

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(NASA-SP-7011(381)) AEROSPACE
MEDICINE AND BIOLOGY: A CONTINUING
BIBLIOGRAPHY WITH INDEXES
(SUPPLEMENT 381) (NASA) 46 p

N94-19069

Unclas

00/52 0197631

The NASA STI Program ... in Profile

Since its founding, NASA has been dedicated to the advancement of aeronautics and space science. The NASA Scientific and Technical Information (STI) Program plays a key part in helping NASA maintain this important role.

The NASA STI Program provides access to the NASA STI Database, the largest collection of aeronautical and space science STI in the world. The Program is also NASA's institutional mechanism for disseminating the results of its research and development activities.

Specialized services that help round out the Program's diverse offerings include creating custom thesauri, translating material to or from 34 foreign languages, building customized databases, organizing and publishing research results ... even providing videos.

For more information about the NASA STI Program, you can:

- **Phone** the NASA Access Help Desk at (301) 621-0390
- **Fax** your question to the NASA Access Help Desk at (301) 621-0134
- **E-mail** your question via the **Internet** to help@sti.nasa.gov
- **Write to:**

NASA Access Help Desk
NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934

NASA SP-7011 (381)
November 1993

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

This publication was prepared by the NASA Center for Aerospace Information,
800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934, (301) 621-0390.

INTRODUCTION

This issue of *Aerospace Medicine and Biology* (NASA SP-7011) lists 89 reports, articles, and other documents recently announced in the NASA STI Database. The first issue of *Aerospace Medicine and Biology* was published in July 1964.

Accession numbers cited in this issue include:

Scientific and Technical Aerospace Reports (STAR) (N-10000 Series)

N93-31326 — N93-32425

International Aerospace Abstracts (IAA) (A-10000 Series)

A93-45451 — A93-49080

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on 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. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the publication consists of a standard 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 include the original accession numbers from the respective announcement journals.

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

A cumulative index for 1993 will be published in early 1994.

Information on availability of documents listed, addresses of organizations, and CASI price schedules are located at the back of this issue.

TABLE OF CONTENTS

Category 51	Life Sciences (General)	357
Category 52	Aerospace Medicine Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.	359
Category 53	Behavioral Sciences Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.	363
Category 54	Man/System Technology and Life Support Includes human engineering; biotechnology; and space suits and protective clothing.	364
Category 55	Space Biology Includes exobiology; planetary biology; and extraterrestrial life.	372

Subject Index	A-1
Personal Author Index	B-1
Corporate Source Index	C-1
Foreign Technology Index	D-1
Contract Number Index	E-1
Report Number Index	F-1
Accession Number Index	G-1
Appendix	APP-1

TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED

↓
ON MICROFICHE

ACCESSION NUMBER → N93-12195 * # Lockheed Engineering and Sciences, Co., Houston, TX. ← CORPORATE SOURCE
TITLE → **ASTRONAUT CANDIDATE STRENGTH MEASUREMENT USING THE CYBEX 2 AND THE LIDO MULTI-JOINT 2 DYNAMOMETERS Final Report**
AUTHORS → AMY E. CARROLL and ROBERT P. WILMINGTON May 1992 ← PUBLICATION DATE
CONTRACT NUMBER → (Contract NAS9-17900)
REPORT NUMBERS → (NASA-CR-185679; NAS 1.26:185679; LESC-30277) Avail: CASI HC ← AVAILABILITY
PRICE CODE → A03/MF A01

The Anthropometry and Biomechanics Laboratory in the man-Systems division at NASA's Johnson Space Center has as one of its responsibilities the anthropometry and strength measurement data collection of astronaut candidates. The anthropometry data is used to ensure that the astronaut candidates are within the height restrictions for space vehicle and space suit design requirements, for example. The strength data is used to help detect abnormalities or isolate injuries to muscle groups that could jeopardize the astronauts' safety. The Cybex II Dynamometer has been used for strength measurements from 1985 through 1991. The Cybex II was one of the first instruments of its kind to measure strength and similarity of muscle groups by isolating the specific joint of interest. In November 1991, a LIDO Multi-Joint II Dynamometer was purchased to upgrade the strength measurement data collection capability of the Anthropometry and Biomechanics Laboratory. The LIDO Multi-Joint II Dynamometer design offers several advantages over the Cybex II Dynamometer including a more sophisticated method of joint isolation and a more accurate and efficient computer based data collection system.

Author

TYPICAL JOURNAL ARTICLE CITATION AND ABSTRACT

ACCESSION NUMBER → A93-11150
TITLE → **STUDIES TOWARDS THE CRYSTALLIZATION OF THE ROD VISUAL PIGMENT RHODOPSIN**
AUTHORS → W. J. DE GRIP, J. VAN OOSTRUM, and G. L. J. DE CALUWE
AUTHORS' AFFILIATION → (Nijmegen Catholic Univ., Netherlands) Journal of Crystal Growth (ISSN 0022-0248) vol. 122, no. 1-4 Aug. 1992 ← JOURNAL TITLE
p. 375-384. Research supported by SRON refs ← PUBLICATION DATE
CONTRACT NUMBER → (Contract NWO-SON-328-050)
Copyright

Results are presented of crystallization experiments on bovine rhodopsin, which established a restricted range of conditions which reproducibly yield rhodopsin crystals. Several parameters were optimized, including the detergent, the precipitant, additives, and pH. The crystals obtained so far are too small (less than 50 microns in any direction) or of insufficient order to allow high-resolution diffraction analysis. Several approaches are proposed for improving the average size, stability, and order of the rhodopsin crystals.

I. S.

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 381)

November 1993

51

LIFE SCIENCES (GENERAL)

A93-45995

EFFECTS OF A MICROGRAVITY ENVIRONMENT ON THE CRYSTALLIZATION OF BIOLOGICAL MACROMOLECULES

A. MCPHERSON (California Univ., Riverside) *Microgravity Science and Technology* (ISSN 0938-0108) vol. 6, no. 2 June 1993 p. 101-109. refs

Copyright

Protein crystal growth experiments in space suggest that macromolecular crystals of sufficient size and quality for X-ray diffraction may be produced in a microgravity environment. It is hypothesized that the absence of density-driven convection and sedimentation is responsible for this improvement over ground-based crystal growth. Microgravity effects that may play a role in protein crystal growth and crystal quality are discussed, and possible mechanisms are suggested. Previous work and experiments in the field are also discussed. AIAA

A93-46075

APPLIED CHEMICAL ENGINEERING THERMODYNAMICS

DIMITRIOS P. TASSIOS (Athens National Technical Univ., Greece) Berlin and New York Springer-Verlag 1993 741 p. refs

(ISBN 0-387-54759-2) Copyright

The present treatment of foundational topics in chemical-engineering thermodynamics covers both the graduate and undergraduate levels. After establishing the general trends of this discipline's historical development, attention is given to the efficient utilization of energy, a limited discussion of intermolecular forces, and the cubic equations of state that have become a major tool in quantitative descriptions of both pure and mixed fluids. The discussion of equilibrium and stability leads to consideration of phase and chemical-reaction equilibria. AIAA

A93-46300

UNDERSTANDING MICROWAVES

ALLAN W. SCOTT (Microwave Training Inst., Los Altos, CA) New York John Wiley & Sons, Inc. 1993 557 p. refs

(ISBN 0-471-57567-4) Copyright

The present work proceeds from a survey of microwave systems and devices to consideration of microwave fields and the quantification of their power, insertion loss and gain characteristics, and Smith-chart matches and mismatches. Attention is then given to such microwave devices as transmission lines, signal-control components, semiconductor amplifiers, oscillators, receivers, integrated circuits, and microwave tubes and antennas. Accounts are finally presented of microwave systems encompassing relays, communications satellites, radars, electronic warfare devices and countermeasures, and microwave navigation aids. AIAA

A93-46468* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

EFFECTS OF INCANDESCENT RADIATION ON PHOTOSYNTHESIS, GROWTH RATE AND YIELD OF 'WALDMANN'S GREEN' LEAF LETTUCE

SHARON L. KNIGHT and CARY A. MITCHELL (Purdue Univ., West Lafayette, IN) *Scientia Horticulturae* (ISSN 0304-4238) vol. 35 1988 p. 37-49. refs

(Contract NCC2-100)

Copyright

Effects of different ratios of incandescent (In) to fluorescent (Fl) radiation were tested on growth of 'Waldmann's Green' leaf lettuce in a controlled environment. After 4 days of treatment, dry weight, leaf area, relative growth rate (RGR), net assimilation rate (NAR), leaf area ratio (LAR) and photosynthetic rate (Pn) were greater for plants grown at 84 rather than 16 percent of total irradiance (82 W/sq m) from In lamps. Although leaf dry weight and area were 12-17 percent greater at 84 percent In after the first 8 days of treatment, there were no differences in RGR or Pn between treatments during the last 4 days. If 84 percent In was compared with 50 percent In, all cumulative growth parameters, RGR, NAR and Pn were greater for 84 percent In during the first 4 days of treatment. However, during the second 4 days, RGR was greater for the 50 percent In treatment, resulting in no net difference in leaf dry weight or area between treatments. Shifting from 84 to 50 percent In radiation between the first and second 4 days of treatment increased plant dry weight, leaf area, RGR and NAR relative to those under 84 percent In for 8 days continuously. Author (revised)

A93-46469* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

GROWTH AND YIELD CHARACTERISTICS OF 'WALDMANN'S GREEN' LEAF LETTUCE UNDER DIFFERENT PHOTON FLUXES FROM METAL HALIDE OR INCANDESCENT + FLUORESCENT RADIATION

SHARON L. KNIGHT and CARY A. MITCHELL (Purdue Univ., West Lafayette, IN) *Scientia Horticulturae* (ISSN 0304-4238) vol. 35 1988 p. 51-61. refs

(Contract NCC2-100)

Copyright

Growth of 'Waldmann's Green' leaf lettuce under metal halide radiation was compared with that under In = Fl at the same photosynthetic photon flux (920 micromol/s/sq m) to evaluate the influence of lamp type on growth. No differences in leaf dry weight, leaf area, relative growth rate or photosynthesis occurred after 8 days of exposure to these radiation treatments for 20 h/day. AIAA

A93-46470* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

MINITRON II SYSTEM FOR PRECISE CONTROL OF THE PLANT GROWTH ENVIRONMENT

SHARON L. KNIGHT, CAROLYN P. AKERS, S. W. AKERS, and CARY A. MITCHELL (Purdue Univ., West Lafayette, IN) *Photosynthetica* (ISSN 0300-3604) vol. 22 1988 p. 90-98. refs

(Contract NCC2-100)

Copyright

The Minitron II system which accommodates hydroponic culture

A
B
S
T
R
A
C
T
S

51 LIFE SCIENCES (GENERAL)

and separate control of atmospheric composition in individual chambers is used to measure gas-exchange by small crop canopies in the undisturbed plant growth environment. It is concluded that the system is capable of providing separate controlled environments for multiple small plants with adequate precision and at relatively low cost when coupled with appropriate control systems. AIAA

A93-46471* National Aeronautics and Space Administration, Washington, DC.

THE MINITRON SYSTEM FOR GROWTH OF SMALL PLANTS UNDER CONTROLLED ENVIRONMENT CONDITIONS

CAROLYN P. AKERS, STUART W. AKERS, and CARY A. MITCHELL (Oklahoma State Univ., Stillwater) American Society for Horticultural Science, Journal (ISSN 0003-1062) vol. 110, no. 3 May 1985 p. 353-357. refs
(Contract NSG-7278)
Copyright

The design and operation of a system is described in which small plants can be grown under controlled environment conditions. Important features of this 'Minitron' system include precise control of temperature and CO₂ concentration in a flowing atmosphere. Plants can be grown either hydroponically or in solid root support medium. For either culture method, nutrient solution or water is added from an external reservoir, altering neither atmospheric composition nor temperature equilibrium within a closed Minitron chamber.

A93-46472* National Aeronautics and Space Administration, Washington, DC.

DYNAMICS OF AUXIN MOVEMENT IN THE GRAVITIMULATED LEAF-SHEATH PULVINUS OF OAT (AVENA SATIVA)

THOMAS C. BROCK, E. H. KAPEN (Michigan Univ., Ann Arbor), NAJATI S. GHOSHEH (East Michigan Univ., Ypsilanti, MI), and PETER B. KAUFMAN (Michigan Univ., Ann Arbor) Journal of Plant Physiology (ISSN 0176-1617) vol. 138 1991 p. 57-62. refs
(Contract NAGW-1600)
Copyright

The role of auxin redistribution in the graviresponser of the leaf-sheath pulvinus of oat was evaluated using H-3-indole-3-acetic acid (H-3-IAA) preloaded into isolated pulvini. Results obtained reveal that, while lateral transport of auxin occurs following gravistimulation, it is not necessary for a graviresponse. Localized changes in tissue responsiveness or the conversion of conjugated hormone to free hormone may suffice to drive the graviresponse. AIAA

A93-46606

HETEROGENEITY OF RAT PITUITARY PROLACTIN CELLS - RELATIONSHIPS AMONG LOCATION, HORMONE ASSAY AND ESTROUS CYCLE STAGE

P. MUKHERJEE and W. C. HYMER (Pennsylvania State Univ., University Park) Progress in Neuroendocrin Immunology (ISSN 1045-2001) vol. 5, no. 2 1992 p. 108-119. refs
(Contract NIH-CA-23248)
Copyright

A technique permitting the study of cells in single pituitary glands under conditions in which they are in contact with their natural neighbors has been applied to GH cells in the male and to prolactin cells in the ovariectomized and estrogenized female. This approach is to study regional differences in prolactin cells as related to stages of the estrous cycle. Pituitary glands from individual rats at estrus, diestrus or proestrus were sectioned into 8 cubes and incubated for 15 min; released prolactin was measured by ELISA, Nb-2 lymphoma bioassay, and IL-2 receptor (IL-2R) assay. Prolactin cell numbers in each tissue section were determined on trypsinized cell suspension by flow cytometric immunofluorescence. Prolactin release among certain sections differed consistently regardless of the estrous status. The dorsal lobe of the diestrus pituitary usually contained the most active prolactin cells; however, as estrogen levels rose during proestrus

and estrus, prolactin cells in the ventral region became more active. Patterns of immunoreactive and bioactive prolactin release did not parallel one another. Prolactin active on a T-lymphocyte tumor cell line (the Nb-2 bioassay) did not always show the same high activity when measured by the IL-2R induction assay.

Author (revised)

A93-47099

RELATIONSHIP BETWEEN G + C IN SILENT SITES OF CODONS AND AMINO ACID COMPOSITION OF HUMAN PROTEINS

D. W. COLLINS and T. H. JUKES (California Univ., Berkeley) Journal of Molecular Evolution (ISSN 0022-2844) vol. 36, no. 3 March 1993 p. 201-213.
(Contract PHS-R01-HG-00312-03)
Copyright

We have investigated the relationship between the G + C content of silent (synonymous) sites in codons and the amino acid composition of encoded proteins for approximately 1,600 human genes. There are positive correlations between silent site G + C and the proportions of codons for Arg, Pro, Ala, Trp, His, Gln, and Leu and negative ones for Tyr, Phe, Asn, Ile, Lys, Asp, Thr, and Glu. The median proteins coded by groups of genes that differ in silent-site G + C content also differ in amino acid composition, as do some proteins coded by homologous genes. The pattern of compositional change can be largely explained by directional mutation pressure, the genetic code, and differences in the frequencies of accepted amino acid substitutions; the shifts in protein composition are likely to be selectively neutral.

A93-47100

CHANGES IN THE PHOSPHOLIPID AND CHOLESTEROL CONTENT OF RAT TISSUES DURING ADAPTATION TO HIGH ALTITUDE AT DIFFERENT ENVIRONMENTAL TEMPERATURES

V. A. TERNOVOJ and V. M. YAKOVLEV Zhurnal Evolyutsionnoj Biokhimii i Fiziologii (ISSN 0044-4529) vol. 29, no. 1 Jan.-Feb. 1993 p. 22-26. In RUSSIAN
Copyright

Studies have been made on the contents of total lipids, cholesterol, phospholipids and the level of lipid peroxidation in rats adapted to a high altitude (3,200 m for 30 days) at temperatures 10 and 30 degrees C. It was shown that at lower temperature, high altitude adaptation is paralleled by more significant activation of lipid peroxidation, the decrease of phosphatidylcholine and phosphatidylethanolamine in the brain, lungs and liver, as well as by the increase of the content of phosphatidic acid and phosphatidylinositol in tissues. No negative cross-adaptation was found to hypoxic hypoxia and low temperatures.

N93-32035 Catholic Univ. of America, Washington, DC. Vitreous State Lab.

MECHANISMS OF MICROWAVE INDUCED DAMAGE IN BIOLOGIC MATERIALS Final Report, 22 Sep. 1986 - 21 Sep. 1992

T. A. LITOVITZ 1 Oct. 1992 92 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(Contract DAMD17-86-C-6260)
(AD-A264415) Avail: CASI HC A05

Concerns over the possibility that exposure to electromagnetic fields can have adverse health consequences has prompted research into the mechanism of interaction between electromagnetic fields and living cells. A six-year study at the Catholic University of America has included experimental and theoretical studies that attempt the following: (1) to firmly establish whether or not there are, in fact, any athermal effects on living cells that can be attributed to exposure to electromagnetic fields; (2) to determine and explain the dose-response relationship between bioeffects and EM field parameters; and (3) to discover how biologic cells can detect very weak ambient fields which are much smaller than intrinsic EM noise fields always present. In this

work we report that significant contributions have been made to each of the three areas described above. DTIC

**N93-32354*# Sverdrup Technology, Inc., Huntsville, AL.
MICROBIOLOGICAL TEST RESULTS OF THE
ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS
VAPORS COMPRESSION DISTILLATION SUBSYSTEM
RECYCLE TANK COMPONENTS FOLLOWING VARIOUS
PRETREATMENT PROTOCOLS**

TIM HUFF Jul. 1993 9 p
(Contract NAS8-37814)
(NASA-CR-192570; NAS 1.26:192570) Avail: CASI HC A02/MF A01

Microbiological samples were collected from the recycle tank of the vapor compression distillation (VCD) subsystem of the water recovery test at NASA MSFC following a 68-day run. The recycle tank collects rejected urine brine that was pretreated with a commercially available oxidant (Oxone) and sulfuric acid and pumps it back to the processing component of the VCD. Samples collected included a water sample and two swab samples, one from the particulate filter surface and a second from material floating on the surface of the water. No bacteria were recovered from the water sample. Both swab samples contained a spore-forming bacterium, *Bacillus insolitus*. A filamentous fungus was isolated from the floating material. Approximately 1 month after the pretreatment chemicals were changed to sodium hypochlorite and sulfuric acid, a swab of the particulate filter was again analyzed for microbial content. One fungus was isolated, and spore-forming bacteria were observed. These results indicate the inability of these pretreatments to inhibit surface attachment. The implications of the presence of these organisms are discussed. Author (revised)

**N93-32365*# Sverdrup Technology, Inc., Huntsville, AL.
OPTIMIZATION OF 15 PARAMETERS INFLUENCING THE
LONG-TERM SURVIVAL OF BACTERIA IN AQUATIC
SYSTEMS**

D. C. OBENHUBER Jul. 1993 21 p
(Contract NAS8-37814)
(NASA-CR-192571; NAS 1.26:192571) Avail: CASI HC A03/MF A01

NASA is presently engaged in the design and development of a water reclamation system for the future space station. A major concern in processing water is the control of microbial contamination. As a means of developing an optimal microbial control strategy, studies were undertaken to determine the type and amount of contamination which could be expected in these systems under a variety of changing environmental conditions. A laboratory-based Taguchi optimization experiment was conducted to determine the ideal settings for 15 parameters which influence the survival of six bacterial species in aquatic systems. The experiment demonstrated that the bacterial survival period could be decreased significantly by optimizing environmental conditions. Author

**N93-32423# National Defence Research Establishment, Umea
(Sweden). NBC Defence Dept.**

**MICRO-ORGANISMS, CYTOTOXINS AND RADIOACTIVE
PREPARATION: RISKS AT RESCUE OPERATIONS IN
HOSPITAL ENVIRONMENT [MIKROORGANISMER,
CYTOSTATIKA, RADIOAKTIVA PREPARAT: RISKER VID
RAEDDNINGSINSATS I SJUKHUSMILJOE]**

INDRA SVENSSON Aug. 1992 32 p In SWEDISH
(ISSN 0281-0220)
(FOA-A-40065-4.5; ETN-93-94028) Avail: CASI HC A03/MF A01; National Defence Research Establishment, S-901 82 Umea, Sweden, HC

The development of society leads to an increased handling of microorganisms, cytotoxins, and radiological preparations in pharmacies, hospital institutions, and in certain factories. The question of whether these organisms/subjects imply special risks for the staff of the rescue board when working in these types of premises is addressed. ESA

AEROSPACE MEDICINE

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

**A93-45691
SOME CHARACTERISTICS OF THE ETIOPATHOGENESIS OF
HEARING LOSS IN AIRCRAFT PERSONNEL [NEKOTORYE
OSOBENNOSTI EHTIOPATOGENEZA SNIZHENIYA SLUKHA U
LETNOGO SOSTAVA]**

V. R. GOFMAN and A. A. MIL'KOV Voenno-Meditsinskij Zhurnal (ISSN 0026-9050) no. 3 March 1993 p. 47-49. In RUSSIAN refs

Copyright

The primary causes of neurosensory hearing loss in aircraft personnel were investigated by conducting a three-year study of level of hearing in pilots of different ages, health condition, and flying record, using parameters of tonal audiometry and results of whisper tests as indices of hearing level. The observations detected a type of perceptive hearing loss that was not related to previously occurring acute illnesses, such as otitis media, cranial injuries, or acute barotraumas. However, a direct correlation was found between the degree of hearing loss and the accumulated flying time. All affected subjects also exhibited one or more symptoms of other pathological conditions, including cervical osteochondrosis, diseases of the gastrointestinal tract, asthenoneurotic conditions, and neurocirculatory hypertony, which were also related to the total hours of flying. Some of these conditions also occurred in subjects not exhibiting hearing loss. AIAA

**A93-45692
A MODIFIED METHOD FOR INVESTIGATING GASTRIC
SECRETION IN AVIATION MEDICAL EXAMINATION
[MODIFITSIROVANNYJ METOD ISSLEDOVANIYA
ZHELUDOCHNOJ SEKRETSII PRI VRACHEBNO-LETNOJ
EKSPERTIZE]**

S. N. TOBOLIN and V. M. LUFT Voenno-Meditsinskij Zhurnal (ISSN 0026-9050) no. 3 March 1993 p. 49-51. In RUSSIAN refs

Copyright

A method for the assessment of the gastric secretory function from the analysis of stomach contents is proposed, in which the modified Bykov method (Miasoedov, 1958) is modified again, mainly by introducing a periodic (rather than continuous) method for collecting gastric juice. This method produced reliable results, yet resulted in shortening of the analysis procedure by one half. AIAA

**A93-46967
CHANGES IN THE CENTRAL HEMODYNAMICS UNDER
ANTIORTHOSTASIS IN HUMANS WITH DIFFERENT BLOOD
CIRCULATION TYPES AND PHYSICAL TRAINING LEVELS
[IZMENENIE TSENTRAL'NOJ GEMODINAMIKI PRI
ANTIORTOSTATICHESKIKH VOZDEJSTVIYAKH U LYUDEJ S
RAZLICHNYMI TIPAMI KROVOBRASHCHENIYA I UROVNEM
FIZICHESKOJ PODGOTOVLENNOSTI]**

V. A. TSYBENKO (Kievskij Gosudarstvennyj Univ., Kiev, Ukraine) and A. V. GRISHCHENKO (Cherkasskij Pedagogicheskij Inst., Cherkassy, Ukraine) Fiziologiya Cheloveka (ISSN 0131-1646) vol. 19, no. 3 May-June 1993 p. 100-105. In RUSSIAN refs

Copyright

The roles of physical training and type of blood circulation in humans in the reaction of central hemodynamics to antiorthostasis were investigated by comparing the plethismographic parameters of central hemodynamics in athletes with those in nonathletes subjected to antiorthostasis (for up to 10 min) after a period of rest. It was found that the athletes and nonathletes differed little in their reaction to antiorthostasis (initial increases in the heart index, HI, pulse index, PI, and systolic arterial pressure and

decreases in the general peripheral vessel resistance, GPVR, with subsequent decreases of HI and PI and increases in GPVP). These indexes reacted differently in subjects with hyperkinetic, eukinetic, and hypokinetic types of blood circulation. AIAA

A93-46968

ELECTROMYOGRAPHIC PATTERNS OF THE THERMOREGULATORY ACTIVITY OF MOTOR UNITS DURING COOLING OF THE ORGANISM

[EHLEKTROMIOGRAFIKESKIE PATTERNY THERMOREGULYATSIONNOJ AKTIVNOSTI DVIGATEL'NYKH EDINITS V PROTSESSE OKHLAZHDENIYA ORGANIZMA]

A. YU. MEJGAL, YU. V. LUPANDIN, and G. I. KUZ'MINA (Petrozavodskij Gosudarstvennyj Univ., Petrozavodsk, Russia) *Fiziologiya Cheloveka* (ISSN 0131-1646) vol. 19, no. 3 May-June 1993 p. 106-114. In RUSSIAN refs

Copyright

The function of individual motor units (MUs) within various patterns of muscular thermoregulatory activity induced in humans by cooling of the body was investigated using results of skin electromyography. It is found that the thermoregulatory muscle tonus in the initial phase of the reaction to cooling is formed on the basis of asynchronous pulsations of slow, low-threshold MUs, with frequencies of 8-11 and 4-7 pulses per second in muscles of the upper and the lower extremities, respectively. The electromyographic pattern of cold tremor is generated on the basis of periodic recruiting of high-threshold MUs. In addition, a pattern generated on the basis of long-term synchronization of active MUs, forming a conelike cold tremor pattern, was observed. The possible mobility correlates in the organization of the MU activity at different stages of body cooling are discussed. AIAA

A93-47096

ARTERIAL PULSE PRESSURE AND VASOPRESSIN RELEASE IN HUMANS DURING LOWER BODY NEGATIVE PRESSURE

P. NORSK, P. ELLEGAARD, R. VIDEBAEK, C. STADEAGER, F. JESSEN, L. B. JOHANSEN, M. S. KRISTENSEN, M. KAMEGAI, J. WARBERG, and N. J. CHRISTENSEN (Danish Aerospace Medical Centre of Research, Copenhagen, Denmark) *American Journal of Physiology* (ISSN 0002-9513) vol. 264, no. 5, pt. 2 May 1993 p. R1024-R1030.

Copyright

The hypothesis that narrowing of arterial pulse pressure (PP) is a determinant of arginine vasopressin (AVP) release in humans is tested. Six normal males completed a two-step lower body negative pressure (LBNP) protocol of -20 and -50 mmHg, respectively, for 10 min each. None of these subjects experienced presyncopal symptoms. Arterial plasma AVP and plasma renin activity (PRA) only increased subsequent to a decrease in PP (invasive brachial arterial measurements) and stroke volume; mean arterial pressure did not change. A selective decrease in central venous pressure and left atrial diameter at LBNP of -20 mmHg did not affect AVP or PRA, whereas arterial plasma norepinephrine increased ($n = 4$). During LBNP, significant intraindividual linear correlations were observed between $\log(\text{AVP})$ and PP in four of the subjects with r values from -0.75 to -0.99 and between $\log(\text{PRA})$ and PP in all six subjects with r values from -0.89 to -0.98. These results are in compliance with the hypothesis that narrowing of PP in humans during central hypovolemia is a determinant of AVP and renin release. Author (revised)

A93-47097

EFFECT OF SPACEFLIGHT ON HUMAN PROTEIN METABOLISM

T. P. STEIN, M. J. LESKIW, and M. D. SCHLUTER (New Jersey Univ. of Medicine and Dentistry, Camden) *American Journal of Physiology* (ISSN 0002-9513) vol. 264, no. 5, pt. 1 May 1993 p. E824-E828.

Copyright

Nitrogen balance and the whole body protein synthesis rate were measured before, during, and after a 9.5-day spaceflight mission on the space shuttle Columbia. Protein synthesis was measured by the single-pulse ^{15}N /glycine method. Determinations

were made 56, 26, and 18 days preflight, on flight days 2 and 8, and on days 0, 6, 14, and 45 postflight. We conclude that nitrogen balance was decreased during spaceflight. The decrease in nitrogen balance was greatest on the 1st day when food intake was reduced and again toward the end of the mission. An approximately 30 percent increase in protein synthesis above the preflight baseline was found for flight day 8 for all 6 subjects (P below 0.05), indicating that the astronauts showed a stress response to spaceflight. Author (revised)

A93-47098

SPECIFIC ABSORPTION RATE AND RADIOFREQUENCY CURRENT-TO-GROUND IN HUMAN MODELS EXPOSED TO NEAR-FIELD IRRADIATION

R. G. OLSEN and T. A. GRINER (U.S. Navy, Naval Aerospace Medical Research Lab., Pensacola, FL) *Health Physics* (ISSN 0017-9078) vol. 64, no. 6 June 1993 p. 633-637.

Copyright

To expand our knowledge of near-field radiofrequency energy absorption in occupationally exposed workers, we used coffin-sized calorimeters to measure specific absorption rate in full-size human models. The models were subjected to near-field irradiation at two frequencies at an outdoor groundplane facility. We also measured radiofrequency current-to-ground in the models to supplement a previous study at 29.9000 MHz. The results have enabled us to construct a frequency-independent mathematical relationship between specific absorption rate and radiofrequency current for the given exposure system. Moreover, the results show a favorable comparison to radiofrequency radiation dosimetry handbook predictions of average specific absorption rate when only the vertical electric field (E-field) component is used to normalize specific absorption rate. Once determined on a case-by-case basis, the use of specific absorption rate vs. radiofrequency current curves for any exposure system or condition could be a simple and quick method to determine onsite compliance with specific absorption rate-based exposure standards.

N93-31454*# McDonnell-Douglas Space Systems Co., Houston, TX.

HYPERBARIC TREATMENT

MICHAEL T. AMOROSO *In its Workshop on Fuzzy Control Systems and Space Station Applications* p 391-411 Nov. 1990 Avail: CASI HC A03/MF A04

Viewgraphs on hyperbaric treatment are presented. Topics covered include: hyperbaric treatment - purpose; decompression sickness; sources of decompression sickness; physical description; forms of decompression sickness; hyperbaric treatment of decompression sickness; and duration of treatment. CASI

N93-31455*# McDonnell-Douglas Space Systems Co., Houston, TX.

DAILY EXERCISE ROUTINES

PATRICK L. ANDERSON and MICHAEL T. AMOROSO *In its Workshop on Fuzzy Control Systems and Space Station Applications* p 413-418 Nov. 1990 Avail: CASI HC A02/MF A04

Viewgraphs on daily exercise routines are presented. Topics covered include: daily exercise and periodic stress testings; exercise equipment; physiological monitors; exercise protocols; physiological levels; equipment control; control systems; and fuzzy logic control. CASI

N93-31917# Army Research Inst. of Environmental Medicine, Natick, MA.

AN ANNOTATED BIBLIOGRAPHY OF RESEARCH INVOLVING WOMEN, CONDUCTED AT THE US ARMY RESEARCH INSTITUTE OF ENVIRONMENTAL MEDICINE Final Report

JAMES A. VOGEL and ANITA K. GAUGER 1993 65 p (AD-A265497) Avail: CASI HC A04/MF A01

Recently, considerable attention has been given to the lack of biomedical research on women's health problems. Within the military services, this concern for lack of research with women or lack of inclusion of women subjects in research has been extended

to most areas of human performance investigation. As women move into an increasing number of military occupations, it is apparent most military research on health and performance has been conducted on male research volunteers. The many anthropometric, body compositional, physiological, and endocrinological differences between genders make it obvious that much of the male research data can not be readily extrapolated to females. Although this issue has only recently received broad attention, the U.S. Army Research Institute of Environmental Medicine (USARIEM) has already executed many studies which either addresses women-related issues or include women in the study population. This report is a bibliography of these studies, complete with abstracts, intended to serve as a convenient resource for women-related health and performance research information. It is anticipated that these references will prompt additional biomedical research related to women in the military.

DTIC

N93-31924* National Aeronautics and Space Administration, Washington, DC.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 377)

Jul. 1993 82 p

(NASA-SP-7011(377); NAS 1.21:7011(377)) Avail: CASI HC A05

This bibliography lists 223 reports, articles, and other documents recently introduced into the NASA Scientific and Technical Information System. Subject coverage includes: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance.

Author (revised)

N93-31981# North Carolina Univ., Chapel Hill. Div. of Otolaryngology.

AUDITORY SPECTRO-TEMPORAL PATTERN ANALYSIS Final Report, 1 Dec. 1989 - 31 Dec. 1992

JOSEPH W. HALL 15 Mar. 1993 11 p

(Contract AF-AFOSR-0108-90)

(AD-A264691; AFOSR-93-0252TR) Avail: CASI HC A03/MF A01

The long-term aim of this project was a better understanding of auditory processes which use across-frequency or across-ear temporal envelope and modulation difference cues to aid performance. Areas of investigation included comodulation masking release (CMR), the masking-level difference (MLD), temporal resolution, and the processing of amplitude and frequency modulation. The goals of the proposed experiments were to (1) examine the possible relation between CMR and auditory phenomena related to auditory grouping, or auditory scene analysis; (2) examine how CMR and MLD effects combine, and to examine the possible relation between CMR and the MLD for narrowband noise maskers; (3) to determine the extent to which across-frequency correlation of temporal envelopes may influence gap detection for wideband stimuli; (4) determine whether masking release can be derived from cues based upon across frequency coherence of frequency modulation; (5) examine a modulation masking phenomenon related to frequency modulation. The tasks involved signal detection in masking noise, temporal gap detection, and the detection of frequency modulation.

DTIC

N93-32015# Pittsburgh Univ., PA. Dept. of Psychiatry.

ORGANIZATION OF THE HUMAN CIRCADIAN SYSTEM Final Report, 1 Feb. 1991 - 31 Jan. 1993

ROBERT Y. MOORE 31 Jan. 1993 10 p

(Contract AF-AFOSR-0175-91)

(AD-A264675; AFOSR-93-0336TR) Avail: CASI HC A02/MF A01

In brains obtained from late gestation fetuses (33-36 weeks), newborns, and young individuals to approximately age 50, the SCN is virtually always identifiable as a discrete nucleus with clear boundaries. From age 50-90, it is sometimes evident and sometimes not evident in the material. We have completed analysis of 22 hypothalami prepared for immunocytochemistry, including quantitative analysis. Sections are routinely stained for VIP, VP, NPY, and NT. This analysis has revealed several interesting aspects

of the human SCN. First, in contrast to what is found in Nissl material, the SCN is always evident as a distinct nucleus in immunocytochemical material. Second, it appears as the first component of the hypothalamus to be found in a rostrocaudal set of coronal sections. Third, the human SCN is characterized by four separate populations of neurons that have different peptide content. These neuronal populations have a different distribution in the nucleus. In contrast to all other mammals, the human SCN contains a population of NPY + neurons that overlaps the VIP + group but extends dorsally beyond it in the center on the SCN. Among the NPY + neurons are scattered coarse fibers and varicosities and a fairly dense plexus of very fine fibers and small varicosities. These are very similar in morphology to GHT projections in other mammals, particularly the cat, and monkey.

DTIC

N93-32018# Dalhousie Univ., Halifax (Nova Scotia). Dept. of Psychology.

NEUROPHYSIOLOGICAL ANALYSIS OF CIRCADIAN RHYTHM ENTRAINMENT Final Report, 1 Jan. 1990 - 31 Dec. 1992

BENJAMIN RUSAK 30 Mar. 1993 15 p

(Contract AF-AFOSR-0104-90)

(AD-A264681; AFOSR-93-0335TR) Avail: CASI HC A03/MF A01

We review recent studies in our laboratory which have investigated the neural mechanisms underlying photic entrainment of the mammalian circadian system. The results from studies of extracellular single-unit recordings and of photic induction of Fos-like immunoreactivity (-lir) indicate that excitatory amino acid (EAA) transmission, and particularly, activation of the NMDA receptor subtype, is important for conveying photic information to suprachiasmatic nucleus (SCN) cells. We have also found that a sub-region of the SCN still shows Fos-lir after blockade of EAA receptors, and we have evidence suggesting that these cells are innervated by a distinct subdivision of the retinal projection to the SCN. In addition, we have found that photic responses of cells in the intergeniculate leaflet (which projects to the SCN) and of SCN cells are modulated by serotonin via a receptor that resembles the 5HT1A subtype.

DTIC

N93-32237 Institute of Sound and Vibration Research, Southampton (England). Audiology and Human Effects Group.

TRANSMISSION OF VIBRATION THROUGH THE HUMAN BODY TO THE HEAD: A SUMMARY OF EXPERIMENTAL DATA

GURMAIL S. PADDAN and MICHAEL J. GRIFFIN May 1993

163 p Sponsored by the UK Ministry of Defence

(ISVR-TR-218) Copyright Avail: Issuing Activity (Institute of Sound and Vibration Research, University of Southampton, Southampton SO9 5NH, England)

The transmission of vibration through the human body to the heads of seated and standing persons is presented. For seated subjects, the transmission of vibration to the head is documented for each of the six orthogonal axes of seat motion (fore-and-aft, lateral, vertical, roll, pitch, and yaw). For standing subjects, the transmission of vibration to the head is documented for three translational axes of floor vibration. In all cases, the head motion was measured in all six axes. Twelve adult male subjects took part in these experiments. The effects of sitting posture and standing posture on transmissibility were determined. The postures for the sitting condition were 'back-on' (leaning slightly against the seat backrest). Different postures were used for each axis of floor vibration with the standing subjects: holding a handrail with two different grips during exposure to fore-and-aft vibration; standing with three different foot separations during exposure to lateral vibration; standing with three different postures of the legs during exposure to vertical vibration. Median transmissibilities and the inter-quartile ranges of transmissibilities were calculated between the input motion (seat or floor acceleration) and head motion. These data are presented in graphical and tabular form.

Author

N93-32249# Service de Medecine Aeronautique, Versailles (France).

LIPODYSTROPHIES IN THE FRENCH MILITARY FLIGHT CREW [LES DYSLIPIDEMIES DANS LE PERSONNEL NAVIGANT MILITAIRE FRANCAIS]

A. SEIGNEURIC, J. P. BURLATON, J. DEROCHE, R. RICHARD, and A. BOUSSIF *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 5 p Mar. 1993 *In* FRENCH Copyright Avail: CASI HC A01/MF A03

Disorders of the lipid metabolism in the French flight crew were evaluated beginning with a population having aeronautical expertise who were hospitalized between 1980 and 1989. An anomaly: -pure hypertriglyceridemia (hyper TGD) - mixed lipodystrophy - isolated hypercholesterolemia (hyper CT), were recognized in 52.3% of the cases (483/923). A hyper CT with an elevated risk was confirmed in 34.8% of the cases (294/923). It is in the group of controllers that this anomaly is the most frequent, with 40% of the subjects affected (50/120), whereas approximately 30% of the subjects are affected in the various groups of pilots as well as among the mechanics and navigators. The follow-up carried out for 177 flying personnel in an average period of two and a half years showed the existence of a cardiovascular attack for 12% of the subjects. Therapeutic treatment (diet +/- medication) was effective in 45% of the cases. The decrease in the numbers for cholesterol, the triglycerides, and for a multifactorial risk factor is established at around 10%. Transl. by FLS

N93-32250# Hellenic Air Force Aeromedical Center, Athens (Greece).

LIPIDEMIC PROFILE OF HELLENIC AIRFORCE OFFICERS

J. PALERMOS, A. KITSOU, S. MICHALOPOULOU, and K. KYRIAKOS *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 4 p Mar. 1993 Copyright Avail: CASI HC A01/MF A03

To gain a better insight into the lipidemic profile of our personnel, the serum concentration of total lipids, total cholesterol, triglycerides, phospholipids, high and low density cholesterol, A-1 and B apolipoproteins were measured chemically in 324 healthy ground officers. Additionally, the LDL cholesterol was estimated using the Friedewald's formula $LDLc = chol - HDLc - (trig/5)$. The population under study, randomly selected, consisted of male, ground officers in active duty serving in the Hellenic Airforce with similar socio-economic status, without any history of coronary heart disease or diabetes mellitus and not receiving any medication. They were grouped into three groups (n= 108) of 31-35, 36-40, and 41-45 years old. A statistically significant increase in the blood concentration of total cholesterol, triglycerides, LDL cholesterol, and apolipoprotein B were found in the 36-40 age group. A significant percentage of individuals in every age group had blood lipid concentrations (cholesterol 41.7 percent, LDL-cholesterol 51.9 percent, triglycerides 7.1 percent, apolipoprotein A-1 43.8 percent) exceeding the desirable levels that prevent an increased risk of a coronary heart disease. Estimated LDLc values were higher than the measured ones, but from regression analysis, stronger relationship between LDLc and total cholesterol was found. No correlation between HDLc and total cholesterol was found. Finally our results suggest that: (1) a high percentage of our ground personnel has blood lipid concentrations (principally chol, LDLc, ap-A1) exceeding the levels that prevent an increased risk of coronary heart disease (CHD); (2) people aged over 40 seem to be sufficiently aware of the risk of high blood lipid concentrations and this awareness has to be extended toward younger ages; (3) certain lipids (phos, HDLc, apo-A1) do not vary among the age groups studied and are possibly not discriminatory markers for the screening of lipidemic profile. Estimated LDLc, though higher than the measured LDLc, showed stronger relationship with total cholesterol and under restrictions can be considered as trustworthy index of the lipidemic profile. Author (revised)

N93-32251# Royal Air Force Central Medical Establishment, London (England).

BLOOD LIPIDS IN AIRCREW RECRUITS AND IN RAF AVIATORS

D. H. HULL *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 8 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

Blood cholesterol is a major indicator of cardiovascular risk, mainly from coronary artery disease. Blood lipid elevations are a common cause for referral of RAF aircrew for specialist assessment. The need for investigation, treatment (dietary, drugs), repeated counseling and indefinite follow-up constitutes a significant commitment. Blood lipids were measured in fasting male subjects from two groups; young recruits provisionally accepted for RAF flying training, and trained RAF aircrew. Mean blood cholesterol (SD's) were 4.65 (0.89) mmol/l (180 (34) mgm/dl) in recruits and 5.5 (1.14) mmol/l (213 (44) mgm/dl) in trained aircrew. Corresponding figures for triglycerides were 1.13 (0.56) mmol/l (100 (50) mgm/dl) in recruits and 1.46 (0.86) mmol/l (129 (76) mgm/dl). All differences between groups were significant (p is less than .001). Lipid levels were correlated with age in both groups. Blood lipid levels in recruits were in general satisfactory; the main purpose of measurement remains the detection of the occasional individual with a familial hyperlipidaemia. Blood cholesterol in trained aircrew, though lower than the average for British men, were above desirable limits in 50 percent of all aircrew tested. Ten percent were in the band requiring clinical care and 2 percent might require drug treatment. A program to reduce cardiovascular risk in RAF personnel will include dietary, exercise, and other measures. Author (revised)

N93-32252# Italian Air Force Pratica di Mare, Rome.

CARDIOVASCULAR RISK FACTORS IN AN ITALIAN AIR FORCE POPULATION: PRELIMINARY REPORT

S. FARRACE, L. SAKARA, L. URBANI, and C. DEANGELIS *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 4 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

Two hundred male subjects from an Italian Air Force AFB were admitted after informed consent to an epidemiological study on the diffusion of cardiovascular risk factors. They were divided in two groups: group A (n=150; aged 37.7 plus or minus 10.7 yr.) was personnel mainly employed in logistic and administrative activities, group B (n=50; aged 35.2 plus or minus 7.8) were pilots regularly performing flight activity. Each subject underwent a clinical examination, height and weight, resting ECG and blood pressure recording, as well as a 20 ml blood sampling. Measurement of total cholesterol, HDL cholesterol, glucose, uric acid, APO-A, APO-B, and Lp(a) lipoprotein concentration was carried out in each subject. Data showed that while lipid values and mean arterial pressure (MAP) levels are significantly lower in group B (p is less than 0.05) as compared to group A, APO A/B ratio and Lp(a) lipoprotein concentration are significantly higher (p is less than 0.05). These findings may suggest that, despite a lipid profile and mean MAP level within the physiological range and independently from these parameters, it may be recognizable in the pilot group a trend towards atherosclerosis development which needs to be further investigated. Author (revised)

N93-32253# Centro de Instruccion de Medicina Aeroespacial, Madrid (Spain).

CARDIOVASCULAR RISK FACTORS (CVRF) IN SPANISH PILOTS WITH CORONARY ARTERY DISEASE DEMONSTRATED BY ANGIOGRAPHIC STUDIES

M. A. GOMEZ-MARINO, C. ALONSO, and F. RIOS *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 10 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

During the years 1987-1991, 32 Spanish pilots with ages between 39 and 56 years (47.34 +/- 4.81) had demonstrated coronary obstructive lesions by means of coronary angiography. Each case was studied investigating separately, the following cardiovascular risk factors (CVRF) - cigarette smoking, hypercholesterolemia, hypertriglyceridemia, diabetes, arterial hypertension, obesity, and coronary disease family history. It was found that CVRF were present in all the Spanish pilots with proved coronary artery disease. 87.5 percent were heavy smokers and

BEHAVIORAL SCIENCES

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

68.5 percent had high levels of plasma cholesterol. The smoking habit was the most important single CVRF, even more than cholesterol high levels, but they may be related with the very high number of cigarettes smoked (33.2 +/- 11.5 for a period of 24.7 +/- 6.3 years). Other CVRF were of little value if not associated to hypercholesterolemia or smoking habit. A proper control of CVRF it should be a priority over the pilot population in order to increase flight safety and the efficiency of the air operations. Author (revised)

N93-32254# German Air Force, Fuerstenfeldbruck (Germany). Aviation Medicine Div.

RESULTS AND MANAGEMENT OF PATHOLOGICAL LIPOPROTEIN CONCENTRATIONS AND OTHER CARDIOVASCULAR RISK FACTORS IN MILITARY PILOTS OF THE GERMAN FEDERAL ARMED FORCES

ERICH ROEDIG *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 8 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

As a result of research findings during the past years, the level and type of circulating lipoprotein concentrations have become a subject of focal interest. It is now well established that high cholesterol levels are related to the extent and severity of arteriosclerotic heart disease. Before this background, the aeromedical physician is called upon to act now, considering the increased psychic and physical demands the new weapon systems will impose on the aviator. In a 4-year survey the lipoprotein concentrations of German military pilots were examined under standardized conditions, the results being evaluated in a statistical program at the German Air Force Institute of Aviation Medicine. Additional risk factors influencing the cardiovascular system are also mentioned. Cholesterol level is greater than 220 mg/dl and HDL cholesterol is less than 35 mg/dl are considered as pathological. This is true in 52.4 percent of German military pilots older than 41 years. In 1992, of all pilots (N=4563) examined, 37.2 percent show cholesterol levels greater than 220 mg/dl while 25.1 percent have a tot. chol./HDL-chol. ratio is greater than 6.0. These results differ from those in the years before. Therefore, besides dietary and physical fitness programs, a regime to reduce pathological lipoprotein concentrations will also be introduced. It is mandatory from an aeromedical point of view that risk factors and disorders of the cardiovascular system be detected by medical flying fitness examination. This particularly applies to silent cardiac ischemia. Author (revised)

N93-32364*# Good Samaritan Hospital and Medical Center, Portland, OR.

TORSIONAL VESTIBULO-OCULAR REFLEX MEASUREMENTS FOR IDENTIFYING OTOLITH ASYMMETRIES POSSIBLY RELATED TO SPACE MOTION SICKNESS SUSCEPTIBILITY

ROBERT J. PETERKA 23 Jul. 1993 8 p Presented at the 10th IAA Man in Space Symposium, Tokyo, Japan, Apr. 1993 (Contract NAG9-117)

(NASA-CR-193304; NAS 1.26:193304) Avail: CASI HC A02/MF A01

Recent studies have identified significant correlations between space motion sickness susceptibility and measures of disconjugate torsional eye movements recorded during parabolic flights. These results support an earlier proposal which hypothesized that an asymmetry of otolith function between the two ears is the cause of space motion sickness. It may be possible to devise experiments that can be performed in the 1 g environment on earth that could identify and quantify the presence of asymmetric otolith function. This paper summarizes the known physiological and anatomical properties of the otolith organs and the properties of the torsional vestibulo-ocular reflex which are relevant to the design of a stimulus to identify otolith asymmetries. A specific stimulus which takes advantage of these properties is proposed. Author (revised)

A93-46966

THE HUMAN EEG CORRELATES DURING MANY-SIDED PERIPHERAL EXPOSURE TO AN ALTERNATING MAGNETIC FIELD [EHEHG-KORRELYATY CHELOVEKA PRI RAZNOSTORONNEM PERIFERICHESKOM VOZDEJSTVIJ PEREMENNYM MAGNITNYM POLEM]

I. V. KORINEVSKAYA, YU. A. KHOLODOV, and A. V. KORINEVSKIJ (RAN, Inst. Vysshej Nervnoj Deyatel'nosti i Nejfiziologii; NII Tekhnicheskij Ehstetiki, Moscow, Russia) Fiziologiya Cheloveka (ISSN 0131-1646) vol. 19, no. 3 May-June 1993 p. 71-79. In RUSSIAN refs

Copyright

The features of the spatial organization of the human cerebral neocortex during exposure to alternating magnetic field (AMF) were investigated by measuring the EEG characteristics in ten human subjects fitted with ear electrodes with branches over the left and right frontal, central, parietal, and occipital regions of the neocortex and subjected to 50-Hz AMFs for 1 min. Results showed that the subjects could be classified into three groups, depending on their sensitivity to AMFs, which are characterized by different structures of the cross-correlation links in the investigated neocortex regions and by the characteristics of interactions between the hemispheres. AIAA

N93-31729 Civil Aviation Authority, London (England).

MANDATORY MULTI-ENGINED TRAINING SYLLABUS

Jun. 1992 32 p

(CAP-601; ISBN-0-86-039518-9; ETN-93-93931) Copyright Avail: Issuing Activity (Civil Aviation Authority, Greville House, 37 Gratton Road, Cheltenham, England, HC)

A training syllabus produced by the United Kingdom Civil Aviation Authority for use by all flying training organizations wishing to conduct the mandatory course for multiengined flying training is presented. The flight and ground training are detailed. The course aims to give a sound theoretical knowledge of multiengined aircraft operation and to teach the skills necessary for the safe and competent operation of such aircraft. An abridged turbojet course is also described. ESA

N93-32011# Battelle Columbus Labs., Research Triangle Park, NC.

SELECTION OF PERSONNEL FOR STRESSFUL OCCUPATIONS: THE POTENTIAL UTILITY OF PSYCHOPHYSIOLOGICAL MEASURES AS SELECTION TOOLS Final Report, Aug. 1991 - Nov. 1992

RONALD J. HESLEGRAVE and CARAN COLVIN Mar. 1993 70 p

(Contract DAAL03-86-D-0001; DA PROJ. 2Q2-63007-A-792)

(AD-A264571; ARI-TR-975) Avail: CASI HC A04/MF A01

The Manpower and Personnel Research Division identified a requirement to assess whether selection and classification for stressful occupations could be improved. An interdisciplinary review, evaluation, and synthesis was carried out to assess the feasibility of using psychophysiological measures to select individuals resistant to stress to improve selection and classification methods for stressful occupations. To integrate this literature, a new psychophysiological model was developed in the context of current industrial/organizational practice. Researchers concluded that psychophysiological measures do have the potential to improve the selection/classification standards for stressful occupations. Three recommendations were made for future research. First, experimentation should begin to assess the validity of the proposed psychophysiological measures to predict successful performance under stress. Second, since people who cope successfully appear

to share some personality traits, research should be conducted into the personality correlates of successful task performance under stress. Third, occupations should be analyzed in terms of stress dimensions to provide a rationale for the identification of valid predictors and criteria of successful performance in stressful jobs. A demonstration study was outlined. DTIC

N93-32064# Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Computer Science.

CONNECTIONIST MODELS AND LINGUISTIC THEORY: INVESTIGATIONS OF STRESS SYSTEMS IN LANGUAGE

PRAHLAD GUPTA and DAVID S. TOURETZKY Apr. 1993 34 p

(Contract N00014-86-K-0678)

(AD-A265450; CMU-CS-93-146) Avail: CASI HC A03/MF A01

We question the widespread assumption that linguistic theory should guide the formulation of mechanistic accounts of human language processing. We develop a pseudo-linguistic theory for the domain of linguistic stress, based on observation of the learning behavior of a perceptron exposed to a variety of stress patterns. There are significant similarities between our analysis of perceptron stress learning and metrical phonology, the linguistic theory of human stress. Both approaches attempt to identify salient characteristics of the stress systems under examination without reference to the workings of the underlying processor. Our theory and computer simulations exhibit some strikingly suggestive correspondences with metrical theory. We show, however, that our high-level pseudo-linguistic account bears no causal relation to processing in the perceptron, and provides little insight into the nature of this processing. Because of the persuasive similarities between the nature of our theory and linguistic theorizing, we suggest that linguistic theory may be in much the same position. DTIC

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

A93-45598* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

KINEMATICS AND CONTROL OF A FULLY PARALLEL FORCE-REFLECTING HAND CONTROLLER FOR MANIPULATOR TELEOPERATION

MARK D. BRYFOGLE (Science Applications International Corp., McLean, VA), CHARLES C. NGUYEN, SAMI S. ANTRAZI, and PETER C. CHIOU (Catholic Univ. of America, Washington) Journal of Robotic Systems (ISSN 0741-2223) vol. 10, no. 5 July 1993 p. 745-766. refs

(Contract NAS7-1069)

Copyright

Design of a parallel force-reflecting hand controller that implements a friction- and inertia canceling control loop about the entire mechanism based on wrench sensing in the mechanism handgrip is discussed. Kinematics of the controller under consideration is analyzed and results are presented using a closed-form solution for the inverse kinematics and Newton-Raphson's method for the forward kinematics. Results indicate that the force control scheme based on a handgrip force sensor provides smaller steady-state errors than the scheme without a handgrip sensor. AIAA

A93-45685

A PROCEDURE FOR ESTIMATING THE VARIABLES OF THE WORKING-CONDITION SPACE OF A MAN-MACHINE SYSTEM FOR THE CONTROL OF A MOVING OBJECT [PROTSEDURA OTSENVANIYA PEREMENNYKH PROSTRANSTVA PROFESSIONAL'NOGO SOSTOYANIYA EHRGATICHESKOJ SISTEMY UPRAVLENIYA PODVIZHNYM OB'EKТОM]

A. A. BEZBOGOV and V. I. AVAKOV (Rizhskoe Vysshee Aviatsionnoe Inzhenernoe Uchilishche, Riga, Latvia) Kibernetika i Vychislitel'naya Tekhnika (ISSN 0454-9910) no. 96 1992 p. 33-36. In RUSSIAN refs

Copyright

The concept of the working-condition space is defined as a set of operator's subjective notions concerning the dynamic properties of the controlled system. A procedure is developed for estimating variables of the working-condition space, and its application is illustrated using example where a pilot has to change the angular position of the aircraft. AIAA

A93-45687

DISTRIBUTION OF FUNCTIONS IN A MAN-MACHINE CONTROL SYSTEM OF A CERTAIN TYPE [RASPREDELENIE FUNKTSIJ V EHRGATICHESKOJ SISTEME UPRAVLENIYA ODNOGO KLASSA]

A. E. RADIEVSKIY (NPO Kievskij Inst. Avtomatiki, Kiev, Ukraine) Kibernetika i Vychislitel'naya Tekhnika (ISSN 0454-9910) no. 96 1992 p. 53-58. In RUSSIAN refs

Copyright

The paper investigates the theoretical principles of a procedure for the efficient distribution of functions between the automatic facilities of an aircraft control system and the manual activity of the operator. It is shown that the procedure must combine the following conditions: (1) continuous participation of the operator in the control process in the support and interactive modes and (2) unified control logic, realized by a smooth transition between automatic and manual control regimes. The paper presents a mathematical formulation and an analysis of the problem. AIAA

A93-45688

A METHOD FOR PREDICTING THE WORK LOAD OF A FLIGHT ENGINEER ENGAGED IN COUNTERACTING FAILURES OF FUNCTIONAL SYSTEMS OF A TRANSPORT AIRCRAFT [METODIKA PROGNOZIROVANIYA RABOCHEJ NAGRUZKI BORTINZHENERA PRI PARIROVANIИ OTKAZOV FUNKSIONAL'NYKH SISTEM TRANSPORTNOGO SAMOLETA]

A. A. TERESHKIN Kibernetika i Vychislitel'naya Tekhnika (ISSN 0454-9910) no. 96 1992 p. 83-90. In RUSSIAN refs

Copyright

The paper presents a formulation of a systems-engineering criterion of the efficiency and reliability of the flight engineer's activity. The criterion depends on the correspondence between the parameters of the real-life activity and the standard specifications, and takes into account the potential danger of deviations from the standard procedures for the crew-aircraft system as a whole. The paper proposes a correlation-factor model of a flight engineer engaged in counteracting the failures of the aircraft's functional system. Mathematical models are developed for predicting the work load of the flight engineer and the time for the completion of the prescribed activity. AIAA

A93-46801

AN ON-LINE WATER QUALITY MONITOR FOR SPACE STATION FREEDOM

E. L. JEFFERS, D. R. DOUGHERTY, T. A. PAXTON (Astro International Corp., League City, TX), and J. E. ATWATER (Umpqua Research Co., Myrtle Creek, OR) Mar. 1993 31 p. AICHE, Spring National Meeting on Development Needs for Spacecraft Advanced Life Support Systems, Houston, TX, Mar. 30, 1993, Paper refs

Water is recycled on Space Station Freedom (SSF) to avoid the high logistical cost of fresh water resupply. The water system produces potable water from humidity condensate, wash water,

fuel cell water transferred from the shuttle, and urine. The processes include vapor compression distillation of urine, heat sterilization, sorption beds, organics oxidation, gas-liquid separation, filtration, and biocide addition. Treated water quality is monitored by a Process Control Water Quality Monitor (PCWQM), which reports water quality to the SSF data management system. Specifically, the PCWQM is an untended, continuous process water quality monitor which measures conductivity, pH, Total Organic Carbon (TOC), temperature, and iodine biocide concentration. TOC is measured by converting organic carbon into CO₂ by UV oxidation and using a photometric cell to determine the quantity of gas. Conductivity is measured using a 1000 Hz conductivity cell compensated for temperature. Iodine is measured using a solid state, LED-based photometric cell, compensated for pH. Temperature is measured directly using an integrated circuit sensor (AD590) mounted in a thermal well. pH is measured using an ISFET, calibrated using solid phase standards. The analytical methodology, hardware description, and results of testing simulated spacecraft water are presented.

A93-46810* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

THE EFFECTS OF HISTORY AND PREDICTIVE INFORMATION ON THE ABILITY OF THE TRANSPORT AIRCRAFT PILOT TO PREDICT AN ALERT

ANNA C. TRUJILLO (NASA, Langley Research Center, Hampton, VA) Feb. 1993 8 p. Mid-Atlantic Human Factors Conference, 1st, Virginia Beach, VA, Feb. 25, 26, 1993, Paper refs Copyright

The early detection of a developing aircraft-subsystem fault has the potential to lessen its ultimate severity. The lack of capability for such early detection is becoming critical in the aviation community. In the commercial sector, for example, twin-engine aircraft are being used for extended transport operations over water. One method to decrease the severity of a developing problem is to predict its behavior and to take appropriate corrective action. In order to investigate pilots' ability to predict events, an experiment was conducted where eighteen airline pilots predicted the time to an alert using three different displays of dials and three different time profile complexities. The three displays of dials were as follows: standard, resembling current aircraft dial presentations; history, indicating the value five seconds in the past; and predictive, indicating the value five seconds into the future. The time profiles describing the behavior of the parameter consisted of constant velocity profiles, decelerating profiles, and accelerating then decelerating profiles. Although pilots indicated that they preferred the predictive dial, the objective data did not support its use. The objective data did show that the time profiles had the most significant effect on performance in estimating the time to an alert.

A93-47019

FLIGHT MECHANICS OF HIGH-PERFORMANCE AIRCRAFT

NGUYEN X. VINH (Michigan Univ., Ann Arbor) Cambridge, United Kingdom and New York Cambridge University Press (Cambridge Aerospace Series, No. 4) 1993 394 p. refs (ISBN 0-521-34123-X) Copyright

The present treatment of military aircraft flight mechanics discusses the equations of motion, propulsion system fundamentals, descent and glide performance, performance in cruising flight, climb, and turning flight, takeoff and landing performance characteristics, and the performance of hypervelocity reentry vehicles. For high performance aircraft, the influence of Mach number at high subsonic and supersonic speeds becomes a major consideration; the concept of 'energy height' is explored. All exercises included are analytical to deepen understanding of the text. AIAA

N93-31456* # McDonnell-Douglas Space Systems Co., Huntington Beach, CA.

ATMOSPHERIC CONTROL SYSTEMS

MELANIE MANKAMYER *In its* Workshop on Fuzzy Control

Systems and Space Station Applications p 419-425 Nov. 1990 Avail: CASI HC A02/MF A04

Viewgraphs on atmospheric control systems are presented. Techniques to maintain atmospheric control parameters are identified. Fuzzy logic control law is mentioned for application to atmospheric control. CASI

N93-31457* # McDonnell-Douglas Space Systems Co., Huntington Beach, CA.

ROTATIONAL SPEED CONTROL

PAUL BASTIN *In its* Workshop on Fuzzy Control Systems and Space Station Applications p 427-434 Nov. 1990 Avail: CASI HC A02/MF A04

Viewgraphs on rotational speed control are presented. The Centrifuge Facility Systems Study - 2.5 m centrifuge is shown. A life sciences centrifuge is scheduled to fly aboard Space Station Freedom. Live animal and plant specimens will be carried on the rotor and compared with microgravity specimens in racks. CASI

N93-31458* # McDonnell-Douglas Space Systems Co., Huntington Beach, CA.

VIBRATION ISOLATION

PAUL BASTIN *In its* Workshop on Fuzzy Control Systems and Space Station Applications p 435-443 Nov. 1990 Avail: CASI HC A02/MF A04

Viewgraphs on vibration isolation are presented. Techniques to control and isolate centrifuge disturbances were identified. Topics covered include: disturbance sources in the microgravity environment; microgravity assessment criteria; life sciences centrifuge; flight support equipment for launch; active vibration isolation system; active balancing system; and fuzzy logic control. CASI

N93-31573* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

PROBABILISTIC SIMULATION OF THE HUMAN FACTOR IN STRUCTURAL RELIABILITY

ASHWIN R. SHAH (Sverdrup Technology, Inc., Brook Park, OH.) and CHRISTOS C. CHAMIS *In its* Structural Integrity and Durability of Reusable Space Propulsion Systems p 159-168 May 1991 Avail: CASI HC A02/MF A03

Many structural failures have occasionally been attributed to human factors in engineering design, analyses maintenance, and fabrication processes. Every facet of the engineering process is heavily governed by human factors and the degree of uncertainty associated with them. Factors such as societal, physical, professional, psychological, and many others introduce uncertainties that significantly influence the reliability of human performance. Quantifying human factors and associated uncertainties in structural reliability require: (1) identification of the fundamental factors that influence human performance, and (2) models to describe the interaction of these factors. An approach is being developed to quantify the uncertainties associated with the human performance. This approach consists of a multi factor model in conjunction with direct Monte-Carlo simulation. Derived from text

N93-31844* # Wyoming Univ., Laramie. Dept. of Computer Science.

A VISION SYSTEM PLANNER FOR INCREASING THE AUTONOMY OF THE EXTRAVEHICULAR ACTIVITY HELPER/RETRIEVER

MICHAEL MAGEE 1 Jun. 1993 54 p (Contract NAG9-634)

(NASA-CR-193301; NAS 1.26:193301) Avail: CASI HC A04/MF A01

The Extravehicular Activity Retriever (EVAR) is a robotic device currently being developed by the Automation and Robotics Division at the NASA Johnson Space Center to support activities in the neighborhood of the Space Shuttle or Space Station Freedom. As the name implies, the Retriever's primary function will be to provide the capability to retrieve tools and equipment or other objects which have become detached from the spacecraft, but it

will also be able to rescue a crew member who may have become inadvertently de-tethered. Later goals will include cooperative operations between a crew member and the Retriever such as fetching a tool that is required for servicing or maintenance operations. This paper documents a preliminary design for a Vision System Planner (VSP) for the EVAR that is capable of achieving visual objectives provided to it by a high level task planner. Typical commands which the task planner might issue to the VSP relate to object recognition, object location determination, and obstacle detection. Upon receiving a command from the task planner, the VSP then plans a sequence of actions to achieve the specified objective using a model-based reasoning approach. This sequence may involve choosing an appropriate sensor, selecting an algorithm to process the data, reorienting the sensor, adjusting the effective resolution of the image using lens zooming capability, and/or requesting the task planner to reposition the EVAR to obtain a different view of the object. An initial version of the Vision System Planner which realizes the above capabilities using simulated images has been implemented and tested. The remaining sections describe the architecture and capabilities of the VSP and its relationship to the high level task planner. In addition, typical plans that are generated to achieve visual goals for various scenarios are discussed. Specific topics to be addressed will include object search strategies, repositioning of the EVAR to improve the quality of information obtained from the sensors, and complementary usage of the sensors and redundant capabilities. Author

N93-32006# Naval Air Warfare Center, Patuxent River, MD. Aircraft Div.

ABRIDGED PROCEDURAL GUIDE TO AIRCREW ANTHROPOMETRIC ACCOMMODATION ASSESSMENT

SCOTT A. PRICE 14 Apr. 1993 69 p
(AD-A265220; NAWCADPAX-TM-992-90-SY) Avail: CASI HC A04/MF A01

NAVAIRSYSCOM (AIR-531) tasked us to investigate and develop new procedures for determining the ranges and limitations of anthropometric accommodation in military aircraft. These procedures quantify what types of aircrew, based on their body's morphologies, are able to safely and efficiently operate a particular crewstation in an operational environment. Aircrew Anthropometric Accommodation Assessment provides detailed, repeatable methods for obtaining the accommodation data needed to determine this. Results are plotted to determine the full range of anthropometric values and their relationship to pilot/aircrew 'fit' for a number of important areas. Use of Aircrew Anthropometric Accommodation Assessment enables the establishment of Anthropometric Restriction Codes, reduces the need for fit-checks, guides student naval aviators into appropriate pipelines, determines contractor compliance with design goals, and identifies deficiencies in the crewstation layout of mockups and aircraft undergoing development. DTIC

N93-32012# Analytics, Inc., Willow Grove, PA.
APPLICATION AND VALIDATION OF WORKLOAD ASSESSMENT TECHNIQUES Final Report, Sep. 1986 - Sep. 1992

RICHARD E. CHRIST, SUSAN G. HILL, JAMES C. BYERS, HELENE M. LAVECCHIA, and ALLEN L. ZAKLAD Mar. 1993 157 p
(Contract MDA903-86-C-0384; DA PROJ. 2Q1-62785-A-790) (AD-A264575; ARI-TR-974) Avail: CASI HC A08/MF A02

A series of eight separate studies was conducted using three different Army systems. These studies applied both empirical methods for evaluating the workload associated with the operation of Army systems and analytical methods for predicting that workload. The empirical methods examined were variants of four operator rating scale techniques. The analytical methods scale techniques and a task analysis and simulation technique. The three systems studied included a mobile air defense missile system, a remotely piloted air vehicle system, and a helicopter system. DTIC

N93-32106*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

MAN-MACHINE COOPERATION IN ADVANCED TELEOPERATION

PAOLO FIORINI, HARI DAS, and SUKHAN LEE *In* NASA. Lyndon B. Johnson Space Center, The Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992) p 87-93 Feb. 1993

Avail: CASI HC A02/MF A04

Teleoperation experiments at JPL have shown that advanced features in a telerobotic system are a necessary condition for good results, but that they are not sufficient to assure consistently good performance by the operators. Two or three operators are normally used during training and experiments to maintain the desired performance. An alternative to this multi-operator control station is a man-machine interface embedding computer programs that can perform some of the operator's functions. In this paper we present our first experiments with these concepts, in which we focused on the areas of real-time task monitoring and interactive path planning. In the first case, when performing a known task, the operator has an automatic aid for setting control parameters and camera views. In the second case, an interactive path planner will rank different path alternatives so that the operator will make the correct control decision. The monitoring function has been implemented with a neural network doing the real-time task segmentation. The interactive path planner was implemented for redundant manipulators to specify arm configurations across the desired path and satisfy geometric, task, and performance constraints. Author (revised)

N93-32107*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

INTEGRATION OF ADVANCED TELEOPERATION TECHNOLOGIES FOR CONTROL OF SPACE ROBOTS

MICHAEL J. STAGNARO *In its* The Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992) p 94-103 Feb. 1993

Avail: CASI HC A02/MF A04

Teleoperated robots require one or more humans to control actuators, mechanisms, and other robot equipment given feedback from onboard sensors. To accomplish this task, the human or humans require some form of control station. Desirable features of such a control station include operation by a single human, comfort, and natural human interfaces (visual, audio, motion, tactile, etc.). These interfaces should work to maximize performance of the human/robot system by streamlining the link between human brain and robot equipment. This paper describes development of a control station testbed with the characteristics described above. Initially, this testbed will be used to control two teleoperated robots. Features of the robots include anthropomorphic mechanisms, slaving to the testbed, and delivery of sensory feedback to the testbed. The testbed will make use of technologies such as helmet mounted displays, voice recognition, and exoskeleton masters. It will allow for integration and testing of emerging telepresence technologies along with techniques for coping with control link time delays. Systems developed from this testbed could be applied to ground control of space based robots. During man-tended operations, the Space Station Freedom may benefit from ground control of IVA or EVA robots with science or maintenance tasks. Planetary exploration may also find advanced teleoperation systems to be very useful. Author (revised)

N93-32108*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

INTERACTIVE AND COOPERATIVE SENSING AND CONTROL FOR ADVANCED TELEOPERATION

SUKHAN LEE *In* NASA. Lyndon B. Johnson Space Center, The Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992) p 104-115 Feb. 1993

Avail: CASI HC A03/MF A04

This paper presents the paradigm of interactive and cooperative sensing and control as a fundamental mechanism of integrating and fusing the strengths of man and machine for advanced

teleoperation. The interactive and cooperative sensing and control is considered as an extended and generalized form of traded and shared control. The emphasis of interactive and cooperative sensing and control is given to the distribution of mutually nonexclusive subtasks to man and machine, the interactive invocation of subtasks under the man/machine symbiotic relationship, and the fusion of information and decisionmaking between man and machine according to their confidence measures. The proposed interactive and cooperative sensing and control system is composed of such major functional blocks as the logical sensor system, the sensor-based local autonomy, the virtual environment formation, and the cooperative decision-making between man and machine. The Sensing-Knowledge-Command (SKC) fusion network is proposed as a fundamental architecture for implementing cooperative and interactive sensing and control. Simulation results are shown. Author

N93-32112*# Naval Command, Control and Ocean Surveillance Center, Kailua, HI.

TELEOPERATOR/TELEPRESENCE SYSTEM (TOPS) CONCEPT VERIFICATION MODEL (CVM) DEVELOPMENT

MIKE S. SHIMAMOTO *In* NASA. Lyndon B. Johnson Space Center, The Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992) p 149-155 Feb. 1993 Avail: CASI HC A02/MF A04

The development of an anthropomorphic, undersea manipulator system, the TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) is described. The TOPS system's design philosophy, which results from NRaD's experience in undersea vehicles and manipulator systems development and operations, is presented. The TOPS design approach, task teams, manipulator, and vision system development and results, conclusions, and recommendations are presented. Author (revised)

N93-32151*# Air Force Systems Command, Brooks AFB, TX.

A PRELIMINARY EMPIRICAL EVALUATION OF VIRTUAL REALITY AS AN INSTRUCTIONAL MEDIUM FOR VISUAL-SPATIAL TASKS Abstract only

J. WESLEY REGIAN, WAYNE SHEBILSKA, and JOHN M. MONK (Galaxy Scientific Corp., Lackland AFB, TX.) *In* NASA. Lyndon B. Johnson Space Center, The Sixth Annual Workshop on Space Operations Applications and Research (SOAR 1992) p 406 Feb. 1993 Avail: CASI HC A01/MF A04

We explored the training potential of Virtual Reality (VR) technology. Thirty-one adults were trained and tested on spatial skills in a VR. They learned a sequence of button and knob responses on a VR console and performed flawlessly on the same console. Half were trained with a rote strategy; the rest used a meaningful strategy. Response times were equivalent for both groups and decreased significantly over five test trials indicating that learning continued on VR tests. The same subjects practiced navigating through a VR building, which had three floors with four rooms on each floor. The dependent measure was the number of rooms traversed on routes that differed from training routes. Many subjects completed tests in the fewest rooms possible. All subjects learned configurational knowledge according to the criterion of taking paths that were significantly shorter than those predicted by a random walk as determined by a Monte Carlo analysis. The results were discussed as a departure point for empirically testing the training potential of VR technology. Author

N93-32152*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

A PRELIMINARY EMPIRICAL EVALUATION OF VIRTUAL REALITY AS AN INSTRUCTIONAL MEDIUM FOR VISUAL-SPATIAL TASKS Abstract only

ERIC HORVITZ (Rockwell International Science Center, Palo Alto, CA.), CORINNE RUOKANGAS (Rockwell International Science Center, Palo Alto, CA.), SAMPATH SRINIVAS (Rockwell International Science Center, Palo Alto, CA.), and MATTHEW BARRY *In its* The Sixth Annual Workshop on Space Operations

Applications and Research (SOAR 1992) p 407-417 Feb. 1993 Avail: CASI HC A03/MF A04

We describe a collaborative research and development effort between the Palo Alto Laboratory of the Rockwell Science Center, Rockwell Space Operations Company, and the Propulsion Systems Section of NASA JSC to design computational tools that can manage the complexity of information displayed to human operators in high-stakes, time-critical decision contexts. We shall review an application from NASA Mission Control and describe how we integrated a probabilistic diagnostic model and a time-dependent utility model, with techniques for managing the complexity of computer displays. Then, we shall describe the behavior of VPROP, a system constructed to demonstrate promising display-management techniques. Finally, we shall describe our current research directions on the Vista 2 follow-on project. Author (revised)

N93-32240# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France). Aerospace Medical Panel.

NUTRITION, METABOLIC DISORDERS AND LIFESTYLE OF AIRCREW [LES DESORDRES METABOLIQUES DUS A LA DIETETIQUE ET HYGIENE DE VIE DES EQUIPAGES D'AERONEFS]

Mar. 1993 230 p Symposium held in Oslo, Norway, 19-23 Oct. 1992

(AGARD-CP-533; ISBN-92-835-0703-7) Copyright Avail: CASI HC A11/MF A03

These proceedings include the Technical Evaluation Report and 30 papers of the symposium sponsored by the AGARD Aerospace Medical Panel and held in Oslo, Norway from 19-23 Oct. 1992. The theme of the symposium was to review and update the knowledge pertaining to diet and nutrition as it applies to aircrew. The metabolic disorders, including hyperlipidemia and alterations of carbohydrate metabolism, are common problems in aviation medicine that demand specific attention and management by NATO flight surgeons. Hyperlipidemia is a cardiovascular risk factor that by itself or when combined with cigarette smoking and sedentary behavior as well as other risk factors presents a formidable problem for all NATO Air Forces as this directly impacts at pilot performance. Performance may also be affected by inadequate crew rest, environmental extremes and time zone shifts, all of which were illustrated in the Persian Gulf Conflict.

N93-32241# Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Delft (Netherlands). Dept. of Human Nutrition.

AN AUTOMATED PROCESSING SYSTEM FOR FOOD FREQUENCY AND NUTRITION KNOWLEDGE QUESTIONNAIRE

A VANERP-BAART, M. J., I. C. KISTEMAKER, and M. R. H. LOEWIK *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 3 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

In surveys and intervention studies, food frequency questionnaires are often used to assess habitual dietary intake. Although this is a relatively quick and simple method, the number of subjects to be examined can still be enormous. So, without a good system, the time needed for the processing of the amount of data may be prohibitive for starting such a project. To structure and speed up this work, FOFRIPS, a food frequency interactive processing system was developed. The starting point was that not each developed specific questionnaire should be automated, but instead only the general procedures of the data processing. Author (revised)

N93-32242# University of South Florida, Tampa. Coll. of Public Health.

NUTRITIONAL ASSESSMENT OF UNITED STATES TACTICAL AIR COMMAND PILOTS

S. D. HART YEVICH, S. J. YEVICH, and C. MORRISON *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 5 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

The nutritional status of 184 TAC fighter pilots was analyzed for caloric intake, macronutrient composition, alcohol intake, and meal frequency. The dietary habits of fighter pilots relative to their age, family configuration, and level of exercise were also examined. The diets of a sub-group of 43 F-16 student fighter pilots were correlated with the subjective graded performance of a Basic Fighter Maneuver. Pilots energy consumption of 2800 kcal fell within the suggested range for the average U.S. male. The macronutrient composition of their diets was better than that of the mean U.S. male, comprising an average of 46% carbohydrates, 34% fats, 15% protein, and 5% alcohol. Missed meals on the day of flying were a frequent occurrence. The older age pilots consumed less fat than their younger counterparts, but their intake of alcohol was greater. Family configuration had no effect on alcohol consumption, caloric intake, or dietary behavior. Pilots who exercised 4 to 7 day a week were heavier than the non-exercisers, and the non-exercisers consumed more alcohol. No statistical difference could be found between total performance scores in the sub-group of F-16 student pilots and any deficiency or excess of specific dietary components or any combinations of these components. Alcohol consumption was shown to be associated with a low G-tolerance score. Author

N93-32243# Oslo Univ. (Norway). Inst. for Nutrition Research. **PORTABLE EQUIPMENT DEVELOPED TO ESTIMATE ENERGY EXPENDITURE BY SIMULTANEOUS RECORDING OF HEART RATE AND BODY POSITION**

A. LOVO, B. E. HUSTVEDT, A. CHRISTOPHERSEN, C. C. CHRISTENSEN (Royal Norwegian Air Force, Oslo.), and H. T. ANDERSEN (Royal Norwegian Air Force, Oslo.) *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 5 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

The operating principle of Actreg, a new device for registration of changes in human body positions, is described. It is robust and functions well also during prolonged periods of high physical activity, in contrast to accelerometers and other devices used as motion sensors. Preliminary experiments indicate that combined use of heart rate and body position recording for estimation of energy expenditure may be superior to the use of heart rate registrations alone. However, validation experiments with doubly labeled water or a whole body calorimeter are needed in order to reach a firm conclusion on this point. Author

N93-32244# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Bretigny sur Orge (France). Div. de Physiologie Metabolique et Hormonale.

PROTEIN REQUIREMENTS IN HYPOXIA OR HYPOKINESIA
C. Y. GUEZENNEC, A. X. BIGARD, and D. TAILLANDIER *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 5 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

Muscle trophicity is under the influence of four major factors which are nutrition, nervous stimulation, muscle activity, and hormones. Numerous works have shown that substrate availability acts directly on muscle protein synthesis. The glucidic and proteic substrates regulate in a coordinated way the muscle proteosynthesis so that the attention was focused on the role of protein nutriment to protect muscle against protein wasting. Several conditions could decrease protein body stores among which are hypoxia exposure or hypokinesia. Both environmental factors are results of aerospace or military events. Two studies were conducted in order to evaluate the role of protein diet on protein metabolism during hypokinesia or hypoxia exposure. Author

N93-32245# Air Force Systems Command, Brooks AFB, TX. Armstrong Lab.

NUTRITION FOR A TYPICAL MAC CREW DURING DESERT STORM

J. FRENCH and T. J. COOK *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 6 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

Data on inflight meals were collected during a 30-day field

experiment conducted by the Armstrong Laboratory designed to evaluate fatigue in C-141 Military Airlift Command (MAC) aircrew. Flight meal information was collected for one five-member crew throughout the area of operation during the last week of Desert Storm and for 3 additional weeks. Focus is on the nutritional components of a representative sample of the inflight meals provided to MAC aircrew. Nutritional analysis was based on fifteen in flight meals obtained from various Desert Storm staging bases. Analysis concerned kilocalories, protein, carbohydrate, fat, cholesterol, sodium, and saturated fats present in the average meal. The mean value for these components, constituting an average inflight meal, were 1758 Kcal, 53 g protein, 233 g carbohydrate, 66 g fat, 136 mg cholesterol, 3240 mg sodium and 20 g saturated fats. The limitations of this opportunistic evaluation and the need for additional field analyses of inflight meals and aircrew diets is discussed. Author

N93-32246# Institute of Aviation Medicine, Oslo (Norway). **CHANGES IN FOOD AND ENERGY INTAKE IN MILITARY AIRCREW**

C. HELLE, K. KVAMSOE, K. TRYGG, and H. T. ANDERSEN *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 7 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

Military flying is a demanding profession requiring excellent performance during operations. Because the modern western society includes several undesirable lifestyle patterns, dietary counseling has been given increased attention over the past few years in Norway where the government has arrived at an official policy of nutritional standards. In order to provide information about the nutritional pattern of military aircrew, the Institute of Aviation Medicine (IAM) carried out a food survey on aircrew at Andoya Air Base in 1986. The present survey is a follow-up study of the 1986 study, using the same squadron and the same method as the previous study. Our survey has three aims. The first one is to detect any change in aircrew diet over the last six years. Secondly, since the 1986 survey showed that the aircrew took a nutritionally better diet than the average Norwegian population, it was investigated whether this group is still ahead. Finally, to what extent the irregular working and resting conditions of aircrew influence their meal schedule was studied. Author (revised)

N93-32247# Spanish Air Force, Talavera AFB. **TRIAL OF EMERGENCY RATION OF THE SPANISH AIR FORCE**

ANTONIO MENDEZ MARTIN and JOSE IGNACIO PERALBA VANO *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 8 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

The response of normal young volunteers to the Spanish Air Force (SAF) Emergency Rations (ER) (NATO code 8.970-33G02-0140) as the only nutriment during seven consecutive days was tested. The nutritional and metabolic response plus the psychological acceptability of the ER was evaluated. All the volunteers were medical students who were fully informed about the trial and its conditions. Each proband received a daily diet with only ER (1,000 Kcal/day, 10 chewable bars/210 grms total weight) equivalent to 580 Kcal/sqmeter/body surface/day with two optional flavors, orange or chocolate. Quantity of liquids per day/probands was from 1.5 to 2.0 liters. Probands carry out their normal daily activity without changes in usual timing except meals. The trial duration was 7 days. The conclusion was that the SAF ER provides satisfactory nutrition for short periods of time without impairing the daily activities or altering the metabolic and nutritional parameters in a normal young population. Author (revised)

N93-32248# Italian Air Force Pratica di Mare, Rome. **IDIOPATHIC REACTIVE HYPOGLYCEMIA IN A POPULATION OF HEALTHY TRAINEES OF AN ITALIAN AIR FORCE MILITARY SCHOOL**

STEFANO FARRACE, LUCA URBANI, LORENZO SAKARA, and CLAUDIO DEANGELIS *In* AGARD, Nutrition, Metabolic Disorders

and Lifestyle of Aircrew 3 p Mar. 1993
Copyright Avail: CASI HC A01/MF A03

Idiopathic Reactive Hypoglycemia (IRH) was investigated among a population of young trainees of an Italian Air Force military school. One hundred and twenty male healthy subjects underwent a 300 min Oral Glucose Tolerance Test (OGTT) after an overnight fasting. Nine out of 120 subjects (group A: 7.5 percent) showed a glycemia nadir below 50 mg/dl. Moreover, in group A eight out of nine subjects reported symptoms referable to clinical hypoglycemia during the glycemia nadir. Furthermore, a lack in glucagon response to hypoglycemia was observed in group A. Data are suggestive for the presence of Idiopathic Reactive Hypoglycemia in group A subjects. Data suggest that IRH may be considered relevant as a possible reason of in-flight accident due to human factor.

Author (revised)

N93-32255# Portuguese Air Force, Alfragide. Centro de Medicina Aeronautica.

NUTRITIONAL AND LIFESTYLE STATUS OF 50 PILOTS OF THE PORTUGUESE AIR FORCE

F. B. OLIVEIRA, N. L. RIBEIRO, and S. R. SILVEIRA /n AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 2 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

A group of 50 pilots selected from a non-academic pilot background, born between 1947-1960, had their body weight, smoking and drinking habits, and blood pressure evaluated during a 10 year survey. Fifty six percent had Real Body Weight (RBW) greater than the Ideal Body Weight (IBW), with a 28 percent of RBW greater than + 10Kg of the IBW. Smoking habits were over 20 cigarettes per day in 36 percent and only 10 percent didn't smoke. Declared alcoholic intake, over average consumption, was admitted in 14 percent, with 3 alcoholic psychiatric treatment and 1 admission to hospital with Acute Alc. Hepatities. Blood pressure was over normal range in 12 percent. A modified clinical and Laboratorial screening is being applied, since 1991.

Author (revised)

N93-32256# Hellenic Air Force General Hospital, Athens (Greece).

CORRELATION OF LIFE-STYLE AND DIETARY CONCOMITANTS OF GREEK PILOTS WITH SERUM ANALYTES

C. DASKALOPOULOS, J. PALERMOS, T. ZOGA, A. STAVROPOULOS, and K. KYRIAKOS /n AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 4 p Mar. 1993
Copyright Avail: CASI HC A01/MF A03

Certain serum analytes (glucose, total cholesterol, HDL cholesterol, triglycerides, uric acid, and γ -glutamyltransferase) were correlated with some lifestyle variables (dietary features, anthropometrics, and physical exercise) in military (n=157) and civilian (n=157) male pilots in order to determine a possible relationship between these variables and their health status. The subjects, randomly selected within a certain period, were currently active without any history of coronary heart disease or diabetes mellitus and were not receiving any medication. In total, military pilots had statistically significant increased mean values of glucose, while a correlation of the mean values between groups with similar age showed that military pilots had increased cholesterol values and civilian pilots had increased triglycerides, LDL cholesterol, and γ -GT values. Both had an average body mass index (weight/height(sup 2)) of 25 and very few of them were following an effective physical exercise program toward lowering cholesterol level. They preferred taking few (82.1 percent, 80.9 percent for military and civilian pilots respectively) but large meals (59.2 percent, 52.2 percent respectively). Concerning food composition, almost 30 percent of them were eating meals containing 38 percent or more fat, and 15 percent of them were eating meals with less than 44 percent carbohydrates of total daily caloric intake. Finally, our data suggest that: (1) the concentration of certain blood analytes (glucose, cholesterol) should be reduced, (2) an effective regular aerobic exercise program should be followed, and (3) meals

should be altered toward the pattern of 'many and small' per day containing less fat and more carbohydrates. Author (revised)

N93-32257# Air Force Systems Command, Brooks AFB, TX. Armstrong Lab.

THE LIFESTYLE AND DIETARY CONSUMPTION PATTERNS OF UNITED STATES AIR FORCE AVIATORS WITHIN AIR TRAINING COMMAND AT RANDOLPH AIR FORCE BASE, TEXAS

TAMMY J. COOK, JONATHAN FRENCH, and BETH SENNE-DUFF (Incarnate Word Coll., San Antonio, TX.) /n AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 8 p Mar. 1993
Copyright Avail: CASI HC A02/MF A03

A lifestyle survey was developed and distributed to two flying squadrons and to the rated officers of the 12th Flying Training Wing to examine lifestyle habits and dietary consumption patterns. Blood lipid profiles were gathered and classified using National Cholesterol Education Program (NCEP) guidelines. Eighty two of 100 surveys were returned, and 75 completed 24-hour dietary recalls. As a group, these surveyed aviators consumed significantly less total fat, saturated fat, and dietary cholesterol than found in the typical American diet. Ninety three percent were non-smokers and 16 percent did not drink alcohol. Twenty eight percent described themselves as overweight by 6-10 pounds. Sixty-two percent exercised aerobically with 56 percent exercising three times a week or more. Monitoring total blood cholesterol level was important to 86 percent of respondents. Using NCEP guidelines, 36 percent of randomly sampled aviators were identified with LDL cholesterol which may warrant dietary or lifestyle intervention. Future research efforts and a proposed approach for educational intervention are discussed for this population. Author (revised)

N93-32258# Spanish Air Force, Talavera AFB.

OBJECTIVE IMPROVEMENTS OBTAINED BY CONTROL OF DIET AND PHYSICAL TRAINING IN SPANISH AIR FORCE FIGHTER PILOTS

JOSE L. GARCIA ALCON, MA DEL ROSARIO DURAN TEJEDA (Extremadura Univ., Badajoz, Spain.), and JUAN M. MORENO VAZQUEZ (Extremadura Univ., Badajoz, Spain.) /n AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 7 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

The effect of diet and sport practice in a homogeneous--age, sex and environmental stress--group of pilots (n=90) was investigated in order to evaluate the impact of diet and sport practice on body weight and plasma lipid levels. The dietary intake was a typical mediterranean diet (55-60 percent carbohydrates, 25 percent lipids, and 15-20 proteins and 3000 Kcal daily). It was controlled by the Flight Surgeon Office. The sport practice was grounded in a physical training program for pilots, directed by the Physical Training Officer. A marked difference in all studied lipid parameters was found between groups with free diet versus controlled diet. A difference in HDL-C levels and TC/HDL-C ratio was found between groups with regular physical training versus free sport practice. Author (revised)

N93-32259# Air Force Systems Command, Brooks AFB, TX. Armstrong Lab.

THE INFLUENCE OF DIETARY COUNSELING AND CARDIAC CATHETERIZATION ON LIPID PROFILES IN AMERICAN MILITARY AVIATORS

. TUOMALA, R. MUNSON, W. BESICH, and P. CELIO /n AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 6 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

The purpose was to determine the combined effect of dietary counseling and cardiac catheterization on lipid profiles when compared to a control group that did not receive dietary counseling or cardiac catheterization. The medical records and lipid profiles of 109 military aviators who underwent cardiac catheterization and dietary counseling and 109 matched controls who received neither were reviewed. All individuals were seen twice at the Aeromedical Consultation Service (ACS) between July 1987 and March 1992.

Lipid profiles of the two groups were compared during their first evaluation and again at follow-up. Overall, there was a trend towards improvement in lipid profiles, but the changes between the 2 groups were not statistically significant. The cardiac catheterization group was divided into 3 subgroups based on severity of disease and compared to their matched control. The subgroup with minimal coronary artery disease (max lesion is less than 30 percent) showed a small but statistically significant improvement in HDL cholesterol. Otherwise the aviators knowledge of his angiographic results did not lead to any significant change in lipid profiles. This suggests that lipid profiles in aviators is not significantly affected by the combined influence of nutritional counseling and cardiac catheterization. The design of this study did not preclude members of either group from receiving dietary recommendations from physicians as part of their overall evaluation. Author (revised)

N93-32260# Belgian Air Force, Brussels.

BIOLOGICAL PARAMETERS AND CARDIOVASCULAR RISK FACTORS WITH THE FLYING PERSONNEL OF THE BELGIAN ARMED FORCES

J.-P. VASTESAEGER and P. VANDENBOSCH *In* AGÅRD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 3 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

Research was done into biological parameters and cardiovascular risk factors of all pilots and navigators of the Belgian Armed Forces (Air Force and Light Aviation) of more than 45 years old and was evaluated according to age categories. The evolution of these data was analyzed with a retrograde study. Special attention was paid to the differences between Light Aviation and Air Force and between the respective linguistic groups. Author (revised)

N93-32261# Royal Norwegian Air Force, Oslo.

CHANGES IN SOME LIFESTYLE PARAMETRES IN NORWEGIAN PILOTS AS STUDENTS, AND AFTER 6 AND 12 YEARS OF SERVICE

I. L. NESLEIN, C. C. CHRISTENSEN, L. LIAN, T. RODE, and H. T. ANDERSEN *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 3 p Mar. 1993

Copyright Avail: CASI HC A01/MF A03

Medical records from candidates accepted for military training in the Royal Norwegian Airforce (RNoAF) between 1978 to 1980, and who still are on flying standards in the RNoAF, were examined. Cholesterol, HDL-cholesterol, resting heart rate, blood pressure, body weight, and maximum oxygen uptake were studied over a 12 year period, i.e. at approximately 20, 26, and 32 years of age. Our pilots gain weight at a rate twice that of the general Norwegian population. They maintain the same physical fitness from the age of 20 to 26, and from 26 to 32 there is a significant increase in maximum oxygen uptake. A 32 year old pilot is in a distinctly better physical condition, both compared to his younger colleagues, and to the average Norwegian of the same age. There is also a significant increase in serum-cholesterol from the age of 20 to 32. HDL-cholesterol and resting heart rate remained unchanged over the period. Systolic blood pressure was unchanged from 20 to 26, but decreased significantly from 26 to 32. Diastolic blood pressure dropped significantly from 20 to 26 years of age. Dietary/lifestyle consultation, as a matter of routine, may be of great importance to young pilots in order to prevent coronary heart diseases in the future. Such information should be given at an early stage, before symptoms occur. Author (revised)

N93-32262# Centro de Instruccion de Medicina Aeroespacial, Madrid (Spain).

SURVEY OF SMOKING HABITS IN THE SPANISH AIR FORCE
F. RIOS TEJADA, C. ALONSO RODRIGUEZ, J. J. CANTON ROMERO, and J. A. AZOFRA GARCIA *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 7 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

Cigarette smoking is a well known cause of major illnesses in the general population, illnesses that can impair a pilot's

performance of duty and even result in temporary or permanent disqualification of the aircrew member. This results in a diminished return on a significant investment of time and resources used to train the individual, a loss that is even more critical as the competition for such resources in an era of budget reduction, becomes more intense. The purpose is to review the diseases and physiologic changes related to cigarette smoking, especially as they relate to the flying environment. Then the prevalence of both the smoking habit and these related impairments in the Spanish Air Force aircrews are specifically examined. Finally, this data is utilized, compared to previous epidemiologic surveys in this target population, to draw conclusions regarding the effectiveness of past efforts at reducing cigarette smoking and propose future methods that might be used to reduce the negative impact of smoking related illness on the SAF mission. Author (revised)

N93-32263# Army Natick Research and Development Command, MA.

THE EFFECTS OF AN ANTIJET LAG DIET

CHARLES A. SALTER, LAURIE S. LESTER, EDWARD HIRSCH, MARGARET MOLINE (Cornell Univ., White Plains, NY.), CHARLES P. POLLAK (Cornell Univ., White Plains, NY.), and DANIEL R. WAGNER (Cornell Univ., White Plains, NY.) *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 13 p Mar. 1993

Copyright Avail: CASI HC A03/MF A03

The unpleasant symptoms surrounding jet lag or phase shifts (fatigue, insomnia, etc.) generally interfere with biological rhythms, performance, and subjective well being. A popular 'jet lag diet' has been touted widely as an effective countermeasure to alleviate symptoms through systematic alternation of high (greater than 3600 calories per day) and low (less than 800 calories per day) food intake, timed consumption of methyl xanthines, high protein breakfasts and lunches, and high carbohydrate dinners. Unfortunately, this system as a whole has never been adequately tested with humans. Fifteen male subjects (aged 18-25) lived individually in time-isolation apartments for 15 consecutive days. For the first seven days they ate and slept according to their usual schedule. During the seventh night, they were phase advanced 6 hours, to simulate an easterly jet flight, and maintained their new schedules for 8 days. The eight control subjects consumed their normal diet throughout the study, while the seven diet group subjects consumed the 'jet lag diet' prescribed by Charles Ehret. All subjects experienced jet lag as evidenced by disrupted sleep and body temperature rhythms, mood and performance decrements, and lessened physical activity. The anti-jet lag diet did not lessen the severity of these symptoms and, in fact, worsened sleep. Although, the two groups did not differ with respect to sleep latency, duration, or composition before the simulated jet lag, afterwards subjects in the diet group slept on average 30 minutes less and were 31 percent less efficient than the control subjects. These results indicate that a popular anti-jet lag diet is not effective in young male subjects and may even worsen symptoms for air crew members relying upon it. Author (revised)

N93-32264# Air Force Systems Command, Brooks AFB, TX. Armstrong Lab.

SUBJECTIVE MOOD AND FATIGUE OF C-141 CREW DURING DESERT STORM

JONATHAN FRENCH, PATRICIA A. BOLL, ROGER U. BISSON, KELLY J. NEVILLE, WILLIAM F. STORM, STEPHEN H. ARMSTRONG, TIMOTHY SLATER, and ROBERT L. MCDANIEL (Military Airlift Wing, 437th, Charleston AFB, SC.) *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 6 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

Profile of Mood States (POMS) data were used to assess the subjective condition of C-141B air crew members during Operation Desert Storm (March/April, 1992). The POMS dimensions used were anger, fatigue, vigor, tension, depression, and confusion. Data were collected during 2 intervals of the MAC crew duty day; legal for alert (LFA) and crew rest (CR) intervals. The POMS dimensions

correlated with one another during the 30-day study. Fatigue, vigor, and confusion were different between LFA and CR suggesting that the CR interval was restorative. During both LFA and CR intervals, cumulative flight hour blocks from 0-75, 76-100, 101-125, and 126-150 hours per month revealed no significant effects on subjective mood states. However, mood was sensitive to conditions of recent (1-2 days) flight hours and sleep hours in combination with cumulative flight hours per 30-days. In particular, when cumulative flight hours exceeded 125 hours per 30-day period, the vigor dimension was affected by the amount of sleep and flight hours in the most recent 24-48 period. Therefore, attending to recent sleep and flight hours as well as cumulative flight hours per 30-day interval may reduce fatigue and improve mood when operational pressures require exceeding the normal 125 flight hours per 30-days. Author (revised)

N93-32265# Air Force Systems Command, Brooks AFB, TX, Armstrong Lab.

C-141 AIRCREW SLEEP AND FATIGUE DURING THE PERSIAN GULF CONFLICT

PATRICIA A BOLL, WILLIAM F. STORM, JONATHAN FRENCH, ROGER U. BISSON, STEPHEN D. ARMSTRONG, TIMOTHY SLATER, WILLIAM E. ERCOLINE (Krug Life Sciences, Inc., San Antonio, TX.), and ROBERT L. MCDANIEL (Military Airlift Wing, 437th, Charleston AFB, SC.) *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 13 p Mar. 1993
Copyright Avail: CASI HC A03/MF A03

Subjective fatigue ratings and sleep logs were collected from pilots flying C-141 strategic airlift missions during Operations Desert Shield and Desert Storm. Descriptive summaries of the data are presented for duty-day, crew rest away from home base, and crew rest at home base. The implications of selected findings are presented as recommendations on management of aircrew work/rest schedules during sustained airlift operations. Author

N93-32266# Army Aeromedical Research Lab., Fort Rucker, AL.

THE EFFECTS OF COCKPIT HEAT ON AVIATOR SLEEP PARAMETERS

J. LYNN CALDWELL, ROBERT THORNTON, JACQUELYN Y. PEARSON, and BARBARA L. BRADLEY *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 10 p Mar. 1993
Copyright Avail: CASI HC A02/MF A03

Aviators are frequently required to work in hot environments while performing the complex cognitive tasks necessary to fly their aircraft. Objective measures of sleep were taken to determine the effects of exposure to high cockpit temperatures. Army helicopter pilots were required to fly a UH-60 simulator while wearing NBC IPE in temperatures of 35 C and 41 C. Additionally, various cooling vests were tested to determine if these cooling mechanisms would alleviate any heating effect seen in sleep parameters. During the day, pilots flew the simulator continuously for 6 h unless they were withdrawn because of excessive core temperature or they voluntarily withdrew. During the night, pilots slept in a cool bedroom in the laboratory while their sleep patterns were recorded by electroencephalography. Analyses of the data indicated when core body temperature rose during the flight by at least 1 C and the flight was at least 5 h in length, rapid eye movement (REM) sleep was significantly reduced. No rise in slow wave sleep (SWS) was seen although there was a tendency for the relationship between SWS and REM sleep to be altered. The results suggest aviators operating in a hot environment for a long period of time may have altered sleep the following night. Author (revised)

N93-32267# Centre National de la Recherche Scientifique, Paris (France).

HUMAN FACTORS AND THE SAFETY OF FLIGHTS: THE IMPORTANCE OF THE MANAGEMENT OF SLEEP [FACTEURS HUMAINS ET SECURITE DES VOLS: IMPORTANCE DE LA GESTION DU SOMMEIL]

P. CABON, R. MOLLARD, A. COBLENTZ (Paris V Univ., France.), J. P. FOUILLLOT (Paris V Univ., France.), and J. J. SPEYER (Airbus Industrie, Toulouse, France.) *In* AGARD, Nutrition, Metabolic

Disorders and Lifestyle of Aircrew 11 p Mar. 1993 *In* FRENCH

Copyright Avail: CASI HC A03/MF A03

In the field of civil air transport, the fatigue and sleep of the pilots becomes more and more of a concern in the area of flight safety, in particular for long distance flights. Indeed, these flights produce important stresses for the pilots: fast and multiple time shifts, work at night or with shifted schedules with occasionally very high amounts of work. The cumulated effect of these stresses involves disturbances of the circadian rhythms and sleep deprivations reducing the performance and the alertness level of the pilots. These difficulties are particularly elevated by the lengthening of the duration of flights with the modern planes such as the Boeing 747-400 and Airbus A340 (flights can attain a duration of 14 hours). These flights which remain for the moment limited to certain types of routes will tend to become more common in the near future. They are carried out with a reinforced crew, the French regulation of civil aviation prohibiting the work of pilots beyond one period of 8 or 10 hours according to the type of aircraft. The relatively recent appearance of these aircraft raises the very delicate question of the management of sleep for the whole crew, during the stopover and the flight. To these physiological constraints, it is necessary to add the modifications of the activity of piloting on the modern aircraft. Sometimes the increasing automation of the cockpits contributes to making the tasks of the pilot very monotonous as well as reducing the sensory stresses considerably. Similar work was also carried out in the military field. The cumulated action of these two factors, sleep disturbances and monotony of activity, are likely to involve states of hypovigilance which can appear, in certain circumstances, prejudicial to the safety of the flight. The results of research aimed at the study of the duration and quality of sleep of the crews of civil aircraft during rotations including long distance flights of durations equal to or greater than 8 hours. Transl. by FLS

N93-32268# Air Force Systems Command, Brooks AFB, TX, Armstrong Lab.

DIGITAL FLIGHT DATA AS A MEASURE OF PILOT PERFORMANCE ASSOCIATED WITH FATIGUE FROM CONTINUOUS OPERATIONS DURING THE PERSIAN GULF CONFLICT

ROGER U. BISSON, KELLY J. NEVILLE, PATRICIA A. BOLL, JONATHAN FRENCH, WILLIAM R. ERCOLINE (Krug Life Sciences, Inc., San Antonio, TX.), ROBERT L. MCDANIEL (Military Airlift Wing, 437th, Charleston AFB, SC.), and WILLIAM F. STORM *In* AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 11 p Mar. 1993

Copyright Avail: CASI HC A03/MF A03

The results of a field study using the C-141 Digital Flight Data Recorder (DFDR) to evaluate whether fatigue affected piloting precision during the Persian Gulf conflict are described. This is the first time digital flight data from the C-141 was used to evaluate routine aircrew performance. Five C-141 military transport crew were granted scheduling priority to quickly accumulate 150 flight hours in less than 30 days. Fatigue estimates were based upon activity logs, fatigue ratings, oral temperature, and mood surveys. Eighty seconds of the instrument landing system (ILS) final approach above decision height were isolated from digital flight data downloaded after each flight. Both an average and a standard deviation were calculated for airspeed, heading, vertical velocity, pitch, and roll for each of the 80 second ILS segments. The standard deviations served as estimates of piloting precision and were correlated to fatigue measures. No significant differences in piloting precision categorically attributable to fatigue were found. However, individual examples of decreased precision associated with high fatigue levels were observed. These deviations did not occur with enough regularity to conclude whether fatigue or other factors were the root cause. DFDR data can be a sensitive measure of performance, but the operational setting of Desert Storm did not permit control of important variables in this first time effort. The findings suggest that DFDR assessment of flying precision could be of value in controlled studies of fatigue, workload, or

drugs that affect pilot performance. Future studies need to evaluate digital flight data versus other cognitive and psychomotor tasks that are sensitive to changes in performance. Transl. by FLS

N93-32269# Army Natick Research and Development Command, MA. Military Performance and Neuroscience Div.

EFFECTS OF CAFFEINE ON MENTAL PERFORMANCE AND MOOD: IMPLICATIONS FOR AIRCREW MEMBERS

HARRIS R. LIEBERMAN, BERNARD J. FINE, JOHN L. KOBRICK, and JOHN D. E. GABRIELI (Stanford Univ., CA.) /n AGARD, Nutrition, Metabolic Disorders and Lifestyle of Aircrew 10 p Mar. 1993

Copyright Avail: CASI HC A02/MF A03

Caffeine is generally regarded as the most widely used drug in the world. However, it is also a food constituent. Its acute effects on behavior appear to be greater than those of any other food constituent as they are detectable when caffeine is administered in doses found in single servings of coffee, tea, and soft drinks. Caffeine affects the central nervous system by binding to adenosine receptors, and it has acute and chronic, dose dependent effects on brain function. Low and moderate doses have beneficial effects on mental performance but high doses may have adverse effects. Tolerance develops to continued use of caffeine, so that its acute effects are altered when it is used chronically in high doses. Physical and mental symptoms associated with sudden withdrawal of caffeine have also been reported. The acute effects of caffeine on vigilance, simple and complex cognitive performance, and mood state are discussed. Doses equal to single servings of beverages consistently improve auditory and visual vigilance. In addition, moderate doses of caffeine increase self-reported alertness. The duration and magnitude of these effects on individuals are related to habitual caffeine consumption and interact with tobacco use. In view of its dose-related beneficial and deleterious effects, aircrew personnel, flight surgeons, military commanders, and planners should have knowledge of the potential influence of caffeine on performance, especially vigilance, and mood, as well as the consequences of its abrupt withdrawal. Author (revised)

N93-32328*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

HEALTH MAINTENANCE FACILITY SYSTEM EFFECTIVENESS TESTING

CHARLES W. LLOYD, JOHN GOSBEE (Krug Life Sciences, Inc., Houston, TX.), RICHARD BUEKER (Krug Life Sciences, Inc., Houston, TX.), DEBRA KUPRA (Krug Life Sciences, Inc., Houston, TX.), and MARY RUTA (Krug Life Sciences, Inc., Houston, TX.) Jul. 1993 111 p

(NASA-TM-104737; S-638; NAS 1.15:104737) Avail: CASI HC A06/MF A02

The Medical Simulations Working Group conducted a series of medical simulations to evaluate the proposed Health Maintenance Facility (HMF) Preliminary Design Review (PDR) configuration. The goal of these simulations was to test the system effectiveness of the HMF PDR configurations. The objectives of the medical simulations are to (1) ensure fulfillment of requirements with this HMF design, (2) demonstrate the conformance of the system to human engineering design criteria, and (3) determine whether undesirable design or procedural features were introduced into the design. The simulations consisted of performing 6 different medical scenarios with the HMF mockup in the KRUG laboratory. The scenarios included representative medical procedures and used a broad spectrum of HMF equipment and supplies. Scripts were written and simulations performed by medical simulations working group members under observation from others. Data were collected by means of questionnaires, debriefings, and videotapes. Results were extracted and listed in the individual reports. Specific issues and recommendations from each simulation were compiled into the individual reports. General issues regarding the PDR design of the HMF are outlined in the summary report. Author (revised)

N93-32356*# Sverdrup Technology, Inc., Huntsville, AL. **MICROBIOLOGICAL AND CORROSION ANALYSIS OF THREE URINE PRETREATMENT REGIMES WITH TITANIUM 6A1-4V Interim Report**

TIMOTHY L. HUFF Jul. 1993 26 p

(Contract NAS8-37814)

(NASA-CR-192575; NAS 1.26:192575) Avail: CASI HC A03/MF A01

One objective of the water recovery test (WRT) performed at NASA's Marshall Space Flight Center (MSFC) for the environmental control and life support systems (ECLSS) of Space Station Freedom is to determine the ability of the water recovery system to reclaim urine for crew reuse. In the process, raw urine is pretreated using a commercially available oxidant, Oxone (Dupont), and sulfuric acid (to reduce ammonia), and pumped into a urine processing subsystem. A combination of sodium hypochlorite and sulfuric acid were also considered as an alternative pretreatment. The ability of these pretreatments, plus a third pretreatment of ozone, to reduce microbial levels in urine generated during testing of the water recovery system at MSFC was examined. In addition, the corrosion rate of weld and base metal specimens of titanium 6A1-4V, a candidate material for the water system of Space Station Freedom, was monitored in the presence of these pretreatments. Specimen surfaces were examined at completion of the 21-day test using scanning electron microscopy. Change in pH, color, turbidity, and odor were recorded over the course of the test.

Author (revised)

N93-32406# Instituto de Pesquisas Energeticas e Nucleares, Sao Paulo (Brazil).

UTILIZATION OF HIGH ENERGY ELECTRON BEAM IN THE TREATMENT OF DRINKING AND WASTE WATER

MARIA HELENA DEOLIVEIRASAMPA, S. I. BORRELY, and D. M. MORITA (Sao Paulo Univ., Brazil.) Aug. 1991 17 p Presented at the First Brazilian Meeting on Nuclear Applications, Recife, Brazil, 27-30 May 1991

(DE92-642335; IPEN-PUB-341; CONF-9105279) Avail: CASI HC A03/MF A01 (US Sales Only)

Samples of drinking water and waste water were irradiated using high energy electron beam with doses from 0.37 kGy to 100 kGy. Preliminary data show the removal of about 100% trihalomethanes (THM) in drinking water concentration from 2.7 micro-g/1 to 45 micro-g/1, 90% of the color of the Public Owned Wastewater Treatment Plant effluent and 87% of oil and grease of the cutting fluid waste water. DOE

SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

A93-47125

FLAVINE-DEPENDENT PROCESSES IN MODEL PREBIOLOGICAL SYSTEMS [FLAVINOZAVISIMYE PROTSESSY V MODEL'NYKH PREDBIOLOGICHESKIKH SISTEMAKH]

M. P. KOLESNIKOV (RAN, Inst. Biokhimii, Moscow, Russia) Rossijskaya Akademiya Nauk, Izvestiya, Seriya Biologicheskaya (ISSN 0002-3329) no. 6 Nov.-Dec. 1992 p. 844-853. In RUSSIAN refs.

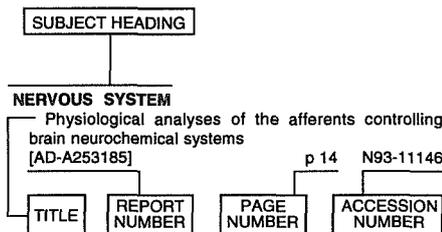
Copyright

The paper presents results of a study of flavine-dependent processes occurring with the participation of microspheres and liposomes containing flavoproteinoid-1 or -2. It was found that the presence of flavoproteinoid-containing microspheres or liposomes catalyzed the photooxidation of glycolate and the photoreduction of NAD to NADH and sensitized the photophosphorylation of ADP to ATP, indicating that all these processes are flavine dependent.

It is suggested that the flavoproteinoid-containing microspheres and lipospheres can be used as a simple model for prebiotic investigations.

AIAA

Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of document content, a title extension is added, separated from the title by three hyphens. The accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence.

A

ACCELERATION TOLERANCE

Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237

ACIDITY

A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692

ACTIVE CONTROL

Vibration isolation p 365 N93-31458

AEROSPACE ENVIRONMENTS

Protein requirements in hypoxia or hypokinesia p 368 N93-32244

AEROSPACE MEDICINE

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377) [NASA-SP-7011(377)] p 361 N93-31924

Nutrition, Metabolic Disorders and Lifestyle of Aircrew [AGARD-CP-533] p 367 N93-32240

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243

Protein requirements in hypoxia or hypokinesia p 368 N93-32244

Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248

Lipidemic profile of Hellenic Airforce officers p 362 N93-32250

Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253

Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254

The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259

Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261

Survey of smoking habits in the Spanish Air Force p 370 N93-32262

Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328

Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364

AEROSPACE SYSTEMS

A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844

AIRCRAFT CONTROL

A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685

Distribution of functions in a man-machine control system of a certain type p 364 A93-45687

AIRCRAFT PILOTS

The effects of history and predictive information on the ability of the transport aircraft pilot to predict an alert p 365 A93-46810

Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006

Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

Nutritional assessment of United States tactical air command pilots p 367 N93-32242

The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257

The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259

Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261

The effects of cockpit heat on aviator sleep parameters p 371 N93-32266

ALERTNESS

Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

ALTITUDE ACCLIMATIZATION

Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100

AMINO ACIDS

Relationship between G + C in silent sites of codons and amino acid composition of human proteins p 358 A93-47099

AMPLITUDE MODULATION

Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981

ANGIOGRAPHY

Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253

ANNOTATIONS

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

ANTHROPOMETRY

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006

Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

ANTIEMETICS AND ANTINAUSEANTS

Applied chemical engineering thermodynamics [ISBN 0-387-54759-2] p 357 A93-46075

ARTERIOSCLEROSIS

Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

ASYMMETRY

Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364

AUDITORY DEFECTS

Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691

AUDITORY PERCEPTION

Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691

Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981

AUDITORY SIGNALS

Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981

AUTOMATIC CONTROL

A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844

AUTONOMY

Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108

B

BACTERIA

Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols

[NASA-CR-192570] p 359 N93-32354

Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems [NASA-CR-192571] p 359 N93-32365

BIBLIOGRAPHIES

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

BIOASSAY

Heterogeneity of rat pituitary prolactin cells - Relationships among location, hormone assay and estrous cycle stage p 358 A93-46606

BIODYNAMICS

Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237

BIOLOGICAL EFFECTS

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377) [NASA-SP-7011(377)] p 361 N93-31924

Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035

BIOMEDICAL DATA

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

BLOOD

Blood lipids in aircrew recruits and in RAF aviators p 362 N93-32251

BLOOD PRESSURE

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260

BODY MEASUREMENT (BIOLOGY)

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243

BODY TEMPERATURE

Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968

SUBJECT

The effects of cockpit heat on aviator sleep parameters p 371 N93-32266

BRINES

Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols [NASA-CR-192570] p 359 N93-32354

C**CAFFEINE**

Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

CALORIC REQUIREMENTS

Trial of emergency ration of the Spanish Air Force p 368 N93-32247

The effects of an antijet lag diet p 370 N93-32263

CANOPIES (VEGETATION)

Minitron II system for precise control of the plant growth environment p 357 A93-46470

CARBOHYDRATE METABOLISM

Nutrition, Metabolic Disorders and Lifestyle of Aircrew [AGARD-CP-533] p 367 N93-32240

CARBOHYDRATES

Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

CARBON DIOXIDE CONCENTRATION

The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471

CARDIOVASCULAR SYSTEM

Changes in the central hemodynamics under antiorthostasis in humans with different blood circulation types and physical training levels p 359 A93-46967
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

Lipodystrophies in the French military flight crew p 362 N93-32249

Blood lipids in aircrew recruits and in RAF aviators p 362 N93-32251

Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253

Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254

Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260

CATHETERIZATION

The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259

CELLS (BIOLOGY)

Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472

Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018

Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035

CENTRIFUGES

Rotational speed control p 365 N93-31457

Vibration isolation p 365 N93-31458

CEREBRAL CORTEX

The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966

CHEMICAL EVOLUTION

Flavine-dependent processes in model prebiological systems p 372 A93-47125

CHOLESTEROL

Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100

Lipodystrophies in the French military flight crew p 362 N93-32249

Lipidemic profile of Hellenic Airforce officers p 362 N93-32250

Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

CIRCADIAN RHYTHMS

Organization of the human circadian system [AD-A264675] p 361 N93-32015

Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018

Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

CLINICAL MEDICINE

A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692

CLOSED ECOLOGICAL SYSTEMS

Atmospheric control systems p 365 N93-31456

COCKPIT SIMULATORS

The effects of cockpit heat on aviator sleep parameters p 371 N93-32266

COCKPITS

Flight mechanics of high-performance aircraft [ISBN 0-521-34123-X] p 365 A93-47019

COGNITIVE PSYCHOLOGY

A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152

COLD TOLERANCE

Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968

COMPLEX SYSTEMS

A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152

COMPUTER PROGRAMS

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

COMPUTER VISION

A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844

CONTAMINATION

Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems [NASA-CR-192571] p 359 N93-32365

CONTROL SYSTEMS DESIGN

Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598

Distribution of functions in a man-machine control system of a certain type p 364 A93-45687

CONTROL THEORY

Daily exercise routines p 360 N93-31455

Atmospheric control systems p 365 N93-31456

Rotational speed control p 365 N93-31457

CONTROLLED ATMOSPHERES

The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471

CONTROLLERS

Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107

CORONARY ARTERY DISEASE

Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253

Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254

CREW WORKSTATIONS

Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006

CROP GROWTH

Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468

Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469

Minitron II system for precise control of the plant growth environment p 357 A93-46470

CRYSTALLIZATION

Effects of a microgravity environment on the crystallization of biological macromolecules p 357 A93-45995

CUES

Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981

D**DATA PROCESSING**

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

DECISION THEORY

A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152

DECOMPRESSION SICKNESS

Hyperbaric treatment p 360 N93-31454

DEOXYRIBONUCLEIC ACID

Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035

DETECTION

The effects of history and predictive information on the ability of the transport aircraft pilot to predict an alert p 365 A93-46810

DIETS

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

Nutritional assessment of United States tactical air command pilots p 367 N93-32242

Protein requirements in hypoxia or hypokinesia p 368 N93-32244

Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257

Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258

The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259

The effects of an antijet lag diet p 370 N93-32263

DISEASES

Survey of smoking habits in the Spanish Air Force p 370 N93-32262

E**EDUCATION**

A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151

ELECTROMAGNETIC FIELDS

Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035

ELECTRON BEAMS

Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406

ELECTROPHYSIOLOGY

Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968

EMOTIONAL FACTORS

Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264

ENDOCRINOLOGY

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

ENERGY ABSORPTION

Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098

ENERGY CONSUMPTION

Nutritional assessment of United States tactical air command pilots p 367 N93-32242

ENERGY REQUIREMENTS

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243

ENTRAINMENT

Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018

ENVIRONMENTAL CONTROL

Minitron II system for precise control of the plant growth environment p 357 A93-46470

The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471

Atmospheric control systems p 365 N93-31456

Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols [NASA-CR-192570] p 359 N93-32354

Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V [NASA-CR-192575] p 372 N93-32356

EPIDEMIOLOGY

Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

ESTROGENS

Heterogeneity of rat pituitary prolactin cells - Relationships among location, hormone assay and estrous cycle stage p 358 A93-46606

EXAMINATION

A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692

EXO BIOLOGY

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377) [NASA-SP-7011(377)] p 361 N93-31924

EXOSKELETONS

Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107

EXTRAVEHICULAR ACTIVITY

A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844

F**FATIGUE (BIOLOGY)**

Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264

Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268

FEEDBACK

Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107

FEMALES

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

FETUSES

Organization of the human circadian system [AD-A264675] p 361 N93-32015

FLIGHT CREWS

A method for predicting the work load of a flight engineer engaged in counteracting failures of functional systems of a transport aircraft p 364 A93-45688

Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006

Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

Nutrition, Metabolic Disorders and Lifestyle of Aircrew [AGARD-CP-533] p 367 N93-32240

Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245

Changes in food and energy intake in military aircrew p 368 N93-32246

Lipodystrophies in the French military flight crew p 362 N93-32249

Blood lipids in aircrew recruits and in RAF aviators p 362 N93-32251

The effects of an antijet lag diet p 370 N93-32263

Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264

C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265

Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268

Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

FLIGHT FATIGUE

C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265

FLIGHT RECORDERS

Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268

FLIGHT SAFETY

Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

FLIGHT SIMULATORS

Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

FLIGHT STRESS (BIOLOGY)

Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264

FLIGHT TRAINING

Mandatory multi-engined training syllabus [CAP-601] p 363 N93-31729

FLUID FILTERS

Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols [NASA-CR-192570] p 359 N93-32354

FLUORESCENCE

Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469

FLYING PERSONNEL

Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691

Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260

FOOD INTAKE

Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245

Changes in food and energy intake in military aircrew p 368 N93-32246

Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248

Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258

The effects of an antijet lag diet p 370 N93-32263

FREQUENCY MODULATION

Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981

FUZZY SYSTEMS

Hyperbaric treatment p 360 N93-31454

Daily exercise routines p 360 N93-31455

Atmospheric control systems p 365 N93-31456

Rotational speed control p 365 N93-31457

Vibration isolation p 365 N93-31458

G**GAS EXCHANGE**

Minitron II system for precise control of the plant growth environment p 357 A93-46470

GENETIC CODE

Relationship between G + C in silent sites of codons and amino acid composition of human proteins p 358 A93-47099

GLUCOSE

Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248

GRAVITATIONAL EFFECTS

Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472

GROUND CREWS

Lipidemic profile of Hellenic Airforce officers p 362 N93-32250

H**HABITS**

The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257

HEAD DOWN TILT

Changes in the central hemodynamics under antihypotension in humans with different blood circulation types and physical training levels p 359 A93-46967

HEAD MOVEMENT

Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237

HEART DISEASES

Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

HEART RATE

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243

HELICOPTERS

Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

HELMET MOUNTED DISPLAYS

Flight mechanics of high-performance aircraft [ISBN 0-521-34123-X] p 365 A93-47019

Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107

HEMODYNAMIC RESPONSES

Changes in the central hemodynamics under antihypotension in humans with different blood circulation types and physical training levels p 359 A93-46967

HIGH ENERGY ELECTRONS

Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406

HIGH TEMPERATURE ENVIRONMENTS

The effects of cockpit heat on aviator sleep parameters p 371 N93-32266

HOSPITALS

Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment [FOA-A-40065-4.5] p 359 N93-32423

HUMAN BEHAVIOR

Nutritional and lifestyle status of 50 pilots of the Portuguese Air Force p 369 N93-32255

HUMAN BODY

Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237

HUMAN FACTORS ENGINEERING

A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685

Distribution of functions in a man-machine control system of a certain type p 364 A93-45687

Flight mechanics of high-performance aircraft [ISBN 0-521-34123-X] p 365 A93-47019

Probabilistic simulation of the human factor in structural reliability p 365 N93-31573

Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328

HUMAN PERFORMANCE

A method for predicting the work load of a flight engineer engaged in counteracting failures of functional systems of a transport aircraft p 364 A93-45688

Probabilistic simulation of the human factor in structural reliability p 365 N93-31573

Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011

A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152

HYPOGLYCEMIA

Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248

HYPOKINESIA

Protein requirements in hypoxia or hypokinesia p 368 N93-32244

HYPOTHALAMUS

Organization of the human circadian system [AD-A264675] p 361 N93-32015

HYPOXIA

Protein requirements in hypoxia or hypokinesia p 368 N93-32244

I**INCANDESCENCE**

Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468

Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469

INTERACTIVE CONTROL

Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108

INVERSE KINEMATICS

Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598

IRRADIATION

Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406

J**JET LAG**

The effects of an antijet lag diet p 370 N93-32263

L**LEAF AREA INDEX**

Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468

Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469

LEAVES

Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472

LIFE SCIENCES

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377) [NASA-SP-7011(377)] p 361 N93-31924

LIFE SUPPORT SYSTEMS

- Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377)
[NASA-SP-7011(377)] p 361 N93-31924
- Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols
[NASA-CR-192570] p 359 N93-32354
- Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems
[NASA-CR-192571] p 359 N93-32365
- LINGUISTICS**
Connectionist models and linguistic theory: Investigations of stress systems in language
[AD-A265450] p 364 N93-32064
- LIPID METABOLISM**
Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100
Lipodystrophies in the French military flight crew p 362 N93-32249
- LIPIDS**
Blood lipids in aircrew recruits and in RAF aviators p 362 N93-32251
Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258
The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259
- LIPOPROTEINS**
Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254
- LOGIC DESIGN**
Hyperbaric treatment p 360 N93-31454
- LOWER BODY NEGATIVE PRESSURE**
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

M

- MACHINE LEARNING**
Connectionist models and linguistic theory: Investigations of stress systems in language
[AD-A265450] p 364 N93-32064
- MACROMOLECULES**
Effects of a microgravity environment on the crystallization of biological macromolecules p 357 A93-45995
- MAGNETIC EFFECTS**
The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966
- MAMMALS**
Neurophysiological analysis of circadian rhythm entrainment
[AD-A264681] p 361 N93-32018
- MAN MACHINE SYSTEMS**
Distribution of functions in a man-machine control system of a certain type p 364 A93-45687
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377)
[NASA-SP-7011(377)] p 361 N93-31924
Man-machine cooperation in advanced teleoperation p 366 N93-32106
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107
Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108
- MANIPULATORS**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
Man-machine cooperation in advanced teleoperation p 366 N93-32106
Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- MANPOWER**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools
[AD-A264571] p 363 N93-32011
- MANUAL CONTROL**
A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685

MASKING

- Auditory spectro-temporal pattern analysis
[AD-A264691] p 361 N93-31981
- MEDICAL SCIENCE**
Hyperbaric treatment p 360 N93-31454
An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine
[AD-A265497] p 360 N93-31917
- MEDICAL SERVICES**
Health maintenance facility system effectiveness testing
[NASA-TM-104737] p 372 N93-32328
- MENTAL PERFORMANCE**
Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269
- METABOLISM**
Trial of emergency ration of the Spanish Air Force p 368 N93-32247
- METAL HALIDES**
Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469
- MICROBIOLOGY**
Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols
[NASA-CR-192570] p 359 N93-32354
Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems
[NASA-CR-192571] p 359 N93-32365
- MICROGRAVITY**
Effects of a microgravity environment on the crystallization of biological macromolecules p 357 A93-45995
Vibration isolation p 365 N93-31458
- MICROORGANISMS**
Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment
[FOA-A-40065-4.5] p 359 N93-32423
- MICROWAVES**
Mechanisms of microwave induced damage in biologic materials
[AD-A264415] p 358 N93-32035
- MILITARY OPERATIONS**
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- MILITARY TECHNOLOGY**
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- MODULATION**
Auditory spectro-temporal pattern analysis
[AD-A264691] p 361 N93-31981
- MOLECULAR STRUCTURE**
Relationship between G + C in silent sites of codons and amino acid composition of human proteins p 358 A93-47099
- MONITORS**
Daily exercise routines p 360 N93-31455
- MOODS**
Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269
- MOTION SICKNESS**
Understanding microwaves
[ISBN 0-471-57567-4] p 357 A93-46300
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility
[NASA-CR-193304] p 363 N93-32364
- MOTION SICKNESS DRUGS**
Applied chemical engineering thermodynamics
[ISBN 0-387-54759-2] p 357 A93-46075
Understanding microwaves
[ISBN 0-471-57567-4] p 357 A93-46300
- MULTIENGINE VEHICLES**
Mandatory multi-engined training syllabus
[CAP-601] p 363 N93-31729
- MUSCULAR FUNCTION**
Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968
Protein requirements in hypoxia or hypokinesia p 368 N93-32244

N

NAVIGATION

- A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
- NEAR FIELDS**
Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098
- NEURAL NETS**
Man-machine cooperation in advanced teleoperation p 366 N93-32106
- NEURONS**
Organization of the human circadian system
[AD-A264675] p 361 N93-32015
- NEUROPHYSIOLOGY**
The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966
Organization of the human circadian system
[AD-A264675] p 361 N93-32015
Neurophysiological analysis of circadian rhythm entrainment
[AD-A264681] p 361 N93-32018
- NEUROTRANSMITTERS**
Understanding microwaves
[ISBN 0-471-57567-4] p 357 A93-46300
- NITROGEN METABOLISM**
Effect of spaceflight on human protein metabolism p 360 A93-47097
- NOISE INJURIES**
Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691
- NUTRITION**
Nutrition, Metabolic Disorders and Lifestyle of Aircrew
[AGARD-CP-533] p 367 N93-32240
An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241
Nutritional assessment of United States tactical air command pilots p 367 N93-32242
Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245
Nutritional and lifestyle status of 50 pilots of the Portugese Air Force p 369 N93-32255
The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259
Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260
- NUTRITIONAL REQUIREMENTS**
Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245
Changes in food and energy intake in military aircrew p 368 N93-32246
Trial of emergency ration of the Spanish Air Force p 368 N93-32247
Nutritional and lifestyle status of 50 pilots of the Portugese Air Force p 369 N93-32255
- OCCUPATION**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools
[AD-A264571] p 363 N93-32011
- OCCUPATIONAL DISEASES**
Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691
Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098
- OPTIMAL CONTROL**
Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems
[NASA-CR-192571] p 359 N93-32365
- ORBITAL SERVICING**
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever
[NASA-CR-193301] p 365 N93-31844
- ORTHOSTATIC TOLERANCE**
Changes in the central hemodynamics under antiorthostasis in humans with different blood circulation types and physical training levels p 359 A93-46967
- OTOLITH ORGANS**
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility
[NASA-CR-193304] p 363 N93-32364

P

- PATTERN RECOGNITION**
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844
- PEPTIDES**
Organization of the human circadian system [AD-A264675] p 361 N93-32015
- PERSONALITY**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- PERSONNEL**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252
- PERSONNEL SELECTION**
Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- PHOSPHORYLATION**
Flavine-dependent processes in model prebiological systems p 372 A93-47125
- PHOTICS**
Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018
- PHOTOXIDATION**
Flavine-dependent processes in model prebiological systems p 372 A93-47125
- PHOTOSYNTHESIS**
Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468
- PHYSICAL EXAMINATIONS**
Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261
- PHYSICAL EXERCISE**
Daily exercise routines p 360 N93-31455
The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257
Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258
- PHYSICAL FITNESS**
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261
- PHYSIOLOGICAL EFFECTS**
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267
- PHYSIOLOGICAL FACTORS**
Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252
Nutritional and lifestyle status of 50 pilots of the Portugese Air Force p 369 N93-32255
Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260
- PHYSIOLOGICAL RESPONSES**
The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096
Effect of spaceflight on human protein metabolism p 360 A93-47097
Trial of emergency ration of the Spanish Air Force p 368 N93-32247
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364
- PHYSIOLOGICAL TESTS**
Daily exercise routines p 360 N93-31455
- PHYSIOLOGY**
An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917
- PILOT PERFORMANCE**
A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685
The effects of history and predictive information on the ability of the transport aircraft pilot to predict an alert p 365 A93-46810
Nutrition, Metabolic Disorders and Lifestyle of Aircrew [AGARD-CP-533] p 367 N93-32240
Nutritional assessment of United States tactical air command pilots p 367 N93-32242
Changes in food and energy intake in military aircrew p 368 N93-32246
Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248
Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253
Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254
Nutritional and lifestyle status of 50 pilots of the Portugese Air Force p 369 N93-32255
The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257
Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
The effects of an antijet lag diet p 370 N93-32263
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269
- PILOT SELECTION**
Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006
- PILOT TRAINING**
Mandatory multi-engined training syllabus [CAP-601] p 363 N93-31729
- PITUITARY GLAND**
Heterogeneity of rat pituitary prolactin cells - Relationships among location, hormone assay and estrous cycle stage p 358 A93-46606
- PITUITARY HORMONES**
Heterogeneity of rat pituitary prolactin cells - Relationships among location, hormone assay and estrous cycle stage p 358 A93-46606
- PLANT ROOTS**
The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471
- PLANTS (BOTANY)**
Minitron II system for precise control of the plant growth environment p 357 A93-46470
- PORTABLE EQUIPMENT**
Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243
- POSTURE**
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
- POTABLE WATER**
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406
- PRESSURE REDUCTION**
Hyperbaric treatment p 360 N93-31454
- PRETREATMENT**
Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V [NASA-CR-192575] p 372 N93-32356
- PROBABILITY THEORY**
Probabilistic simulation of the human factor in structural reliability p 365 N93-31573
- PROTECTIVE CLOTHING**
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377) [NASA-SP-7011(377)] p 361 N93-31924
- PROTEIN CRYSTAL GROWTH**
Effects of a microgravity environment on the crystallization of biological macromolecules p 357 A93-45995
- PROTEIN SYNTHESIS**
Effect of spaceflight on human protein metabolism p 360 A93-47097
Relationship between G + C in silent sites of codons and amino acid composition of human proteins p 358 A93-47099
- PROTEINOIDS**
Flavine-dependent processes in model prebiological systems p 372 A93-47125
- PSYCHOLOGICAL FACTORS**
Nutritional and lifestyle status of 50 pilots of the Portugese Air Force p 369 N93-32255
- PSYCHOPHYSIOLOGY**
A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- RADIATION DAMAGE**
Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035
- RADIATION EFFECTS**
Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468
Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098
Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035
- RADIO WAVES**
Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098
- RADIOACTIVE MATERIALS**
Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment [FOA-A-40065-4.5] p 359 N93-32423
- RATIONS**
Trial of emergency ration of the Spanish Air Force p 368 N93-32247
- REAL TIME OPERATION**
Man-machine cooperation in advanced teleoperation p 366 N93-32106
- REFLEXES**
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364
- RESCUE OPERATIONS**
Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment [FOA-A-40065-4.5] p 359 N93-32423
- RESEARCH PROJECTS**
An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917
- RHYTHM (BIOLOGY)**
The effects of an antijet lag diet p 370 N93-32263
- RIBONUCLEIC ACIDS**
Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035
- RISK**
Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253
Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254
- ROBOT ARMS**
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- ROBOT CONTROL**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598

- A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844
- ROBOT SENSORS**
Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108
- ROBOTICS**
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844
- ROBOTS**
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- ROTATING ENVIRONMENTS**
Rotational speed control p 365 N93-31457
- ROUTES**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151

S

- SCENE ANALYSIS**
Flight mechanics of high-performance aircraft [ISBN 0-521-34123-X] p 365 A93-47019
Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981
- SECRETIONS**
A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692
- SELF ORGANIZING SYSTEMS**
Connectionist models and linguistic theory: Investigations of stress systems in language [AD-A265450] p 364 N93-32064
- SENSORY FEEDBACK**
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107
- SERUMS**
Lipidemic profile of Hellenic Airforce officers p 362 N93-32250
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256
- SEX FACTOR**
An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917
- SIGNAL DETECTION**
Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981
- SITTING POSITION**
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
- SLEEP**
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267
- SMOKE**
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
- SPACE FLIGHT STRESS**
Effect of spaceflight on human protein metabolism p 360 A93-47097
- SPACE STATION FREEDOM**
An on-line water quality monitor for Space Station Freedom p 364 A93-46801
Hyperbaric treatment p 360 N93-31454
Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328
Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V [NASA-CR-192575] p 372 N93-32356
- SPACECRAFT CABIN ATMOSPHERES**
Atmospheric control systems p 365 N93-31456
- SPACECRAFT MAINTENANCE**
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844
- SPEED CONTROL**
Rotational speed control p 365 N93-31457
- STATISTICAL ANALYSIS**
Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

- STEREOSCOPIC VISION**
Flight mechanics of high-performance aircraft [ISBN 0-521-34123-X] p 365 A93-47019
- STOMACH**
A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692
- STRESS (PSYCHOLOGY)**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- STRESS (PSYCHOLOGY)**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- STRUCTURAL RELIABILITY**
Probabilistic simulation of the human factor in structural reliability p 365 N93-31573
- STRUCTURAL VIBRATION**
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
- SURVEYS**
The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257
- SURVIVAL**
Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems [NASA-CR-192571] p 359 N93-32365
- SYSTEM EFFECTIVENESS**
Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328
- SYSTEM FAILURES**
The effects of history and predictive information on the ability of the transport aircraft pilot to predict an alert p 365 A93-46810

T

- TASK PLANNING (ROBOTICS)**
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844
- TASKS**
Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012
Man-machine cooperation in advanced teleoperation p 366 N93-32106
- TELEOPERATORS**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
Man-machine cooperation in advanced teleoperation p 366 N93-32106
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107
Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- TELEROBOTICS**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
Man-machine cooperation in advanced teleoperation p 366 N93-32106
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- TEMPERATURE CONTROL**
The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471
- TEMPERATURE EFFECTS**
Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266
- THERMOREGULATION**
Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968
- TIME DEPENDENCE**
A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152
- TIME LAG**
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107

- TOBACCO**
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
- TOLERANCES (PHYSIOLOGY)**
Understanding microwaves [ISBN 0-471-57567-4] p 357 A93-46300
The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966
- TORSION**
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364
- TOXIC HAZARDS**
Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment [FOA-A-40065-4.5] p 359 N93-32423
- TRANSPORT AIRCRAFT**
A method for predicting the work load of a flight engineer engaged in counteracting failures of functional systems of a transport aircraft p 364 A93-45688

U

- UNDERWATER VEHICLES**
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- URINE**
Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols [NASA-CR-192570] p 359 N93-32354
Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V [NASA-CR-192575] p 372 N93-32356

V

- VEGETABLES**
Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468
Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469
- VEGETATION GROWTH**
Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472
- VIBRATION EFFECTS**
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
- VIBRATION ISOLATORS**
Vibration isolation p 365 N93-31458
- VIRTUAL REALITY**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
- VISUAL TASKS**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
- VOMITING**
Applied chemical engineering thermodynamics [ISBN 0-387-54759-2] p 357 A93-46075
Understanding microwaves [ISBN 0-471-57567-4] p 357 A93-46300

W

- WASTE WATER**
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406
- WATER MANAGEMENT**
An on-line water quality monitor for Space Station Freedom p 364 A93-46801
- WATER QUALITY**
An on-line water quality monitor for Space Station Freedom p 364 A93-46801
- WATER RECLAMATION**
Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols [NASA-CR-192570] p 359 N93-32354

SUBJECT INDEX

Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V
[NASA-CR-192575] p 372 N93-32356
Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems
[NASA-CR-192571] p 359 N93-32365

WATER TREATMENT

Utilization of high energy electron beam in the treatment of drinking and waste water
[DE92-642335] p 372 N93-32406

WORKLOADS (PSYCHOPHYSIOLOGY)

A method for predicting the work load of a flight engineer engaged in counteracting failures of functional systems of a transport aircraft p 364 A93-45688
Application and validation of workload assessment techniques
[AD-A264575] p 366 N93-32012

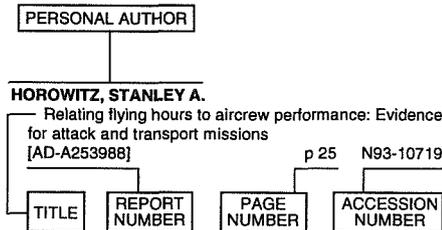
WORKLOADS (PSYCHOPHYSIOLOGY)

PERSONAL AUTHOR INDEX

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Supplement 381)

November 1993

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The title of the document is used to provide a brief description of the subject matter. The report number helps to indicate the type of document (e.g., NASA report, translation, NASA contractor report). The page and accession numbers are located beneath and to the right of the title. Under any one author's name the accession numbers are arranged in sequence.

A

- AKERS, CAROLYN P.**
Minitron II system for precise control of the plant growth environment p 357 A93-46470
The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471
- AKERS, S. W.**
Minitron II system for precise control of the plant growth environment p 357 A93-46470
- AKERS, STUART W.**
The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471
- ALCON, JOSE L. GARCIA**
Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258
- ALONSO, C.**
Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253
- AMOROSO, MICHAEL T.**
Hyperbaric treatment p 360 N93-31454
Daily exercise routines p 360 N93-31455
- ANDERSEN, H. T.**
Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243
Changes in food and energy intake in military aircrew p 368 N93-32246
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261
- ANDERSON, PATRICK L.**
Daily exercise routines p 360 N93-31455
- ANTRAZI, SAMI S.**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
- ARMSTRONG, STEPHEN D.**
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
- ARMSTRONG, STEPHEN H.**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264

- ATWATER, J. E.**
An on-line water quality monitor for Space Station Freedom p 364 A93-46801
- AVAKOV, V. I.**
A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685

B

- BARRY, MATTHEW**
A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152
- BASTIN, PAUL**
Rotational speed control p 365 N93-31457
Vibration isolation p 365 N93-31458
- BESICH, W.**
The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259
- BEZBOGOV, A. A.**
A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685
- BIGARD, A. X.**
Protein requirements in hypoxia or hypokinesia p 368 N93-32244
- BISSON, ROGER U.**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- BOLL, PATRICIA A**
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
- BOLL, PATRICIA A.**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- BORRELY, S. I.**
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406
- BOUSSIF, A.**
Lipodystrophies in the French military flight crew p 362 N93-32249
- BRADLEY, BARBARA L.**
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266
- BROCK, THOMAS C.**
Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472
- BRYFOGLE, MARK D.**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
- BUEKER, RICHARD**
Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328
- BURLATON, J. P.**
Lipodystrophies in the French military flight crew p 362 N93-32249
- BYERS, JAMES C.**
Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012
- CABON, P.**
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

C

- CALDWELL, J. LYNN**
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266
- CELIO, P.**
The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259
- CHAMIS, CHRISTOS C.**
Probabilistic simulation of the human factor in structural reliability p 365 N93-31573
- CHIOU, PETER C.**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
- CHRIST, RICHARD E.**
Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012
- CHRISTENSEN, C. C.**
Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261
- CHRISTENSEN, N. J.**
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096
- CHRISTOPHERSEN, A.**
Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243
- COBLENTZ, A.**
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267
- COLLINS, D. W.**
Relationship between G + C in silent-sites of codons and amino acid composition of human proteins p 358 A93-47099
- COLVIN, CARAN**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- COOK, T. J.**
Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245
- COOK, TAMMY J.**
The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257

D

- DAS, HARI**
Man-machine cooperation in advanced teleoperation p 366 N93-32106
- DASKALOPOULOS, C.**
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256
- DEANGELIS, C.**
Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252
- DEANGELIS, CLAUDIO**
Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248
- DEOLIVEIRASAMPA, MARIA HELENA**
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406
- DEROCHE, J.**
Lipodystrophies in the French military flight crew p 362 N93-32249
- DOUGHERTY, D. R.**
An on-line water quality monitor for Space Station Freedom p 364 A93-46801

E

ELLEGAARD, P.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

ERCOLINE, WILLIAM E.

C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265

ERCOLINE, WILLIAM R.

Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268

F

FARRACE, S.

Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

FARRACE, STEFANO

Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248

FINE, BERNARD J.

Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

FIORINI, PAOLO

Man-machine cooperation in advanced teleoperation p 366 N93-32106

FOUILLOT, J. P.

Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

FRENCH, J.

Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245

FRENCH, JONATHAN

The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268

G

GABRIELI, JOHN D. E.

Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

GARCIA, J. A. AZOFRA

Survey of smoking habits in the Spanish Air Force p 370 N93-32262

GAUGER, ANITA K.

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

GHOSHEH, NAJATI S.

Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472

GOFMAN, V. R.

Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691

GOMEZ-MARINO, M. A.

Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253

GOSBEE, JOHN

Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328

GRIFFIN, MICHAEL J.

Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237

GRINER, T. A.

Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098

GRISHCHENKO, A. V.

Changes in the central hemodynamics under antihypertension in humans with different blood circulation types and physical training levels p 359 A93-46967

GUEZENNEC, C. Y.

Protein requirements in hypoxia or hypokinesia p 368 N93-32244

GUPTA, PRAHLAD

Connectionist models and linguistic theory: Investigations of stress systems in language [AD-A265450] p 364 N93-32064

H

HALL, JOSEPH W.

Auditory spectro-temporal pattern analysis [AD-A264691] p 361 N93-31981

HELLE, C.

Changes in food and energy intake in military aircrew p 368 N93-32246

HESLEGRAVE, RONALD J.

Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011

HILL, SUSAN G.

Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

HIRSCH, EDWARD

The effects of an antijet lag diet p 370 N93-32263

HORVITZ, ERIC

A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152

HUFF, TIM

Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols [NASA-CR-192570] p 359 N93-32354

HUFF, TIMOTHY L.

Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V [NASA-CR-192575] p 372 N93-32356

HULL, D. H.

Blood lipids in aircrew recruits and in RAF aviators p 362 N93-32251

HUSTVEDT, B. E.

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243

HYMER, W. C.

Heterogeneity of rat pituitary prolactin cells - Relationships among location, hormone assay and estrous cycle stage p 358 A93-46606

J

JEFFERS, E. L.

An on-line water quality monitor for Space Station Freedom p 364 A93-46801

JESSEN, F.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

JOHANSEN, L. B.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

JUKES, T. H.

Relationship between G + C in silent sites of codons and amino acid composition of human proteins p 358 A93-47099

K

KAMEGAI, M.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

KAPEN, E. H.

Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472

KAUFMAN, PETER B.

Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472

KHOLODOV, YU. A.

The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966

KISTEMAKER, I. C.

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

KITSOU, A.

Lipidemic profile of Hellenic Airforce officers p 362 N93-32250

KNIGHT, SHARON L.

Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468

Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469

Minitron II system for precise control of the plant growth environment p 357 A93-46470

KOBRIK, JOHN L.

Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

KOLESNIKOV, M. P.

Flavine-dependent processes in model prebiological systems p 372 A93-47125

KORINEVSKAYA, I. V.

The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966

KORINEVSKIY, A. V.

The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966

KRISTENSEN, M. S.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

KUPRA, DEBRA

Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328

KUZMINA, G. I.

Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968

KVAMSOE, K.

Changes in food and energy intake in military aircrew p 368 N93-32246

KYRIAKOS, K.

Lipidemic profile of Hellenic Airforce officers p 362 N93-32250
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

L

LAVECCHIA, HELENE M.

Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

LEE, SUKHAN

Man-machine cooperation in advanced teleoperation p 366 N93-32106
Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108

LESKWI, M. J.

Effect of spaceflight on human protein metabolism p 360 A93-47097

LESTER, LAURIE S.

The effects of an antijet lag diet p 370 N93-32263

LIAN, L.

Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261

LIEBERMAN, HARRIS R.

Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

LITOVITZ, T. A.

Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035

LLOYD, CHARLES W.

Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328

LOEWIK, M. R. H.

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

LOVO, A.

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243

LUFT, V. M.

A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692

LUPANDIN, YU. V.

Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968

M

MAGEE, MICHAEL

A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever [NASA-CR-193301] p 365 N93-31844

- MANKAMYER, MELANIE**
Atmospheric control systems p 365 N93-31456
- MARTIN, ANTONIO MENDEZ**
Trial of emergency ration of the Spanish Air Force p 368 N93-32247
- MCDANIEL, ROBERT L.**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- MCPHERSON, A.**
Effects of a microgravity environment on the crystallization of biological macromolecules p 357 A93-45995
- MEJGAL, A. YU.**
Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968
- MICHALOPOULOU, S.**
Lipidemic profile of Hellenic Airforce officers p 362 N93-32250
- MIL'KOV, A. A.**
Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691
- MITCHELL, CARY A.**
Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468
Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469
Minitron II system for precise control of the plant growth environment p 357 A93-46470
The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471
- MOLINE, MARGARET**
The effects of an antijet lag diet p 370 N93-32263
- MOLLARD, R.**
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267
- MONK, JOHN M.**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
- MOORE, ROBERT Y.**
Organization of the human circadian system [AD-A264675] p 361 N93-32015
- MORITA, D. M.**
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406
- MORRISON, C.**
Nutritional assessment of United States tactical air command pilots p 367 N93-32242
- MUKHERJEE, P.**
Heterogeneity of rat pituitary prolactin cells - Relationships among location, hormone assay and estrous cycle stage p 358 A93-46606
- MUNSON, R.**
The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259
- N**
- NESLEIN, I. L.**
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261
- NEVILLE, KELLY J.**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- NGUYEN, CHARLES C.**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
- NORSK, P.**
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096
- O**
- OBENHUBER, D. C.**
Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems [NASA-CR-192571] p 359 N93-32365
- OLIVEIRA, F. B.**
Nutritional and lifestyle status of 50 pilots of the Portuguese Air Force p 369 N93-32255
- OLSEN, R. G.**
Specific absorption rate and radiofrequency current-to-ground in human models exposed to near-field irradiation p 360 A93-47098
- P**
- PADDAN, GURMAIL S.**
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
- PALERMOS, J.**
Lipidemic profile of Hellenic Airforce officers p 362 N93-32250
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256
- PAXTON, T. A.**
An on-line water quality monitor for Space Station Freedom p 364 A93-46801
- PEARSON, JACQUELYN Y.**
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266
- PETERKA, ROBERT J.**
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364
- POLLAK, CHARLES P.**
The effects of an antijet lag diet p 370 N93-32263
- PRICE, SCOTT A.**
Abridged procedural guide to aircrew anthropometric accommodation assessment [AD-A265220] p 366 N93-32006
- R**
- RADIEVSKIJ, A. E.**
Distribution of functions in a man-machine control system of a certain type p 364 A93-45687
- REGIAN, J. WESLEY**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
- RIBEIRO, N. L.**
Nutritional and lifestyle status of 50 pilots of the Portuguese Air Force p 369 N93-32255
- RICHARD, R.**
Lipodystrophies in the French military flight crew p 362 N93-32249
- RIOS, F.**
Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253
- RODE, T.**
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261
- RODRIGUEZ, C. ALONSO**
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
- ROEDIG, ERICH**
Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254
- ROMERO, J. J. CANTON**
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
- RUOKANGAS, CORINNE**
A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152
- RUSAK, BENJAMIN**
Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018
- RUTA, MARY**
Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328
- S**
- SAKARA, L.**
Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252
- SAKARA, LORENZO**
Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248
- SALTER, CHARLES A**
The effects of an antijet lag diet p 370 N93-32263
- SCHLUTER, M. D.**
Effect of spaceflight on human protein metabolism p 360 A93-47097
- SCOTT, ALLAN W.**
Understanding microwaves [ISBN 0-471-57567-4] p 357 A93-46300
- SEIGNEURIC, A.**
Lipodystrophies in the French military flight crew p 362 N93-32249
- SENNE-DUFF, BETH**
The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257
- SHAH, ASHWIN R.**
Probabilistic simulation of the human factor in structural reliability p 365 N93-31573
- SHEBILSKIE, WAYNE**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
- SHIMAMOTO, MIKE S.**
TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development p 367 N93-32112
- SILVEIRA, S. R.**
Nutritional and lifestyle status of 50 pilots of the Portuguese Air Force p 369 N93-32255
- SLATER, TIMOTHY**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
- SPEYER, J. J.**
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267
- SRINIVAS, SAMPATH**
A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152
- STADEAGER, C.**
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096
- STAGNARO, MICHAEL J.**
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107
- STAVROPOULOS, A.**
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256
- STEIN, T. P.**
Effect of spaceflight on human protein metabolism p 360 A93-47097
- STORM, WILLIAM F.**
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- SVENSSON, INDRRA**
Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment [FOA-A-40065-4.5] p 359 N93-32423
- T**
- TAILLANDIER, D.**
Protein requirements in hypoxia or hypokinesia p 368 N93-32244
- TASSIOS, DIMITRIOS P.**
Applied chemical engineering thermodynamics [ISBN 0-387-54759-2] p 357 A93-46075
- TEJADA, F. RIOS**
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
- TEJEDA, MA DEL ROSARIO DURAN**
Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258
- TERESHKIN, A. A.**
A method for predicting the work load of a flight engineer engaged in counteracting failures of functional systems of a transport aircraft p 364 A93-45688
- TERNOVOJ, V. A.**
Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100
- THORNTON, ROBERT**
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266

TOBOLIN, S. N.**TOBOLIN, S. N.**

A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692

TOURETZKY, DAVID S.

Connectionist models and linguistic theory: Investigations of stress systems in language [AD-A265450] p 364 N93-32064

TRUJILLO, ANNA C.

The effects of history and predictive information on the ability of the transport aircraft pilot to predict an alert p 365 A93-46810

TRYGG, K.

Changes in food and energy intake in military aircrew p 368 N93-32246

TSYBENKO, V. A.

Changes in the central hemodynamics under antiothostasis in humans with different blood circulation types and physical training levels p 359 A93-46967

TUOMALA, B.

The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259

U**URBANI, L.**

Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

URBANI, LUCA

Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248

V**VANDENBOSCH, P.**

Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260

VANERP-BAART, A, M. J.

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

VANO, JOSE IGNACIO PERALBA

Trial of emergency ration of the Spanish Air Force p 368 N93-32247

VASTESAEGER, J.-P.

Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260

VAZQUEZ, JUAN M. MORENO

Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258

VIDEBAEK, R.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

VINH, NGUYEN X.

Flight mechanics of high-performance aircraft [ISBN 0-521-34123-X] p 365 A93-47019

VOGEL, JAMES A.

An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

W**WAGNER, DANIEL R.**

The effects of an antijet lag diet p 370 N93-32263

WARBERG, J.

Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

Y**YAKOVLEV, V. M.**

Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100

YEVICH, S. D. HART

Nutritional assessment of United States tactical air command pilots p 367 N93-32242

YEVICH, S. J.

Nutritional assessment of United States tactical air command pilots p 367 N93-32242

Z**ZAKLAD, ALLEN L.**

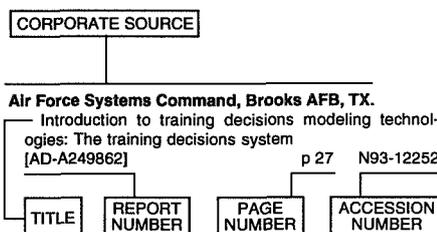
Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012

ZOGA, T.

Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

CORPORATE SOURCE INDEX

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document is used to provide a brief description of the subject matter. The page number and the accession number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document.

A

- Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).**
Nutrition, Metabolic Disorders and Lifestyle of Aircrew [AGARD-CP-533] p 367 N93-32240
- Air Force Systems Command, Brooks AFB, TX.**
A preliminary empirical evaluation of virtual reality as an instructional medium for visual-spatial tasks p 367 N93-32151
Nutrition for a typical MAC crew during Desert Storm p 368 N93-32245
The lifestyle and dietary consumption patterns of United States Air Force aviators within air training command at Randolph Air Force Base, Texas p 369 N93-32257
The influence of dietary counseling and cardiac catheterization on lipid profiles in American military aviators p 369 N93-32259
Subjective mood and fatigue of C-141 crew during Desert Storm p 370 N93-32264
C-141 aircrew sleep and fatigue during the Persian Gulf conflict p 371 N93-32265
Digital flight data as a measure of pilot performance associated with fatigue from continuous operations during the Persian Gulf conflict p 371 N93-32268
- Analytics, Inc., Willow Grove, PA.**
Application and validation of workload assessment techniques [AD-A264575] p 366 N93-32012
- Army Aeromedical Research Lab., Fort Rucker, AL.**
The effects of cockpit heat on aviator sleep parameters p 371 N93-32266
- Army Natick Research and Development Command, MA.**
The effects of an antijet lag diet p 370 N93-32263
Effects of caffeine on mental performance and mood: Implications for aircrew members p 372 N93-32269

- Army Research Inst. of Environmental Medicine, Natick, MA.**
An annotated bibliography of research involving women, conducted at the US Army Research Institute of Environmental Medicine [AD-A265497] p 360 N93-31917

B

- Battelle Columbus Labs., Research Triangle Park, NC.**
Selection of personnel for stressful occupations: The potential utility of psychophysiological measures as selection tools [AD-A264571] p 363 N93-32011
- Belgian Air Force, Brussels.**
Biological parameters and cardiovascular risk factors with the flying personnel of the Belgian Armed Forces p 370 N93-32260

C

- Carnegie-Mellon Univ., Pittsburgh, PA.**
Connectionist models and linguistic theory: Investigations of stress systems in language [AD-A265450] p 364 N93-32064
- Catholic Univ. of America, Washington, DC.**
Mechanisms of microwave induced damage in biologic materials [AD-A264415] p 358 N93-32035
- Centre d'Etudes et de Recherches de Medecine Aeronautique, Bretigny sur Orge (France).**
Protein requirements in hypoxia or hypokinesia p 368 N93-32244
- Centre National de la Recherche Scientifique, Paris (France).**
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267
- Centro de Instruccion de Medicina Aeroespacial, Madrid (Spain).**
Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253
Survey of smoking habits in the Spanish Air Force p 370 N93-32262
- Civil Aviation Authority, London (England).**
Mandatory multi-engined training syllabus [CAP-601] p 363 N93-31729

D

- Dalhousie Univ., Halifax (Nova Scotia).**
Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018

G

- German Air Force, Fuerstenfeldbruck (Germany).**
Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254
- Good Samaritan Hospital and Medical Center, Portland, OR.**
Torsional vestibulo-ocular reflex measurements for identifying otolith asymmetries possibly related to space motion sickness susceptibility [NASA-CR-193304] p 363 N93-32364

H

- Hellenic Air Force Aeromedical Center, Athens (Greece).**
Lipidemic profile of Hellenic Airforce officers p 362 N93-32250
- Hellenic Air Force General Hospital, Athens (Greece).**
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

I

- Institute of Aviation Medicine, Oslo (Norway).**
Changes in food and energy intake in military aircrew p 368 N93-32246
- Institute of Sound and Vibration Research, Southampton (England).**
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
- Instituto de Pesquisas Energeticas e Nucleares, Sao Paulo (Brazil).**
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406
- Italian Air Force Pratica di Mare, Rome.**
Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248
Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

J

- Jet Propulsion Lab., California Inst. of Tech., Pasadena.**
Kinematics and control of a fully parallel force-reflecting hand controller for manipulator teleoperation p 364 A93-45598
Man-machine cooperation in advanced teleoperation p 366 N93-32106
Interactive and cooperative sensing and control for advanced teleoperation p 366 N93-32108

M

- McDonnell-Douglas Space Systems Co., Houston, TX.**
Hyperbaric treatment p 360 N93-31454
Daily exercise routines p 360 N93-31455
- McDonnell-Douglas Space Systems Co., Huntington Beach, CA.**
Atmospheric control systems p 365 N93-31456
Rotational speed control p 365 N93-31457
Vibration isolation p 365 N93-31458

N

- National Aeronautics and Space Administration, Washington, DC.**
The Minitron system for growth of small plants under controlled environment conditions p 358 A93-46471
Dynamics of auxin movement in the gravistimulated leaf-sheath pulvinus of oat (*Avena sativa*) p 358 A93-46472
Aerospace medicine and biology: A continuing bibliography with indexes (supplement 377) [NASA-SP-7011(377)] p 361 N93-31924
- National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA.**
Effects of incandescent radiation on photosynthesis, growth rate and yield of 'Waldmann's Green' leaf lettuce p 357 A93-46468
Growth and yield characteristics of 'Waldmann's Green' leaf lettuce under different photon fluxes from metal halide or incandescent + fluorescent radiation p 357 A93-46469
Minitron II system for precise control of the plant growth environment p 357 A93-46470
- National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, TX.**
Integration of advanced teleoperation technologies for control of space robots p 366 N93-32107
A decision-theoretic approach to the display of information for time-critical decisions: The Vista project p 367 N93-32152
Health maintenance facility system effectiveness testing [NASA-TM-104737] p 372 N93-32328

NASA, Langley Research Center**National Aeronautics and Space Administration.****Langley Research Center, Hampton, VA.**

The effects of history and predictive information on the ability of the transport aircraft pilot to predict an alert
p 365 N93-46810

National Aeronautics and Space Administration, Lewis Research Center, Cleveland, OH.

Probabilistic simulation of the human factor in structural reliability
p 365 N93-31573

National Defence Research Establishment, Umea (Sweden).

Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment
[FOA-A-40065-4.5] p 359 N93-32423

Naval Air Warfare Center, Patuxent River, MD.

Abridged procedural guide to aircrew anthropometric accommodation assessment
[AD-A265220] p 366 N93-32006

Naval Command, Control and Ocean Surveillance Center, Kailua, HI.

TeleOperator/telePresence System (TOPS) Concept Verification Model (CVM) development
p 367 N93-32112

North Carolina Univ., Chapel Hill.

Auditory spectro-temporal pattern analysis
[AD-A264691] p 361 N93-31981

O**Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Delft (Netherlands).**

An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

Oslo Univ. (Norway).

Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position
p 368 N93-32243

P**Pittsburgh Univ., PA.**

Organization of the human circadian system
[AD-A264675] p 361 N93-32015

Portuguese Air Force, Alfragide.

Nutritional and lifestyle status of 50 pilots of the Portuguese Air Force p 369 N93-32255

R**Royal Air Force Central Medical Establishment, London (England).**

Blood lipids in aircrew recruits and in RAF aviators
p 362 N93-32251

Royal Norwegian Air Force, Oslo.

Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service
p 370 N93-32261

S**Service de Medecine Aeronautique, Versailles (France).**

Lipodystrophies in the French military flight crew
p 362 N93-32249

Spanish Air Force, Talavera AFB.

Trial of emergency ration of the Spanish Air Force
p 368 N93-32247

Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots
p 369 N93-32258

Sverdrup Technology, Inc., Huntsville, AL.

Microbiological test results of the environmental control and life support systems vapors compression distillation subsystem recycle tank components following various pretreatment protocols
[NASA-CR-192570] p 359 N93-32354

Microbiological and corrosion analysis of three urine pretreatment regimes with titanium 6A1-4V
[NASA-CR-192575] p 372 N93-32356

Optimization of 15 parameters influencing the long-term survival of bacteria in aquatic systems
[NASA-CR-192571] p 359 N93-32365

U**University of South Florida, Tampa.**

Nutritional assessment of United States tactical air command pilots p 367 N93-32242

W**Wyoming Univ., Laramie.**

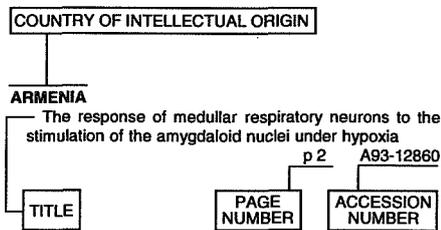
A vision system planner for increasing the autonomy of the Extravehicular Activity Helper/Retriever
[NASA-CR-193301] p 365 N93-31844

FOREIGN TECHNOLOGY INDEX

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Supplement 381)

November 1993

Typical Foreign Technology Index Listing



Listings in this index are arranged alphabetically by country of intellectual origin. The title of the document is used to provide a brief description of the subject matter. The page number and accession number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document.

B

BRAZIL
Utilization of high energy electron beam in the treatment of drinking and waste water [DE92-642335] p 372 N93-32406

C

CANADA
Neurophysiological analysis of circadian rhythm entrainment [AD-A264681] p 361 N93-32018

D

DENMARK
Arterial pulse pressure and vasopressin release in humans during lower body negative pressure p 360 A93-47096

F

FRANCE
Nutrition, Metabolic Disorders and Lifestyle of Aircrew [AGARD-CP-533] p 367 N93-32240
Protein requirements in hypoxia or hypokinesia p 368 N93-32244
Lipodystrophies in the French military flight crew p 362 N93-32249
Human factors and the safety of flights: The importance of the management of sleep p 371 N93-32267

G

GERMANY
Results and management of pathological lipoprotein concentrations and other cardiovascular risk factors in military pilots of the German Federal Armed Forces p 363 N93-32254

GREECE
Applied chemical engineering thermodynamics [ISBN 0-387-54759-2] p 357 A93-46075
Lipidemic profile of Hellenic Airforce officers p 362 N93-32250
Correlation of life-style and dietary concomitants of Greek pilots with serum analytes p 369 N93-32256

I

ITALY
Idiopathic Reactive Hypoglycemia in a population of healthy trainees of an Italian Air Force military school p 368 N93-32248
Cardiovascular risk factors in an Italian Air Force population: Preliminary report p 362 N93-32252

L

LATVIA
A procedure for estimating the variables of the working-condition space of a man-machine system for the control of a moving object p 364 A93-45685

N

NETHERLANDS
An automated processing system for food frequency and nutrition knowledge questionnaire p 367 N93-32241

NORWAY
Portable equipment developed to estimate energy expenditure by simultaneous recording of heart rate and body position p 368 N93-32243
Changes in food and energy intake in military aircrew p 368 N93-32246
Changes in some lifestyle parameters in Norwegian pilots as students, and after 6 and 12 years of service p 370 N93-32261

P

PORTUGAL
Nutritional and lifestyle status of 50 pilots of the Portugese Air Force p 369 N93-32255

R

RUSSIA
Some characteristics of the etiopathogenesis of hearing loss in aircraft personnel p 359 A93-45691
A modified method for investigating gastric secretion in aviation medical examination p 359 A93-45692
The human EEG correlates during many-sided peripheral exposure to an alternating magnetic field p 363 A93-46966
Electromyographic patterns of the thermoregulatory activity of motor units during cooling of the organism p 360 A93-46968
Changes in the phospholipid and cholesterol content of rat tissues during adaptation to high altitude at different environmental temperatures p 358 A93-47100
Flavine-dependent processes in model prebiological systems p 372 A93-47125

S

SPAIN
Trial of emergency ration of the Spanish Air Force p 368 N93-32247

Cardiovascular Risk Factors (CVRF) in Spanish pilots with coronary artery disease demonstrated by angiographic studies p 362 N93-32253
Objective improvements obtained by control of diet and physical training in Spanish Air Force fighter pilots p 369 N93-32258
Survey of smoking habits in the Spanish Air Force p 370 N93-32262

SWEDEN
Micro-organisms, cytotoxins and radioactive preparation: Risks at rescue operations in hospital environment [FOA-A-40065-4.5] p 359 N93-32423

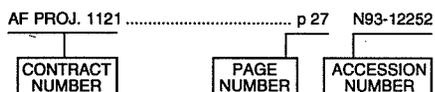
U

UKRAINE
Distribution of functions in a man-machine control system of a certain type p 364 A93-45687
A method for predicting the work load of a flight engineer engaged in counteracting failures of functional systems of a transport aircraft p 364 A93-45688
Changes in the central hemodynamics under antiorthostasis in humans with different blood circulation types and physical training levels p 359 A93-46967

UNITED KINGDOM
Mandatory multi-engined training syllabus [CAP-601] p 363 N93-31729
Transmission of vibration through the human body to the head: A summary of experimental data [ISVR-TR-218] p 361 N93-32237
Blood lipids in aircrew recruits and in RAF aviators p 362 N93-32251

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing

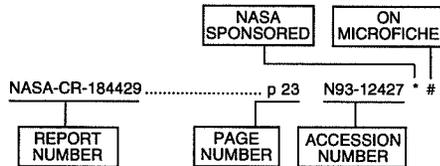


Listings in this index are arranged alphanumerically by contract number. Under each contract number the accession numbers denoting documents that have been produced as a result of research done under the contract are shown. The accession number denotes the number by which the citation is identified in the abstract section. Preceding the accession number is the page number on which the citation may be found.

AF-AFOSR-0104-90	p 361	N93-32018
AF-AFOSR-0108-90	p 361	N93-31981
AF-AFOSR-0175-91	p 361	N93-32015
DA PROJ. 2Q1-62785-A-790	p 366	N93-32012
DA PROJ. 2Q2-63007-A-792	p 363	N93-32011
DAAL03-86-D-0001	p 363	N93-32011
DAMD17-86-C-6260	p 358	N93-32035
MDA903-86-C-0384	p 366	N93-32012
NAGW-1600	p 358	A93-46472
NAG9-117	p 363	N93-32364
NAG9-634	p 365	N93-31844
NAS7-1069	p 364	A93-45598
NAS8-37814	p 359	N93-32354
	p 372	N93-32356
	p 359	N93-32365
NCC2-100	p 357	A93-46468
	p 357	A93-46469
	p 357	A93-46470
NIH-CA-23248	p 358	A93-46606
NSG-7278	p 358	A93-46471
N00014-86-K-0678	p 364	N93-32064
PHS-R01-HG-00312-03	p 358	A93-47099

REPORT NUMBER INDEX

Typical Report Number Index Listing



NASA-CR-193304	p 363	N93-32364 * #
NASA-SP-7011(377)	p 361	N93-31924 *
NASA-TM-104737	p 372	N93-32328 * #
NAWCADPAX-TM-992-90-SY	p 366	N93-32006 #
S-638	p 372	N93-32328 * #

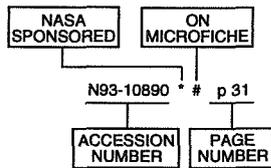
Listings in this index are arranged alphanumerically by report number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

AD-A264415	p 356	N93-32035
AD-A264571	p 363	N93-32011 #
AD-A264575	p 366	N93-32012 #
AD-A264675	p 361	N93-32015 #
AD-A264681	p 361	N93-32018 #
AD-A264691	p 361	N93-31981 #
AD-A265220	p 366	N93-32006 #
AD-A265450	p 364	N93-32064 #
AD-A265497	p 360	N93-31917 #
AFOSR-93-0252TR	p 361	N93-31981 #
AFOSR-93-0335TR	p 361	N93-32018 #
AFOSR-93-0336TR	p 361	N93-32015 #
AGARD-CP-533	p 367	N93-32240 #
ARI-TR-974	p 366	N93-32012 #
ARI-TR-975	p 363	N93-32011 #
CAP-601	p 363	N93-31729
CMU-CS-93-146	p 364	N93-32064 #
CONF-9105279	p 372	N93-32406 #
DE92-642335	p 372	N93-32406 #
ETN-93-93931	p 363	N93-31729
ETN-93-94028	p 359	N93-32423 #
FOA-A-40065-4.5	p 359	N93-32423 #
IPEN-PUB-341	p 372	N93-32406 #
ISBN 0-387-54759-2	p 357	A93-46075
ISBN 0-471-57567-4	p 357	A93-46300
ISBN 0-521-34123-X	p 365	A93-47019
ISBN-0-86-039518-9	p 363	N93-31729
ISBN-92-835-0703-7	p 367	N93-32240 #
ISVR-TR-218	p 361	N93-32237
NAS 1.15:104737	p 372	N93-32328 * #
NAS 1.21:7011(377)	p 361	N93-31924 *
NAS 1.26:192570	p 359	N93-32354 * #
NAS 1.26:192571	p 359	N93-32365 * #
NAS 1.26:192575	p 372	N93-32356 * #
NAS 1.26:193301	p 365	N93-31844 * #
NAS 1.26:193304	p 363	N93-32364 * #
NASA-CR-192570	p 359	N93-32354 * #
NASA-CR-192571	p 359	N93-32365 * #
NASA-CR-192575	p 372	N93-32356 * #
NASA-CR-193301	p 365	N93-31844 * #

REPORT

ACCESSION NUMBER INDEX

Typical Accession Number Index Listing



Listings in this index are arranged alphanumerically by accession number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A93-45598 *	p 364	N93-32242 #	p 367
A93-45685	p 364	N93-32243 #	p 368
A93-45687	p 364	N93-32244 #	p 368
A93-45688	p 364	N93-32245 #	p 368
A93-45691	p 359	N93-32246 #	p 368
A93-45692	p 359	N93-32247 #	p 368
A93-45995	p 357	N93-32248 #	p 368
A93-46075	p 357	N93-32249 #	p 362
A93-46300	p 357	N93-32250 #	p 362
A93-46468 *	p 357	N93-32251 #	p 362
A93-46469 *	p 357	N93-32252 #	p 362
A93-46470 *	p 357	N93-32253 #	p 362
A93-46471 *	p 358	N93-32254 #	p 363
A93-46472 *	p 358	N93-32255 #	p 369
A93-46606	p 358	N93-32256 #	p 369
A93-46801	p 364	N93-32257 #	p 369
A93-46810 *	p 365	N93-32258 #	p 369
A93-46966	p 363	N93-32259 #	p 369
A93-46967	p 359	N93-32260 #	p 370
A93-46968	p 360	N93-32261 #	p 370
A93-47019	p 365	N93-32262 #	p 370
A93-47096	p 360	N93-32263 #	p 370
A93-47097	p 360	N93-32264 #	p 370
A93-47098	p 360	N93-32265 #	p 371
A93-47099	p 358	N93-32266 #	p 371
A93-47100	p 358	N93-32267 #	p 371
A93-47125	p 372	N93-32268 #	p 371
		N93-32269 #	p 372
N93-31454 * #	p 360	N93-32328 * #	p 372
N93-31455 * #	p 360	N93-32354 * #	p 359
N93-31456 * #	p 365	N93-32356 * #	p 372
N93-31457 * #	p 365	N93-32364 * #	p 363
N93-31458 * #	p 365	N93-32365 * #	p 359
N93-31573 * #	p 365	N93-32406 #	p 372
N93-31729	p 363	N93-32423 #	p 359
N93-31844 * #	p 365		
N93-31917 #	p 360		
N93-31924 *	p 361		
N93-31981 #	p 361		
N93-32006 #	p 366		
N93-32011 #	p 363		
N93-32012 #	p 366		
N93-32015 #	p 361		
N93-32018 #	p 361		
N93-32035	p 358		
N93-32064 #	p 364		
N93-32106 * #	p 366		
N93-32107 * #	p 366		
N93-32108 * #	p 366		
N93-32112 * #	p 367		
N93-32151 * #	p 367		
N93-32152 * #	p 367		
N93-32237	p 361		
N93-32240 #	p 367		
N93-32241 #	p 367		

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A93-10000 Series)

Publications announced in *IAA* are available from the AIAA Technical Information Service as follows: Paper copies of accessions are available at \$10.00 per document (up to 50 pages), additional pages \$0.25 each. Standing order microfiche are available at the rate of \$1.45 per microfiche for *IAA* source documents and \$1.75 per microfiche for AIAA meeting papers.

Minimum air-mail postage to foreign countries is \$2.50. All foreign orders are shipped on payment of pro-forma invoices.

All inquiries and requests should be addressed to: Technical Information Service, American Institute of Aeronautics and Astronautics, 555 West 57th Street, New York, NY 10019. Please refer to the accession number when requesting publications.

STAR ENTRIES (N93-10000 Series)

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below, and their addresses are listed on page APP-3. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: CASI. Sold by the NASA Center for AeroSpace Information. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page APP-5.

NOTE ON ORDERING DOCUMENTS: When ordering publications from CASI, use the N accession number or other report number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: ESDU. Pricing information on specific data, computer programs, and details on Engineering Sciences Data Unit (ESDU) topic categories can be obtained from ESDU International Ltd. Requesters in North America should use the Virginia address while all other requesters should use the London address, both of which are on page APP-3.

Avail: Fachinformationszentrum, Karlsruhe. Gesellschaft für wissenschaftlich-technische Information mbH 7514 Eggenstein-Leopoldshafen 2, Germany.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, CA. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

- Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration (JBD-4), Public Documents Room (Room 1H23), Washington, DC 20546-0001, or public document rooms located at NASA installations, and the NASA Pasadena Office at the Jet Propulsion Laboratory.
- Avail: NTIS. Sold by the National Technical Information Service. Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) are available. For information concerning this service, consult the NTIS Subscription Section, Springfield, VA 22161.
- Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.
- Avail: US Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of \$1.50 each, postage free.
- Avail: (US Sales Only). These foreign documents are available to users within the United States from the National Technical Information Service (NTIS). They are available to users outside the United States through the International Nuclear Information Service (INIS) representative in their country, or by applying directly to the issuing organization.
- Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed on page APP-3. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

FEDERAL DEPOSITORY LIBRARY PROGRAM

In order to provide the general public with greater access to U.S. Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 53 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. At least one copy of nearly every NASA and NASA-sponsored publication, either in printed or microfiche format, is received and retained by the 53 regional depositories. A list of the regional GPO libraries, arranged alphabetically by state, appears on the inside back cover of this issue. These libraries are *not* sales outlets. A local library can contact a regional depository to help locate specific reports, or direct contact may be made by an individual.

PUBLIC COLLECTION OF NASA DOCUMENTS

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England for public access. The British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols # and * from ESA — Information Retrieval Service European Space Agency, 8-10 rue Mario-Nikis, 75738 CEDEX 15, France.

STANDING ORDER SUBSCRIPTIONS

NASA SP-7011 supplements and annual index are available from the NASA Center for Aerospace Information (CASI) on standing order subscription. Standing order subscriptions do not terminate at the end of a year, as do regular subscriptions, but continue indefinitely unless specifically terminated by the subscriber.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, NY 10019

British Library Lending Division
Boston Spa, Wetherby, Yorkshire
England

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, DC 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, TN 37830

European Space Agency-
Information Retrieval Service ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Engineering Sciences Data Unit International
P.O. Box 1633
Manassas, VA 22110

Engineering Sciences Data Unit
International, Ltd.
251-259 Regent Street
London, W1R 7AD, England

Fachinformationszentrum Karlsruhe
Gesellschaft für wissenschaftlich-technische
Information mbH
7514 Eggenstein-Leopoldshafen 2, Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Center for AeroSpace Information
800 Elkridge Landing Road
Linthicum Heights, MD 21090-2934

National Aeronautics and Space Administration
Scientific and Technical Information Program
(JTT)
Washington, DC 20546-0001

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, CA 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, MI 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey Library National Center
MS 950
12201 Sunrise Valley Drive
Reston, VA 22092

U.S. Geological Survey Library
2255 North Gemini Drive
Flagstaff, AZ 86001

U.S. Geological Survey
345 Middlefield Road
Menlo Park, CA 94025

U.S. Geological Survey Library
Box 25046
Denver Federal Center, MS914
Denver, CO 80225

CASI PRICE TABLES

(Effective August 1, 1993)

STANDARD PRICE DOCUMENTS

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	\$ 9.00	\$ 18.00
A02	12.50	25.00
A03	17.50	35.00
A04-A05	19.50	39.00
A06-A09	27.00	54.00
A10-A13	36.50	73.00
A14-A17	44.50	89.00
A18-A21	52.00	104.00
A22-A25	61.00	122.00
A99	Call For Price	Call For Price

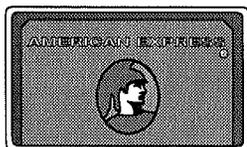
MICROFICHE

PRICE CODE	NORTH AMERICAN PRICE	FOREIGN PRICE
A01	\$ 9.00	\$ 18.00
A02	12.50	25.00
A03	17.50	35.00
A04	19.50	39.00
A06	27.00	54.00
A10	36.50	73.00

IMPORTANT NOTICE

CASI Shipping and Handling Charges
U.S.—ADD \$3.00 per TOTAL ORDER
Canada and Mexico—ADD \$3.50 per TOTAL ORDER
All Other Countries—ADD \$7.50 per TOTAL ORDER
Does NOT apply to orders
requesting CASI RUSH HANDLING.

CASI accepts charges to American Express, Diners Club, MasterCard and VISA.



REPORT DOCUMENT PAGE

1. Report No. NASA SP-7011 (381)	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aerospace Medicine and Biology A Continuing Bibliography (Supplement 381)		5. Report Date November 1993	
		6. Performing Organization Code JTT	
7. Author(s)		8. Performing Organization Report No.	
		10. Work Unit No.	
9. Performing Organization Name and Address NASA Scientific and Technical Information Program		11. Contract or Grant No.	
		13. Type of Report and Period Covered Special Publication	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Washington, DC 20546-0001		14. Sponsoring Agency Code	
		15. Supplementary Notes	
16. Abstract This report lists 89 reports, articles and other documents recently announced in the NASA STI Database.			
17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects		18. Distribution Statement Unclassified - Unlimited Subject Category - 52	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 52	22. Price A04/HC

FEDERAL REGIONAL DEPOSITORY LIBRARIES

ALABAMA

AUBURN UNIV. AT MONTGOMERY LIBRARY

Documents Dept.
7300 University Dr.
Montgomery, AL 36117-3596
(205) 244-3650 Fax: (205) 244-0678

UNIV. OF ALABAMA

Amelia Gayle Gorgas Library
Govt. Documents
Box 870266
Tuscaloosa, AL 35487-0266
(205) 348-6046 Fax: (205) 348-8833

ARIZONA

DEPT. OF LIBRARY, ARCHIVES, AND PUBLIC RECORDS

Federal Documents
Third Floor State Capitol
1700 West Washington
Phoenix, AZ 85007
(602) 542-4121 Fax: (602) 542-4400,
542-4500

ARKANSAS

ARKANSAS STATE LIBRARY

State Library Services
One Capitol Mall
Little Rock, AR 72201
(501) 682-2869

CALIFORNIA

CALIFORNIA STATE LIBRARY

Govt. Publications Section
914 Capitol Mall - P.O. Box 942837
Sacramento, CA 94237-0001
(916) 322-4572 Fax: (916) 324-8120

COLORADO

UNIV. OF COLORADO - BOULDER

Norlin Library
Govt. Publications
Campus Box 184
Boulder, CO 83309-0184
(303) 492-8834 Fax: (303) 492-2185

DENVER PUBLIC LIBRARY

Govt. Publications Dept. BS/GPD
1357 Broadway
Denver, CO 80203
(303) 571-2135

CONNECTICUT

CONNECTICUT STATE LIBRARY

231 Capitol Avenue
Hartford, CT 06106
(203) 566-4971 Fax: (203) 566-3322

FLORIDA

UNIV. OF FLORIDA LIBRARIES

Documents Dept.
Library West
Gainesville, FL 32611-2048
(904) 392-0366 Fax: (904) 392-7251

GEORGIA

UNIV. OF GEORGIA LIBRARIES

Govt. Documents Dept.
Jackson Street
Athens, GA 30602
(404) 542-8949 Fax: (404) 542-6522

HAWAII

UNIV. OF HAWAII

Hamilton Library
Govt. Documents Collection
2550 The Mall
Honolulu, HI 96822
(808) 948-8230 Fax: (808) 956-5968

IDAHO

UNIV. OF IDAHO LIBRARY

Documents Section
Moscow, ID 83843
(208) 885-6344 Fax: (208) 885-6817

ILLINOIS

ILLINOIS STATE LIBRARY

Reference Dept.
300 South Second
Springfield, IL 62701-1796
(217) 782-7596 Fax: (217) 524-0041

INDIANA

INDIANA STATE LIBRARY

Serials/Documents Section
140 North Senate Avenue
Indianapolis, IN 46204
(317) 232-3678 Fax: (317) 232-3728

IOWA

UNIV. OF IOWA LIBRARIES

Govt. Publications Dept.
Washington & Madison Streets
Iowa City, IA 52242
(319) 335-5926 Fax: (319) 335-5830

KANSAS

UNIV. OF KANSAS

Govt. Documents & Map Library
6001 Malatt Hall
Lawrence, KS 66045-2800
(913) 864-4660 Fax: (913) 864-5380

KENTUCKY

UNIV. OF KENTUCKY LIBRARIES

Govt. Publications/Maps Dept.
Lexington, KY 40506-0039
(606) 257-3139 Fax: (606) 257-1563,
257-8379

LOUISIANA

LOUISIANA STATE UNIV.

Middleton Library
Govt. Documents Dept.
Baton Rouge, LA 70803
(504) 388-2570 Fax: (504) 388-6992

LOUISIANA TECHNICAL UNIV.

Prescott Memorial Library
Govt. Documents Dept.
305 Wisteria Street
Ruston, LA 71270-9985
(318) 257-4962 Fax: (318) 257-2447

MAINE

TRI-STATE DOCUMENTS DEPOS.

Raymond H. Fogler Library
Govt. Documents & Microforms Dept.
Univ. of Maine
Orono, ME 04469
(207) 581-1680

MARYLAND

UNIV. OF MARYLAND

Hornbake Library
Govt. Documents/Maps Unit
College Park, MD 20742
(301) 454-3034 Fax: (301) 454-4985

MASSACHUSETTS

BOSTON PUBLIC LIBRARY

Govt. Documents Dept.
666 Boylston Street
Boston, MA 02117
(617) 536-5400 ext. 226
Fax: (617) 267-8273, 267-8248

MICHIGAN

DETROIT PUBLIC LIBRARY

5201 Woodward Avenue
Detroit, MI 48202-4093
(313) 833-1440, 833-1409
Fax: (313) 833-5039

LIBRARY OF MICHIGAN

Govt. Documents Unit
P.O. Box 30007
Lansing, MI 48909
(517) 373-0640 Fax: (517) 373-3381

MINNESOTA

UNIV. OF MINNESOTA

Wilson Library
Govt. Publications Library
309 19th Avenue South
Minneapolis, MN 55455
(612) 624-5073 Fax: (612) 626-9353

MISSISSIPPI

UNIV. OF MISSISSIPPI

J.D. Williams Library
Federal Documents Dept.
106 Old Gym Bldg.
University, MS 38677
(601) 232-5857 Fax: (601) 232-5453

MISSOURI

UNIV. OF MISSOURI - COLUMBIA

Ellis Library
Govt. Documents
Columbia, MO 65201
(314) 882-6733 Fax: (314) 882-8044

MONTANA

UNIV. OF MONTANA

Maureen & Mike Mansfield Library
Documents Div.
Missoula, MT 59812-1195
(406) 243-6700 Fax: (406) 243-2060

NEBRASKA

UNIV. OF NEBRASKA - LINCOLN

D.L. Love Memorial Library
Documents Dept.
Lincoln, NE 68588
(402) 472-2562

NEVADA

UNIV. OF NEVADA

Reno Library
Govt. Publications Dept.
Reno, NV 89557
(702) 784-6579 Fax: (702) 784-1751

NEW JERSEY

NEWARK PUBLIC LIBRARY

U.S. Documents Div.
5 Washington Street -
P.O. Box 630
Newark, NJ 07101-0630
(201) 733-7812 Fax: (201) 733-5648

NEW MEXICO

UNIV. OF NEW MEXICO

General Library
Govt. Publications Dept.
Albuquerque, NM 87131-1466
(505) 277-5441 Fax: (505) 277-6019

NEW MEXICO STATE LIBRARY

325 Don Gaspar Avenue
Santa Fe, NM 87503
(505) 827-3826 Fax: (505) 827-3820

NEW YORK

NEW YORK STATE LIBRARY

Documents/Gift & Exchange Section
Federal Depository Program
Cultural Education Center
Albany, NY 12230
(518) 474-5563 Fax: (518) 474-5786

NORTH CAROLINA

UNIV. OF NORTH CAROLINA -

CHAPEL HILL
CB#3912, Davis Library
BA/SS Dept. - Documents
Chapel Hill, NC 27599
(919) 962-1151 Fax: (919) 962-0484

NORTH DAKOTA

NORTH DAKOTA STATE UNIV. LIB.

Documents Office
 Fargo, ND 58105
(701) 237-8886 Fax: (701) 237-7138
In cooperation with Univ. of North
Dakota, Chester Fritz Library
Grand Forks

OHIO

STATE LIBRARY OF OHIO

Documents Dept.
65 South Front Street
Columbus, OH 43266
(614) 644-7051 Fax: (614) 752-9178

OKLAHOMA

OKLAHOMA DEPT. OF LIBRARIES

U.S. Govt. Information Div.
200 NE 18th Street
Oklahoma City, OK 73105-3298
(405) 521-2502, ext. 252, 253
Fax: (405) 525-7804

OKLAHOMA STATE UNIV.

Edmon Low Library
Documents Dept.
Stillwater, OK 74078
(405) 744-6546 Fax: (405) 744-5183

OREGON

PORTLAND STATE UNIV.

Millar Library
934 SW Harrison - P.O. Box 1151
Portland, OR 97207
(503) 725-3673 Fax: (503) 725-4527

PENNSYLVANIA

STATE LIBRARY OF PENN.

Govt. Publications Section
Walnut St. & Commonwealth Ave. -
P.O. Box 1601
Harrisburg, PA 17105
(717) 787-3752

SOUTH CAROLINA

CLEMSON UNIV.

Cooper Library
Public Documents Unit
Clemson, SC 29634-3001
(803) 656-5174 Fax: (803) 656-3025
In cooperation with Univ. of South
Carolina, Thomas Cooper Library,
Columbia

TENNESSEE

MEMPHIS STATE UNIV. LIBRARIES

Govt. Documents
Memphis, TN 38152
(901) 678-2586 Fax: (901) 678-2511

TEXAS

TEXAS STATE LIBRARY

United States Documents
P.O. Box 12927 - 1201 Brazos
Austin, TX 78711
(512) 463-5455 Fax: (512) 463-5436

TEXAS TECH. UNIV. LIBRARY

Documents Dept.
Lubbock, TX 79409
(806) 742-2268 Fax: (806) 742-1920

UTAH

UTAH STATE UNIV.

Merrill Library & Learning Resources
Center, UMC-3000
Documents Dept.
Logan, UT 84322-3000
(801) 750-2684 Fax: (801) 750-2677

VIRGINIA

UNIV. OF VIRGINIA

Alderman Library
Govt. Documents
Charlottesville, VA 22903-2498
(804) 824-3133 Fax: (804) 924-4337

WASHINGTON

WASHINGTON STATE LIBRARY

Document Section
MS A-J-11
Olympia, WA 98504-0111
(206) 753-4027 Fax: (206) 753-3546

WEST VIRGINIA

WEST VIRGINIA UNIV. LIBRARY

Govt. Documents Section
P.O. Box 6069
Morgantown, WV 26506
(304) 293-3640

WISCONSIN

ST. HIST. SOC. OF WISCONSIN LIBRARY

Govt. Publications Section
816 State Street
Madison, WI 53706
(608) 262-2781 Fax: (608) 262-4711
In cooperation with Univ. of Wisconsin -
Madison, Memorial Library

MILWAUKEE PUBLIC LIBRARY

Documents Div.
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 278-2167 Fax: (414) 278-2137

POSTMASTER
Address Correction Requested
(Sections 137 and 159 Post Manual)

**National Aeronautics and
Space Administration
Code JTT
Washington, DC 20546-0001**

Official Business
Penalty for Private Use, \$300

BULK RATE
POSTAGE & FEES PAID
NASA
Permit No. G-27