural muscle contraction induces greater middle ear impedance and greater threshold shift. It was also hypothesized that activation of the acoustic reflex differently attenuates soft and loud sounds.

Dissert. Abstr.

**N78-15674** Florida State Univ., Tallahassee.  
**THE EFFECTS OF DIFFERENT SPEAKERS ON THE WORD DISCRIMINATION SCOPES OF PERSONS WITH SENSORI-NEURAL HEARING IMPAIRMENT** Ph.D. Thesis

John Peter Penrod 1976 88 p

Avail: Univ. Microfilms Order No. 77-22137

The effects of different speakers on word discrimination scores achieved by individuals with sensori-neural hearing impairment were investigated. High quality tape recordings were made of four different audiologists' presentations of word discrimination lists under actual clinical conditions. Hearing impaired subjects having varying degrees of loss and word discrimination ability listened to each of the four speakers presented randomly. The results revealed clinically significant variations in word discrimination scores. Greater variability in word discrimination scores was apparent for those subjects with the greatest amount of loss of understanding. Differences were not attributable to any one speaker but were apparent for all speakers. The differences in scores could not be attributed to intensity variations, fundamental frequency, or articulation errors.

Dissert. Abstr.

**N78-15675** Columbia Univ. Teachers Coll., New York.  
**THE EFFECT OF TEMPORAL PARAMETERS ON THE SUPRATHRESHOLD CONTINUOUS/INTERRUPTED SEPARATION IN NORMAL HEARING SUBJECTS** Ph.D. Thesis

Jo Ann Nicholas 1977 124 p

Avail: Univ. Microfilms Order No. 77-22279

Research has demonstrated that normal hearing subjects track continuous (C) tones at significantly lower intensity levels than interrupted (I) tones at suprathreshold levels. This suprathreshold C/I separation has been attributed to a difference in C and I loudness, ambiguity of the loudness standard, loudness memory effects, and effect of psychophysical method. The effect of on-time, off-time, duty cycle, and period were investigated to clarify their effects on the suprathreshold C/I separation. Normal hearing young adults were tested using an audiometer to track most comfortable listening levels for 1000 Hz C and I tones. Although the results showed that both period and duty cycle had significant effects on the size of the mean C/I separation, period was shown in further analysis to have no systematic effect across the range of period conditions.

Dissert. Abstr.

**N78-15676** North Carolina State Univ., Raleigh.  
**A MATHEMATICAL MODEL OF TRANSPORT AND REMOVAL OF OZONE IN MAMMALIAN LUNGS** Ph.D. Thesis

Frederick John Miller 1977 103 p

Avail: Univ. Microfilms Order No. 77-21560

A unified approach for evaluating the pulmonary toxicity of ozone (O<sub>3</sub>) was formulated which involved experimental laboratory animal studies and mathematical modeling analyses. Applicability was illustrated by examining the similarity between man and laboratory animals in regional pulmonary deposition of O<sub>3</sub>. The experimental phase concerned the determination of nasopharyngeal removal of O<sub>3</sub> in rabbits, guinea pigs, and rats. A lower airway mathematical model was developed which incorporated species anatomical differences and chemico-physical properties of O<sub>3</sub> as parameters. The predicted pulmonary O<sub>3</sub> dose curves obtained by model analysis of the transport and

removal of O<sub>3</sub> in the lungs of guinea pigs, rabbits, and man indicated a general similarity between these species.

Dissert. Abstr.

**N78-15677** Temple Univ., Philadelphia, Pa.  
**BLOOD FIBRINOLYSIS, COAGULATION AND LACTATE IN TRAINED AND UNTRAINED MEN AT REST AND AFTER EXERCISE** Ph.D. Thesis

Abraham Alfaro 1977 80 p

Avail: Univ. Microfilms Order No. 77-21792

Blood in vitro fibrinolysis (ELA), coagulation, and lactate concentration (Lac) were determined at rest and immediately after a 20 minute treadmill exercise at percentages of max V(O<sub>2</sub>) for men, ages 17 to 35 years. A total of 14 men were classified by their Lac and ELA at 80% max V(O<sub>2</sub>) as either trained fibrinolytic responders, untrained fibrinolytic responders or untrained poor fibrinolytic responders. It was concluded that above 40% max V(O<sub>2</sub>) the rise in ELA varies with the relative work load and state of training. Since Lac at a % max V(O<sub>2</sub>) reflected levels of training, the regression equation between ELA and Lac should be used to evaluate in vitro fibrinolytic responses to exercise. This equation may also be used to identify poor fibrinolytic responders.

Dissert. Abstr.

**N78-15678** Loyola Univ., Chicago, Ill.  
**ASCENDING SPINAL PATHWAYS FOR THE SOMATOSYMPATHETIC REFLEX** Ph.D. Thesis

Jin Mo Chung 1977 161 p

Avail: Univ. Microfilms Order No. 77-22335

To explore ascending spinal pathways for the somatosympathetic reflexes, systemic blood pressure responses and sympathetic nerve activity during different nerve stimulation were compared before and after various spinal lesions in anesthetized, vagotomized and paralyzed cats. Sympathetic unit activity recorded from the cervical sympathetic trunk increased markedly during peroneal nerve stimulation. After bilateral dorsolateral sulcus area lesions at T12, identical stimulation resulted in decreased sympathetic nerve activity. This activity remained unchanged from spontaneous activity during peroneal nerve stimulation after additional bilateral dorsolateral funiculus lesions at T12. These data confirm the localization of ascending pressor and depressor pathways and indicate that the ascending pressor and depressor pathways are sympathoexcitatory and inhibitory pathways.

Dissert. Abstr.

**N78-15679** Nebraska Univ., Lincoln.  
**MICROVASCULAR ALTERATIONS IN HYPERTENSION** Ph.D. Thesis

Roger Lee Click 1977 122 p

Avail: Univ. Microfilms Order No. 77-22561

The microcirculation of the cheek pouch and renal tissue grafted into the cheek pouch of hamsters in normal and hypertensive states was directly evaluated. Experiments were completed to determine the relative contribution of qualitative and quantitative alterations at the microcirculatory level in the hypertensive state. Results indicated that during the development of hypertension an increased arteriolar response to norepinephrine and angiotensin 2 was preceded by an increased response to potassium. There was no change in the arteriolar wall/lumen ratio or venular response to norepinephrine. During the chronic stage of hypertension, an increased arteriolar response was accompanied by an increased arteriolar wall/lumen ratio and increased venular response to norepinephrine.

Dissert. Abstr.

**N78-15680** New York Univ., N. Y.  
**THE VISUALLY EVOKED MAGNETIC FIELD OF THE HUMAN BRAIN** Ph.D. Thesis

Douglas Scott Brenner 1977 122 p

Avail: Univ. Microfilms Order No. 77-21270

A sensitive magnetic field detection system was developed and applied to the measurement of variations in a human brain's magnetic field induced with visual stimuli. The field from the brain is nonuniform in regions close to the scalp where measurements were taken and therefore coupled into the gradiometer. Currents in the gradiometer were sensed by a superconducting quantum interference device which has sufficient

sensitivity for these small fields. Findings demonstrated that magnetic field measurements can provide new information about human visual perception. Spatial mapping of the visual evoked fields (VEF) revealed two separate sets of active cells. The temporal properties of the responses were determined by both the temporal and spatial features of the stimuli. This enabled the responses to be related to known types of spatially and temporally discriminating cells.

Dissert. Abstr.

**N78-15681** Minnesota Univ., Minneapolis.  
**THE PHYSIOLOGICAL RESPONSE TO TIME VARYING WORK LOADS** Ph.D. Thesis

Robert Patrick Patterson 1977 129 p

Avail: Univ. Microfilms Order No. 77-19024

The response of the oxygen uptake (VO<sub>2</sub>), carbon dioxide output (VCO<sub>2</sub>), minute ventilation (VE), heart rate (H.R.), and the end tidal gas concentrations (FO<sub>2</sub> and FCO<sub>2</sub>) to sinusoidal work loads was investigated. The metabolic response parameters and the H.R. were fitted to first order models both with and without delay. The end tidal gas concentration parameters were fitted to a second order model with delay. Subjects were then subjected to work loads of 10, 20, or 30 sec. durations. Two of the subjects showed a very significant fast component in the metabolic response that temporally followed the work pulse with a delay of approximately 2 sec probably of neutral origin. A slow component in the response was seen after the work pulse that peaked in approximately 45 sec. Blood pressure cuffs were inflated around the legs to cut off the circulation during the work pulse and for 20 sec after the work pulse, causing delay in the slow response. However, the results from this phase of the experiment suggest that peripheral chemoreceptors or venous blood PCO<sub>2</sub> and PO<sub>2</sub> receptors do not control ventilation.

Dissert. Abstr.

**N78-15682\*** National Aeronautics and Space Administration, Washington, D. C.

**LABORATORY SIMULATION OF THE ACTION OF WEIGHTLESSNESS ON THE HUMAN ORGANISM**

A. M. Genin Dec. 1977 18 p refs Transl. into ENGLISH from "Laboratornoye Modelirovaniye Deystviya Nevesomosti na Organizm Cheloveka", Rept. Interkosmos Council, Acad. of Sci. USSR and Directorate of Space Biol. and Med., Min. of Health USSR (Moscow), 1977 p 1-17 Transl. by Transemantics, Inc., Washington, D.C.

(Contract NASw-2792)

(NASA-TM-75072) Avail: NTIS HC A02/MF A01 CSCL 06S

A brief history of attempts by the U.S. and the U.S.S.R. to simulate weightlessness in the laboratory is presented. Model for laboratory modeling of weightlessness included the bed regimen, the clinostat, and water immersion. An outline of immediate physiological effects of weightlessness and long term effects is offered.

B.L.P.

**N78-15683\*** Scientific Translation Service, Santa Barbara, Calif.  
**WATER-SALT EXCHANGE DURING BEDREST OF VARYING DURATION**

Yu. V. Natchin Jan. 1978 43 p refs Transl. into ENGLISH of "Vodno-Solevoy Obmen pri Postelnom Rezhime Razlichnoy Prodolzhitelnosti", Interkosmos Council, Acad. of Sci. USSR, and Directorate of Space Biol. and Med., Min. of Health USSR, Moscow, 1977 p 1-42 Transl. by Sci. Transl. Serv., Santa Barbara, Calif.

(Contract NASw-2791)

(NASA-TM-75077) Avail: NTIS HC A03/MF A01 CSCL 06S

Problems associated with the status of water-sodium metabolism under bedrest programs of varying lengths were studied. The dynamics of electrolyte concentration in blood serum, functional status of kidney osmosis regulating function, and other problems are discussed.

Author

**N78-15684\*** Civil Aeromedical Inst., Oklahoma City, Okla.  
**REFRACTIVE ERROR CHARACTERISTICS OF EARLY AND ADVANCED PRESBYOPTIC INDIVIDUALS**

Kenneth W. Welsh, Paul G. Rasmussen, and John A. Vaughan Jul. 1977 10 p refs

(AD-A044555/1; FAA-AM-77-14)

Avail: NTIS

HC A02/MF A01 CSCL 06/5

The frequency and distribution of ocular refractive errors among middle aged and older people are obtained from a nonclinical population holding a variety of blue collar, clerical, and technical jobs. The 422 individuals ranged in age from 35 to 69 years and were volunteers for several vision research studies. Data include frequency of various spherical and astigmatic refractive errors, including differences in refractive errors in pairs of eyes. These data, together with information provided by other investigators, allows a realistic assessment of the distribution of refractive errors and expected visual acuities in the adult population. Author

**N78-15685#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**EFFECTS OF LITHIUM CARBONATE ON PERFORMANCE AND BIOMEDICAL FUNCTIONS**

E. Arnold Higgins, W. Dean Chiles, Jess M. McKenzie, Audie W. Davis, Jr., Gordon E. Funkhouser, Alan E. Jennings, Stanley R. Mullen, and Patsy R. Fowler Aug. 1977 30 p refs  
 (AD-A044824/1; FAA-AM-77-17) Avail: NTIS HC A03/MF A01 CSCL 06/15

The effects of a single 600-mg dose of lithium carbonate were evaluated in a study of 15 healthy, normal male subjects. Subjects were studied, on two occasions, by utilizing a double-blind design--once receiving the lithium carbonate and once receiving a lactose placebo. Measurements were made of (1) complex performance, using the civil Aeromedical Institute Multiple Task Performance Battery, (2) hand steadiness, using the steadiness tester of the motor steadiness kit, (3) heart rate, (4) the urinary excretion of 17-ketogenic steroids, epinephrine, and norepinephrine, and (5) short term memory, as measured by the Wechsler Memory Scale. The only statistically significant effect due to the drug was for short term memory, in which scores made by subjects taking the placebo were higher than scores made by those taking the lithium carbonate. Author

**N78-15686#** Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).

**MEASUREMENT OF HEAT STRESS: KIOWA AND MUSKETEER COCKPITS**

S. D. Livingstone, D. G. Bell, and L. A. Kuehn Jul. 1977 22 p refs

(AD-A046388; DCIEM-TR-77-X-32) Avail: NTIS HC A02/MF A01 CSCL 06/19

During hot summer weather at CFB Portage la Prairie, measurements were made of the heat stress experienced in the cockpits of the Musketeer aircraft and the Kiowa helicopter while stationary (not-running) on the runway and during flight. It was found that severe heat stress can occur in either cockpit when monitored in closed configuration, either on the ground or in flight, and that such heat stress can lead to dire physiological strain in less than one hour. Use of air vents on the Musketeer aircraft did not completely ameliorate the cockpit heat stress problem and added considerably to communication difficulty because of wind noise. Air conditioning is recommended for alleviation of heat stress in this aircraft. It was found that no difference existed between the cockpit stress and ambient heat stress when the Kiowa aircraft was flown without its doors, and it is recommended that this practice be encouraged during warm or hot weather to reduce pilot strain. Author (GRA)

**N78-15687#** California Univ., Los Angeles.  
**BIOFEEDBACK AND SELF-REGULATION IN ESSENTIAL HYPERTENSION**

David Shapiro, J. Alberto Mainardi, and Richard S. Surwit 20 Sep. 1977 38 p

(Contract N00014-75-C-0150)  
 (AD-A046774) Avail: NTIS HC A03/MF A01 CSCL 06/2

This paper consists of a review of basic biofeedback research on the control of human blood pressure, a presentation of the clinical studies on the application of biofeedback methods to treatment of hypertension, and a summary of related clinical research on other methods of self-regulation for the disorder. Medical and physiological facts about the disorder and those of importance to behavioral approaches are presented. Practical clinical issues which complicate the application of biofeedback are discussed. It is concluded that biofeedback and other

behavioral procedures may provide alternative or adjunctive modalities in the treatment of high blood pressure. In several studies, biofeedback techniques appear to be effective in reducing pressure levels or in reducing medication requirements. However, the clinical research is incomplete, and more comprehensive studies are needed to evaluate the long-term effects and feasibility of biofeedback and other methods of behavioral and self-regulation in essential hypertension. GRA

**N78-15688#** Advisory Group for Aerospace Research and Development, Paris (France).

**COMPARATIVE STUDY OF REGULATIONS ON STANDARDS OF MEDICAL FITNESS FOR FLYING DUTIES IN NINE AIR FORCES COVERING SEVEN NATO COUNTRIES**

E. Evrard Nov. 1977 124 p refs  
 (AGARD-AG-213(Eng); AGARDograph-213(Eng);  
 ISSN-92-835-1265-0) Avail: NTIS HC A06/MF A01

Comparisons were made of current standards for assessing fitness for flying duties in the Armed Forces of seven NATO nations. Regulations used were provided by Belgium, France, Canada, Britain, Norway, the Federal Republic of Germany, and the United States. The study was done to provide medical officers in each of the allied countries with the main texts, recommendations and provisions applicable to military aircrews of the others, and to initiate a review of ideas and doctrines used in assessing medical fitness. Author

**N78-15689** Texas A&M Univ., College Station.  
**VIBRATION, PERFORMANCE, AND PERSONALITY**  
 Ph.D. Thesis

Bonnie I. Hunt 1977 187 p  
 Avail: Univ. Microfilms Order No. 77-20381

The study was conducted using 16 subjects, two test sites, and two levels of vibration. The subjects were qualified physically fit for exposure to whole-body, z-axis vibration. The test sites were the Western Gear and C-5A in the Aerospace Medical Research Laboratory, Area B, Wright-Patterson AFB. Performance, physiological, and subjective measurements were taken in five test sessions for each subject individually. The performance measures included a one dimensional, foot-controlled tracking task, the Hockey test of attentional selectivity, and the Landolt broken ring test of visual acuity. The physiological measure was one channel of EKG to monitor heart rate and ecotopic beats. The subjective measures were modified versions of the NASA nine point rating scale used to obtain the subject's evaluations of motion severity and task difficulty. Dissert. Abstr.

**N78-15690\*#** National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

**MODELS FOR INTERRUPTED MONITORING OF A STOCHASTIC PROCESS**

Everett Palmer Oct. 1977 29 p refs  
 (NASA-TM-78453; A-7276) Avail: NTIS HC A03/MF A01 CSCL 05H

As computers are added to the cockpit, the pilot's job is changing from of manually flying the aircraft, to one of supervising computers which are doing navigation, guidance and energy management calculations as well as automatically flying the aircraft. In this supervisory role the pilot must divide his attention between monitoring the aircraft's performance and giving commands to the computer. Normative strategies are developed for tasks where the pilot must interrupt his monitoring of a stochastic process in order to attend to other duties. Results are given as to how characteristics of the stochastic process and the other tasks affect the optimal strategies. Author

**N78-15691#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**READABILITY OF ALPHANUMERIC CHARACTERS HAVING VARIOUS CONTRAST LEVELS AS A FUNCTION OF AGE AND ILLUMINATION MODE**

Kenneth W. Welsh, Paul G. Rasmussen, and John A. Vaughan Jul. 1977 13 p refs  
 (AD-A044554/4; FAA-AM-77-13) Avail: NTIS HC A02/MF A01 CSCL 05/10

Readability data of alphanumeric characters that vary in figure-to-ground contrast ratio were obtained from 36 subjects three age groups (20 to 25 yr, 40 to 45 yr, and 60 to 65 yr). Minimum illuminance required to identify all contrast combinations was determined at a viewing distance of 40 cm under dim white and red illumination. Subjects identified all characters while viewing through an artificial pupil and, when required, while wearing a spectacle lens correction. Data indicate a significant difference in luminance values for successive changes in contrast ratio under both illumination modes. Under red illumination, threshold luminance values showed a significant trend with age for all five contrast levels. Under white illumination, significant trends were indicated for three of the five contrast levels. With reference to the younger group, individuals in the middle aged and older groups required an average luminance increase of 18 and 63 percent respectively for equivalent readability scores under white illumination. Under red lighting, corresponding values were 18 and 58 percent. Author

**N78-15692\*** # System Development Corp., Edwards, Calif.  
**AN ANALYSIS OF FLIGHT DATA FROM AIRCRAFT LANDINGS WITH AND WITHOUT THE AID OF A PAINTED DIAMOND ON THE SAME RUNWAY**  
 Ram Swaroop and George R. Ashworth Feb. 1978 51 p refs (Contract NAS4-2334)  
 (NASA-CR-143849) Avail: NTIS HC A04/MF A01 CSCL 05H

The usefulness of a painted diamond on a runway as a visual aid to perform safe landings of aircraft was studied. Flight data on glideslope intercepts, flight path elevation angles, and touchdown distances were collected and analyzed. It is concluded that an appropriately painted diamond on a runway has the potential of providing glideslope information for the light weight class of general aviation aircraft. This conclusion holds irrespective of the differences in landing techniques used by the pilots. Author

**N78-15693\*** # Life Systems, Inc., Cleveland, Ohio.  
**PROTOTYPE BOSCH CO2 REDUCTION SUBSYSTEM FOR THE RLSE EXPERIMENT Final Report**  
 D. B. Heppner, R. A. Wynveen, and F. H. Schubert Dec. 1977 52 p refs  
 (Contract NAS8-32492)  
 (NASA-CR-150504; LSI-ER-332-2) Avail: NTIS HC A04/MF A01 CSCL 06K

Requirements for the Bosch carbon dioxide reduction subsystem were established in a study of regenerative life support evaluation experiments. A detailed design is presented including a schematic, components list and characteristics, requirements summaries, and complete definition of life systems' advanced control/monitor instrumentation applied to the Bosch subsystem. Design information needed to proceed with the final design and fabrication of a preprototype system is presented. Author

**N78-15694\*** # Hamilton Standard, Windsor Locks, Conn.  
**FLIGHT PROTOTYPE CO2 AND HUMIDITY CONTROL SYSTEM Final Report**  
 K. M. Rudy Sep. 1977 196 p refs  
 (Contract NAS9-13624)  
 (NASA-CR-151591; SVHSER-7182) Avail: NTIS HC A09/MF A01 CSCL 06K

A regenerable CO2 and humidity control system is presently being developed for potential use on the space shuttle as an alternative to the baseline lithium hydroxide system. The system utilizes a sorbent material (designated HS-C) to adsorb CO2 and water vapor from the cabin atmosphere and desorb the CO2 and water vapor overboard when exposed to a space vacuum. Continuous operation is achieved by utilizing two beds which are alternately cycled between adsorption and desorption. A shuttle vehicle integration study showed that the HS-C system offers substantial weight advantages compared to the baseline shuttle orbiter expendable lithium hydroxide CO2 removal system for extended missions beyond the nominal design of four men for seven days. This study defined a system packaging envelope in the area presently occupied by the LiOH cartridges. Author

**N78-15695#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**OBJECTIVE METHODS FOR DEVELOPING INDICES OF PILOT WORKLOAD**  
 W. Dean Chiles Jul. 1977 45 p refs  
 (AD-A044556/9; FAA-AM-77-15) Avail: NTIS HC A03/MF A01 CSCL 05/9

A discussion is given of the various types of objective methodologies that either have been or have the potential of being applied to the general problem of the measurement of pilot workload as it occurs on relatively short missions or mission phases. Selected studies that have dealt with the workload measurement problem or some similar problem are reviewed in relation to their applicability to securing answers to operational questions. The types of methods are classified as: laboratory, analytic and synthetic, simulator, and in-flight. The paper concludes with a general discussion of the relative merits and some of the cautions to be observed in attempting to apply these methods and in trying to interpret the results with a view toward generalizing to operational situations. Author

**N78-15696#** Human Engineering Labs., Aberdeen Proving Ground, Md.  
**A HUMAN FACTORS EVALUATION OF AN EXPERIMENTAL REVERSIBLE EXTREME COLD WEATHER CLOTHING ENSEMBLE Final Report**  
 Arthur A. Woodward, Jr. and Charles A. Hickey, Jr. Aug. 1977 27 p refs  
 (AD-A046620; HEL-TN-9-77) Avail: NTIS HC A03/MF A01 CSCL 15/5

A human factors evaluation was performed on an experimental two-component reversible extreme cold weather clothing ensemble (parka and trousers). The garments tested had been improved following recommendations of an earlier feasibility test; all of the improvements introduced were judged to be completely acceptable. Troop acceptance of the basic concept of the new ensemble is high. Despite this, the two new clothing items remain unsatisfactory for several reasons. These include: (a) excessive sleeve and leg lengths, (b) lack of front fly opening on trousers, (c) lack of trouser ankle closures, (d) poor construction of parka neck for attachment of hood, (e) very poor method of button hold construction, and (f) noise and static electricity generation by the outer fabric layer of the garments. Author (GRA)

**N78-15697#** Omnemii, Inc., Vienna, Va.  
**RESEARCH ON MANNED SYSTEM DESIGN USING OPERATOR MEASURES AND CRITERIA (OMAC) DATA Final Report, 1 Apr. 1975 - 31 May 1977**  
 Edward M. Connelly 31 Jul. 1977 21 p refs  
 (Contract N00014-75-C-0810)  
 (AD-A046464; OTR-62-77-2) Avail: NTIS HC A02/MF A01 CSCL 05/8

System performance models for ship control were investigated as an aid to ship display and control design. A human operator model, which represents the total system response by identifying the criteria optimized by that response, was developed to represent the ship control performance of the officer of the deck. In addition, a sensitive contact avoidance measure was developed which detects conditions leading to ship collisions and near collisions. OMAC models representing performance obtained with each display design revealed that performance differences are explained by differences in a constraint self-imposed by the operator to select only a portion of the display information in order to control the ship. Author

**N78-15698#** Naval Air Development Center, Warminster, Pa. Crew Systems Dept.  
**CEREBRAL ACTIVATION AND THE PLACEMENT OF VISUAL DISPLAYS Final Report**  
 Steven M. Casey, William A. Breitmaier, and William E. Nason 12 Aug. 1977 32 p refs  
 (AD-A046478; NADC-77247-40) Avail: NTIS HC A03/MF A01 CSCL 05/8

Previous studies have shown that the human cerebral hemispheres are functionally asymmetrical. In addition, differential hemispheric activation has been brought about by shifts in lateral visual orientation. In view of this information, an experiment

was conducted to study the effects of the lateral placement of displays with spatial-type information on human performance. Thirty two right-handed males were required to respond to peripherally-located engine monitoring displays while performing a centrally-located compensatory tracking task. For half of the subjects the engine monitoring displays were presented to the left of the tracking display and for the other half the engine monitoring displays were presented to the right of the tracking display. Performance was found to be better for those subjects who were required to orient to the left than for those who were required to orient to the right. The results of this experiment support the theory that cerebral activation may be an important consideration when locating certain types of visual displays in a high workload cockpit environment. Author (GRA)

**N78-15699#** Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Computer Science.

**ZOG: A MAN-MACHINE COMMUNICATION PHILOSOPHY Interim Report**

G. Robertson, A. Newell, and K. Ramakrishna 4 Aug. 1977 58 p refs

(Contracts N00014-76-0874; F44620-73-C-0074)

(AD-A046857) Avail: NTIS HC A04/MF A01 CSCL 05/8

ZOG is a rapid response, large network, menu selection system used for man-machine communication. The philosophy behind this system was first developed by the PROMIS (Problem Oriented Medical Information System) Laboratory of the University of Vermont. ZOG will be used in a number of task domains to help explore and evaluate the limits and potential benefits of the communication philosophy. This paper discusses the basic ideas in ZOG and describes the architecture of a system that has just been implemented to carry out that exploration and evaluation. Author (GRA)

**N78-15700#** Illinois Univ., Savoy. Aviation Research Lab.  
**THE ISOLATION OF MINIMUM SETS OF VISUAL IMAGE CUES SUFFICIENT FOR SPATIAL ORIENTATION DURING AIRCRAFT LANDING APPROACHES Technical Report, 1974 - 1976**

Janice E. Eisele, Robert C. Williges, and Stanley N. Roscoe Nov. 1976 49 p refs

(Contract N00014-76-C-0081; NR Proj. 196-133)

(AD-A046369; ARL-76-16/ONR-76-3) Avail: NTIS HC A03/MF A01 CSCL 14/2

An experimental investigation of synthetic imaging displays was directed toward the isolation of minimum sets of visual cues sufficient for spatial orientation in ground-referenced aircraft landing approaches. Thirty-two flight instructors viewed static computer-generated airport scenes TV-projected onto a large screen viewed from the cockpit of the twin-engine general aviation trainer. Judgments of lateral and vertical deviations from a four-degree approach to landing aim point in the display were made to 32 combinations of four contact analog cues: runway outline, runway touchdown zone, runway centerline, and ground plane texture; and one guidance cue: glidepath-localizer symbol. Each resulting display was responded to once or more from each of 27 different flight position and attitude viewpoints by each of eight subjects in different serial orders. Dependent measures were response choice and response latency. The most accurate glidepath and course deviation judgments were made when the guidance cue glidepath was in the set. When only contact analog cues were present the best judgments of spatial orientation consistently were made when the runway outline was present at far and medium ranges from touchdown and when the runway centerline was present at near range. Author (GRA)

**N78-15701#** Naval Medical Research Inst., Bethesda, Md.  
**SAFETY CONSIDERATIONS IN HUMAN ENGINEERING OF HYPERBARIC EQUIPMENT Medical Research Progress Report**

Arthur J. Bachrach, W. W. Banks, D. M. Heaney, and G. Goehring Oct. 1977 18 p refs Presented in Proc. of the 3rd Intern. System Safety Conf., held at the Stouffers National Center Inn, Washington, D. C., 17-21 Oct. 1977

(AD-A046839) Avail: NTIS HC A02/MF A01 CSCL 14/2

Recent increased interest in deep ocean diving has been accompanied by a marked increase in the development of hyperbaric research in support of diving operations. This research is concentrated in a number of industrial, university, and Navy laboratories throughout the world, which have hyperbaric chamber complexes of varying capabilities. The deeper ones, with pressures to approximately 904 psi (2000 ft), are located at the University of Pennsylvania, Taylor Diving and Salvage of Louisiana, Duke University, and the U.S. Navy Experimental Diving Unit in Panama City, Florida. Recently installed and under current testing is a deep chamber at the Naval Medical Research Institute in Bethesda, which has manned capability of 1500 psi. Because human subjects are under hyperbaric pressure and are therefore subjected to marked physiological stress, there is a strong concern for system safety in the development, maintenance, and operation of such hyperbaric chamber complexes. Yet it has only been in recent years that the human engineering of hyperbaric chambers and supporting consoles has begun in a systematic fashion. The Defense and Civil Institute of Environmental Medicine in Toronto was one of the first to employ human engineering techniques. This presentation covers an analysis of human engineering problems associated with the complex at the hyperbaric research facility at the Naval Medical Research Institute. A systematic approach to these problems has demonstrated that proper human factors engineering optimizes operator/system performance, minimizes physiological costs to the operator, and can contribute to improved efficiency and safety. GRA

**N78-15702#** Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

**INFLATABLE BODY AND HEAD RESTRAINT**

Marvin Schulman and James McElhenney 30 Sep. 1977 46 p refs

(AD-A046477; NADC-77176-40) Avail: NTIS HC A03/MF A01 CSCL 01/2

This investigation established the feasibility of using an automatically inflatable restraint system as an alternative to the conventional restraint worn by helicopter crewmen. This type restraint provides increased crash protection because it provides automatic pretensioning which forces the occupant back in his seat, thereby reducing dynamic overshoot; reduces strap loading on the wearer when the inflated restraint is compressed during crash loading; reduces the concentration of strap loads on the body because of the increased bearing surface provided when the restraint is inflated; reduces head rotation and whiplash induced trauma. Author (GRA)

**N78-15703#** Nederlands Instituut voor Praeventieve Geneeskunde TNO, Leiden.

**EFFECT OF ALCOHOL AND DISTRACTION TASK ON THE BEHAVIOR OF A PERSON RIDING A BICYCLE SIMULATOR [ONDERZOEK NAAR DE INVLOED VAN ALCOHOL EN AFLEIDINGSTAAK OP HET GEDRAG VAN DE BERICHTER VAN EEN FIETSSIMULATOR]**

M. Soede May 1977 53 p refs In DUTCH Prepared jointly

with Tech. Hogeschool, Delft

Avail: NTIS HC A04/MF A01

Experiments were performed using a bicycle simulator operated by a test person with mental capacity reduced by a binary choice task and the oral administration of alcohol. The visual evoked response was recorded before and after each session, and the ECG was measured during task execution to determine the overall task loading. A model was established for the test person to describe his behavior. Notwithstanding a large variability in results, a non-specific effect of alcohol upon behavior was noted, i.e., a deterioration in tracking and balancing. The binary choice task more specifically affects tracking. ESA

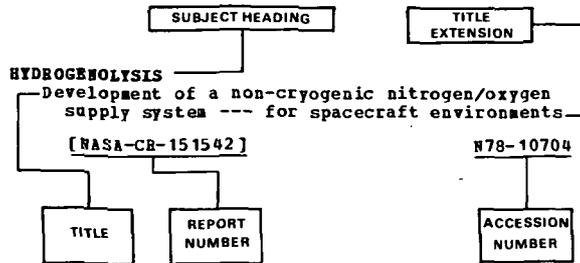
**N78-15704#** National Bureau of Standards, Washington, D. C.  
**THERMAL ANALYSIS; HUMAN COMFORT; INDOOR ENVIRONMENTS: PROCEEDINGS OF A SYMPOSIUM**  
**Final Report**

B. W. Mangum, ed. and J. E. Hill, ed. Sep. 1977 201 p refs  
Symp. held at Gaithersburg, Md., 11 Feb. 1977  
(PB-272862/4; NBS-SP-491; LC-77-12602) Avail: NTIS  
HC A10/MF A01 CSCL 05H

A symposium was sponsored by NBS for the purpose of exploring new aspects of indoor thermal environments caused by the impact of energy conservation in new and existing buildings. Topics covered included thermal and comfort, modelling human responses, and industrial heat stress monitoring. GRA

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## ALPHANUMERIC CHARACTERS

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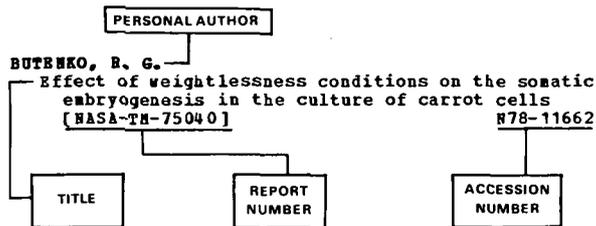
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