NASA SP-7011(297)

NASA

Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011(297)
May 1987

Aerospace Medicine & Biology

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A Continuing Bibliography with Indexes

Pages 83-98

May 1987

ACCESSION NUMBER RANGES

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

STAR (N-10000 Series)	N87-15160 — N87-16783
IAA (A-10000 Series)	A87-19611 — A87-23306

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NASA SP-7011(297)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 297)

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 April 1987 in

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

NASA Scientific and Technical Information Office 1987
National Aeronautics and Space Administration
Washington, DC

This supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, price code A03.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 89 reports, articles and other documents announced during April 1987 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA).* The first issue of the bibliography was published in July 1964.

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 by *STAR* categories 51 through 55, the Life Sciences division. 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. The *IAA* items will precede the *STAR* items within each category.

Seven indexes — subject, personal author, corporate source, foreign technology, contract, report number, and accession number — are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1987 Supplements.

Information on the availability of cited publications including addresses of organizations and NTIS price schedules is located at the back of this bibliography.

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TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED

ON MICROFICHE

ACCESSION NUMBER → **N87-11481*#** Umpqua Research Co., Myrtle Creek, Ore. ← CORPORATE SOURCE

TITLE → **A PROTOTYPE SPACE FLIGHT INTRAVENOUS INJECTION SYSTEM Final Report** ← PUBLICATION DATE

AUTHOR → G. V. COLOMBO May 1985 65 p ← AVAILABILITY SOURCE

(Contract NAS9-16337)

REPORT NUMBERS → (NASA-CR-171911; NAS 1.26:171911) Avail: NTIS HC A04/MF ← PRICE CODE

A01 CSCL 06E

COSATI CODE

Medical emergencies, especially those resulting from accidents, frequently require the administration of intravenous fluids to replace lost body liquids. The development of a prototype space flight intravenous injection system is presented. The definition of requirements, injectable concentrates development, water polisher, reconstitution hardware development, administration hardware development, and prototype fabrication and testing are discussed.

B.G.

TYPICAL JOURNAL ARTICLE CITATION AND ABSTRACT

NASA SPONSORED

ACCESSION NUMBER → **A87-11660*** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TITLE → **EFFECT OF ANTIGRAVITY SUIT INFLATION ON CARDIOVASCULAR, PRA, AND PVP RESPONSES IN HUMANS**

AUTHORS → S. E. KRAVIK, L. C. KEIL, G. GEELEN, C. E. WADE, P. R. BARNES

AUTHOR'S AFFILIATION → (NASA, Ames Research Center, Moffett Field; U.S. Army, Letterman Army Medical Center, San Francisco, CA) et al. Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Aug. 1986, p. 766-774. refs ← JOURNAL TITLE

← PUBLICATION DATE

The effects of lower body and abdominal pressure, produced by antigravity suit inflation, on blood pressure, pulse rate, fluid and electrolyte shift, plasma vasopressin and plasma renin activity in humans in upright postures were studied. Five men and two women stood upright for 3 hr with the suit being either inflated or uninflated. In the control tests, the suit was inflated only during the latter part of the trials. Monitoring was carried out with a sphygnomanometer, with sensors for pulse rates, and using a photometer and osmometer to measure blood serum characteristics. The tests confirmed earlier findings that the anti-g suit eliminates increases in plasma renin activity. Also, the headward redistribution of blood obtained in the tests commends the anti-g suit as an alternative to water immersion or bed rest for initial weightlessness studies.

M.S.K.

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 297)

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LIFE SCIENCES (GENERAL)

A87-20213#
FLIGHT RESULTS FROM THE BIORACK EXPERIMENTS ON THE SPACELAB D-1 MISSION
D. MESLAND (ESA, Special Projects Div., Noordwijk, Netherlands) ESA Bulletin (ISSN 0376-4265), no. 47, Aug. 1986, p. 32-38.

The Biorack experiments flown on the German Spacelab D-1 mission have provided striking evidence of the effects of gravity on bacteria, unicellular organisms, white blood cells and insect development. They have shed new light on the mechanisms of geotropism in plant roots. Two major biological fields, cell proliferation and cell differentiation, have emerged as being of particular importance and meriting further investigations. Author

A87-20497
RNA AS AN ENZYME
THOMAS R. CECH (Colorado, University, Boulder) Scientific American (ISSN 0036-8733), vol. 255, Nov. 1986, p. 64-69, 72-75.

The discovery that some RNAs can catalyze their own replication and that of other RNAs and can also assemble RNAs is reviewed. The splicing process involved in these transformations is described, showing the nature of the structures that participate. The types of RNAs in various organisms that self-splice are considered, and the evolutionary implications of the enzymatic activities of these RNAs are briefly addressed. Author

A87-20867
REGIONAL RELEASE OF CYCLOOXYGENASE PRODUCTS AFTER RADIATION EXPOSURE OF THE RAT
M. J. SCHNEIDKRAUT, P. A. KOT, P. W. RAMWELL, and J. C. ROSE (Georgetown University, Medical Center, Washington, DC) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1264-1269. refs
(Contract DAMD17-84-C-4006)

The effect of 4-h-long gamma irradiation of intact rats and of isolated, in situ perfused kidneys on the excretion of arachidonate metabolites of the cyclooxygenase pathway was evaluated using radioimmunoassay. In the intact rats, the radiation-induced increases in urine of immunoreactive thromboxane B2 (TxB2) were reduced to control levels by thoracic shielding. Irradiation of isolated kidneys did increase excretion of prostaglandin E2 and 6-keto-prostaglandin F-1-alpha, but not of TxB2, indicating that the increases in the excreted TxB2 affected by the whole-body irradiation were due to altered extrarenal synthesis and/or metabolism of this compound. I.S.

A87-20869
CONTROL OF ACTIVITY OF THE DIAPHRAGM IN RAPID-EYE-MOVEMENT SLEEP
LEWIS R. KLINE, JOAN C. HENDRICKS, RICHARD O. DAVIES, and ALLAN I. PACK (Pennsylvania, University, Philadelphia) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1293-1300. Research supported by the Philadelphia/Montgomery County American Lung Association. refs
(Contract NIH-HL-07163; NIH-HL-08805; NIH-HL-29596; NIH-NS-13110)

EEG, electrooculogram, and neck and diaphragm EMG records obtained on cats with implanted electrodes, were used to investigate the respiration rates during REM sleep (REMS). The inspiratory slopes during the slow-wave sleep and tonic REMS (when no eye movements were recorded) were similar. However, during phasic REMS, many breaths displayed either increases (excitation) or decreases (inhibition) in slope, compared with the tonic REMS. The occurrence of these altered slopes increased with the frequency of phasic events. I.S.

A87-20875
CLOSED-CIRCUIT METABOLIC SYSTEM WITH MULTIPLE APPLICATIONS
J. A. MOLNAR, J. J. CUNNINGHAM, S. MIYATANI, A. VIZULIS, J. D. WRIGHT (Massachusetts General Hospital; Harvard University, Boston; Environics Adaptive Technology, Newton, MA) et al. Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1582-1585. refs
(Contract NIH-GM-21700-11)

The design of an efficient and versatile closed-circuit metabolic system is described. The system includes a pressure sensor, electronic control unit for regulating air pressure within a closed chamber, and a liquid crystal display calculator. Compared with a standard indirect calorimetry system, the new device had improved precision during studies of O2 consumption both at room temperature and at 5 deg C. Some potential applications include maintenance of pressureand O2-controlled environments, exposure to toxic gases, and study of diurnal variations in metabolic rate in various species including humans. I.S.

A87-21171
STABLE ISOTOPE EVALUATION OF THE ORIGINS OF AMINO ACIDS IN FOSSILS
MICHAEL H. ENGEL (Oklahoma, University, Norman) and STEPHEN A. MACKO (Newfoundland, Memorial University, Saint John's, Canada) Nature (ISSN 0028-0836), vol. 323, Oct. 9, 1986, p. 531-533. Research supported by the Petroleum Research Fund. refs
(Contract NSF EAR-83-52055; NSERC-A-2644)

Laboratory experiments were carried out to evaluate the effects of racemization on the stable carbon and nitrogen isotopic compositions of amino acid enantiomers. The results indicate that after the death of an organism, low-temperature diagenetic reactions such as racemization should not cause a significant shift in the stable carbon or nitrogen isotopic compositions of the resultant D- and L-amino acid enantiomer products. Hence, a comparison of these enantiomers from individual amino acids isolated from fossils may provide a method for establishing the absolute indigeneity of these compounds. K.K.

A87-21324
EFFECTS OF HYPOXIA ON THE OPERANT BEHAVIOUR AND BRAIN CATECHOLAMINE IN RAT
IZO SAKURAI (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa) Japanese Journal of Aerospace and Environmental Medicine (ISSN 0387-0723), vol. 23, March 1986, p. 1-14. In Japanese, with abstract in English. refs

Changes in the catecholamine levels and avoidance behavior of rats treated with apomorphine and bromocriptine in normoxic and hypoxic environments are analyzed. Alterations in norepinephrine and dopamine concentrations following exposure to oxygen and treatment with bromocriptine are described. The data reveal that: (1) avoidance behavior is suppressed as oxygen concentration is lowered below 12 percent; (2) resistance to extinction in a hypoxic environment is decreased; (3) following electric shock intensity reduction, the negative behavior contrast is not obtained in the hypoxic environment; however, it is observed in the normoxic environment; and (4) bromocriptine improves the suppression of avoidance behavior of rats under hypoxic conditions and apomorphine has no effect. I.F.

A87-21325
THERMAL BALANCE DURING INTRAPERITONEAL ELECTRIC HEATING AT VARIOUS AMBIENT TEMPERATURES IN RATS
OSAMU SHIDO and TETSUO NAGASAKA (Kanazawa University, Japan) Japanese Journal of Aerospace and Environmental Medicine (ISSN 0387-0723), vol. 23, June 1986, p. 27-32. refs

The effect of a given internal heat load on thermal balance was examined in rats with direct and indirect calorimetry at ambient temperatures (Ta) 18, 24, and 28 C. The internal heat was loaded by an intraperitoneal electric heater implanted chronically. The threshold of hypothalamic temperature (Thy) for tail skin vasodilation was lowered as Ta increased. The total heat loss, the total body thermal conductance, and heat storage over Thy during internal heating increased as Ta decreased. The energy required to raise core temperature by 1 C were 16.41 + or - 4.20, 7.73 + or - 0.54, and 5.03 + or 0.31 J/g at Ta 18, 24, and 28 C, respectively. Author

A87-21428
HYPOXIA-INDUCED ENDOTOXEMIA IN PRIMATES - ROLE OF RETICULOENDOTHELIAL SYSTEM FUNCTION AND ANTI-LIPO-POLYSACCHARIDE PLASMA
S. L. GAFFIN, J. G. BROCK-UTNE, A. ZANOTTI, and M. T. WELLS (Natal, University, Durban, Republic of South Africa) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1044-1049. Research supported by the South African Chamber of Mines and National Cancer Association. refs

A87-21430
A HEAT-STRESSED RAT MODEL TO DETERMINE RELATIVE ANTICHOLINERGIC AND ANTICHOLINESTERASE DRUG POTENCY
CANDACE B. MATTHEW, ROGER W. HUBBARD, and RALPH P. FRANCESCONI (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1061-1065. refs

Matthew et al. have previously reported that atropine, the prototype of muscarinic anticholinergic drugs, elicits a dose-dependent increase in core temperature of heat-stressed rats. In the present study, the effects of other anticholinergic drugs on increments in core temperature were quantified, and the following potencies relative to atropine were derived: imipramine 0.004, amitriptyline 0.02, chlorpromazine 0.1, atropine 1, L-hyoscyamine 2, atropine methyl nitrate 4, and scopolamine 16. Additionally, the efficacy of carbamates to reduce the elevated heating rate of atropinized rats was quantified as a measure of anticholinesterase efficiency. The results indicated the following relative potencies: neostigmine 8, physostigmine 2, and pyridostigmine 1. It was concluded that alterations in core temperature responses to exposure to hot environments may be a useful and sensitive bioassay for anticholinergic and anticholinesterase alloy. Author

A87-21431* Tulane Univ., Covington, La.
EFFECT OF MACULAR ABLATION ON FREQUENCY AND LATENCY OF MOTION-INDUCED EMESIS IN THE SQUIRREL MONKEY
KENNETH R. BRIZZEE (Tulane University, Covington, LA) and MAKOTO IGARASHI (Baylor College of Medicine, Houston, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1066-1070. refs
(Contract NAG2-101; NAG2-289; NIH-RR-00164; NIH-NS-10940)

Three previously motion-emetic sensitive squirrel monkeys were rendered refractory to a standard motion-emetic regimen by a two-stage utriculosacculectomy procedure which preserved the cristae ampullares of semicircular canals. Three nonoperated control squirrel monkeys tested on the same motion-emetic regimen time schedule as the operated animals remained motion-emetic sensitive with regard to incidence, frequency, and latency of motion-induced emetic responses. Following a sham surgical procedure (stapedectomy) performed on two of the latter animals and one additional new animal, the emetic incidence decreased from 100 to 89 percent, but the frequency and latency were not altered significantly. Author

A87-21432* Baylor Coll. of Medicine, Houston, Tex.
VESTIBULAR-VISUAL CONFLICT IN PITCH AND YAW PLANES IN THE SQUIRREL MONKEY
MAKOTO IGARASHI, WALTER B. KULECZ, KAZUTOYO KOBAYASHI, and HIDEMITSU ISAGO (Baylor College of Medicine, Houston, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1071-1074. refs
(Contract NAG2-289)

Direction conflicting vestibular and visual (optokinetic) stimuli either in the pitch or yaw plane were given to squirrel monkey subjects. The conflict sickness symptom score in the pitch plane was significantly higher than that in the yaw plane for the initial exposure session (p less than 0.01). A significant score difference was also encountered when the exposure sessions were repeated (p less than 0.05). Author

A87-21800
CYTOMORPHOLOGY AND ULTRASTRUCTURE OF THE MAIZE ROOT MERISTEM IN WEIGHTLESSNESS [TSITOMORFOLOGIIA I UL'TRASTRUKTURA KORNEVOI MERISTEMY KUKURUZY V NEVESOMOSTI]
M. G. TAIRBEKOV, V. G. GRIF, E. M. BARMICHEVA, and E. M. VALOVICH (Institut Mediko-Biologicheskikh Problem, Moscow; AN SSSR, Botanicheskii Institut, Leningrad, USSR) Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia (ISSN 0002-3329), Sept.-Oct. 1986, p. 680-687. In Russian. refs

The root meristem cells of maize seedlings grown in weightlessness aboard the Cosmos-1515 biosatellite were examined using light microscopy and electron microscopy. Major cytological and ultrastructural characteristics, and the features of morphogenesis of the space-grown seedlings were compared with those of the control cultures. The results indicate that weightlessness and other space flight factors had no significant effect on the structural and morphogenetic characteristics of the experimental cultures. I.S.

A87-21840
STUDIES OF LITHIUM AEROSOLS THAT COULD BE RELEASED IN ACCIDENTS INVOLVING SPACE NUCLEAR SYSTEMS
MICHAEL D. ALLEN, ALAN H. REBAR, BERNARD J. GREENSPAN, and MARK D. HOOVER (Lovelace Inhalation Toxicology Research Institute, Albuquerque, NM) IN: Space nuclear power systems 1985; Proceedings of the Second Symposium, Albuquerque, NM, Jan. 14-16, 1985. Volume 4 . Malabar, FL, Orbit Book Co., Inc., 1987, p. 367-381. refs
(Contract DE-AC04-76EV-01013)

The potential health hazards of accidents involving the lithium employed in space power systems are presently assessed by means of a lithium aerosol-generating system in which the metal is inductively heated to as much as 1300 C and dispersed by argon gas into a chamber where it is burned in air. The intense

white flame thus produced generates branched-chain condensation aerosol particles. Rats have been exposed to 4 hr of breathing atmospheres contaminated by these aerosols at various concentrations; histopathologic lesions were observed in the nasal turbinates, larynx, and lungs of these animals. The pulmonary lesions were a secondary extension of the upper respiratory tract lesions. O.C.

A87-21862
THE INFLUENCE OF THE VESTIBULAR APPARATUS ON THE VISUAL ANALYZER [VLIIANIE VESTIBULIARNOGO APPARATA NA ZRITEL'NYI ANALIZATOR]
V. F. MESHMAN Moscow, Izdatel'stvo Nauka, 1986, 112 p. In Russian. refs

Evidence is presented for the influence of vestibular activity on the visual system, using measurements of the biopotentials evoked in various regions of the visual system by stimulation of the vestibular system, as well as of the changes effected by vestibular stimuli in the visual system responses to visual stimuli. The changes in the bioelectric activity of the retina and optic nerve, corpora quadrigemina, the outer geniculate body, and the optic zone of the cortex observed after application of physical stresses or electric stimuli to the vestibular apparatus are considered. The mechanisms of the vestibulooptic interactions and the physiological significance of the vestibular influence are discussed. I.S.

A87-22768
EFFECTS OF CHRONIC CONTINUOUS WAVE MICROWAVE RADIATION (2.45 GHZ) ON THE FORAGING BEHAVIOR OF THE WHITE-THROATED SPARROW
FRED E. WASSERMAN, DEBORAH A. PATTERSON, THOMAS H. KUNZ (Boston University, MA), SAM P. BATTISTA (Arthur D. Little, Inc., Cambridge, MA), and DAVID BYMAN (Pennsylvania State University, Dunmore) Space Power (ISSN 0883-6272), vol. 6, 1986, p. 99-105. Research supported by the Boston University, Manomet Bird Observatory and DOE. refs
(Contract EPA-68-02-3278)

To determine possible environmental effects of the Satellite Solar Power System, the effect of chronic continuous microwave radiation on the foraging behavior of the white-throated sparrow was studied using an optimal foraging laboratory technique. Exposure to microwaves at the proposed frequency of 2.45 GHz for seven days at power densities of 0.0, 0.1, 1.0, 10.0 and 25.0 mW/sq cm did not result in foraging behavior trends for a dose response effect. No significant differences in the foraging behaviors for these birds was noted among preexposure, exposure, and postexposure periods under the temperature and humidity conditions of the study. R.R.

N87-15678*# National Aeronautics and Space Administration, Washington, D.C.
REFERENCE MISSION OPERATIONAL ANALYSIS DOCUMENT (RMOAD) FOR THE LIFE SCIENCES RESEARCH FACILITIES
Jan. 1987 215 p
(NASA-TM-89604; NAS 1.15:89604) Avail: NTIS HC A10/MF A01 CSCL 06C

The space station will be constructed during the next decade as an orbiting, low-gravity, permanent facility. The facility will provide a multitude of research opportunities for many different users. The pressurized research laboratory will allow life scientists to study the effects of long-term exposure to microgravity on humans, animals, and plants. The results of these studies will increase our understanding of this foreign environment on basic life processes and ensure the safety of man's long-term presence in space. This document establishes initial operational requirements for the use of the Life Sciences Research Facility (LSRF) during its construction. Author

N87-15679*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENCES DIGEST, ISSUE 9
LYDIA RAZRAN HOOKE, MIKE RADTKE, RONALD TEETER, and JOSEPH E. ROWE (Library of Congress, Washington, D. C.) Washington NASA Jan. 1987 109 p
(Contract NASW-3676)
(NASA-CR-3922(10); NAS 1.26:3922(10)) Avail: NTIS HC A06/MF A01 CSCL 06B

This is the ninth issue of NASA's USSR Space Lifes Sciences Digest. It contains abstracts of 46 papers recently published in Russian language periodicals and bound collections and of a new Soviet monograph. Selected abstracts are illustrated with figures and tables from the original. Additional features include reviews of a Russian book on biological rhythms and a description of the papers presented at a conference on space biology and medicine. A special feature describes two paradigms frequently cited in Soviet space life sciences literature. Information about English translations of Soviet materials available to readers is provided. The abstracts included in this issue have been identified as relevant to 28 areas of aerospace medicine and space biology. These areas are: adaptation, biological rhythms, body fluids, botany, cardiovascular and respiratory systems, developmental biology, endocrinology, enzymology, equipment and instrumentation, gastrointestinal system, genetics, habitability and environment effects, hematology, human performance, immunology, life support systems, mathematical modeling, metabolism, microbiology, morphology and cytology, musculoskeletal system, nutrition, neurophysiology, operational medicine, perception, personnel selection, psychology, radiobiology, and space biology and medicine. Author

N87-15680# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.
INHALATION TOXICOLOGY. PART 7: TIMES TO INCAPACITATION AND DEATH FOR RATS EXPOSED CONTINUOUSLY TO ATMOSPHERIC ACROLEIN VAPOR Technical Report, Oct. 1982 - Jul. 1983
CHARLES R. CRANE, DONALD C. SANDERS, BOYD R. ENDECOTT, and JOHN K. ABBOTT May 1986 27 p
(AD-A169666; FAA/AM-86/5) Avail: NTIS HC A03/MF A01 CSCL 06T

Acrolein, an organic aldehyde ($CH_2{=}CH{-}CHO$), is extremely irritating to the respiratory passages at very low concentrations. It is known to be present in the smoke from certain materials used in aircraft cabin interiors and could contribute, therefore, to an individual's failure to escape from a burning aircraft. In order to assess acrolein's ability to produce physical incapacitation in a mammal, laboratory rats were exposed continuously to measured atmospheric concentrations of acrolein vapor until they expired. The exposure time required to produce lethality was measured, as was the time at which physical incapacitation occurred. Incapacitation was defined operationally as loss of the ability to walk in a motor-driven wheel, which was enclosed in the exposure chamber. Dose-response curves were generated by equating these two endpoints, time-to-incapacitation and time-to-death, to the atmospheric acrolein concentration via statistically derived regression equations. Experimental results suggest that the acrolein dose that will produce physical incapacitation could be 10 to 100 times greater than has been predicted in the past. The possible relationship between the effective toxic doses of acrolein for rats, and those required for humans, is discussed. GRA

N87-16503*# Management and Technical Services Co., Washington, D.C.
USSR SPACE LIFE SCIENES DIGEST, INDEX TO ISSUES 5-9
LYDIA RAZRAN HOOKE Washington NASA Jan. 1987 112 p
(Contract NASW-3676)
(NASA-CR-3922(11); NAS 1.26:3922(11)) Avail: NTIS HC A06/MF A01 CSCL 06B

An index to issues 5 through 9 of the USSR Space Life Sciences Digest is provided in two sections. The first section lists bibliographic citations of abstracts contained in the Digest issues

covered, grouped by topic area categories. Cross references to other relevant abstracts in different categories are also provided. The second section provides a key word index for the same set of abstracts. Author

N87-16504*# National Aeronautics and Space Administration, Washington, D.C.
LIFE SCIENCES SPACE STATION PLANNING DOCUMENT: A REFERENCE PAYLOAD FOR THE EXOBIOLOGY RESEARCH FACILITIES
Feb. 1987 62 p
(NASA-TM-89606; NAS 1.15:89606) Avail: NTIS HC A04/MF A01 CSCL 06B

The Cosmic Dust Collection and Gas Grain Simulation Facilities represent collaborative efforts between the Life Sciences and Solar System Exploration Divisions designed to strengthen a natural exobiology/Planetary Sciences connection. The Cosmic Dust Collection Facility is a Planetary Science facility, with Exobiology a primary user. Conversely, the Gas Grain Facility is an exobiology facility, with Planetary Science a primary user. Requirements for the construction and operation of the two facilities, contained herein, were developed through joint workshops between the two disciplines, as were representative experiments comprising the reference payloads. In the case of the Gas Grain Simulation Facility, the astrophysics Division is an additional potential user, having participated in the workshop to select experiments and define requirements. Author

N87-16505# SRI International Corp., Menlo Park, Calif. Life Sciences Div.
NEUROPHYSIOLOGICAL BASES OF EVENT-RELATED POTENTIALS Annual Report, 1 May 1985 - 30 Apr. 1986
CHARLES S. REBERT 8 Aug. 1986 66 p
(Contract F49620-82-K-0016)
(AD-A172995; AFOSR-86-0910TR; AR-4) Avail: NTIS HC A04/MF A01 CSCL 06C

In order to more fully understand the physiological and psychological significance of event-related brain potentials, cortical and subcortical recordings were obtained from monkeys performing an operant conditioning task (cued reaction time). During the past year three cynomolgus monkeys were studied following the administration of MPTP, a drug that selectively destroys nigra-striatal dopaminergic neurons in the pars compacta of the substantia nigra. This manipulation indicated the critical role of the nigra-striatal dopamine for task performance enhancement would be to determine if increasing nigra-striatal dopaminergic activity would enhance performance and electrophysiological responsivity. GRA

N87-16506# Desmatics, Inc., State College, Pa.
STATISTICAL IMPACT ACCELERATION INJURY PREDICTION MODELS BASED ON -G SUB X ACCELERATOR DATA
CARL A. MAURO, KEVIN C. BURNS, and DENNIS E. SMITH Oct. 1986 48 p
(Contract N00014-85-C-0846)
(AD-A173720; TR-126-1) Avail: NTIS HC A03/MF A01 CSCL 06Q

Since 1974, the Naval Biodynamics Laboratory (NBDL) has collected, as part of its research effort on acceleration impact injury prevention, an extensive data base from -G sub x accelerator runs on Rhesus subjects. Over this time period, Desmatics, Inc. has been actively involved in the development of statistically based models to predict injury in Rhesus subjects resulting from indirect head/neck impact acceleration in the -X direction. The objectives of the present technical report are: (1) to summarize, update, and consolidate the Desmatics modeling efforts for fatal injury; (2) to investigate extending the injury prediction models to include nonfatal injury criteria; and (3) to evaluate the accuracy and validity of the prediction models obtained in the modeling efforts. GRA

N87-16507# Veterans Administration Hospital, Loma Linda, Calif.
TISSUE INTERACTIONS WITH NONIONIZING ELECTROMAGNETIC FIELDS Final Report, Mar. 1979 - Feb. 1986
W. R. ADEY, S. M. BAWIN, C. V. BYUS, C. D. CAIN, S. LIN-LIU, R. A. LUBEN, D. B. LYLE, P. M. SAGAN, A. R. SHEPPARD, and M. A. STELL Aug. 1986 21 p Prepared in cooperation with Loma Linda Univ., Calif. and California Univ., Riverside
(Contract DE-AI01-79ET-29078)
(DE86-014715; DOE/ET-29078/T2) Avail: NTIS HC A02/MF A01

This report provides an overview of this research program focused on basic research in nervous system responses to electric fields at 60 Hz. The emphasis in this project was to determine the fundamental mechanisms underlying some phenomena of electric field interactions in neural systems. The five studies of the initial program were tests of behavioral responses in the rat based upon the hypothesis that electric field detection might follow psychophysical rules known from prior research with light, sound and other stimuli; tests of electrophysiological responses to normal forms of stimulation in rat brain tissue exposed in vitro to electric fields, based on the hypothesis that the excitability of brain tissue might be affected by fields in the extracellular environment; tests of electrophysiological responses of spontaneously active pacemaker neurons of the Aplysia abdominal ganglion, based on the hypothesis that electric field interactions at the cell membrane might affect the balance among the several membrane-related processes that govern pacemaker activity; studies of mechanisms of low frequency electromagnetic field interactions with bone cells in the context of field therapy of united fractures; and manipulation of cell surface receptor proteins in studies of their mobility during EM field exposure. DOE

N87-16508# Arizona Univ., Tucson. Dept. of Biochemistry.
MECHANISMS OF ENERGY CONVERSION BY CHLOROPHYLL Technical Progress Report, 1 Mar. 1983 - 1 Jan. 1986
G. TOLLIN 1986 7 p
(Contract DE-AC02-78ER-04927)
(DE87-000753; DOE/ER-04927/17) Avail: NTIS HC A02/MF A01

Studies to elucidate the detailed mechanisms of light-induced one-electron transfer reactions involving chlorophyll and electron donors and acceptors in lipid bilayer vesicles are reported. The interactions between the elementary steps in these processes and parameters such as bilayer viscosity, surface electrical charge, and donor and acceptor structure are described. A body of fundamental information which can be used to devise strategies for increasing the yields of the high energy products of such reactions, to physically separate these products so as to decrease the probability of reverse electron transfer (i.e., back reaction), and to facilitate secondary electron transfer to external donors and acceptors were sought. Such information should prove useful in the development of biomimetic systems for practical solar energy conversion based on green plant photosynthesis. DOE

52

AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

A87-20868
OCCLUSION PRESSURE AND VENTILATION DURING SLEEP IN NORMAL HUMANS

DAVID P. WHITE (Pennsylvania State University, Hershey) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1279-1287. Research supported by the Pennsylvania Lung Association. refs
(Contract NIH-HL-01316; NIH-AG-04491)

Occlusion pressures (P01) and ventilation were measured in men and women (some of whom were snorers) during wakefulness and NREM and REM sleep under conditions of unstimulated ventilation and rebreathing-induced hypercapnia. During both NREM and REM sleep, ventilation was reduced in all groups (but more so in snorers than in nonsnorers), while the unstimulated P01 was maintained or increased. The ventilatory response to hypercapnia fell during both NREM and REM, while the P01 response to hypercapnia was reduced during REM, but not during NREM, sleep. The results suggest that the mechanism of the reduction in ventilation and the hypercapnic ventilatory response is likely to be multifactorial and not totally a product of decreasing central respiratory drive. I.S.

A87-20870
PLASMA ADRENOCORTICOTROPIN AND CORTISOL RESPONSES TO BRIEF HIGH-INTENSITY EXERCISE IN HUMANS
MICHAEL J. BUONO, JOHN E. YEAGER, and JAMES A. HODGDON (San Diego State Heart Institute; U.S. Naval Health Research Center, San Diego, CA) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1337-1339. refs
(Contract NAVY ORDER M0096-PN001-1050)

The effect of 1-min-long high-intensity exercise (on a cycle ergometer at 120 percent maximum O2 uptake) on plasma levels of cortisol and adrenocorticotropin (ACTH) was investigated. Blood samples were collected at rest and at 5, 15, and 30 min after the exercise. Following exercise, mean plasma ACTH levels increased immediately (and briefly), while the cortisol levels increased at 15 min postexercise. The observed temporal sequence suggests that the increase in plasma cortisol is the result of ACTH-induced steroidogenesis in the adrenal cortex. I.S.

A87-20871
INFLUENCE OF CENTRAL VENOUS PRESSURE CHANGE ON PLASMA VASOPRESSIN IN HUMANS
PETER NORSK, FLEMMING BONDE-PETERSEN, and JORGEN WARBERG (Copenhagen, University, Denmark) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1352-1357. Sponsorship: Danish Space Board. refs
(Contract DSB-1112-13/84; DSB-1112-19/84; DSB-1112-33/84; DSB-1112-34/84)

Simultaneous changes in central venous pressure (CVP) and plasma arginine vasopressin (AVP) were examined before, during, and after lower body positive pressure (LBPP) or lower body negative pressure (LBNP) was applied to induce graded changes in central blood volume. It was found that in spite of large changes in the CVP and significant changes in blood volume and in esophageal pressure observed as a result of LBPP and/or LBNP applications, the values of plasma AVP did not change significantly as a result of either the LBPP or the LBNP. It is concluded that cardiopulmonary mechanoreceptors in humans do not play a major role in regulation of AVP secretion during short-term changes in CVP. I.S.

A87-20872* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECT OF HYDRATION ON PLASMA VOLUME AND ENDOCRINE RESPONSES TO WATER IMMERSION
M. H. HARRISON, L. C. KEIL, C. A. WADE, J. E. SILVER, G. GEELEN (NASA, Ames Research Center, Moffett Field, CA) et al. Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1410-1417. refs

The effect of hydration status on early endocrine responses and on osmotic and intravascular volume changes during immersion was determined in humans undergoing successive periods of dehydration, immersion, rehydration, and immersion. Immersion caused an isotonic expansion of plasma volume, as well as suppression of plasma renin activity and aldosterone, which all occurred independently of hydration status. On the other hand, the concentration of plasma vasopressin (PVP) was found to decrease during dehydrated immersion, but not during rehydrated immersion. It is concluded that plasma tonicity is not a factor influencing PVP suppression during water immersion. I.S.

A87-20873
INDUCTION OF PERIODIC BREATHING DURING SLEEP CAUSES UPPER AIRWAY OBSTRUCTION IN HUMANS
ERGUN ONAL, DONALD L. BURROWS, ROBERT H. HART, and MELVIN LOPATA (Illinois, University Hospital; USVA, West Side Medical Center, Chicago, IL) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1438-1443. U.S. VA-supported research. refs

To test the hypothesis that periodic breathing predisposes upper airways to collapse, periodic breathing was induced in normal human subjects during NREM sleep by administering hypoxic mixtures of O2 and N2. In periodically breathing subjects, the nadir of periodic changes in tidal volume, V(T), corresponded with the highest pulmonary resistance (Rp); there was a significant linear relationship between Rp and 1/V(T), indicating the development of obstructive hypopneas. It is concluded that periodic breathing resulting in periodic diminution of upper airway muscle activity is associated with increased upper airway resistance that predisposes upper airways to collapse. I.S.

A87-20874
NITROGEN GAS EXCHANGE IN THE HUMAN KNEE
P. K. WEATHERSBY, P. MEYER, E. T. FLYNN, L. D. HOMER, and S. SURVANSHI (U.S. Navy, Naval Medical Research Institute, Bethesda, MD; California, University, Livermore) Journal of Applied Physiology (ISSN 0161-7567), vol. 61, Oct. 1986, p. 1534-1545. Navy-supported research. refs

Human decompression sickness is presumed to result from excess inert gas in the body when ambient pressure in reduced. Although the most common symptom is pain in the skeletal joints, no direct study of nitrogen exchange in this region has been undertaken. For this study, nitrogen tagged with radioactive N-13 was prepared in a linear accelerator. Nine human subjects rebreathed this gas from a closed circuit for 30 min, then completed a 40- to 100-min washout period breathing room air. The isotope N-13 was monitored continuously in the subject's knee during the entire period using positron detectors. The concentration in most knees continued to rise for at least 30 min into the washout period. Various causes of this unexpected result are discussed, the most likely of which is an extensive redistribution of gas within avascular knee tissues. Author

A87-21427
EFFECT OF INSPIRATORY VOLUME ON INTRATHORACIC PRESSURE GENERATED BY AN L-1 MANEUVER
RICHARD COTE, LLOYD TRIPP, TOM JENNINGS, ALVA KARL, CHUCK GOODYEAR (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH) et al. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1035-1038. refs

Since each muscle has an optimal length at which it can generate the maximum tension, an optimal inspiratory volume may exist for producing the maximum intrathoracic pressure during the

L-1 maneuver. Intrathoracic pressures were measured in eight healthy men after they inspired various volumes of air and performed the L-1 straining maneuver in a 1-G environment. Both the peak and mean intrathoracic pressures increased at greater inspiratory volumes, except for the mean intrathoracic pressure at the highest volumes. The ability to increase intrathoracic pressure with large inspiratory volumes may improve +Gz tolerance.
Author

A87-21429
EFFECTS OF ATROPINE ON THERMOREGULATORY RESPONSES TO EXERCISE IN DIFFERENT ENVIRONMENTS
BRUCE S. CADARETTE, LESLIE LEVINE, PAUL B. ROCK, LOU A. STEPHENSON, and MARGARET A. KOLKA (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1050-1055. refs

The effect of atropine on the thermoregulatory responses of humans exercising in three environments: hot-dry (HD), warm-moderate (WM), and warm-wet (WW), which provided similar heat stress but different evaporative capacities, was investigated. Atropine-induced increases in the Tsk and heart rate and decreases in the whole body sweating rate were the largest in the HD group, while an elevated rectal temperature and significantly reduced exercise time were recorded only in HD. The results indicate that the whole body sweating rate depression had its greatest effect in HD, whre evaporation was critical to heat dissipation; in WW and MW, sensible heat loss accounted for a greater portion of heat exchange. I.S.

A87-21434* University of South Florida, Tampa.
THERMOREGULATORY RESPONSES TO HEAT AND VIBRATION IN MEN
W. A. SPAUL (South Florida, University, Tampa, FL), R. C. SPEAR (California, University, Berkeley), and J. E. GREENLEAF (NASA, Ames Research Center, Moffett Field, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1082-1087. refs

The effect of vibration on thermoregulatory responses was studied in heat-acclimated men exposed suddenly to simultaneous heat and whole body vibrations (WBVs) at two intensity levels, each at graded frequencies between 5 and 80 Hz. The mean rectal temperature (Tre) became elevated more quickly in the WBV exposures than in the controls (heat exposure alone). Both intensity- and frequency-dependent WBV relationships were recorded in localized blood flows and in sweat rates. Thus, vibration appears to reduce the efficiency of the cooling mechanisms during a heat exposure. I.S.

A87-21436
DECOMPRESSION SICKNESS INCIDENCE OVER 63 MONTHS OF HYPOBARIC CHAMBER OPERATION
STEPHEN PIWINSKI, JOHN MILLS, ROBERT CASSINGHAM, ARTHUR SIPPO, ROBERT MITCHELL (U.S. Army, School of Aviation Medicine, Fort Rucker, AL) et al. Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1097-1101. refs

U.S. Army hypobaric chamber operations over a 63-month period were retrospectively reviewed, and incidence rates for decompression sickness were calculated. The overall incidence rate was 1.38/1000 exposures. The rate for interior technicians monitoring chamber operations was 6.16/1000 exposures. The rate for students was 0.64/1000 exposures. The increased incidence of decompression sickness for technicians was especially pronounced for the 10,668-m and 13,106-m flight profiles. Rapid decompression after the 7,620-m flight profile did not appear to increase the incidence of decompression sickness. Author

A87-21924
MOTION ARTIFACT FROM SPOT AND BAND ELECTRODES DURING IMPEDANCE CARDIOGRAPHY
MINGHAI QU (Shandong University, Jinan, People's Republic of China), YUJIAN ZHANG (Shanghai University of Science and Technology, People's Republic of China), JOHN G. WEBSTER, and WILLIS J. TOMPKINS (Wisconsin, University, Madison) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-33, Nov. 1986, p. 1029-1036. refs

Impedance cardiography for monitoring cardiac output during stress tests was modified. Employing an off-line microcomputer, the instrument ensemble averaged impedance signals to minimize the effect of motion artifacts. A new four-spot electrode array was proposed to replace the usual encircling band electrode array. Ten normal subjects were tested, and the signal-to-noise ratio from the spot electrode array was compared to that from a typical band electrode array at rest and during four levels of exercise on a treadmill. The average of the signal-to-noise ratios for ten subjects from the spot electrode array was 13.6-45.5 percent larger than that from the band electrode array at rest and during four levels of exercise. Author

A87-21925
CARDIAC OUTPUT MONITORING BY IMPEDANCE CARDIOGRAPHY DURING TREADMILL EXERCISE
YUJIANG ZHANG (Shanghai University of Science and Technology, People's Republic of China), MINGHAI QU (Shandong University, Jinan, People's Republic of China), JOHN G. WEBSTER, WILLIS J. TOMPKINS, B. ANN WARD (Wisconsin, University, Madison) et al. IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-33, Nov. 1986, p. 1037-1042. refs

Impedance cardiography for monitoring cardiac output during stress tests was modified. An ensemble-averaging technique was adapted for eliminating motion artifacts. An array consisting of four spot ECG electrodes was applied for impedance cardiogram (ICG) monitoring and compared to conventional encircling band electrodes. Ten normal adults were tested, comparing the cardiac output obtained by the ICG monitoring system to that simultaneously obtained by the carbon dioxide rebreathing method at rest and during three levels of treadmill exercise. The results show that the correlation coefficient between the spot electrode ICG and the CO2 rebreathing method is 0.90, and that between the band electrode ICG and the CO2 rebreathing method is 0.96. If the peak-to-valley height of dZ/dt is used instead of the peak height of dZ/dt in computing cardiac output, the correlation coefficient between the spot electrode ICG and the CO2 rebreathing method can be improved to reach the value of 0.95.
Author

N87-15681*# Johns Hopkins Univ., Baltimore, Md. School of Public Health.
BEDREST IN HEALTHY WOMEN: EFFECTS OF MENSTRUAL FUNCTION AND ORAL CONTRACEPTIVES Final Report
SUZANNE M. FORTNEY, WILLIAM B. BECKETT (Yale Univ., New Haven, Conn.), NEIL B. VROMAN (New Hampshire Univ., Durham), JOHN DAVIS, JOHN ROCK, ALLYN KIMBELL, NORMAN LAFRANCE, and HELEN DREW 1986 160 p
(Contract NAS9-16703; NAS9-17199)
(NASA-CR-171946; NAS 1.26:171946) Avail: NTIS HC A08/MF A01 CSCL 06P

With the development of the space shuttle program, space flight for the first time is available to individuals who have not been specially selected and trained to be astronauts. In addition, women are being actively recruited into the space program, both as mission specialists and as career astronauts. One purpose of this project was to examine some of the physiological responses of women to a simulated weightlessness program (12 day horizontal bedrest), to compare their responses to those reported in men during similar programs, and to test whether menstrual function might alter some of the physiological changes which occur during bedrest, specifically changes in the plasma volume, exercise tolerance, and venous compliance before and after bedrest.
E.R.

N87-15682*# Vacumetrics, Inc., Ventura, Calif. VacaMed Div.
A NEW APPROACH TO NON-INVASIVE OXYGENATED MIXED VENOUS PCO(SUB)2 Final Report
JOSEPH A. FISHER (Toronto Univ., Ontario) and CLIFFORD A. ANSEL 31 Mar. 1986 79 p
(Contract NAS9-17516)
(NASA-CR-171949; NAS 1.26:171949) Avail: NTIS HC A05/MF A01 CSCL 06E

A clinically practical technique was developed to calculate mixed venous CO2 partial pressure for the calculation of cardiac output by the Fick technique. The Fick principle states that the cardiac output is equal to the CO2 production divided by the arterio-venous CO2 content difference of the pulmonary vessels. A review of the principles involved in the various techniques used to estimate venous CO2 partial pressure is presented. B.G.

N87-15683*# North Carolina Univ., Chapel Hill.
BIOCHEMICAL CHANGES IN BONE IN A MODEL OF WEIGHTLESSNESS Technical Report - 1 Jan. - 31 Dec. 1986
GERALD L. MECHANIC 1986 10 p
(Contract NAG2-181)
(NASA-CR-180095; NAS 1.26:180095) Avail: NTIS HC A02/MF A01 CSCL 06S

The amounts of nonmineralized and mineralized collagen in bone from control, immobilized, and immobilized reambulated monkeys were examined. In order to understand structure function relationships of bone collagen and the reponse of a variety of conditions on control of the three dimensional structure of the collagen fibril, the stereochemistry of the cross-linking reactions as well as the stereospecific packing of the collagen molecules were studied. B.G.

N87-15684# New York Univ. Medical Center. Dept. of Ophthalmology.
INTRACORTICAL INTERACTIONS IN VISUAL PROCESSING Final Report
JEREMIAH I. NELSON May 1986 24 p
(Contract N62269-83-M-3126)
(AD-A169674; NADC-86066-60) Avail: NTIS HC A02/MF A01 CSCL 06P

Microelectrodes were used to record responses from single cells in the visual system of cats, at the level of the visual cortex. Interactions were discovered and measured between the cell under study and neighboring cells, when these neighbors were stimulated with large patterns. The interactions obey specific rules. It is argued that these rules are ideal for separating and strengthening the neural response to one object from the response of myriad other neurons to a cluttered background. The next step in this project will be multielectrode array studies to isolate and identify the neurons participating in these interactions. GRA

N87-15685# School of Aerospace Medicine, Brooks AFB, Tex.
G-TOLERANCE STANDARDS FOR AIRCREW TRAINING AND SELECTION Final Report, Jan. 1977 - Mar. 1986
KENT K. GILLINGHAM May 1986 9 p
(AD-A170441; USAFSAM-TR-86-12) Avail: NTIS HC A02/MF A01 CSCL 06N

G tolerance varies widely among individuals. To assure that aircrew with abnormally low G tolerance are not assigned to aircraft that operate in the high-G environment, a G-tolerance standard and the means to implement that standard are necessary. Since 1977 the USAF SAM has used, in human centrifuge operations, an informal G-tolerance standard for selecting experimental subjects, evaluating medically disqualified aircrew, and ensuring efficacy of high-G training for aircrew. That standard consists of the subject's being able to sustain for 15 s a rapidly applied +7-G sub z load, without totally losing peripheral vision or losing consciousness, while wearing a functioning anti-G suit, performing an anti-G straining maneuver, and sitting in a conventionally configured fighter aircraft seat. Inability to tolerate a 7-G, 15-s, rapid-onset G profile in a centrifuge is also the basis of internationally recognized (NATO, ASCC) definitions of low G tolerance. The rationale for choosing the 7-G, 15-s standard is discussed. Experience with use of this standard and the equivalent standard of 8 G for 15 s when the F-16-configured seat is used reveals that fewer than 1% of actively flying fighter aircrew are unable to meet the standard. GRA

N87-15686# California Univ., Irvine. Dept. of Community and Environmental Medicine.
EXPLORATORY STUDY OF THE POTENTIAL EFFECTS OF EXPOSURE TO SONIC BOOM ON HUMAN HEALTH. VOLUME 2: EPIDEMIOLOGICAL STUDY Final Report, Nov. 1984 - May 1986
H. ANTON-GUIRGIS, B. D. CULVER, S. WANG, and T. H. TAYLOR Jun. 1986 174 p Prepared in cooperation with California Univ., Irvine
(Contract F33615-81-C-0500)
(AD-A170953; AAMRL-TR-86-020-VOL-2) Avail: NTIS HC A08/MF A01 CSCL 06S

A study has been carried out to investigate possible human health effects caused by exposure of people to sonic boom. The subjects of the study were the residents of Nevada. This state was selected for the study because supersonic military flight operations have been carried out in Nevada, primarily within the boundaries of the Tactical Fighter Weapons Center (TFWC) Range Complex near Las Vegas, longer than in any other area within the United States. This volume presents the results of an epidemiological study to search for any health effects. The health effects study was built entirely on a statewide epidemiologic evaluation of mortality for Nevada residents from 1968 to 1983, supplemented by hospital discharge morbidity data. The results of the statewide study revealed no convincing evidence to prove or disprove any relationship between exposure to sonic boom and adverse health phenomena. Statewide, age-adjusted mortality in Nevada is unremarkable compared to national figures. Crude death rates did vary directly with exposure to sonic booms but this relation disappeared when mortality was age-adjusted. Analyses of time trends and bivariate linear regressions failed to yield convincing associations between sonic boom exposure and age-adjusted mortality. Access to a population of weapons-range workers and to their health records, which was an additional key component of the research study, was not granted. GRA

N87-15687# New York Univ., New York.
THE PERCEPTION OF THE HIGHER DERIVATIVES OF VISUAL MOTION Final Scientific Report, 1 Jan. 1982 - 31 Sep. 1985
LLOYD KAUFMAN and SAMUEL J. WILLIAMSON 24 Jun. 1986 85 p
(Contract AF-AFOSR-0050-82)
(AD-A171076; AFOSR-86-0515TR) Avail: NTIS HC A05/MF A01 CSCL 06B

Sensitivity to changing speed was studied with gratings of various spatial frequencies drifting across a screen while the average velocity was modulated. Thresholds expressed either as the velocity amplitude (difference between peak and average velocities) or as the maximum acceleration, increased monotonically with average velocity. The threshold for velocity contrast (velocity amplitude divided by average velocity) actually decreased with average velocity. The velocity contrast was minimal for velocity modulation frequencies of about 2 Hz and for spatial frequencies in the range of 2-4.5 c/d. In addition to these basic findings, we failed to find any effect of selective adaptation to changing speed other than that could be attributed to smooth motion. It seems unlikely that mechanisms tuned to respond to changing speed per se are present in the human perceptual system. However, it is not possible to generalize from this to situations where higher derivatives are introduced by causing stimuli to change direction of motion. Author (GRA)

N87-15688# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
THE EFFECT OF LONG TERM MONOCULAR OCCLUSION ON VERNIER THRESHOLD: ELASTICITY IN THE YOUNG ADULT VISUAL SYSTEM M.S. Thesis
RICHARD J. DENNIS Jun. 1986 86 p
(AD-A171289; AFIT/CI/NR-86-122T) Avail: NTIS HC A05/MF A01 CSCL 06P

Five subjects (ages 19 to 22) were monocularly occluded for six days. Their vernier thresholds and fixation integrity measurements (using a modified Haidinger's brush) were determined at pre-occlusion, two, four, and six days of monocular occlusion, and 24 hours after patch removal. The occluded eye demonstrated a significant rise in vernier threshold after the two day occlusion period. The threshold continued at that level throughout the six day occlusion period before returning to normal within 24 hours after removal of the patch. The non-occluded eye did not show a matching enhancement effect characteristic of the competition model. Every subject also manifested an amount of eccentric fixation in the occluded eye. The eccentric fixation did not generally increase with time occluded, but did show an elastic response by returning to normal foveal fixation in 24 hours. The decrement in vernier performance in the occluded eye is probably best explained as a temporary (elastic) eccentric fixation rather than the loss of channels as theorized in the competition model. Our data did indicate a faster drop off of vernier acuity with retinal eccentricity than did the interpolated data of Westheimer's (1979) postulating that a secondary process was also contributing to the rise in threshold. GRA

N87-15689# Case Western Reserve Univ., Cleveland, Ohio.
ATTENTION AND PREPARATORY PROCESSES IN THE CENTRAL NERVOUS SYSTEM Final Report, 13 Jun. 1983 - 12 Jun. 1986
VERNON ROWLAND and HENRY GLUCK Aug. 1986 4 p
(Contract DAAG29-83-K-0089)
(AD-A171316; ARO-20472.3-LS) Avail: NTIS HC A02/MF A01 CSCL 05J

Efforts were directed toward improved understanding of the slow potential (SP) of the brain. This electrically recordable dynamic differs from the conventional EEG in being nonrhythmic and of durations from 1 to many fold longer than the longest enduring components of the EEG. It is best elicited by use of motivating (conditioned) stimuli and by signals (conditioning stimuli) related to them in the learning process. A study was made of the relation of multiple firing potentials of neurons to the SP as both are related to temporal (fixed interval) conditioning controlled by medial forebrain bundle (MFB) electrical reward in the rat. A correlation was observed of the pacing of the level of expectancy in the trained subject with the SP, which, in this context, has been termed the Anticipatory Potential Gradient or APG. GRA

N87-15690# EIC, Inc., Norwood, Mass.
DEVELOPMENT OF N(2) SENSOR FOR DETERMINATION OF PN(2) IN BODY TISSUES Final Report, 15 Jun. 1983 - 14 Jun. 1986
LOIS S. ROBBLEE, THOMAS J. LEWIS, RICHARD B. SALMONSEN, PATRICIA A. HUMINSKI, and MICHAEL S. BLANKINSHIP Aug. 1986 47 p
(Contract N00014-83-C-0458)
(AD-A171330; C-731; ONR-0458(F)) Avail: NTIS HC A03/MF A01 CSCL 07D

Experiments were performed to identify transition metal ion-dinitrogen complex systems whose chemical and electrochemical properties would be favorable for use in quantitating PN2, and to develop methods of immobilizing those metal ions so that the reactions of interest would take place on an electrode surface. A N2 sensing system was developed which is comprised of an ion exchange polymer membrane (Nafion), containing Ru(III) cations coated onto a glassy carbon electrode. The electrode is activated for N2 measurement by applying a reducing potential to generate the N2-complexing Ru(II) cation on the electrode surface. The surface Ru(II) cation reacts with N2 in solution to form a surface RU(II)-N2 complex. This complex is electrochemically detectable and distinguishable from the RU(II) precursor. At short times, the reaction follows first-order kinetics with a rate constant 10 times greater than for the equivalent homogeneous reaction. The reaction rate is proportional to PN2 up to 8 atm and possibly higher. The sensitivity approaches 1/10 atmosphere and the minimum electrode respons e time at elevated PN2 is 10 sec. This N2 sensing system holds promise for eventual configuration into an implantable unit for in situ measurements of tissue PN2 during compression and decompression of an experimental animal. GRA

N87-15691# Catholic Univ. of America, Washington, D.C. Human Performance Lab.
SPATIAL SCALE IN IMAGE DETECTION AND RECOGNITION
JAMES H. HOWARD, JR. Feb. 1986 60 p
(Contract N00014-83-K-0481)
(AD-A171348; TR-86-25-ONR) Avail: NTIS HC A04/MF A01 CSCL 05H

Considerable recent physiological and psychophysical evidence suggests that the visual system operates as a series of independent channels or analyzers, each sensitive to image structure at a different spatial scale. In this view, image structure is processed separately at different scales by the various channels. Several individuals have argued that the broad, low-frequency channels respond to global or Gestalt properties of an image and are important in early processing--for instance, during an initial glance at an image. In constrast, the high-frequency channels are sensitive to local detail and are important in later visual processing when attention has been focused on a particular aspect of the image. Two experiments investigated the ability of human observers to detect and recognize simple objects in visual images. Prior to presentation, the images were transformed by spatial frequency filters to emphasize the global- (low spatial frequencies), local- (high spatial frequencies) or intermediate- (mid spatial frequencies) scale structure. Four categories of top-view ship hulls were synthesized for the experiments. In the first experiment separate groups of observers made both detection (which quadrant of the display contained a ship?) and recognition (which of the four ships occurred?) judgements. In the second experiment, observers also selected the filter condition to be display on each trial prior to the detection or recognition response. GRA

N87-15692# Technion - Israel Inst. of Tech., Haifa.
MODELS OF CEREBRAL SYSTEM MECHANICS Final Report
S. SOREK, J. BEAR, Z. KARNI, and M. FEINSOD 20 Jul. 1986 121 p
(Contract AF-AFOSR-0233-85)
(AD-A171483; EOARD-TR-86-07; SR-2) Avail: NTIS HC A06/MF A01 CSCL 06P

A model of a system is a simplified version of the real system. The simplification is done by introducing a set of assumptions that express our understanding of the system's behavior. In the process of simplification, we omit non-dominant effects, leaving the main features of the system. The objective of simplification is to obtain a set that can be solved by available tools and still maintain the main characteristics of the real system. The model is a tool that provides forecasts of the response of the real system to various excitations. Thus it is essential that the model retains those features that are the subject of investigations. This volume contains 7 papers dealing with models of brain mechanics. The objective of the models is to provide a tool for simulating the mechanical behavior of the cerebral system, as manifested by pressure, velocity, stress and strain variations, in response to changes in input pressures and fluxes. GRA

N87-15693# Naval Aerospace Medical Research Lab., Pensacola, Fla.
NOISE SUSCEPTIBILITY: A COMPARISON OF TWO NAVAL AVIATOR POPULATIONS Final Report
GERALD B. THOMAS and CARL E. WILLIAMS Jun. 1986 20 p
(AD-A172222; NAMRL-1320) Avail: NTIS HC A02/MF A01 CSCL 06S

The identification of characteristics of noise susceptible or noise resistant individuals is necessary for the development of noise susceptibility risk profiles. Fifty-six Naval aviators, categorized as having either incurred a hearing loss (i.e., hearing threshold levels greater than 40 dB at 4000 to 8000 Hz) or retained normal hearing (i.e., hearing threshold levels less than or equal to 25 dB at 125 to 8000 Hz) after thousands of flight hours were compared along several auditory and non-auditory dimensions. The following variables occurred differentially in the two groups: Minimal Auditory Intensity Differential (MAID) scores at 2000 Hz (p less than .01) and 4000 Hz (p less than .001); iris pigmentation (blue eyes were overrepresented in the noise susceptible group; p less than .05); blood type (type A occurred more often in the noise susceptible population; p less than .05); systolic blood pressure (sitting; noise susceptible group was higher; p less than .05); calcium, albumin, and LDH levels (higher in the noise resistant group; p less than .05); and present tobacco usage (more noise-susceptible aviators were currently smokers; p less than .05). The noise susceptible population also tended (p less than .10) to exhibit elevated cholesterol and triglyceride levels, higher contralateral acoustic reflexes, and had fewer individuals who had never smoked. Although no classic profile of the noise susceptible or noise resistant individual definitively emerged, results suggested that at least one measurement device (MAID test) may serve as an early warning sign. GRA

N87-15694# Technische Hogeschool, Eindhoven (Netherlands). Dept. of Electrical Engineering.
A THEORETICAL STUDY OF THE ELECTROMAGNETIC FIELDS IN A LIMB, EXCITED BY ARTIFICIAL SOURCES
A. M. J. VANAMELSFORT and TH. SCHARTEN Feb. 1986 81 p
(EUT-86-E-156; ISBN-90-6144-156-0; ISSN-0167-9708; ETN-86-98712) Avail: NTIS HC A05/MF A01

Using integral transform techniques, a procedure to compute the electromagnetic field inside and outside a circularly cylindrical limb, excited by any electric or electromagnetic source is developed. The component layers of the limb are assumed to be homogeneous, anisotropic, and dissipative. The time-harmonic field of an axial pair of ring-shaped electrodes, located symmetrically inside the limb is calculated. The influences of anisotropy and boundaries on field distribution and surface charges are investigated. ESA

N87-16509* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 292)
Jan. 1987 70 p
(NASA-SP-7011(292); NAS 1.21:7011(292)) Avail: NTIS HC A04 CSCL 06E

This bibliography lists 192 reports, articles and other documents introduced into the NASA scientific and technical information system in December, 1986. Author

N87-16510*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON THE POTENTIAL IMPACT OF THE NEWLY PROPOSED QUALITY FACTORS ON SPACE RADIATION PROTECTION
JOHN W. WILSON, LAWRENCE W. TOWNSEND, and FRANCIS A. CUCINOTTA (Old Dominion Univ., Norfolk, Va.) Jan. 1987 17 p
(NASA-TM-89055; NAS 1.15:89055) Avail: NTIS HC A02/MF A01 CSCL 06R

The recently proposed changes in the defined quality factor hold great potential for easing some of the protection requirements from electrons and protons in the near-Earth environment. At the same time, the high Linear Energy Transfer (LET) components play an even more important role which must be further evaluated. Several recommendations are made which need to be addressed before these new quality factors can be implemented into space radiation potection practice. Author

N87-16511# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Industrial Engineering and Operations Research.
VEHICULAR SIMULATOR-INDUCED SICKNESS. VOLUME 2: A SELECTED ANNOTATED BIBLIOGRAPHY Final Report, Aug. 1985 - Aug. 1986
JOHN G. CASALI and J. R. ROESCH 31 Aug. 1986 47 p
(Contract N00014-84-K-0226)
(AD-A172990; IEOR-TR-8502; NTSC-TR-86-011) Avail: NTIS HC A03/MF A01 CSCL 06S

A serious problem associated with training and research applications of both driving and flight simulators is the provocation of illness symptoms and after effects in human subjects. In spite of its frequency and severity, human factors research attention to the problem of simualtor sickness has been somewhat scant. However, documentation of a number of instances of simulator-induced sickness appears in journal articles, technical reports, and memoranda. Several other publications have specifically addressed the syptomatology and/or the etiology of the problem, while a few papers have described laboratory or field studies. This report includes bibliographic listings and abstracts for those references which have direct mention of simulator sickness and does not attempt to represent the plethora of associated articles on motion sickness and human perception. The majority of the bibliography is comprised of incidence reports, field surveys, technical memoranda on specific simulators, reports on countermeasures, and research studies on simulator design aspects, procedural and operational aspects, and subject individual differences such as experience level and perceptual style. It is intended to provide the researcher or simulator user with an up-to-date source of background representing the state of knowledge on simulator sickness. GRA

N87-16512# Indiana Univ., Indianapolis. Research and Sponsored Programs.
SLEEP DEPRIVATION AND EXERCISE TOLERANCE Final Report, 1 Feb. 1981 - 31 Jan. 1986
BRUCE J. MARTIN Jan. 1986 11 p
(Contract DAMD17-81-C-1023; DA PROJ. 3E1-62777-A-879)
(AD-A172931) Avail: NTIS HC A02/MF A01 CSCL 06S

Acute sleep deprivation radically alters mood and sleepiness. It blunts, as well, the ability to perform long-term maximal exercise. These effects are more evident after 50 than after 25 hours without sleep. Sleeplessness does not, however, change any measured physiological responses to exercise. Stress hormone levels, that is beta-endorphin and cortisol, are the same during exercise with or without prior sleep. Similarly, exercise heart rate, ventilation, and blood pressure, and blood lactate levels, are identical under the two conditions. We conclude that sleep loss hampers physical performance primarily through psychological mechanisms. GRA

N87-16513# Oak Ridge National Lab., Tenn.
RADIATION CARCINOGENESIS FOLLOWING LOW DOSE OR LOW DOSE RATE EXPOSURES
R. L. ULLRICH 1986 11 p Presented at the Radiological Accidents, Perspectives and Emergency Planning Preparedness, Bethesda, Md., 15 Sep. 1986
(Contract DE-AC05-84OR-21400)
(DE87-000350; CONF-860932-6) Avail: NTIS HC A02/MF A01

A variety of dose responses have been observed for cancer induction following low linear energy transfer (LET) radiation. In general, however, the response is curvilinear, with a rapidly rising component in the intermediate dose range followed by a plateau or decline in incidence at high doses. The response is more linear at low doses, whereas the response at intermediate doses is approximated by a dose-squared relationship. Models for this response are based on the biophysical theory of cellular effects. However, many types of effects contribute to the tumorigenic processes, and host factors play a major role. At low dose rates the carcinogenic effect is generally reduced, which is caused by a dimunition of the dose-squared component and results in a linear response. Effects of fractionation can vary with total dose, fraction size, and fraction interval. High LET radiation is more tumorigenic. The dose-response relationships are more nearly linear and are less dose-rate dependent. The relative biological effectiveness (RBE) varies with dose, dose rate, fractionation, and target tissue. DOE

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

A87-20499
FEATURES AND OBJECTS IN VISUAL PROCESSING
ANNE TREISMAN (California, University, Berkeley) Scientific American (ISSN 0036-8733), vol. 255, Nov. 1986, p. 114B-122, 124, 125.

The unconscious mental processes underlying the ability to perceive meaningful wholes in the visual world are discussed. The automatic extraction of features from a scene is examined, describing the experiments which reveal the simple features of the visual world that are used in the initial stage of visual processing. The assembly of these features into objects is considered, emphasizing the roles of expectation and focused attention in this process. C.D.

A87-21426
ANTI-G TRAINING OF JAPANESE AIR SELF DEFENSE FORCE FIGHTER PILOTS
CHIHARU SEKIGUCHI, MASAAKI IWANE, and MASASHI OSHIBUCHI (Air Self-Defense Force, Aeromedical Laboratory, Tokyo, Japan) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1029-1034. refs

The high-G training program designed for pilots of high-performance aircraft (such as the F-15) is described. The program included periods of centrifuge rides of two basic patterns: a tracking performance and a simulated aerial combat maneuver (SACM). Mean relaxed G tolerances for the gradual onset run (GOR) and the rapid onset run (ROR) were found to be +5.5 Gz and +4.9 Gz, respectively. Physiological problems included petechiae, vertigo, general malaise, limb pain, nausea, and neck pain. Some trainees suffered brief periods of loss of consciousness (LOC) at GOR and/or ROR, but all F-15 trainees completed the SACM pattern without LOC. I.S.

A87-21433
SUBJECTIVE EFFECTS OF COMBINED-AXIS VIBRATION. III - COMPARISON OF Y-AXIS AND Y-PLUS-YAW VIBRATIONS
RICHARD W. SHOENBERGER (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1075-1081. refs
(Contract F33615-82-C-0504)
(AD-A175381; AMRL-SR-85-305)

Two psychophysical experiments were conducted to compare the perceived intensity of y-axis and y-plus-yaw vibrations, in which the subjects were seated either forward of the axis of rotation (exp. I), or aft of the axis (exp. II). The subjects matched their perceptions of the intensity of both kinds of vibrations by adjusting the intensity of a sinusoidal z-axis response vibration. In both experiments, the results showed that, as frequency increased, the acceleration of the matching response decreased for both types of stimuli. However, in exp. I the combined-axis stimuli produced higher response accelerations than the y-axis vibrations, while in exp. II matching responses were the same for both vibration types. I.S.

A87-21435
THRESHOLDS FOR THE DETECTION OF THE DIRECTION OF WHOLE-BODY, LINEAR MOVEMENT IN THE HORIZONTAL PLANE
A. J. BENSON, M. B. SPENCER, and J. R. R. STOTT (RAF, Institute of Aviation Medicine, Farnborough, England) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 57, Nov. 1986, p. 1088-1096. refs

Experiments to establish thresholds for the detection of the direction of discrete whole body linear movements in the horizontal plane were performed to determine the effects of the frequency of the motion stimulus and of the subject's orientation to the axis of motion. Thresholds in the movement in the z body axis were significantly higher than for the movements in the x or the y axes. In eight (out of the 24) subjects, the x-axis acceleration threshold was found to increase as a monotonic function of stimulus duration over the range of 0.98 to 6.96 s and exhibit frequency-dependent characteristics. I.S.

A87-22676#
IMPACT OF CREW WORKLOAD ON SPACE STATION ON-ORBIT OPERATIONS
ANTHONY C. BEARDSLEY and ROBERT H. SCHAEFER (Grumman Aerospace Corp., Space Systems Div., Bethpage, NY) AIAA, Aerospace Sciences Meeting, 25th, Reno, NV, Jan. 12-15, 1987. 8 p. refs
(AIAA PAPER 87-0505)

The complexity of the Space Station coupled with the diversity of its operations charter places an enormous burden on the psychological and physiological domains of each flight crewmember. This condition is exacerbated by the hazards of the environment and the remoteness and isolation of the crewmembers over extended periods in space. Also, economics demand that each crewmember's time be optimized for maximum productivity in order to render the Space Station profitable and self-sustaining over time. Information on long-term exposure to man in space is sparse, but earlier spaceflights demonstrated that astronaut workloads were very high and that this contributed significantly to stress. The elements that make up workload and the methodologies of quantifying it are discussed. Also, the physiological and psychological factors that contribute to workload on orbit and their consequences on stress are examined. The impact of other variables such as schedules and how they add to workload and to overall stress on Space Station crewmembers is discussed. Author

A87-23046
EXPOSURE-DURATION EFFECTS IN LOCALIZATION JUDGMENTS
CHRISTINA A. BURBECK (SRI International Corp., Visual Sciences Program, Menlo Park, CA) Optical Society of America, Journal, A: Optics and Image Science (ISSN 0740-3232), vol. 3, Nov. 1986, p. 1983-1988. refs
(Contract F49620-82-K-0024; F49620-85-K-0022)

The effects on localization accuracy of increasing exposure duration beyond 100 msec are explored for a wide range of object separations. Previous reports that localization accuracy for objects separated by a few minutes of arc increases for exposures up to at least 400 msec are confirmed. It is reported that localization of larger objects at larger separations does not improve when the exposure duration is increased beyond 100 msec. This difference between the smalland large-scale results can be explained by the difference in the spatial-frequency content of the objects being localized. When high-frequency objects are substituted for spectrally broadband objects in the large-scale case, the exposure-duration effects for widely separated objects become similar to those obtained in the small-scale case. These results suggest that the exposure-duration effect previously reported in hyperacuity studies is not specific to the localization task per se but rather is a suprathreshold version of the familiar form of spatiotemporal interaction seen in contrast-threshold results. They also suggest that a single type of mechanism underlies small- and large-scale localization. Author

A87-23065
COORDINATION OF VESTIBULAR AND VISUAL PERCEPTUAL CUES IN REAL-TIME SIMULATION
G. M. MCKINNON, R. V. KRUK, S. STOBER (CAE Electronics, Ltd., Montreal, Canada), E. M. BRUSSELL, M. KOMODA (Concordia University, Montreal, Canada) et al. IN: 1986 Summer Computer Simulation Conference, Reno, NV, July 28-30, 1986, Proceedings . San Diego, CA, Society for Computer Simulation, 1986, p. 531-533.

The current lack of understanding of the interactions that may occur between visual, vestibular and proprioceptive information limits perceptual realism in real time flight simulation. An attempt is presently made to specify the nature of perceptual interactions in simulation, such that they may be taken into account during initial programming of platform motion and visual systems to achieve a higher degree of perceptual fidelity. Attention is given to the evaluation and calibration of criteria for displays using the human visual system as a calibrating instrument, the establishment of the characteristics of visual flow patterns to furnish optimum impression of visual motion, and the determination of physiological thresholds for vestibular/proprioceptive motion detection and identification. O.C.

A87-23067
EFFECTIVE TRAINING FOR A MODERN AIR COMBAT VEHICLE
MATT NAROTAM (Burtek Corp., Tulsa, OK) IN: 1986 Summer Computer Simulation Conference, Reno, NV, July 28-30, 1986, Proceedings . San Diego, CA, Society for Computer Simulation, 1986, p. 559-564.

Attention is given to a low cost, highly effective Intermediate Training Device (ITD) simulation unit for modern fighter aircraft which mediates the transition from conventional to digital aircraft instruments for navigation, stores management and radar operation. Through the implementation of hands-on training for cockpit familiarization, and the development of skills for complex attack systems while engaging both air and surface targets, military training objectives are met more economically with ITD than with the systems formerly employed. O.C.

A87-23069
COMPARISONS OF PERFORMANCE IN VARIOUS VISUAL SYSTEMS COMMON TO SIMULATION
ROBERT E. CLAPP (Gould, Inc., Systems and Simulation Div., Tampa, FL) IN: 1986 Summer Computer Simulation Conference, Reno, NV, July 28-30, 1986, Proceedings . San Diego, CA, Society for Computer Simulation, 1986, p. 578-585.

A comparative evaluation is conducted of visual systems employed in simulation programs, using standard parametes and common references together with simplified comparison tables. The greatest shortcomings of current technology are the lack of suitable vertical fields of view, inadequate scene resolution and brightness, and lack of stereoscopic displays. Ironically, the simulators that most closely approximate real world scenes are the ones psychologically prone to be judged most severely with respect to what flaws remain. It is noted that training for long endurance flights requires simulators with highly refined cue coordination capabilities. O.C.

A87-23225#
PSYCHOLOGICAL UNEASINESS BEFORE RIDING HUMAN-CENTRIFUGE OR DISORIENTATOR
MIYAKO OKAUE and ZENJI TAKASHIMA Japan Air Self Defence Force, Aeromedical Laboratory, Reports (ISSN 0023-2858), vol. 27, March 1986, p. 1-12. In Japanese, with abstract in English. refs

A survey for assessing an individual's psychological uneasiness before riding a human-centrifuge or disorientator was developed. The test consisted of 40 descriptions of physiological and psychological states. The subjects (60 experienced pilots, 261 candidate pilots, and 60 nonpilots) had never ridden these devices before. The psychological uneasiness levels of the nonpilots were the highest of the three groups. K.K.

N87-15695*# National Aeronautics and Space Administration, Washington, D.C.
ON THE PILOT'S BEHAVIOR OF DETECTING A SYSTEM PARAMETER CHANGE
N. MORIZUMI and H. KIMURA 1986 18 p Transl. into ENGLISH from Japan Society for Aeronautical and Space Sciences Journal (Japan), v. 33, no. 380, 1985 Original language document was announced in IAA as A86-25229 Transl. by SCITRAN, Inc., Santa Barbara, Calif.
(Contract NASW-4004)
(NASA-TM-88479; NAS 1.15:88479; ISSN-0021-4663) Avail: NTIS HC A02/MF A01 CSCL 05I

This paper deals with the detection characteristics of a human pilot, who is engaged in a compensatory control, to a sudden change in the controlled element's characteristics. Taking the case where the change manifests itself as a variance change of the monitored signal, it is shown that the detection time, defined to be the time elapsed until the pilot detects the change, is related to the monitored signal and its derivative. Then, the detection behavior is modeled by an optimal controller, an optimal estimator, and a variance-ratio test mechanism that is performed for the monitored signal and its derivative. Results of a digital simulation show that the pilot's detection behavior can be well represented by the model proposed here. Author

N87-15696# California Univ., Irvine. Congnitive Sciences Group.
MINIMUM POINTS AND VIEWS FOR THE RECOVERY OF 3-DIMENSIONAL STRUCTURE
MYRON L. BRAUNSTEIN, DONALD D. HOFFMAN, LIONEL R. SHAPIRO, GEORGE J. ANDERSEN, and BRUCE M. BENNETT 20 Jun. 1986 43 p
(Contract NOOO14-85-K-0529)
(AD-A171148) Avail: NTIS HC A03/MF A01 CSCL 46P

Mathematical analyses of motion perception have established minimum combinations of points and distinct views that are sufficient to recover three-dimensional (3D) structure from two-dimensional (2D) images, using such regularities as rigid motion, fixed axis of rotation, and constant angular velocity. To

determine whether human subjects could recover 3D information at these theoretical levels, we presented subjects with pairs of displays and asked them to determine whether they represented the same or different 3D structures. Number of points was varied between 2 and 5; number of views was varied between 2 and 6; and the motion was either fixed axis with constant angular velocity, fixed axis with variable velocity, or variable axis with variable velocity. Accuracy increased with views, but decreased with points, apparently due to the increased difficulty of the comparison task as the structure became more complex. Subjects' performance exceeded theoretical expectations, implying that they exploited regularities in addition to those in the theoretical analyses. Some possible additional regularities, and possible grouping effects, are discussed. Author (GRA)

N87-15697# Arizona State Univ., Tempe.
THE EFFECTS OF RESPONSE MODALITY ON INTERFERENCE BETWEEN STIMULUS DIMENSIONS
V. G. CUQLOCK and KATHRYN A. BLOEM Jul. 1986 25 p
(Contract DAAG29-84-K-0197)
(AD-A171177; ARO-22256.1-LS) Avail: NTIS HC A02/MF A01
CSCL 05J

This report concerns the effects of response modality and the relation between stimulus dimensions on subjects ability to report one dimension of a multidimensional stimulus. Subjects were asked to report, as rapidly as possible, either the name or the ink color of colored words. The relation between the ink color and work was either congruent (Blue in blue ink), neutral (Door in blue ink), or incongruent (Blue in red ink). Responses were made either manually or vocally. Results are consistent with previous findings in the area of Stroop (Stroop, 1935) research. That is, responding to one of two dimensions is more difficult when the relation between dimensions is incongruent than when the relation between dimensions is congruent or neutral. But in addition, results show that no interference from an incongruent, ink-color dimension results when subjects respond vocally to the word dimension, whereas when subjects respond manually to this dimension, the incongruence between the colors and word produce interference. Results suggest a limitation on the usefulness of a color dimension when a word dimension requires a speeded-speech response. onse. Author (GRA)

N87-15698# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Psychology.
NOVICE RULES FOR ASSESSING IMPORTANCE IN SCIENTIFIC TEXTS Interim Report, Aug. 1985 - Jul. 1986
DIANA DEE-LUCAS and JILL H. LARKIN Aug. 1986 37 p
(Contract MDA903-85-K-0180; DA PROJ. 2Q1-61102-B-74-F)
(AD-A171551; ARI-RN-86-89) Avail: NTIS HC A03/MF A01
CSCL 05J

Scientific texts are typically densely packed with complex content, making it particularly difficult for novice learners to identify important information. The current study found that novice readers judge importance on the basis of form (i.e., definition or fact) in which information is presented. In this study, expert and novice physicists judged the importance of sentences in physics texts when they were presented as definitions or facts. The definitions and facts were identical in content differing only in minor wording changes. Sentence form influenced the importance judgments of novices, but not those of experts. Novices judged sentences that were identical in content as more important when they were presented as definitions. These results indicate that textbook writers need to be aware of how form influences novices' perception of what is important in order to effectively guide attention to critical text content. Techniques for altering readers' attention (i.e., signaling and strategy instruction) are discussed. GRA

N87-15699# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HUMAN REAL TIME PERCEPTION IN NOISE
MICHAEL J. STOCK, CHARLES W. NIXON, VERNIE G. FISHER, III, and CHARLES D. GOODYEAR 20 Aug. 1986 41 p
(AD-A172374; AAMRL-TR-86-034) Avail: NTIS HC A03/MF A01
CSCL 20A

A novel device, the Real Time Perception Analyzer (RTPA), has been developed to measure the perception of real time as well as simple and choice reaction time under microgravic conditions on board the space shuttle. This study examined only real time perception; reaction times were not measured. The RTPA real time perception task produces a target dot that moves from left-to-right across a narrow, horizontal light bar. A vertical marker is positioned almost two inches beyond the right end of the light bar. The subject's task is to push a switch when it is estimated that the target dot has moved beyond the end of the light bar, a region where the dot is no longer visible, and reached the vertical marker. Sixteen subjects performed the time perception task under various conditions of quiet and noise exposure. Errors consisted of underestimations or overestimations of the actual time intervals which ranged from 1.75 to 14.0 seconds. Results indicate that subjects overestimated time intervals and that the greatest errors occurred for the shortest time intervals and in noises that changed during the task. Also, female subject estimates of time intervals were consistently shorter than those of the male subjects. These findings are compared to earlier research on time estimation and verify that the RTPA provides a reliable and sensitive measure of the perception of real time in noise. Author (GRA)

N87-16514# New York Univ., New York.
THE PERCEPTION OF THE HIGHER DERIVATIVES OF VISUAL MOTION Interim Report, 31 Dec. - 31 Dec. 1983
LLOYD KAUFMAN and SAMUEL J. WILLIAMSON 24 Jun. 1986 27 p
(Contract AF-AFOSR-0050-82)
(AD-A171855; AFOSR-86-0514TR; IR-1) Avail: NTIS HC A03/MF A01 CSCL 05J

This report describes theoretical work involved in the early stages of this research effort and gives a brief review of the literature studied during that work. In particular, it reviews work on velocity difference thresholds, since several workers have concluded that judgmental comparisons of velocities at different times accounts for the human ability to discriminate between uniform linear motion in the frontal plane and acceleration. This conclusion is consistent with physiology, where motion detecting units are found to be sensitive to speed in specific directions, and none are known to be tuned to respond to particular rates of change of speed. No models of motion perception include provisions for detecting either changes in speed or changes in direction. Direct work on acceleration, however, is flawed. Hence, we devised a novel stimulus composed of sine wave gratings that drift at an average speed across the display. The speed is sinusoidally modulated, thus introducing acceleration and jerk (the third dervative). We also control spatial frequency, drift rate and luminance contrast. An experiment is described along with a computer program to permit conduct of the experiment. GRA

N87-16515# Essex Corp., Orlando, Fla.
ISSUES IN PERFORMANCE MEASUREMENT FOR MILITARY AVIATION WITH APPLICATIONS TO AIR COMBAT MANEUVERING Final Report, 15 Apr. 1985 - 4 Apr. 1986
NORMAN E. LANE 4 Apr. 1986 157 p
(Contract DAAG29-81-D-0100; AF PROJ. 4796)
(AD-A172986; EOTR-86-3; NTSC-TR-86-008) Avail: NTIS HC A08/MF A01 CSCL 05I

This report describes the history, development and current practice of measuring operator performance in systems, in particular military aviation systems, with additional emphasis on measurement in air combat maneuvering (ACM). The principal themes are that: (1) performance is used interchangeably with proficiency, and as such has acquired evaluative meanings about goodness or badness of individual capabilities. Performance measures thus require the

same attention to measurement properties and validation as any other measures on individuals; (2) there are tendencies to substitute physical measures, which scale physical quantities or events, for behavioral measures, which are representative of how well an individual can perform a given task. Performance measures are behavioral measures, and acquire meaning through validation operations beyond those required for physical measurement. Not all the measures obtainable on individuals or systems are appropriately called performance measures; (3) task performance must be viewed as a construct. Tasks are complex and multidimensional; individual proficiency must be inferred from limited observables. For proposed measures, it is necessary to show that measures are reliable, that they tap the most important components of successful performance, and that they are credible as representatives of individual task proficiency. GRA

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

A87-21798
AUTOMATION OF THE HUMAN OPERATOR STATE EVALUATION [OB AVTOMATIZATSII OTSENKI SOSTOIANIIA CHELOVEKA-OPERATORA]
A. M. KARPUKHINA, V. I. NEDASHKOVSKAIA, V. A. SALAMATOV (Nauchno-Issledovatel'skii Institut Psikhologii, Kiev, Ukrainian SSR), and IU. A. PLIUSHCH (AN USSR, Institut Problem Modelirovaniia v Energetike, Kiev, Ukrainian SSR) Elektronnoe Modelirovanie (ISSN 0204-3572), vol. 8, Sept.-Oct. 1986, p. 78-83. In Russian. refs

The paper is concerned with the possibility of evaluating the psychophysiological state of the human operator on the basis of the energy characteristic of the electric potential dynamics of biologically active skin points. An instrument implementing this approach is described. The method and instrument proposed here can also be used for studying the structural-functional organization of the bioelectric characteristics of the psychophysiological states of man in relation to the structure of human operator activities. V.L.

A87-23228*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MONOVISION TECHNIQUES FOR TELEROBOTS
PLESENT W. GOODE and KARIN CORNILS (NASA, Langley Research Center, Hampton, VA) Workshop on Space Telerobotics, Pasadena, CA, Jan. 20-22, 1987, Paper. 8 p. refs

The primary task of the vision sensor in a telerobotic system is to provide information about the position of the system's effector relative to objects of interest in its environment. The subtasks required to perform the primary task include image segmentation, object recognition, and object location and orientation in some coordinate system. The accomplishment of the vision task requires the appropriate processing tools and the system methodology to effectively apply the tools to the subtasks. This paper describes the functional structure of the telerobotic vision system used in the Langley Research Center's (LaRC) Intelligent Systems Research Laboratory (ISRL) and discusses two monovision techniques for accomplishing the vision subtasks. Author

A87-23229*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va.
A FLEXIBLE TELEROBOTIC SYSTEM FOR SPACE OPERATIONS
NANCY ORLANDO SLIWA and RALPH W. WILL (NASA, Langley Research Center, Hampton, VA) Workshop on Space Telerobotics, Pasadena, CA, Jan. 20-22, 1987, Paper. 9 p.

This paper describes the objective and design of a proposed goal-oriented knowledge-based telerobotic system for space operations. This design effort encompasses the elements of the system executive and user interface and the distribution and general structure of the knowledge base, the displays, and the task sequencing. The objective of the design effort is to provide an expandable structure for a telerobotic system that provides cooperative interaction between the human operator and computer control. The initial phase of the implementation provides a rule-based, goal-oriented script generator to interface to the existing control modes of a telerobotic research system, in the Intelligent Systems Research Lab at NASA Research Center. Author

N87-15700 Florida Univ., Gainesville.
ADAPTIVE CONTROL OF ROBOTIC MANIPULATORS Ph.D. Thesis
L. SABRI TOSUNOGLU 1986 269 p
Avail: Univ. Microfilms Order No. DA8618692

Currently industrial robot manipulators operate slowly to avoid dynamic interactions between links. Typically each joint is controlled independently and system stability and precision are maintained at the expense of underutilizing these systems. As a result, productivity is limited, and more importantly, the lack of reliability has hindered investment and wider industrial use. This work addresses the adaptive control of spatial, serial manipulators. Centralized adaptive controllers which yield globally asymptotically stable systems are designed via the second method of Lyapunov. Actuator dynamics is also included in the system model. Lagrange equations are used in deriving dynamic equations for n-link, spatial robot manipulators which are modeled with rigid links connected by either revolute or prismatic pairs. Although manipulators may exhibit structural flexibility, the rigid link assumption is justified, because control of manipulators needs to be understood precisely before flexibility is included. The plant, which represents the actual manipulator, and the reference model, representing the ideal robot, are both expressed as distinct, nonlinear, coupled systems. Error-driven system dynamics is then written and adaptive controllers which assure global asymptotic stability of the system are given utilizing the second method of Lyapunov. It is shown that these control laws also lead to asymptotically hyperstable systems. Integral feedback is introduced to compensate for the steady-state system disturbances. Dissert. Abstr.

N87-15701# Report Store, Lawrence, Kans.
SURVEY OF ERGONOMICS DATABASES IN MEMBER COUNTRIES OF THE INTERNATIONAL ERGONOMICS ASSOCIATION Final Report, 1 Oct. 1985 - 1 Jul. 1986
B. WILLIAMS and L. WASCHER 1 Jul. 1986 56 p
(Contract DAAL02-86-P-1599)
(AD-A171142; HEL-FI-5-86) Avail: NTIS HC A04/MF A01
CSCL 05B

This report surveys the status of ergonomics databases in the member countries of the International Ergonomics Association. Most ergonomic data is available only in the literature where it was first reported. Few formal data collections exist and very few computerized databases were found in this survey. Handbooks and textbooks are still the main sources of collected ergonomics data. Anthropometry is the only body of information in which we found significant collections of international data currently available in computerized form. Most ergonomics data are still embedded in the published literature. Recent use of the computer for ergonomics data gathering and data analysis has created the potential for previously existing limited studies of small populations to be extended into entirely new automated databases, but this potential has not been realized. After reviewing the strengths and weaknesses of available published data compendia and then

describing the few large scale databases found in the survey, this report presents some examples of how existing data-gathering systems could be used to build new automated databases. GRA

N87-15702# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
USE OF DISJUNCTIVE RESPONSE REQUIREMENTS IN DUAL-TASK ENVIRONMENTS: IMPLICATIONS FOR AUTOMATION Ph.D. Thesis
ROBERT J. SCHOEN May 1986 107 p
(AD-A171277; AFIT/CI/NR-86-133D) Avail: NTIS HC A06/MF A01 CSCL 05J

Two experiments were conducted to assess the difference in resource requirements for choice and disjunctive (Donders Type c) responses in a dual-task environment. Experiment 1 utilized two binary tasks paired in all possible combinations of choice and disjunctive response requirements. For both tasks the disjunctive responses were faster and less error prone with the additional benefit of improving performance on the concurrent task. Experiment 2, using a primary-secondary dual-task paradigm, contrasted the resource cost of responding to the cost of not responding to stimuli that had varying degrees of similarity to the go stimuli. Results demonstrated a high degree of operator involvement in terms of resource use even when a response was not required. These results were discussed in terms of reducing operator workload within a semiautomated multitask environment by employing disjunctive responding in place of binary choice responding. Author (GRA)

N87-15703# Arizona State Univ., Tempe.
THE USE OF INTERACTIVE VOICE SYSTEMS TO IMPROVE MULTIPLE-TASK PERFORMANCE Final Report, Jan. 1982 - Aug. 1986
DIANE L. DAMOS 15 Aug. 1986 23 p Prepared in cooperation with the University of Southern California, Los Angeles
(Contract NOOO14-82-C-0179)
(AD-A171492; REPT-916416-FTN) Avail: NTIS HC A02/MF A01 CSCL 17B

The primary purpose of this contract was to examine the effect of voice generation and recognition systems on dual-task performance although three other research efforts on complementary topics also were investigated. This report is divided into four sections. The first section provides background information for the first experiments conducted under this contract. The second section describes each of the six experiments examining the effect of voice generation and recognition systems on dual-task performance and summarizes their results. The third section briefly discusses three other research efforts performed on this contract in support of current activities at the Naval Biodynamics Laboratory and the Naval Aerospace Medical Research Laboratory. The last section lists the products of the contract. GRA

N87-16331*# California Univ., Santa Barbara.
DUTY CYCLE TESTING AND PERFORMANCE EVALUATION OF THE SM-229 TELEOPERATOR
ROBERT S. STOUGHTON and DANIEL P. KUBAN (Oak Ridge National Lab., Tenn.) *In* NASA. Lewis Research Center The 20th Aerospace Mechanics Symposium p 133-148 May 1986
Previously announced as N86-31059
(Contract DE-AC05-84OR-21400)
Avail: NTIS HC A14/MF A01 CSCL 05H

The first known experimental studies and analyses of teleoperator performance for specific duty cycles are discussed. The results are presented in two distinct areas as position usage patterns, and as three-dimensional power grids. The position usage patterns are a valuable means to assess the available motion range. The power grids are a unique concept for evaluating joint performance. Final conclusions contain recommendations to upgrade the teleoperator for optimum performance. Author

N87-16516 California Univ., Berkeley.
SYSTEM MODELING AND VIBRATION ANALYSIS OF BAND/WHEEL MECHANICAL SYSTEMS Ph.D. Thesis
KON-WELL WANG 1985 150 p
Avail: Univ. Microfilms Order No. DA8610263

High speed axially moving bands, driven by rotating wheels, are the basic elements in many machines. In this research, a model describing the coupled motions is formulated and verified. Hamilton's Principle is used to derive the equations of motion and boundary conditions. The resulting equations are linearized and then discretized by applying the Galerkin Method. The results show that the mechanism of vibration coupling is the finite equilibrium curvature of the band. The transverse vibrations of the spans are linearly coupled to their longitudinal motions and to the motion of the wheels. The contributions of various system parameters to the coupling are clarified. The effects of different types of linear damping on the band/wheel system dynamics are analyzed. The damping in each mode is examined by calculating the real part of the corresponding eigen-value. Once the dominating modes are identified, one can minimize the principal span vibration by adjusting the damping distribution of the system. Dissert. Abstr.

N87-16517# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
ROBOTIC MANIPULATOR CONTROL PERFORMANCE EVALUATION Ph.D. Thesis
MICHAEL B. LEAHY, JR. Aug. 1986 218 p
(AD-A172919; AFIT/CI/NR-86-173D) Avail: NTIS HC A10/MF A01 CSCL 13I

A robotic manipulator dynamically based controller performance baseline is established by the creation and utilization of a hierarchical robotic evaluation environment. Creation of a hierarchical robotic evaluation environment provides an original solution to the problems that previously constrained real-time evaluation of modern manipulator control schemes. Utilization of that environment fulfills the application of proposed theories. The performance baseline is established by simulated and experimental evaluation of feedforward dynamics and feedback loop design for joint motion high speed trajectory tracking robot control. The real-time performance produced by application of all proposed robotic control techniques to harmonic and gear driven manipulators can be extrapolated from the baseline. A feedforward loop composed of uncoupled inertia and gravity dynamics exhibited the best tracking accuracy. Forces unmodeled by those dynamics can be effectively treated as disturbances to the feedback loop. Dynamic based control techniques exhibited the potential to control high speed gross motion of a manipulator without additional sensor devices. GRA

N87-16518# Drexel Univ., Philadelphia, Pa. Biomedical Engineering & Science Inst.
A PULSATING ANTI-GRAVITY SUIT FOR ACCELERATION PROTECTION: SYSTEM DESCRIPTION AND PRELIMINARY EXPERIMENTS Interim Report
T. W. MOORE, B. R. REDDY, J. FOLEY, F. KEPICS, and L. HREBIEN Jul. 1986 7 p
(Contract N00014-85-K-0566)
(AD-A173708; NADC-86120-60) Avail: NTIS HC A02/MF A01 CSCL 06K

This document describes a system designed to study the feasibility of augmenting tolerance to acceleration stress using external pressure pulsations synchronized to the electrocardiogram. The system, known as synchronized pulsating anti-gravity suit, consists of a modified G Suit, a controller and a pneumatic subsystem. The modified suit has individual bladders for calf, thigh, and abdomen with separate inlet/outlet ports. A microcomputer controls the synchronization, phasing and sequencing of pressure pulses in the bladders. Desired high and low pressures are obtained using feedback of pressure signals to a set of comparators. Solenoid valves and related circuitry regulate the flow of air in and out of the bladders. Results based on the centrifuge experiments suggest the feasibility of obtaining improved tolerance with a synchronized pulsating suit. GRA

N87-16519# New Mexico State Univ., Las Cruces. Behavioral Engineering Lab.
HUMAN FACTORS AFFECTING PILOT PERFORMANCE IN VERTICAL AND TRANSLATIONAL INSTRUMENT FLIGHT Final Technical Report
STANLEY N. ROSCOE 1986 31 p
(Contract N00014-81-K-0439)
(AD-A174057; BEL-86-1/ONR-86-1) Avail: NTIS HC A03/MF A01 CSCL 05E

A program to apply the best aircraft control and display ideas and principles generated since World War II to an integrated, computer-based system for vertical and translational instrument flight is reviewed. A generic thrust-borne aircraft capable of vertical takeoff and landing (VTOL) and six degrees of maneuvering freedom was simulated, as were a forward-looking contact analog display and a downward-looking horizontal situation display. Features incorporated in these displays included command guidance symbology, directionally compatible frequency-separated quasi-pursuit flight path predictors with vernier-deviation indications and uniquely integrated presentations of altitude and vertical speed in the horizontal situation display. Features of the simulated control system included automatic stabilization of position and velocity vector against air mass movements and reduced orders of maneuvering performance control. A holistic experimental approach was applied to screen critical dynamic design variables, optimize their response surfaces, and investigate direction of display motion relationships, all leading to multiple-regression models of pilot performance in vertical and translational instrument flight. GRA

N87-16520# Human Engineering Labs., Aberdeen Proving Ground, Md.
THE EFFECT OF HELICOPTER VIBRATION ON THE ACCURACY OF A VOICE RECOGNITION SYSTEM Final Report
THOMAS W. DENNISON, FRANK J. MALKIN, and CHRISTOPHER C. SMYTH Sep. 1986 15 p
(AD-A174284; HEL-TM-11-86) Avail: NTIS HC A02/MF A01 CSCL 17B

Speech recognition technology could be especially advantageous to single-crewmember helicopters like the Light Helicopter Family (LHX). Before speech recognition can be considered a viable technology for helicopters, several issues remain to be resolved. One of these is changes in the voice that occur as a result of stress, noise, and vibration. This paper reports the results of an investigation conducted to determine the effect of vibration-induced changes in the voice on the accuracy of a speech recognition system. A series of flight tests were conducted using 12 participants and 8 different flight maneuvers. Data were collected with the participants speaking 50 phonetically balanced words into the speech recognizer while seated in the copilot's seat of a UH-1H helicopter during each of the 8 flight maneuvers. The results indicate that speech recognition system accuracy is not affected by helicopter vibration. GRA

N87-16521# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
OPTICAL TOLERANCES FOR ALIGNMENT AND IMAGE DIFFERENCES FOR BINOCULAR HELMET-MOUNTED DISPLAYS
HERSCHEL C. SELF May 1986 38 p
(AD-A174536; AAMRL-TR-86-019) Avail: NTIS HC A03/MF A01 CSCL 06S

The literature on optical alignment and image difference tolerances for binocular devices are reviewed. Tolerances for vertical and horizontal misalignment and for rotation, magnification and luminance differences are recommended. Recommendations are made for collimation tolerance and for eye relief and exit pupil diameter for helmet-mounted binocular displays. Formulas are derived for magnification difference tolerances for partially and totally overlapping fields of view. GRA

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SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

A87-22234* Cornell Univ., Ithaca, N.Y.
AMINO ACIDIS DERIVED FROM TITAN THOLINS
BISHUN N. KHARE, CARL SAGAN (Cornell University, Ithaca, NY), HIROSHI OGINO, BARTHOLOMEW NAGY, CEVAT ER (Arizona, University, Tucson) et al. Icarus (ISSN 0019-1035), vol. 68, Oct. 1986, p. 176-184. refs
(Contract NGR-33-010-101; NGR-33-010-220; NGR-03-002-171; DE-AC05-84OR-21400)

The production of amino acids by acid treatment of Titan tholin is experimentally investigated. The synthesis of Titan tholin and the derivatization of amino acids to N-trifluoroacetyl isopropyl esters are described. The gas chromatography/mass spectroscopy analysis of the Titan tholins reveals the presence of glycine, alpha and beta alainine, and aspartic acid, and the total yield of amino acids is about 0.01. I.F.

N87-16522*# National Aeronautics and Space Administration, Washington, D.C.
PUBLICATIONS OF THE EXOBIOLOGY PROGRAM FOR 1985: A SPECIAL BIBLIOGRAPHY
Jan. 1987 70 p Prepared in cooperation with George Washington Univ., Washington, D.C.
(Contract NASW-3165)
(NASA-TM-89605; NAS 1.15:89605) Avail: NTIS HC A04/MF A01 CSCL 03B

The Exobiology Program, within the Office of Space Science and Applications of the National Aeronautics and Space Administration, is an integrated program to methodically investigate those processes that are responsible for, or related to, the origin, evolution, and distribution of life in the universe. The list of 1985 publications resulting from research pursued is contained. B.G.

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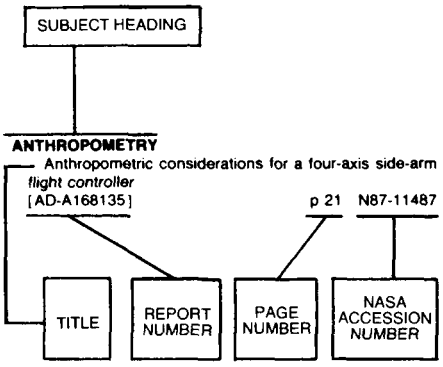

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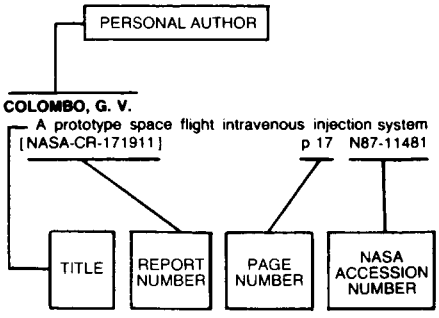

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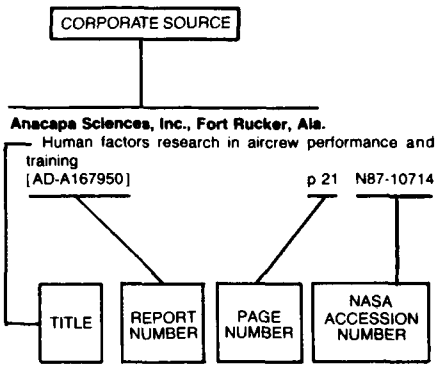

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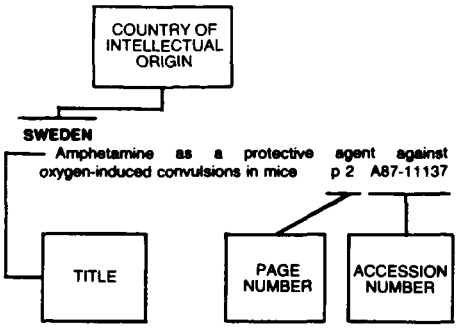

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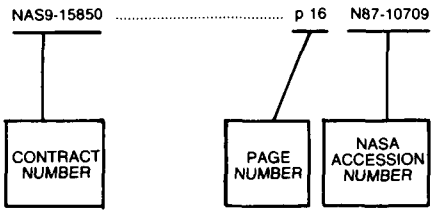

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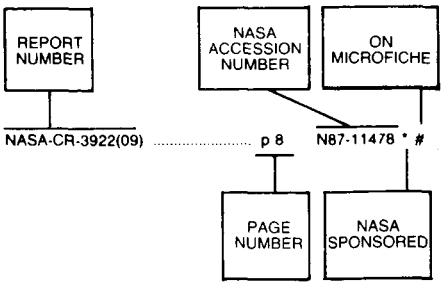

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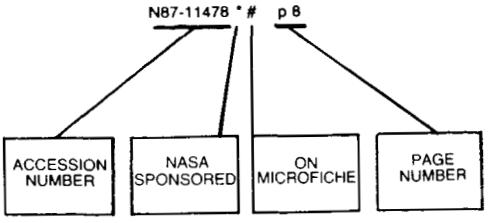

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