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**NASA SP-7011(227)**

# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY  
WITH INDEXES**

**(Supplement 227)**

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1981 in

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



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1982

**National Aeronautics and Space Administration**

Washington, DC

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 166 reports, articles and other documents announced during December 1981 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

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

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1981 Supplements.

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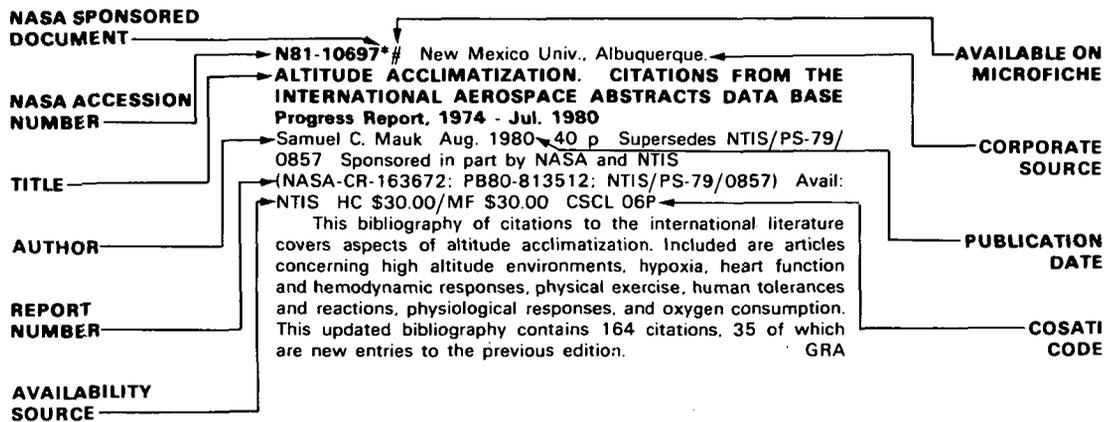
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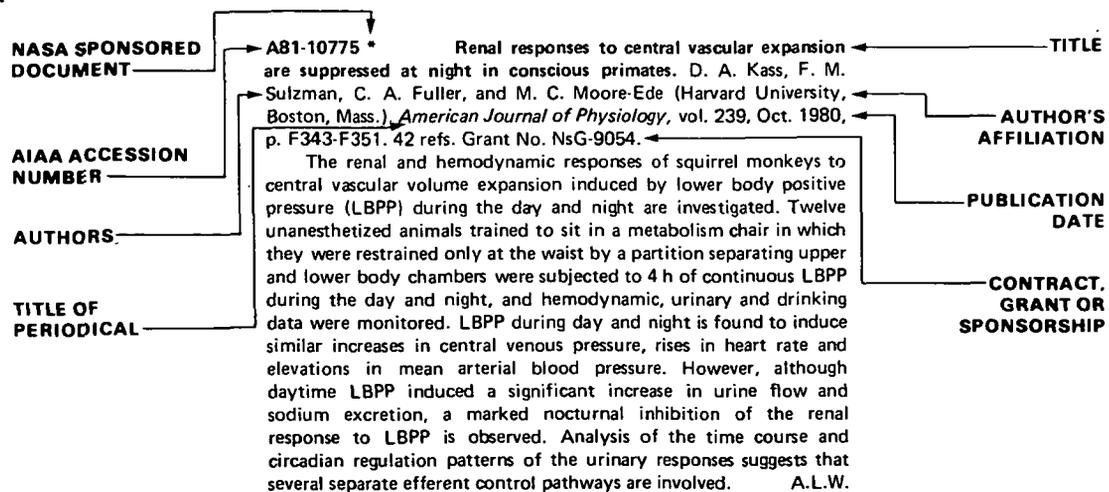
# TABLE OF CONTENTS

	Page
IAA ENTRIES (A81-10000) .....	217
STAR ENTRIES (N81-10000) .....	227
Subject Index .....	I-1
Personal Author Index .....	I-21

## TYPICAL CITATION AND ABSTRACT FROM STAR



## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 227)*

JANUARY 1982

## IAA ENTRIES

**A81-47150 #** Oxygen provision to humans under conditions of high-altitude flight (Obespechenie cheloveka kislorodom v usloviakh vysotnogo poleta). L. G. Golovkin, V. A. Glazkova, I. V. Maksimov, and I. N. Cherniakov. *Voenno-Meditsinskii Zhurnal*, July 1981, p. 50, 51. In Russian.

Human functional responses during the use of the KP-56 oxygen supply system with an open-type face mask, allowing the mixture of supplied oxygen with cabin air, are investigated under simulated high-altitude conditions. Electrocardiograms, respiratory frequency, alveolar gas composition and blood oxygen levels were determined and psychophysiological responses were evaluated in 10 healthy subjects wearing the KM-15M mask at a simulated altitude of 8 km for up to 4 hours and at 10-12 km for up to 1 hour. Results demonstrate a normal oxygen supply after 4 hours at 8 km with the subjects performing physical and mental work, thus justifying the use of the KP-56 system with the KM-15M mask as a life-support system during extended flight in an uncompressed cabin. Signs of oxygen deprivation and cases of decompression sickness are observed at the higher altitudes, however, indicating that exposure in a depressurized cabin must be limited to less than 5-10 min. A.L.W.

**A81-47194 #** A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system (Sravnitel'nyi analiz biologicheskikh effektov elektromagnitnykh izlucheni. I - Nervnaia sistema). V. V. Antipov, B. I. Davydov, and V. S. Tikhonchuk. *Kosmicheskie Issledovaniia*, vol. 19, July-Aug. 1981, p. 649-653. 27 refs. In Russian.

Data in the literature up to 1979 concerning the effects of nonionizing electromagnetic radiation on the nervous system is reviewed. Results obtained in clinical studies of workers exposed to electromagnetic radiation, particularly microwaves, in the industrial environment are considered which indicate a variety of complaints and symptoms appearing upon radiation exposure, including headaches, exhaustion, sleep disturbances, irritability and loss of memory, as well as vegetative impairments and changes in the electrical activity of the cerebral cortex. Disadvantages of the use of industrial experiments, in which radiation doses cannot be determined exactly and complicating factors may be presented, are pointed out. Results of laboratory experiments performed on humans and experimental animals are then outlined which demonstrate the high sensitivity and variability of response of the central nervous system to electromagnetic radiation, the polymorphism of changes, and the presence of a gradual decrease in reactions with decreasing dosage, and which exhibit caution in evaluating the pathological significance of the observed changes. Areas for further research on the effects of radiation flux density, exposure time and frequency and on the influence of other factors encountered in the space flight environment on nervous system reactions are indicated. A.L.W.

**A81-47383** Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/. I. I. Gitelson, I. A. Terskov, B. G. Kovrov, G. M. Lisovskii, F. Ia. Sidko, Iu. N. Okladnikov, I. N. Trubachev, I. M. Pankova, I. V. Gribovskaia, and G. V. Denisov (Akademiia Nauk SSSR, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-164*. 6 p.

Results of a four-month long experiment (carried out in the

USSR and called BIOS-3) are presented for a closed-control ecosystem composed of humans and higher plants, with atmospheric moisture and a large part of the food being regenerated. A description of the system is presented, noting dimensions (a volume of 230 cu m, and an area of 90 sq m x 39.4 sq m) and details on the two phytotrons. Light energy is supplied by xenon lamps which imitate sunlight. Wheat is grown in the conveyor culture on a non-substrate medium, and chuffa is grown on ceramsit by the hydroponic method. Conclusions are presented, including the necessity of solar energy utilization for the realization of photosynthesis in the life-support systems of space. K.S.

**A81-47384** Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies. E. L. Kordium, E. M. Nedukha, A. F. Popova, P. G. Sidorenko, V. M. Fomicheva, and K. M. Sytnik (Ukrainian Academy of Sciences, Institute of Botany, Kiev, Ukrainian SSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-165*. 8 p. 7 refs.

The effects of physical and dynamic space flight factors (weightlessness, magnetic fields, vibration, and acceleration) on the growth, reproduction, and structure of plant cells (algae, mosses, angiosperms, and higher plant cell cultures) are investigated by means of electron microscopy, cytophotometry, and autoradiography. Some of the results include the fact that changes in cell ultrastructure caused by vibration and acceleration were temporary and organelles of meristematic cells proved to be more sensitive to vibration than those of differentiated cells. It is concluded that many cellular and subcellular responses to space flight conditions are primarily due to weightlessness, and that many space flight biological effects are connected to the degree of complexity of the organization of the cell, and to the duration of the effects. K.S.

**A81-47385** Advanced life support - Orbital work base. M. A. Shuey (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-166*. 18 p. 6 refs.

A status report is presented on advanced life support technology applicable to a space station or 'orbital work base', with attention not merely to the formulation of requirements but also the identification of system elements that can be implemented with existing technology. The range of considerations presented comprises: (1) environmental control; (2) atmosphere revitalization; (3) water management; (4) waste management; (5) food service; (6) thermal control; (7) health and hygiene; (8) habitability, operations and safety; and (9) extravehicular activities. Special attention is given carbon dioxide management by means of solid amine and electrochemical processes, oxygen supply and water conservation. A series of recommendations on the most promising technologies for further research is given in conclusion. O.C.

**A81-47386** Life support system development in West Germany. A. I. Skoog (Dornier System GmbH, Friedrichshafen, West Germany). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-167*. 21 p.

A status report is given for spaceborne life support systems developed in Germany since the beginning of Spacelab Environmental Control and Life Support system (ECLS) studies in 1972, along with a series of terrestrial and marine CO<sub>2</sub>-absorber system offshoots. In addition to the ECLS, whose Atmosphere Revitaliza-

## A81-47387

tion Section (ARS) and Atmosphere Storage and Control Section (ASCS) are described in detail, such Spacelab follow-on developments as the 'Biorack' life science experiments life support system and closed biological life support systems are considered. The closed ecological systems are intended for large, long mission duration space station designs that are currently at a conceptual development stage. Schematics and detailed mechanical drawings are given for major ECLS and Biorack system elements. O.C.

**A81-47387** Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems. G. M. Lisovskii, I. A. Terskov, I. I. Gitelson, F. Ia. Sidko, B. G. Kovrov, M. P. Shilenko, V. I. Polonskii, and S. A. Ushakova (Akademiia Nauk SSSR, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-169.* 5 p.

Experimental consideration is given to the use of such food crops as wheat, barley, carrots and beets as elements of a closed environmental system in which the 'day-night' period and illumination intensity (600-650 W/sq m) of the moon are assumed. Emphasis is put on the compatibility of the various kinds of plants with each other, with the technical facilities assumed and with man, as producers of edible biomass. Comparisons are made between biomass yields under continuous illumination and those obtained under intermittent, lunar conditions. O.C.

**A81-47388** Simple technique to evaluate on the ground the energetic expenditure of physical exercise carried out in weightlessness. A. Scano (Istituto Superiore di Educazione Fisica; Roma, Università, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-170.* 6 p.

A simple method is described to evaluate the energetic expenditure of graded muscular exercises carried out on the ground in such a way as to approximate the state of space microgravity. The consumption of O<sub>2</sub> measured at different rates of execution is shown as well as a tentative computation of the mechanical work on the basis of the accelerations impressed alternately on the mass of the trunk and upper limbs. The practicability of the method proposed under space conditions is pointed out; it does not require any ergometer, in fact, but only the fixing of the subject's feet to the floor of the vehicle. (Author)

**A81-47389\*** Development of an Animal Holding Facility for Space Shuttle studies. W. E. Berry, G. H. Bowman (NASA, Ames Research Center, Life Sciences Flight Experiments Projects Office, Moffett Field, CA), R. B. Jagow, and T. M. Olcott (Lockheed Missiles and Space Co., Inc., Sunnyvale, CA). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-171.* 15 p.

The modular Research Animal Holding Facility (RAHF) developed by NASA is described. Besides providing general housing for various animal species, the RAHF is designed to minimize disturbance of the specimens caused by vehicle and mission operations. The RAHF system offers life-sustaining capabilities, such as food, water, and waste removal, as well as environmental control. Modularity of construction to accommodate a variety of small animals and associated instrumentation ensures continued use of RAHF as the sophistication of experiments increases on subsequent missions. C.R.

**A81-47390** Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach. P. Ascenzi, G. Amiconi (Roma, Università, Rome, Italy), and A. Scano (Istituto Superiore di Educazione Fisica, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-175.* 6 p.

A kinetic analysis is made of changes in some physiological parameters due to changes in gravitational environment, to investigate adaptation to weightlessness in Skylab flights. A single mathematical model is devised, and it is assumed that the body may undergo any kinetic process only if the process is continuously differentiable. The process is determined by several external conditions which are identified with the gravity, and experimental data are presented and compared to determine the effects of different periods

of exposure to weightlessness. The data are linearized by semilogarithmic plots, and indicate that the adaptation of the body mass to weightlessness takes place in two phases characterized by half-time values of 5 and 15 days, and the adaptation phenomena related to restoration of the body mass after recovery on the earth are characterized by two phases with half-time values of 2 and 10 days. D.L.G.

**A81-47391** Relative efficacy of the proposed Space Shuttle antimotion sickness medications. J. R. Hordinsky, J. Beier, E. Schwartz, and J. Martin (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Cologne, West Germany). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-177.* 31 p. 13 refs.

The relative efficacies and side effects of treatments to be used to prevent and ameliorate space motion sickness on Space Shuttle flights are investigated. Nine subjects who had displayed sensitivity to motion sickness in preliminary tests were given transdermal injections of scopolamine, intramuscular injections of promethazine and oral doses of scopolamine-dextroamphetamine and promethazine-ephedrine combinations in a double-blind experiment employing standardized head movements during acceleration at a rate of 0.2 deg/sec per sec to a maximum rotation of 240 deg/sec, with an intermediate plateau of 10 min at 180 deg/sec. Visual tests, objective psychological tests and tilt table orthostatic response tests were also performed to assess other system influences of the drugs. The promethazine-ephedrine combination is found to produce the most drastic side effects and mood changes, producing sleepiness, dizziness and subjective vision difficulty. No significant decrements in the psychological performance were obtained with transdermal scopolamine or scopolamine-dextroamphetamine, although transient hyperactivity changing to fatigue and light depression was observed with the latter. The intramuscular injection was found to lead to marked absolute performance decrements, extreme fatigue, and resignation. It is noted that the transdermal scopolamine provided an adequate anti-motion-sickness effectiveness associated with the least significant side effects, although no more than one day's use may as yet be recommended for prophylaxis. A.L.W.

**A81-47392** Antiorthostatic hypokinesia as a means of simulating weightlessness. Y. G. Zorbas and S. Shoja. *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-178.* 6 p. 15 refs.

In simulating acute weightlessness, the physiological effects of seven days of clinostatic hypokinesia (CSHK) and antiorthostatic hypokinesia (AOHK) were investigated on 12 physically healthy men from 18 to 23 years of age. They were divided into four groups with three men in each: the first group of men subjected to CSHK (zero deg); the second, third and fourth groups were submitted to AOHK tilting at -4, -8 and -12 deg, respectively. An ordinary diet and unrestricted amount of fluid was provided. Postural equilibrium state of men, their reactions to orthostatic tests, ergometric tests, with measured physical training (PT) of 600 kg-m/min, heart rate, arterial pressure, oxygen uptake (OU) and the amount of oxygen utilized by the body with maximum load per systolic volume (OU/SV) were determined. It was established that AOHK at angles of -4 and -12 deg simulated much better physiological effects of actual weightlessness than CSHK. It can be concluded that AOHK makes it possible to simulate man's acute adaptational reactions to weightlessness. (Author)

**A81-47393** Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos'. L. Macho, S. Nemeth, R. Kvetnansky, M. Fickova (Slovenska Akademia Vied, Ustav Experimentálnej Endokrinologie, Bratislava, Czechoslovakia), and R. A. Tigranian (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-179.* 10 p. 20 refs.

The effects of space flight conditions on enzymes involved in amino acid metabolism and on lipolytic processes are investigated. Enzyme activities and lipolytic responses were determined in adult male rats flown on the Cosmos 1129 biosatellite for 18.5 days immediately following landing and after a recovery period of six days, and compared with those of animals subjected to simulated space flight conditions (except weightlessness) and controls. In-

creases in plasma corticosterone levels and the activities of enzymes with a rapid response to glucocorticoids (tyrosine aminotransferase, tryptophan pyrrolase, serine dehydratase) and with a response to chronic corticosterone levels (alanine aminotransferase, aspartate aminotransferase) were found in the flight animals following flight, suggesting the presence of acute-stress- and chronic-stress-induced hypercorticosteronemia. Plasma corticosterone levels and enzyme activities were observed to return to control levels following the recovery period. No changes in basal lipolysis were observed in the flight rats, however both the flight rats and the ground simulation controls exhibited a lower sensitivity to lipolysis stimulation by norepinephrine both directly after the flight and following recovery. A.L.W.

**A81-47394 \*** **Space Shuttle life support systems - A status report.** M. A. Faget and W. W. Guy (NASA, Johnson Space Center Engineering and Development Directorate, Houston, TX). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-181.* 50 p.

The Space Shuttle Program has two independent life support systems. One provides the basic environmental control for the Orbiter cabin while the second enables the crewmen to function outside the spacecraft for extravehicular operation. Although both of these systems were developed and fabricated under contract to NASA, all system-level testing was conducted at the Johnson Space Center. The paper will discuss the results of this testing which, in part, includes: (1) certification of the Orbiter cabin atmospheric pressure and composition control system at three operational pressures (8 psia, 9 psia and 14.7 psia); (2) certification of the Orbiter atmospheric revitalization system at 9 psia and 14.7 psia; (3) manrating of the Orbiter airlock at 14.7 psia, 9 psia and vacuum; and (4) certification of the space suit/life support system in the airlock and at deep space thermal/vacuum conditions. In addition, pertinent flight information from the on-orbit performance of the Shuttle life support systems will be presented. (Author)

**A81-47424** **Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future.** G. Rotondo (Aeronautica Militare, Servizio di Sanità, Rome, Italy), C. A. Ramacci (Scuola Militare di Sanità Aeronautica, Rome, Italy), G. Meineri, F. Monesi (Aeronautica Militare, Centro Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy), and G. C. Modugno (Roma, Università, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-250.* 9 p. 16 refs.

The physiological and functional selection procedures employed in the selection of Italian Spacelab payload specialist candidates are discussed. Following a brief review of preliminary investigations of human capacities under conditions of weightlessness, attention is given to the physiological tests performed on those candidates who had passed a preliminary medical screening. The tests included a treadmill exercise test, and two acceleration tests designed to measure the tolerance of the 24 candidates (including two women) to vertical accelerations of up to 3 G for 10 minutes using electrocardiography and the critical flicker fusion test. The changes observed in critical flicker fusion frequency and heart rate were observed to correlate with subject fitness or unfit, with critical flicker fusion being an earlier indicator. The need for the continuing development of selection criteria for scientific space personnel and neurophysiological and psychological selection methods is pointed out. A.L.W.

**A81-47427** **On increasing reliability of cosmonaut-operator's activity.** N. V. Krylova and A. K. Bokovikov (Academy of Sciences of the USSR, Institute of Psychology, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-255.* 6 p. 7 refs.

A technique is suggested which may be used to improve cosmonaut operator reliability in the performance of on-board tasks. The technique is designated operator reporting (OR) and consists of specially organized verbal communication which serves to maintain operator activity and provide a means of performance evaluation. Principles have been formulated concerning the organization of OR which ensure its relationship with the task involved, uniform usage

and training in the techniques. Experimental studies with two-dimensional tracking tasks have demonstrated the effectiveness of OR in improving performance in the most complex control tasks. Requirements for the structure of OR have been derived from experimental studies which concern the informational content of the speech and its structural correlation with the optimum OR scheme. The technique may thus be used to achieve a fuller utilization of human activities to improve the operational reliability of the operator-spacecraft system. A.L.W.

**A81-47447 \*** **Recent progress in exobiology and planetary biology.** T. H. Jukes (California, University, Berkeley, CA). *International Astronautical Federation, International Astronautical Congress, 32nd, Rome, Italy, Sept. 6-12, 1981, Paper 81-308.* 12 p. 23 refs. Grant No. NGR-05-003-460.

Recent work in the fields of exobiology, the study of the possible characteristics of extraterrestrial life, and planetary biology, the study of life forms as a function of planetary conditions, is reviewed. Searches conducted for life on Mars by the Viking Landers and on Titan by Voyager 1 are considered, and the origin of life on earth is considered in relation to the question of the inorganic trace elements in living systems that are required for life. The question of the origin of terrestrial life from spores carried through the interstellar medium is examined, and the unlikelihood of the survival of such spores except within meteorites or dust particles is pointed out. Studies of organic molecules present in the interstellar medium are indicated as evidence that the conditions necessary for the formation of life can exist in various locations throughout the universe. Investigations of the molecular evolution of life on earth and of life under extreme conditions of heat, cold, drought and ultraviolet radiation, and of the organic compounds found in meteorites and comets are also discussed. The importance of a mechanism of heredity, such as terrestrial DNA, to the evolution of terrestrial and possible extraterrestrial life is pointed out. A.L.W.

**A81-47574 #** **Biological flows (Biologische Strömungen).** A. Naumann. *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, Aachen, West Germany, May 11-14, 1981, Paper 81-001.* 12 p. 37 refs. In German.

The importance of flow processes for the human body is considered, taking into account the blood circulation, respiration activities, and the secretion of urine. A survey is provided of investigations conducted at the Aerodynamical Institute of Aachen University, and the effect of shear stress on the blood cells is discussed. The critical shear stress which causes damage to the cells depends on the time during which the cells are subjected to the shear stress and on the form of the pulse wave. Hemolysis and thrombosis are the most important symptoms in case of a critical narrowing of the vessels through which the blood passes. Flow studies conducted in connection with the development of a blood pump are also discussed. G.R.

**A81-47665** **Moving and the motion after-effect.** L. R. Harris, M. J. Morgan, and A. W. Still (Durham, University, Durham, England). *Nature*, vol. 293, Sept. 10, 1981, p. 139-141. Medical Research Council Grant No. G-977/865/N.

The role of observer motion in the occurrence of the movement after-effect is investigated in relation to the hypothesis that the after-effect represents a recalibration of the relationship between optical and other information. In the experiment, both the observer and the display showing centrifugal or centripetal motion were mounted on a trolley that was moved backwards and forwards. Subject responses, monitored by the method of cancellation, revealed a very small motion after-effect after viewing an expanding pattern during forward motion in contrast to larger after-effects found in the three other possible combinations of pattern and observer motion. The results do not entirely conform to the hypothesis of recalibration, as the expected enhancement of the effect under conditions of incompatible self motion and the suppression of the effect of a contracting pattern during backward self motion are not observed, although a clear influence of self motion on the visual after-effect is demonstrated. A.L.W.

**A81-47672** **Determination of otolith afferent response parameters using small amplitude sinusoidal roll and pitch tilts.** R. J.

Peterka (Eye and Ear Hospital, Pittsburgh, PA). *IEEE Transactions on Biomedical Engineering*, vol. BME-28, Sept. 1981, p. 624-630. 13 refs.

Previous methods for the determination of the orientation of the preferred response axis of individual afferent neurons innervating the otolith organs have required the rotation of an animal through a full 360 deg about its pitch and roll axes while maintaining a microelectrode recording of a single neuron. The present paper presents a more practical method for the determination of the polarization vector, sensitivity and zero-force discharge rate of a neuron from data collected during small-amplitude sinusoidal roll and pitch tilts. The method is derived from an expression relating the neuronal discharge rate to the effective force experienced by the otolith in terms of the polarization vector, and may be used for both tonic afferents, in which frequency-dependent dynamic effects are small; and phasic afferents, although a modification taking into account dynamic properties is preferable in the latter case. Results of simulations of otolith afferent responses are presented which demonstrate the accuracy of the method in identifying tonic otolith afferent response parameters and the effects of phasic otolith properties. A.L.W.

**A81-47673 Algorithms for the clinical analysis of nystagmus eye movements.** C. Wall, III and F. O. Black (Eye and Ear Hospital, Pittsburgh, PA). *IEEE Transactions on Biomedical Engineering*, vol. BME-28, Sept. 1981, p. 638-646. 20 refs.

Two algorithms used in the clinical analysis of nystagmus are described. Their development was necessitated by the greater complexity of the nystagmus waveforms in response to system identification types of vestibular and optokinetic stimuli as compared to the less complex response to a step input. Practical considerations for clinical application also influenced their development. The first algorithm converts nystagmus data into a regularly sampled estimate of slow phase velocity (SPV), an important feature of the signal. It uses a new set of fast phase detection conditions which allow for automatic processing of reversals in nystagmus direction and for wide variability for clinical data. The second algorithm detects noise induced spikes in this SPV estimate using an adaptive criterion based upon a measure of the overall 'noisiness' of the data compared to the stimulus. (Author)

**A81-47674 Effects of microwave irradiation on human blood platelets.** M. L. Piana (Engineering Science, Inc., Austin, TX), J. D. Hellums, and W. L. Wilson, Jr. (Rice University, Houston, TX). *IEEE Transactions on Biomedical Engineering*, vol. BME-28, Sept. 1981, p. 661-664. 18 refs.

The response of human blood platelet functions to microwave irradiation is investigated. Platelets were exposed to continuous radiation at 2.45 GHz and 40 mW/sq cm in citrate-anticoagulated platelet-rich plasma for up to 2 h, and platelet aggregation, lysis, membrane permeability, release reaction stimulation and ADP aggregation response properties were determined and compared to those of block-heated and nonheated controls. No significant changes in lysis or permeability are found in the irradiated or control platelets, while both microwave irradiation and heating are found to stimulate serotonin release, induce aggregation, and impair platelet aggregation function. It is thus concluded that the effects of microwave irradiation on human blood platelet functions are entirely thermal in nature. A.L.W.

**A81-47675 \* A new CT collimator for producing two simultaneous overlapping slices from one scan.** Y. S. Kwoh, W. V. Glenn, Jr. (Long Beach, Memorial Hospital Medical Center, Long Beach, CA), J. S. Reed (Southern California, University, Los Angeles, CA), and T. K. Truong (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA). *IEEE Transactions on Biomedical Engineering*, vol. BME-28, Sept. 1981, p. 664-667. Research supported by the Children and Memorial Research Foundation; Grant No. AF-AFOSR-80-0151; Contract No. NAS7-100.

A new CT collimator is developed which is capable of producing two simultaneous successive overlapping images from a single scan. The collimator represents a modification of the standard EMI 5005 collimator achieved by alternately masking one end or portions of both ends of the X-ray detectors at a 13-mm beamwidth so that a set of 540 filtered projections is obtained for each scan which can be separated into two sets of interleaved projections corresponding to

views 3 mm apart. Tests have demonstrated that the quality of the images produced from these two projections almost equals the quality of those produced by the standard collimator from two separate scans. The new collimator may thus be used to achieve a speed improvement in the generation of overlapping sections as well as a reduction in X-ray dosage. A.L.W.

**A81-47847 \* The use of ultrasonic spectroscopy to characterize calcified lesions.** J. A. Rooney (Maine, University, Orono, ME), P. M. Gammell (California Institute of Technology, Jet Propulsion Laboratory, Pasadena; Southern California, University, Los Angeles, CA), J. D. Hestenes (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), H. P. Chin, and D. H. Blankenhorn (Southern California, University, Los Angeles, CA). *IEEE Transactions on Sonics and Ultrasonics*, vol. SU-28, Sept. 1981, p. 291-297. 14 refs. NASA-supported research; Grant No. NIH-N01-HV-7-2930.

A quantitative basis is developed for the medical application of ultrasonic spectroscopy, particularly in the characterization of calcified lesions associated with atherosclerotic conditions. A theory of the field radiation patterns of disk and ring sources is presented which can be used to predict minima in the reflection spectra of a target as a function of frequency and angle relative to the acoustic axis. The theory is then tested experimentally for objects of known geometry by the use of a time delay spectroscopy system using a swept frequency technique, and results are obtained which demonstrate the usefulness of the technique. Finally, the theory is verified in the determination of lesion diameter and orientation from spectra received from calcified lesions on in vitro arterial specimens as a function of angle. A.L.W.

**A81-47894 \* # Scaling of metabolic rate on body mass in small laboratory mammals.** N. Paue, D. F. Rahlmann, and A. H. Smith (California, University, Berkeley, CA). *International Union of Physiological Sciences, International Congress of Physiological Sciences and International Exhibition of Medical Instruments, 28th, Budapest, Hungary, July 13-19, 1980, Paper. 5 p. 5 refs. Grant No. NsG-7336.*

The scaling of metabolic heat production rate on body mass is investigated for five species of small laboratory mammal in order to define selection of animals of metabolic rates and size range appropriate for the measurement of changes in the scaling relationship upon exposure to weightlessness in Shuttle/Spacelab experiment. Metabolic rates were measured according to oxygen consumption and carbon dioxide production for individual male and female Swiss-Webster mice, Syrian hamsters, Simonsen albino rats, Hartley guinea pigs and New Zealand white rabbits, which range in mass from 0.05 to 5 kg mature body size, at ages of 1, 2, 3, 5, 8, 12, 18 and 24 months. The metabolic intensity, defined as the heat produced per hour per kg body mass, is found to decrease dramatically with age until the animals are 6 to 8 months old, with little or no sex difference. When plotted on a logarithmic graph, the relation of metabolic rate to total body mass is found to obey a power law of index 0.676, which differs significantly from the classical value of 0.75. When the values for the mice are removed, however, an index of 0.749 is obtained. It is thus proposed that six male animals, 8 months of age, of each of the four remaining species be used to study the effects of gravitational loading on the metabolic energy requirements of terrestrial animals. A.L.W.

**A81-47982 # The application of robotic sensors - A survey and assessment.** W. H. Boykin and R. G. Diaz (Florida, University, Gainesville, FL). In: *Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference, San Francisco, CA, August 12-15, 1980.* New York, American Society of Mechanical Engineers, 1980, p. 160-165. 48 refs. Contract No. ER-78-S-05-6102.

Sensor applicable to general purpose robotic manipulators were surveyed and assessed. Computerized literature searches aided the survey. The assessment classified the sensors according to the basic wave length or physical spectrum: photoreceptors, mechanoreceptors, chemoreceptors, thermoreceptors and electromagnetic receptors. Sensors were also classified as imaging and nonimaging. Imaging sensors are further classified as video and others. Among the major conclusions is the finding that although significant research has been

done across the sensor spectrum, little integrated sensor work has been performed and even less of the sensor work has been in maturing the technology for production. (Author)

**A81-47986 \* #** Kinesthetic coupling between operator and remote manipulator. A. K. Bejczy (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and J. K. Salisbury, Jr. (Stanford University, Stanford, CA). In: *Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference*, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 197-211. 12 refs. Contract No. NAS7-100.

A universal force-reflecting hand controller has been developed which allows the establishment of a kinesthetic coupling between the operator and a remote manipulator. The six-degree-of-freedom controller was designed to generate forces and torques on its three positional and three rotational axes in order to permit the operator to accurately feel the forces encountered by the manipulator and be as transparent to operate as possible. The universal controller has been used in an application involving a six-degree-of-freedom mechanical arm equipped with a six-dimensional force-torque sensor at its base. In this application, the hand controller acts as a position control input device to the arm, while forces and torques sensed at the base of the mechanical hand back drive the hand controller. The positional control relation and the back driving of the controller according to inputs experienced by the force-torque sensor are established through complex mathematical transformations performed by a minicomputer. The hand controller is intended as a development tool for investigating force-reflecting master-slave manipulator control technology. A.L.W.

**A81-47988 #** Robotic actuators - A technology assessment. R. G. Diaz and W. H. Boykin, Jr. (Florida University, Gainesville, FL). In: *Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference*, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 225-232. 32 refs. Contract No. ER-78-S-05-6102.

Robotic technology is comprised of many component technologies. Actuator technology is one of the least formally understood. Robotic actuators produce the forces used to affect tasks in the work scene and in teleoperators provide force feedback to operators. Robotic actuator technology was assessed by: considering basic actuator technology, developing design criteria and performance parameters for optimal actuators, comparing actuators considered, relative to the parameters and finally identifying promising new concepts and developments in the technology. The complete set of conclusions presented demonstrates that actuator technology is a fundamental component of robotic technology; one which offers tremendous potential for development. (Author)

**A81-47990 #** A novel design for a robot arm. E. F. Fichter and E. D. McDowell (Oregon State University, Corvallis, OR). In: *Advances in computer technology - 1980. Volume 1 - Proceedings of the International Computer Technology Conference*, San Francisco, CA, August 12-15, 1980. New York, American Society of Mechanical Engineers, 1980, p. 250-256. 6 refs. Research supported by the Oregon State University.

An alternative to the conventional open kinematic chain design of a robot arm is discussed. Advantages of the traditional anthropomorphic design with respect to reach, range of motion and capability of entering a small hole and disadvantages with respect to cantilever structure and kinematic indeterminacy are pointed out and compared with those of a robot arm based on a closed kinematic chain, which eliminates the problems caused by kinematic indeterminacy and is rigidly supported but is limited in reach and range of motion. The Stewart Platform is then introduced as an example of a three-dimensional closed-chain manipulator mechanism, which is based on an octahedral geometry with a rigid base and platform capable of assuming any position and orientation within a limited volume of space. Control involves the verification that the desired position is within the range of feasibility and the determination of the proper lengths of the six legs supporting the platform. Applications for a manipulator device based on the Stewart Platform exist in

material handling, assembly and shaping and coating tasks and in tasks where rotational motion is more important than translational motion. A.L.W.

**A81-48006 \*** A study of the comparative effects of various means of motion cueing during a simulated compensatory tracking task. B. T. McKissick, B. R. Ashworth, R. V. Parrish (NASA, Langley Research Center, Hampton, VA), and D. J. Martin, Jr. (Sperry Support Services, Hampton, VA). In: *Annual Simulation Symposium*, 13th, Tampa, FL, March 19-21, 1980, Record of Proceedings. Tampa, FL, Annual Simulation Symposium, 1980, p. 227-246. 9 refs.

NASA's Langley Research Center conducted a simulation experiment to ascertain the comparative effects of motion cues (combinations of platform motion and g-seat normal acceleration cues) on compensatory tracking performance. In the experiment, a full six-degree-of-freedom YF-16 model was used as the simulated pursuit aircraft. The Langley Visual Motion Simulator (with in-house developed wash-out), and a Langley developed g-seat were principal components of the simulation. The results of the experiment were examined utilizing univariate and multivariate techniques. The statistical analyses demonstrate that the platform motion and g-seat cues provide additional information to the pilot that allows substantial reduction of lateral tracking error. Also, the analyses show that the g-seat cue helps reduce vertical error. (Author)

**A81-48056 \*** Effects of ethidium bromide on development and aging of *Drosophila* - Implications for the free radical theory of aging. J. E. Fleming, H. A. Leon, and J. Miquel (NASA, Ames Research Center, Biomedical Div., Moffett Field, CA). *Experimental Gerontology*, vol. 16, no. 3, 1981, p. 287-293. 18 refs.

**A81-48074** Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia. T. S. Johnson, J. B. Young, and L. Landsberg (Beth Israel Hospital; Harvard University, Boston, MA). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Sept. 1981, p. 614-620. 26 refs. Research supported by the Beth Israel Hospital; Grants No. PHS-AM-20378; No. PHS-RR-01302.

Sympathetic nervous system activity in the lung during cold exposure and hypoxia is investigated by the monitoring of norepinephrine turnover in rat lung. Following preliminary validation studies of the measurement of tritiated norepinephrine turnover as an indicator of sympathetic activity, norepinephrine turnover rate was measured in the lungs of rats exposed to hypobaric hypoxia at a simulated altitude of 5500 m for seven days, or a temperature of 4 C in a cold room for 24 hours. Results demonstrate that the labeled norepinephrine injected into the rats is taken up by the sympathetic nerve endings, stored within the pool of endogenous norepinephrine and released in response to sympathetic nerve impulses. Norepinephrine turnover rates are observed to increase in response to both chronic hypoxia and cold exposure, thus indicating an increase in sympathetic activity. A.L.W.

**A81-48075** Osmoregulation and interstitial fluid pressure changes in humans during water immersion. S. S. Khosla and A. B. DuBois (John B. Pierce Foundation Laboratory, New Haven, CT). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 51, Sept. 1981, p. 686-692. 28 refs. Grants No. NIH-RR-125; No. NIH-HL-17407.

The mechanisms of the observed fluid shifts and intracellular osmoregulatory changes accompanying diuresis upon water immersion in man are investigated. Urinary and plasma electrolyte concentrations, plasma amino acid concentrations and interstitial fluid pressures were measured in subjects before, during and after immersion in 34 C water up to their necks for 1 hour. In experiments where vasopressin was administered prior to immersion, urinary sodium, potassium and osmolal clearances are found to increase significantly during immersion, accompanied by decreases in hematocrit, plasma sodium, chloride and potassium concentrations, osmolality and proteins and increases in total plasma CO<sub>2</sub> content, threonine, proline, methionine and alanine, plasma volume and red blood cell volume. In experiments without vasopressin injection, interstitial fluid pressure is observed to decrease on the average by up to 2.10 cm H<sub>2</sub>O during immersion. It is concluded that hypotonic fluid is mobilized into the blood from interstitial and other

extravascular spaces, probably including intracellular volumes, during immersion. A.L.W.

**A81-48119**      **The evolutionary development of vertebrate thermoregulation.** L. I. Crawshaw (Portland State University, Portland, OR), B. P. Moffitt (Lehman College, Bronx, NY), J. A. Downey (Columbia University, New York, NY), and D. E. Lemons. *American Scientist*, vol. 69, Sept.-Oct. 1981, p. 543-550. 44 refs.

Evidence is presented in support of the thesis that although the basic organization of the vertebrate thermostat has evolved over as much as 500 million years, it has served the vertebrate classes in a way that is dependent on two distinct factors: (1) whether the respiratory medium is air or water; and (2) whether the body temperature varies passively with thermal conditions or is maintained at a constant level by the expenditure of stored fluid and energy. Attention is given the behavioral and autonomic responses of water breathers, thermoregulation in such cold-blooded air breathers as reptiles and amphibians, and the human thermoregulatory processes of blood flow variation between hot and cold environments, sweating and shivering, and the thermoregulatory perturbations during menopause called 'hot flashes'. O.C.

**A81-48189 #**      **Experimental studies on the estimation of the dynamic characteristics of the human operator.** Y. Oka, T. Takeda, and M. Naito. *Hokkaido University, Faculty of Engineering, Bulletin*, July 1981, p. 141-151. 5 refs. In Japanese, with abstract in English.

The dynamic characteristics of human operators are discussed in terms of an autoregression model for several simple manual control systems. The control tasks considered include: pursuit tracking, compensatory tracking, and two-variable compensatory tracking. The dynamic behavior of the human operator is described by a linear model with additional noise representing the nonlinear component. It is shown how this additional noise is whitened by the autoregression model despite the presence of a feedback loop. As a result, the variation of the dynamic characteristics of human operators is represented by discrete pulse sequences. V.L.

**A81-48225**      **Efficiency of human visual signal discrimination.** A. E. Burgess (British Columbia, University, Vancouver, Canada), R. F. Wagner, R. J. Jennings (U.S. Food and Drug Administration, Bureau of Radiological Health, Rockville, MD), and H. B. Barlow (Cambridge University, Cambridge, England). *Science*, vol. 214, Oct. 2, 1981, p. 93, 94. 13 refs.

The overall statistical efficiency of human subjects discriminating the amplitude of visual pattern signals added to noisy backgrounds is measured. By changing the noise amplitude, the amount of intrinsic noise can be estimated and allowed for. For a target containing a few cycles of a spatial sinusoid of about 5 cycles per degree, the overall statistical efficiency is as high as 0.7 + or - 0.07, and after correction for intrinsic noise, efficiency reaches 0.83 + or - 0.15. Such a high figure leaves little room for residual inefficiencies in the neural mechanisms that handle these patterns. (Author)

**A81-48360**      **Analytic derivation of training transfer effectiveness ratios /TERs/ for new training systems.** W. V. Hagin (Seville Research Corp., Tempe, AZ). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 375, 376. 8 refs.

The task cue-commonality analysis of Caro (1970) is used to derive TER's for Navy's new Undergraduate Jet Pilot Training System. The approach involves identification of the cues required to perform a given task in the aircraft and an analytical evaluation of the degree to which that cue is provided in the simulator. The cue-commonality approach to TER generation offers a practical solution to the problem of providing the training system designer with training effectiveness estimates. V.L.

**A81-48361 \***      **Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator.** J. A. Houck and A. T. Markos (NASA, Langley Research Center, Hampton, VA). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 377-382. 6 refs.

This paper describes the work being done at the National Aeronautics and Space Administration's (NASA) Langley Research

Center on the development of a multi-media crew-training program for the Terminal Configured Vehicle (TCV) Mission Simulator. Brief descriptions of the goals and objectives of the TCV Program and of the TCV Mission Simulator are presented. A detailed description of the training program is provided along with a description of the performance of the first group of four commercial pilots to be qualified in the TCV Mission Simulator. (Author)

**A81-48362**      **Pilot performance as a function of peripheral cues and color in computer generated images.** C. L. Kraft, C. D. Anderson, and C. L. Elworth (Boeing Aerospace Co., Seattle, WA). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 383-388. Contract No. F49620-79-C-0030.

The effects of the visual field size, scene complexity, and color on flight performance has been measured in a flight simulator with a computer generated imagery system. It is found that the size of the field of view is significant in its effects on approach and landing performance in the descending turn and on the straight-in approach. Training with an unrealistically small visual simulation may result in the inculcation of poor flying practices in the student pilot, e.g. too tight turns. Greater detail in the scene and color realism are also found to be an important aid to training. V.L.

**A81-48363**      **Computer controlled electronic warfare simulation for tactical operator training.** I. V. Deaton (Singer Co., Link Flight Simulation Div., Silver Spring, MD). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 439-442.

Electronic warfare (EW) plays a key role in modern warfare; operational tactics and EW systems are changed frequently as each side tries to stay a jump ahead of the other side. Proper training of EW operators prior to combat greatly increases the effectiveness of EW combat tactics and also increases the probability of survival of EW operator and platform. This paper describes the role of computer controlled EW simulation to safely train EW system operators in a cost effective manner. A radar warning receiver (RWR) is selected as a typical and important EW system and its simulation is described at the block diagram level. Hardware/software tradeoffs to provide the most effective training while still allowing the training to be quickly adapted to meet the needs of changing operational tactics and equipment are discussed. (Author)

**A81-48374**      **Computer-based simulations for man-computer system design.** B. M. Crawford, W. H. Pearson, and R. F. Bachert (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 574-579. 18 refs.

Man-in-the-loop simulations to investigate human factors problems posed by man-computer interactions in proposed weapon system concepts. Two of the system contexts in which computer-based simulations have been used are command-control and digital avionics. Two command-control experiments and one cockpit design experiment will be summarized. Generic principles for user-oriented man-computer system design are also considered. (Author)

**A81-48375**      **Real time simulation of OAS Phase I controls and displays.** G. P. Chubb (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) and S. Beecroft (Systems Research Laboratories, Inc., Dayton, OH). In: Summer Computer Simulation Conference, Seattle, WA, August 25-27, 1980, Proceedings. Arlington, VA, AFIPS Press, 1980, p. 580-585. 8 refs.

The experience with the Strategic Avionics Crewstation Design Facility (SACDEF) demonstrates the feasibility of developing substantial in-house Air Force simulations of systems in the development stage. Here, design documentation and concepts for operational utilization receive scrutiny they might not otherwise get. Human engineering consultation furnished to the System Program Office is predicated on an understanding of crew capabilities as well as the mission and equipment. What is more important, human factors considerations are based on empirical studies of workload, and design validation is accomplished by exercising system functions against

crewmembers representing the experience levels of the actual user community. C.R.

**A81-48499** Development of a search task for the measurement of peripheral visual acuity. L. J. Bellamy (Birmingham, University, Birmingham, England) and A. J. Courtney (University of Hong Kong, Hong Kong). *Ergonomics*, vol. 24, July 1981, p. 497-509. 29 refs. Science Research Council Grant No. GR/A/9297/9.

Experimental evidence is discussed which indicates a relationship between peripheral visual acuity and search performance. It is suggested that use of this relationship can be made in assessing the relative extent of a person's peripheral visual field (visual lobe) for target detection when visually screening individuals for industrial inspection tasks. A card sorting task involving visual search was developed which was shown to be sensitive to subject differences in search speed. Speed of search correlated significantly with visual lobe area. Subjects' foveal acuities were not significantly related to search time. Test-retest reliability for forms A and B of the card sorting task over a one-week period was  $r=0.81$ . (Author)

**A81-48500** Variations in response to whole-body vibration - Intensity dependent effects. D. J. Osborne, P. Boarer, and T. O. Heath (Swansea, University College, Swansea, Wales). *Ergonomics*, vol. 24, July 1981, p. 523-530. 19 refs. Research supported by the Social Science Research Council.

The effects of overall vibration intensity on human response to whole-body vibration over a given frequency range are investigated. Equal sensation contours were measured in 24 standing subjects experiencing vibrations at frequencies from 2.5 to 60 Hz at intensities of 0.5, 1.0, 2.0 or 3.5 m/sec per sec rms. The shapes of the contours generated for each of the starting intensities are found to differ significantly, with the contour becoming more quadratic rather than linear in shape as the intensity levels increase. The results support the argument that different frequency weightings should be applied in the assessment of vibration environments with different intensities, however, contradict the contour shapes suggested by the International Standards Organisation (1974). A.L.W.

**A81-48725** Origin of life between Scylla and Charybdis. U. Niesert, D. Harnasch (Deutsche Forschungsgemeinschaft, Zentral-laboratorium für Mutagenitätsprüfung, Freiburg im Breisgau, West Germany), and C. Bresch (Freiburg, Universität, Freiburg im Breisgau, West Germany). *Journal of Molecular Evolution*, vol. 17, Sept. 1981, p. 348-353. 19 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A package model of the chemical evolution of nucleotides under prebiotic conditions is analyzed with respect to the stability of packages to fluctuations in replication and fission on the one hand, and mutations on the other. In the model, packages are conceived of as small compartments in the primordial broth enclosing a few RNA molecules in varying numbers of copies and a few polypeptides, which occasionally undergo fission with a random distribution of contents to the arising daughter packages. A computer simulation of package viability as a function of parameters including the number of participating genes, and the number of replicated molecules between two package fissions is presented which was performed for probable values of the lethal and parasitic mutation rates and the accident rate. It is shown that the origin of life must have involved no more than three genes, with between 20 and 80 RNA molecules on the average replicating between each fission. A.L.W.

**A81-48868** Space settlements - The medical perspective. E. T. Paterson (Medical Clinic, Creston, British Columbia, Canada). *British Interplanetary Society, Journal (Space Chronicle)*, vol. 34, Oct. 1981, p. 429-434.

Following an examination of the physiological responses to weightlessness, the likely implications are considered from the point of view of many major diseases. Cardiac, respiratory, neurological, musculoskeletal, renal, reproductive, digestive, psychiatric and infectious diseases are shown to be probably strongly influenced by low, or zero, gravity. Some implications for rehabilitation are also discussed. It is concluded that major health benefits may be realized from the migration into space. (Author)

**A81-49327** Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions. T. Uchiyama, E. Corday, S. Meerbaum, T.-W. Lang, P. Gueret, M. Povzhitkov, and T. Peter (Cedars-Sinai Medical Center; California, University, Los Angeles, CA). *American Journal of Cardiology*, vol. 48, Oct. 1981, p. 679-689. 30 refs. Research supported by the Ahmanson Foundation, Keck Foundation, Lillian D. Truyens Foundation, and Jules Stein Foundation; Grants No. NIH-HL-17651-06; No. NIH-HL-17651-07; No. NIH-HL-14644-07.

The technique of two-dimensional echocardiography is applied to the investigation of contractile patterns of the left ventricle during cardiac arrhythmias in the closed-chest dog. Echocardiographic short- and long-axis tomographic images were obtained for seven anesthetized dogs undergoing single premature ventricular contractions induced through threshold stimulation at the apex. The cross-sectional short-axis views revealed that, compared with contraction patterns during normal sinus rhythm, premature ventricular contractions with a short coupling interval were associated with minimal differences between end-diastolic and end-systolic areas as well as distorted regional contraction, while the subsequent postextrasystolic contraction showed a pronounced reduction in end-systolic area and increase in end-diastolic area. In contrast, premature beats with relatively long coupling intervals lead to less reduction in contraction and only minor postextrasystolic potentiation. The long-axis views revealed normal contraction patterns aside from regional systolic outward bulging in the apical region for long coupling intervals, with short coupling intervals associated with a generalized derangement of ventricular wall motion during systole. It is concluded that two-dimensional echocardiography can be used to characterize both global and region left ventricular function during cardiac rhythm disturbances. A.L.W.

**A81-49328** Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning. G. Maurer and N. C. Nanda (Rochester, University, Rochester, NY). *American Journal of Cardiology*, vol. 48, Oct. 1981, p. 720-727. 33 refs.

The paper presents a study of the use of two-dimensional echocardiography for the prospective evaluation of ventricular asynergy immediately after treadmill stress testing and the correlation of echocardiographic findings with thallium perfusion scans. Echocardiography was performed in the left decubitus position before and immediately after graded treadmill exercise in 41 patients who subsequently underwent cardiac catheterization for suspected coronary artery disease. Exercise-induced wall motion abnormalities were detected in 19 of the 23 patients with significant coronary artery disease and no prior history of myocardial infarction, and in all five of the patients with known previous infarction. Exercise-induced myocardial perfusion defects were found to be well correlated with exercise-induced asynergy detected by echocardiography. It is concluded that two-dimensional echocardiography performed immediately after treadmill exercise is a valuable technique in the assessment of both left and right ventricular wall motion abnormalities, with results comparable with those of thallium scanning in the evaluation of coronary artery disease. A.L.W.

**A81-49474 #** The pharmacological analysis of the stress mechanism and its consequences (Farmakologicheskii analiz mekhanizma stressa i ego posledstviy). I. S. Zavodskaya and E. V. Moreva (Akademiya Meditsinskikh Nauk SSSR, Moscow, USSR). Leningrad, Izdatel'stvo Meditsina, 1981. 216 p. 245 refs. In Russian.

The pharmacological aspects of neurogenic damage to the internal organs under conditions of extreme nervous system stimulation are examined. Results are presented of observations on the intracellular, cellular, organ and system levels of damage to the digestive system, cardiovascular system, liver, and lungs induced by excessive nervous stimulation in experimental and clinical situations. The applicability of various pharmacological preparations of these conditions is considered, with particular attention given to the neurotropic substances. A.L.W.

**A81-49673** Cues reduce direction uncertainty and enhance motion detection. K. Ball and R. Sekuler (Northwestern University,

Evanston, IL). *Perception and Psychophysics*, vol. 30, no. 2, Aug. 1981, p. 119-128. 13 refs. Grant No. AF-AFOSR-79-0064.

Previous work has shown that detectability of motion is better when the observer knows ahead of time the direction of that motion (certainty) than when he does not know the direction (uncertainty). Attempts to reduce this performance decrement associated with direction uncertainty are now reported. In these experiments, a briefly flashed, oriented line cued the observer to the direction of motion that might occur. When the cue appeared before the moving target, detectability increased; when the cue appeared after the moving target, performance dropped below that for no cue at all. In addition, the effect of cue reliability was examined by varying the relation between cue orientation and actual direction of target motion. The more accurate the cue is, the larger the performance increment. When the cue indicated a direction more than 90 deg from the actual target direction, performance was worse than when there was no cue. Results are discussed with regard to the feasibility of reducing uncertainty in real-world situations. (Author)

**A81-49885**      **Systems engineering models of human-machine interaction.** W. B. Rouse (Illinois, University, Urbana, IL). New York and Amsterdam, North Holland (North Holland Series in System Science and Engineering. Volume 6), 1980. 162 p. 150 refs. \$29.95.

The book treats various types of mathematical models allowing the prediction of human-machine system performances. Methodologies and applications in such fields as aircraft piloting, air traffic control, industrial process monitoring and control, failure detection and diagnosis and text editing are examined for the modeling approaches of estimation theory, control theory, queueing theory and fuzzy set theory. Consideration is also given to the less widely applicable rule-based production system models, pattern recognition concepts and Markov chain models. A.L.W.

**A81-49917**      **Geomagnetic field - Its role in the evolution of life and intelligence on earth.** U. R. Rao (Indian Space Research Organization, Satellite Centre, Bangalore, India). *British Interplanetary Society, Journal (Interstellar Studies)*, vol. 34, Nov. 1981, p. 459-465. 35 refs. Research supported by the Department of Space and Space Commission.

The hypothesis that the fundamental cause responsible for the formation of the ozone layer on earth is the dipole magnetic field of the earth is elaborated on and supportive quantitative estimates are presented to show that the magnetic property of the earth is responsible for the sustenance of a steady ozone blanket in the earth's atmosphere, which in turn has been the major factor in the evolution of life with an oxygen metabolism. The effects of the ozone layer on the development of the earth's climate are discussed, and it is concluded that if the earth were devoid of the ozone layer, its overall surface temperature would have become as low as 1.5 K, the correlation between glacial changes and solar activity confirming this hypothesis. The constraint of the necessity of having a magnetic field for the evolution of life with an oxygen metabolism and intelligence is taken into consideration, and it is proposed that Drake's equation, which governs the calculation of the probability for finding intelligence elsewhere in the Universe, is reduced by about a factor of 10. K.S.

**A81-49918**      **Medical considerations for manned interstellar flight.** J. R. Murphy. *British Interplanetary Society, Journal (Interstellar Studies)*, vol. 34, Nov. 1981, p. 466-476. 60 refs.

Medical effects of prolonged space flight, with respect to interstellar flight, are reviewed, dividing the discussion into two broad categories, i.e., the effects of weightlessness and those of spacecraft and space environments. Topics included in the first category of effects are: musculo-skeletal deconditioning and cardiovascular deconditioning. The second category includes the following topics: (1) effects, prevention, and treatment of human exposure to radiation in space (with attention given to sources of radiation, methods of shielding, and pharmacological methods of radiation-protection), and (2) factors increasing crew members' susceptibility to infection (with attention given to microbial contamination of the spacecraft, decreased resistance of the crew to infection, and increased microorganism mutation rate). Other topics discussed are: disturbances of biorhythms, sensory disturbances, effects of linear and radial accelerations, and psychological and social effects of space

flight. It is concluded that present knowledge of the effects of space flight on man confirms the feasibility of interstellar flight, but further investigation in earth orbit ground studies are necessary. K.S.

**A81-49951 #**      **A histopathological study of coronary arteries in aircrew fatalities during 1962-1978.** S. K. Adaval (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), R. N. Diwan (Air Force Central Medical Establishment, New Delhi, India), R. N. Verma (Armed Forces Medical College, Poona, India), and G. N. Kunzru. *Aviation Medicine*, vol. 25, June 1981, p. 1-6. 36 refs.

The incidence of coronary artery disease in aircrew members is evaluated on the basis of a histopathological study of accident fatalities in the period 1962-1978. Coronary artery slides available for 174 aircrew autopsies were examined and compared with those taken from 105 autopsies performed on nonaircrew personnel of the same age groups who had died with no evidence of atherosclerotic conditions. Microscopic disease is found in 29.3% of the aviators, aged 20-39, and 14.3% of the control group, with the incidence of the disease increasing with subject age and accumulated flight hours. A greater incidence is observed in supersonic and transonic pilots despite their lower average age than helicopter and transport pilots, which finding is attributed to the stress factors inherent in high-speed aviation. Of the three cases of aircrew with severe atherosclerotic conditions, only one is found to be possibly related to the accident. A.L.W.

**A81-49952 #**      **Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration.** B. R. S. Reddy, K. Rai, V. K. Gupta (Indian Air Force, Institute of Aviation Medicine, Bangalore, India), and A. K. Ali (Iraqi Air Force, Baghdad, Iraq). *Aviation Medicine*, vol. 25, June 1981, p. 7-10.

A dynamic system with multiple lights for presenting visual stimuli at graduated angles and for measuring subject response has been developed and incorporated into a human centrifuge as a convenient means of determining subject tolerances to +Gz acceleration as indicated by peripheral light loss. GRADEPS consists of eight LEDs mounted symmetrically in pairs subtending angles of 64, 60, 56 and 52 deg at eye level and connected so that only one pair is operative at a time. Light stimuli are presented at random intervals starting with the pair at 64 deg and switching to the next pair only when the subject fails to respond to the signal by pressing a microswitch. The system has been designed using TTL integrated circuits for the controlled clock, sequence generator, LED drivers' stimulus repetition control, discretizer and random switching circuit components. GRADEPS has been used to establish g thresholds at onset rates of 0.1 to 0.5 g/sec in over 100 subjects, with improved accuracy relative to conventional single-stimulus methods. A.L.W.

**A81-49953 #**      **Backache in helicopter pilots.** H. Malik and R. R. Kapur (Indian Air Force, Aero-Medical Training Centre, Hindan, India). *Aviation Medicine*, vol. 25, June 1981, p. 11-15. 8 refs.

Long term flying in helicopters currently in use produces backache. Attempts have been made to analyze the problem with special emphasis on helicopter seat design. Suitable human engineering aspects in terms of seat and relocation of controls have been recommended. Regular spinal exercises by aircrew have been advised. (Author)

**A81-49954 #**      **Aeromedical evaluation of aircrew with lower limb disabilities.** R. Singh (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). *Aviation Medicine*, vol. 25, June 1981, p. 16-20. 7 refs.

The aeromedical evaluation of pilot fitness following recovery from injuries resulting in surgical or orthopedic disabilities to the lower limbs is discussed. It is noted that while a clinical assessment based on laboratory and radiological tests may be used to determine fitness to resume duties with or without restrictions, a human engineering assessment is required to indicate accurately how a particular disability will affect aircrew performance under changing leg geometries and flight profiles. The human engineering assessment includes anthropometric measurements to assess leg shortening and joint movements, cockpit trials of rudder pedal control operation, and trials in a simulated cockpit environment with a rudder pedal assembly at force maxima likely to be encountered in an emergency situation. Recommendations concerning means to improve the

instrumentation, applications and usefulness of the present method of aeromedical evaluation are presented. A.L.W.

**A81-49955 # Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber.** P. Tyagi (Indian Air Force, New Delhi, India). *Aviation Medicine*, vol. 25, June 1981, p. 21-26. 9 refs.

Cardiac responses to short-term hypoxia at a simulated altitude of 15,000 ft are studied by the simultaneous recording of electrocardiograms, phonocardiograms and external carotid pulse activity. Systolic time intervals were determined by the three methods and blood pressure was monitored in seven healthy, normal male subjects exposed to ground-level conditions and 45 min of simulated high-altitude hypoxia in a decompression chamber. A rise in heart rate and decline in left ventricular ejection time (LVET) are noted immediately upon ascent to 15,000 ft, with the heart rate decreasing somewhat and the ratio of pre-ejection period (PEP) to LVET increasing after 30 min. A subsequent rise in heart rate and decrease in PEP/LVET ratio suggest a cyclic pattern in these parameters. A decrease in heart rate accompanied by an increase in PEP and the PEP/LVET ratio are observed immediately upon return to ground level, with baseline values regained after an additional 15 min. Further studies are recommended to establish the range of normal responses for the evaluation of borderline ECG abnormalities. A.L.W.

**A81-49956 # Cardiac arrhythmias in service personnel - An electrophysiologic evaluation.** M. Durairaj (Military Hospital, Poona, India), G. R. Narayanan (Command Hospital, Poona, India), G. Kuppaswamy (Armed Forces Medical College, Poona, India), and H. L. Kher. *Aviation Medicine*, vol. 25, June 1981, p. 27-30.

Experience with the electrophysiological evaluation of military personnel with cardiac arrhythmias using the electrode catheter technique is presented. His bundle electrograms and atrial pacing were performed in 50 subjects including 14 normal controls and 36 subjects with various types of cardiac arrhythmias. In the 15 patients with sick sinus syndrome, intracardiac electrocardiography revealed corrected sinus node recovery times of above 600 msec in all cases and associated A-V node disease manifested by a prolonged A-H interval in four patients. Very short resting H-V intervals were observed in the eight cases of WPW syndrome. The electrophysiological studies revealed complete heart block in two subjects with A-V block, indicating the need for permanent pacemaker therapy. His bundle and atrial tachypacing did not show any H-V prolongation in three cases of right bundle branch block with left axis deviation, indicating that pacing could be avoided. The correct diagnosis of supraventricular ectopics with wide QRS complex was also made. Results demonstrate the usefulness of electrophysiological studies in the diagnosis of conditions which may not be distinguishable by surface electrocardiography. A.L.W.

**A81-49957 # Physiological aspects of heat exposure as applied to flying.** M. L. Wadhawan. (*Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.*) *Aviation Medicine*, vol. 25, June 1981, p. 34, 35.

Physiological responses to heat stress as encountered in an aircraft cockpit during low-level high-speed flight at high ambient temperatures are discussed. Human thermoregulatory pathways are considered, with attention given to the cooling mechanisms of cutaneous vasodilation, circulating blood volume increase, perspiration, respiratory heat exchange and radiation, and the accompanying stresses on the cardiovascular and circulatory systems. It is noted that aircrew performance will start to deteriorate long before physiological tolerance is reached. Mechanisms of heat acclimatization are also considered. A.L.W.

**A81-49958 # Effects of thermal stress on psychological functions and performance.** J. M. Wadhawan (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). (*Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.*) *Aviation Medicine*, vol. 25, June 1981, p. 36-38.

The effects of thermal stresses as encountered in the fighter cockpit environment during a tropical summer on human psychomotor performance are considered. Possible mechanisms through which heat stress might act to affect human performance are

indicated, including a rise in internal temperature increasing the rate of neural activity, and experiments with a liquid-cooled suit demonstrating the role of core temperature in determining performance speed and the role of skin temperature in determining error rate are presented. Factors which influence the level of thermal stress are pointed out, including the relative intensity of the stress, its rate of application, duration, the presence of other stresses and subject physical, mental and emotional condition. The results of experiments on temperature intervals for the response of neural activity rate, reaction time, vigilance and monitoring performance, tracking and cognitive functions to elevations in body temperature are then presented. It is concluded that although it is not necessary to eliminate completely heat-induced psychophysiological strain, cooling measures should be undertaken to limit internal heat storage to acceptable levels. A.L.W.

**A81-49959 # Evaluation of thermal strain index for assessment of tolerance to heat stress.** K. C. Sinha (Defence Institute of Physiology and Allied Sciences, Delhi, India). (*Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.*) *Aviation Medicine*, vol. 25, June 1981, p. 39-42.

The development of various thermal strain indexes for the determination of human heat tolerances is examined. Direct and indirect approaches to the measurement of thermal strain as the degree of heat accumulation or loss are indicated, and the various heat strain indexes are presented, including the actual heat content, sweating rate, heart rate, mean skin temperature and oral temperature. It is pointed out that the point of convergence of mean skin temperature with oral temperature correlates very well (correlation coefficient 0.86) with tolerance time as indicated by subjective feelings and the onset of heat collapse, whereas the other known strain indices correlate less well (correlation coefficient 0.5). A.L.W.

**A81-49960 # Microenvironmental protection in military flying.** C. A. Verghese (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). (*Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.*) *Aviation Medicine*, vol. 25, June 1981, p. 43-45.

Means for the prevention of pilot performance degradation due to excessive thermal stresses encountered during low-altitude flight during the summer months at tropical locations are considered with particular attention given to a liquid-cooled suit. Possible measures to be taken to avoid heat accumulation totalling more than 100 Kcal during flight include body cooling in a cold environment and cooling by an air-ventilated suit prior to encountering thermal stresses, and short-burst cooling by dry oxygen with an air-ventilated suit during thermal stresses. The liquid-cooled suit considered has a cooling capacity of 200 Kcal and has been shown to allow only marginal heart rate changes and heat accumulation in one hour of heat exposure at 50 C DB. The refrigeration system developed for in-flight use incorporates a fiberglass container for survival aids, refrigerant ice pack, quick-release connectors and liquid circulation pump and has been found compatible with ejection procedures. A.L.W.

**A81-49961 # Field studies of heat stress in fighter operations in Assam Valley.** V. K. Gupta (Indian Air Force, Institute of Aviation Medicine, Bangalore, India). (*Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.*) *Aviation Medicine*, vol. 25, June 1981, p. 46-48.

Results are presented of a study of thermal stresses in aircrews engaged in fighter operations under the high temperatures and high humidity conditions of the Assam Valley of India. Environmental temperatures and physiological parameters were recorded during low-level strike, medium altitude and high altitude flight profiles flown in a supersonic fighter trainer aircraft with a turbocooler system for cabin atmosphere control. In the low-level sorties, cockpit temperature was observed to rise by 3-5 C in the 15 min between cockpit entrance and takeoff, decrease by the same amount 5 min after takeoff, and increase progressively thereafter in the in-flight and post-landing phases, accompanied by subjective feelings of discomfort and sweat loss. Significant heat accumulation or sweat loss was not found in the medium- or high-altitude flights. Results point up the potential dangers of consecutive low-level missions in high-temperature, high-humidity ambient environments, especially in the absence of air-conditioned crew rooms for pilot recovery. A.L.W.

## A81-49962

**A81-49962 # Thermal stress in high speed low level flying.**  
B. Singh (Indian Air Force, New Delhi, India). (*Aero Medical Society of India, Symposium on Heat Stress in Aviation, Bangalore, India, Nov. 27, 28, 1980.*) *Aviation Medicine*, vol. 25, June 1981, p. 49, 50.

The problem of thermal stress in high-speed, low-level flight at high ambient temperatures is discussed in light of studies carried out on supersonic flight in northwest India and in Sardinia. The studies involved the measurement of cockpit air temperatures and aircrew sweat losses during the pre-flight and in-flight portions of 35-40 min sorties undertaken in fighter aircraft in the summer and winter. Results demonstrate the severity of the aircraft thermal environment in the summer even when compared to laboratory observations at higher temperatures and even in the comparatively mild summers of southern Europe. Relations between pilot mean body temperature, and cockpit temperature, cockpit temperature and sortie time, and pilot mean body temperature and sortie time are presented which allow the prediction of pilot mean body temperature during a sortie at various cockpit temperatures. It is pointed out that the only promising way of achieving a satisfactory thermal environment is by the creation of a microenvironment around the pilot by the use of a liquid-cooled suit.

A.L.W.

**COSMOS 1129 Final Report**

Milton R. Heinrich, ed. and Kenneth A. Souza, ed. Aug. 1981  
441 p refs  
(NASA-TM-81289; A-8572) Avail: NTIS HC A19/MF A01  
CSCL 06C

The physiological effects of an 18.5 day space flight on young male Wistar rats, on rat embryology, and on fertile quail eggs are described.

## STAR ENTRIES

**N81-32570\*#** California Univ. at Santa Barbara. Dept. of Geography.

**CREATION OF LEARNING KITS**

Douglas A. Stow, John E. Estes, and Frederick C. Mertz *In* NASA. Ames Research Center Field Study for Remote Sensing 1981 p 35-43

Avail: NTIS HC A05/MF A01 CSCL 05I

A learning kit is an essential part of any remote sensing workshop, course, or in-house training program to provide the 'hands-on' experience of working with remotely sensed imagery. This is the objective of laboratory and field exercises as well as the reason behind the production of imagery/map kits. The way in which these learning kits (containing conventional remotely sensed and collateral data products) are put together is described and some concerns that influence the creation of learning kits are discussed. These include budgetary constraints, number of imagery types, and number of collateral data types. A.R.H.

**N81-32572\*#** Humboldt State Univ., Arcata, Calif. Remote Sensing Technology Transfer Project Office.

**TEACHING/LEARNING PRINCIPLES**

Donna B. Hankins and William H. Wake *In* NASA. Ames Research Center Field Study for Remote Sensing 1981 p 61-68

Avail: NTIS HC A05/MF A01 CSCL 05I

The potential remote sensing user community is enormous, and the teaching and training tasks are even larger; however, some underlying principles may be synthesized and applied at all levels from elementary school children to sophisticated and knowledgeable adults. The basic rules applying to each of the six major elements of any training course and the underlying principle involved in each rule are summarized. The six identified major elements are: (1) field sites for problems and practice; (2) lectures and inside study; (3) learning materials and resources (the kit); (4) the field experience; (5) laboratory sessions; and (6) testing and evaluation. A.R.H.

**N81-32829\*** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

**BIOCENTRIFUGE SYSTEM CAPABLE OF EXCHANGING SPECIMEN CAGES WHILE IN OPERATIONAL MODE Patent**

Robert R. Bewley, inventor (to NASA) Issued 18 Aug. 1981 10 p Filed 30 Apr. 1980 Supersedes N80-24342 (18 - 15, p 1944)

(NASA-Case-MFS-23825-1; US-Patent-4,284,034;

US-Patent-Appl-SN-145273; US-Patent-Class-119-17;

US-Patent-Class-119-18) Avail: US Patent and Trademark Office CSCL 06B

The centrifuge comprises a generally circular, rotatably mounted frame carrying a plurality of removable and replaceable cages for the animal specimens. Pairs of opposing cages may be removed from the frame while it is rotating by means of a cage exchanger which rotates concentrically within the centrifuge and the speed of which is controlled independently of the frame speed. An image rotator is provided for selective observation of the rotating animals. The system further includes a waste conveyor system, a food supply system, and a water supply system for each cage for creating a life sustaining environment so that the animals can live in the rotating centrifuge for extended periods.

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

**N81-32830\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.  
**US RAT EXPERIMENTS FLOWN ON THE SOVIET SATELLITE**

**N81-32831\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EXPERIMENT K304: STUDIES OF SPECIFIC HEPATIC ENZYMES AND LIVER CONSTITUENTS INVOLVED IN THE CONVERSION OF CARBOHYDRATES TO LIPIDS IN RATS EXPOSED TO PROLONGED SPACE FLIGHT Final Report**  
S. Abraham (Children's Hospital Medical Center, Oakland, Calif.), H. P. Klein, C. Y. Lin (Children's Hospital Medical Center, Oakland, Calif.), C. Volkmann, R. A. Tigranyan (Inst. of Medical and Biological Problems, Moscow), and E. G. Vetrova (Inst. of Medical and Biological Problems, Moscow) *In its* US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 35-100 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The effects of space flight on the activities of 26 enzymes concerned with carbohydrate and lipid metabolism in hepatic tissue taken from male Wistar rats are investigated. These activities were measured in the various hepatic cell compartments, i.e., cytosol, mitochondria and microsomes. In addition, the levels of glycogen, total lipids, phospholipids, triglycerides, cholesterol, cholesterol esters, and the fatty acid composition of the rat livers were also examined and quantified. A similar group of ground-based rats treated in an identical manner served as controls. Both flight and synchronous control rats were sacrificed at three time intervals: R+0, 7-11 hours after recovery; R+6, after 6 days; R+6(S), after 6 days (having undergone 2-5 hour periods of fixed stress in a 'backward' position on days 0, 3, 4, 5 and 6) and R+29, after 29 days post-flight. Although most of the enzyme activities and the amounts of liver constituents studied were unaffected by the period of weightlessness, some significant differences were observed. J.D.H.

**N81-32832\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS Final Report**

Thomas J. Wrongski, Emily Morey-Holton, Christopher E. Cann (California Univ., San Francisco), Claude D. Arnaud (California Univ., San Francisco), David J. Baylink (American Lake Veterans Administration Medical Center, Tacoma, Wash.), Russell T. Turner (American Lake Veterans Administration Medical Center, Tacoma, Wash.), and Webster S. S. Jee (Utah Univ., Salt Lake City) *In its* US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 101-125 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The skeletal alterations induced by space flight were determined to be a reduced rate of periosteal bone formation in tibial and humeral diaphyses, a decreased trabecular bone volume, and an increased fat content of the bone marrow in the proximal tibial metaphysis. An increased incidence of arrest lines in flight animals suggested that periosteal bone formation may have ceased during space flight. Endosteal bone resorption was not affected markedly. Author

**N81-32833\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 1: EFFECTS OF WEIGHTLESSNESS ON OSTEOBLAST DIFFERENTIATION IN RAT MOLAR PERIODONTIUM Final Report**

W. Eugene Roberts (Univ. of the Pacific, San Francisco), Peter G. Mozsary (Univ. of the Pacific, San Francisco), and Emily Morey-Holton *In its* US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 127-148 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The morphometric analysis of periodontal ligament (PDL), the osteogenic interface between tooth and bone, is described. Immediately post-flight, PDL width and total cell number wer

decreased: Frequency distributions of nuclear volume revealed that presumptive preosteoblasts were particularly depressed. Depleted numbers of preosteoblasts may be an important factor in the mechanism of inhibited bone formation during weightlessness. J.D.H.

**N81-32834\*** Utah Univ., Salt Lake City. Dept. of Pharmacology.

**EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 2: BONE ELONGATION RATE AND BONE MASS IN METAPHYSIS OF LONG BONES Final Report**

Webster S. S. Jee, D. B. Kimmel, C. Smith, and R. B. Dell /n NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 149-175 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The proximal humeral metaphysis of rats from time periods recovery plus zero days (R+0), recovery plus six days (R+6), and recovery plus twenty nine days (R+29) was analyzed. The volume of calcified cartilage and bone in flight and synchronous controls was reduced in groups R+0 and R+6, but was normal in group R+29. The number of functional bone cells (osteoblasts and osteoclasts) was decreased in proportion to the amount of bone in the early groups, and was normal in the last group. The fatty marrow volume was increased only in flight animals of groups R+0 and R+6, but was normal in the R+29 group. Accumulation of excess fatty marrow was seen only in flight animals. The decreased amount of bone and calcified cartilage is believed to be the result of a temporarily slowed or arrested production of calcified cartilage as a substrate for bone formation. This would have resulted from slowed bone elongation during flight and synchronous control conditions. Bone elongation returned to normal by twenty nine days after return. Author

**N81-32835\*** Baylor Univ., Dallas, Tex. Dept. of Pathology. **EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 3A: TRABECULAR SPACING AND ORIENTATION IN THE LONG BONES Final Report**

M. M. Judy /n NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 177-198 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Values of mean trabecular spacing computed from optical diffraction patterns of 1:1 X-ray micrographs of tibial metaphysis and those obtained by standard image digitization techniques show excellent agreement. Upper limits on values of mean trabecular orientation deduced from diffraction patterns and the images are also in excellent agreement. Values of the ratio of mean trabecular spatial density in a region of 300 micrometers distal to the downwardly directed convexity in the cartilage growth plate to the value adjacent to the plate determined for flight animals sacrificed at recovery were significantly smaller than values for vivarium control animals. No significant differences were found in proximal regions. No significant differences in mean trabecular orientation were detected. Decreased values of trabecular spatial density and of both osteoblastic activity and trabecular cross-sectional area noted in collateral researches suggest decreased modeling activity under weightlessness. Author

**N81-32836\*** Baylor Univ., Dallas, Tex. Medical Center. **EXPERIMENT K305: QUANTITATIVE ANALYSIS OF SELECTED BONE PARAMETERS. SUPPLEMENT 3B: MINERALIZATION IN THE LONG BONES Final Report**

J. L. Matthews /n NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 199-228 ref

Avail: NTIS HC A19/MF A01 CSCL 06C

Electron microscope and optical birefringent studies of growth plates and metaphyseal trabeculae are described. The type and functional state of bone cells were investigated and the zone of calcification of the cartilagenous growth plate, particularly the presence and condition of matrix vesicles, was characterized. Trabecular number, size, and orientation were assessed. Comparisons with a control group, indicating changes resulting from a zero gravity situation, are presented. J.D.H.

**N81-32837\*** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio. Biodynamic Effects Branch.

**EXPERIMENT K307: VERTEBRAL BODY STRENGTH OF RAT SPINAL COLUMNS Final Report**

Leon E. Kazarian /n NASA. Ames Research Center US Rat Expts. Flown on the Soviet Satellite Cosmos 1129 Aug. 1981 p 229-266 refs

(NASA Order A-71669-B; Contract F33615-76-C-0401; AF Proj. 7231)

Avail: NTIS HC A19/MF A01 CSCL 06C

The effects of space flight on vertebral body bone strength excised were investigated. Comparative biomechanical investigations of vertebral body strength for flight, synchronous, and vivarium rats following spacecraft recovery (R+0), at R+6 and R+29 days post flight recovery are presented. Statistical analyses are presented for the mechanical properties of stiffness, ultimate load, displacement to ultimate load, and energy to ultimate load. At R+0 all of the above properties show that the vertebral body exhibits an increasing susceptibility to fracture. The reduction of bone strength is inhomogeneous and dependent on vertebral level. The R+6 recovery data was inconclusive since it varied above and below the R+0 data. At R+29 ultimate load values showed a statistically significant increase in bone strength approaching that of the vivarium or control group. J.D.H.

**N81-32838\*** Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**EXPERIMENT K-308: AUTOMATIC ANALYSIS OF MUSCLE FIBERS FROM RATS SUBJECTED TO SPACEFLIGHT Final Report**

Kenneth R. Castleman (Jet Propulsion Lab., Pasadena, Calif.), Luis A. Chui (Univ. of Southern California, Los Angeles), and Joseph P. VanDerMeullen /n NASA. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 267-278 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The morphology of histochemically prepared muscle sections from the gastrocnemius and plantaris muscles of flight and vivarium control rats was studied quantitatively. Both fast-twitch and slow-twitch fibers were significantly smaller in flight groups than in control groups. Fibers in group 4F were somewhat larger than in 1F, presumably due to growth after recovery. Fibers in 4V were slightly larger than in 1V, presumably due to age. The slow fibers showed more spaceflight induced size loss than fast fibers, suggesting they suffered more from hypogravity. The proportion of slow fibers was also lower in the flight groups, suggesting spaceflight induced fiber type conversion from slow to fast. Author

**N81-32839\*** Washington Univ., St. Louis, Mo. Dept. of Surgery.

**EXPERIMENT K-310: THE EFFECT OF SPACEFLIGHT ON OSTEOGENESIS AND DENTINOGENESIS IN THE MANDIBLES OF RATS Final Report**

David J. Simmons, Jean E. Russell, Frank Winter, Gary D. Rosenberg (Indiana Univ.), and William V. Walker /n NASA. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 279-306 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Normal rates of dentinogenesis and osteogenesis in the body of the mandible were observed. The total calcium, inorganic phosphorus and hydroxyproline levels in the jaws and incisors of the flight rats were normal. Gravity density fractionation studies suggested, however, that spaceflight caused a delay in the normal maturation of bone mineral and matrix; normal values were reestablished by 6 days postflight. The teeth were spared: The circadian and ultradian patterns of dentin calcification were normal during spaceflight and recovery periods, but the enamel rhythms displayed a greater amplitude of sulfur concentrations and this abnormal calcium to sulfur ratios only during exposure to zero gravity. The rat mandible and teeth do not suffer the deficits of bone formation common to weight bearing parts of the skeleton during spaceflight. The only derangements detected were in the quality of the matrix and mineral moieties. J.D.H.

**N81-32840\*** Yale Univ., New Haven, Conn. Dept. of Internal Medicine and Cell Biology.

**EXPERIMENT K-310: THE EFFECT OF SPACE FLIGHT ON OSTEOGENESIS AND DENTINOGENESIS IN THE MANDIBLE OF RATS. SUPPLEMENT 1: THE EFFECTS OF SPACE FLIGHT ON ALVEOLAR BONE MODELING AND REMODELING IN THE RAT MANDIBLE** Final Report

P. Tran Van, A. Vignery, and R. Bacon /*In NASA*. Ames Research Center US Rat Expts. flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 307-324 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The histomorphometric study of alveolar bone, a non-weight-bearing bone submitted mainly to the mechanical stimulations of mastication, showed that space flight decreases the remodeling activity but does not induce a negative balance between resorption and formation. The most dramatic effect of space flight has been observed along the periosteal surface, and especially in areas not covered with masticatory muscles, where bone formation almost stopped completely during the flight period. This bone, having been submitted to the same mechanical forces in the flight animals and the controls, leads to the conclusion that factors other than mechanical loading might be involved in the decreased bone formation during flight. J.D.H.

N81-32841\*# Bio Space, Inc., Painesville, Ohio.

**EXPERIMENT K-313: RAT AND QUAIL ONTOGENESIS** Final Report

J. Richard Keefe /*In NASA*. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 325-362 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

The potential effects of spaceflight on the processes of mammalian fertilization, implantation and embryonic development are investigated. Five female and two male rats were placed together on Day 2 of the flight. By R+17, it was determined that both flight and synchronous females were not carrying normal pregnancies and three of the flight animals were laparotomized. The uterus and ovaries were processed for microscopic analyses. The two remaining flight females were allowed to recover from the exploratory operation, rebred with flight males and delivered normal litters. As a control for potential transplacental effects that might be interpreted as direct spaceflight effects, a series of fertilized Japanese quail (*Coturnix japonica*) eggs was flown on Cosmos 1129. Although all of the eggs were adversely impacted by an inflight failure of the incubator humidifier on flight Day 13, several embryos were able to progress to a development stage equivalent to that of a control 10-12 Day embryo. J.D.H.

N81-32842\*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EXPERIMENT K-314: FETAL AND NEONATAL RAT BONE AND JOINT DEVELOPMENT FOLLOWING IN UTERO SPACEFLIGHT** Final Report

E. E. Sabelman (California Univ., San Francisco), E. M. Holton, and C. D. Arnaud (California Univ., San Francisco). /*In its US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 363-404 refs*

Avail: NTIS HC A19/MF A01 CSCL 06C

Infant rat limb specimens from Soviet and U.S. ground-based studies were examined by radiography, macrophotography, histologic sectioning and staining and scanning electron microscopy. A comparison was conducted between vivarium and flight-type diets suggesting that nutritional obesity may adversely affect pregnancy. Data were obtained on maturation of ossification centers, orientation of collagen fibers in bone, tendon and ligaments, joint surface texture and spatial relationships of bones of the hind limb. Computer reconstructions of the knee and hip show promise as a means of investigating the etiology of congenital hip dislocation. Auhor

N81-32843\*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EXPERIMENT K-315: STUDIES OF THE NASAL MUCOSA** Final Report

Lisbeth M. Kraft /*In its US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 405-414 refs*

Avail: NTIS HC A19/MF A01 CSCL 06C

The posterior regions of the olfactory nasal mucosa of rats flown on Cosmos 1129 failed to reveal histopathological changes. These results are at variance with those of the Apollo 12 Biocore experiment in which severe necrotic olfactory mucosal lesions were seen in flight animals only. In the anterior aspect of the nasal cavity of the Cosmos 1129 rats, however, focal lesions of moderate severity and variable extent were seen. These were consistent in character with that of a mild virus infection, which, it is postulated, was self-limiting. The infection was present in all groups of animals: flight, synchronous and vivarium control. Author

**N81-32844\*# Institute of Biomedical Problems, Moscow (USSR). EXPERIMENT K-316: EFFECTS OF WEIGHTLESSNESS ON BODY COMPOSITION IN THE RAT** Final Report

A. S. Ushakov, T. A. Smirnova, G. C. Pitts (Virginia Univ.), N. Pace (California Univ., Berkeley), and A. H. Smith (California Univ., Davis) /*In NASA*. Ames Research Center US Rat Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 415-426 refs

Avail: NTIS HC A19/MF A01 CSCL 06C

Five male rats were dissected into three major compartments (musculo-skeletal system, skin, and pooled viscera) and compared with synchronous controls. The flight group show a 6.7% reduction in total body water probably attributable to a 36.2% reduction in the extracellular compartment, reductions of 6.6% in musculo-skeletal water and 17.2% in skin water, an apparent shift of some water from skin to viscera, and a 20% reduction in bone mineral mass. Among organ fresh masses there was a 7.5% increase in kidneys and a 14.0% decrease in spleen. J.D.H.

N81-32845\*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**EXPERIMENT K-317: BONE RESORPTION IN RATS DURING SPACEFLIGHT** Final Report

Christopher E. Cann (California Univ., San Francisco) and Richard R. Adachi /*In its US Rats Expts. Flown in the Soviet Satellite Cosmos 1129 Aug. 1981 p 427-438 refs*

Avail: NTIS HC A19/MF A01 CSCL 06C

Direct measurement of bone resorption in flight and synchronous control rats is described. Continuous tracer administration techniques were used, with replacement of dietary calcium with isotopically enriched Ca40 and measurement by neutron activation analysis of the Ca48 released by the skeleton. There is no large change in bone resorption in rats. Based on the time course of changes, the measured 20-25% decrease in resorption is probably secondary to a decrease in total body calcium turnover. The excretion of sodium, potassium and zinc all increase during flight, sodium and potassium to a level 4-5 times control values. J.D.H.

N81-32846# Norwegian Defence Research Establishment, Kjeller.

**SPACECRAFT AND STELLAR OCCULTATIONS BY TURBULENT PLANETARY ATMOSPHERES. A THEORETICAL INVESTIGATION OF VARIOUS WAVE PROPAGATION EFFECTS AND THEIR IMPACT ON DERIVED PROFILES OF REFRACTIVITY, TEMPERATURE AND PRESSURE**

Bjarne Sigurd Haugstad 8 May 1981 75 p refs (AD-A103069; NDRE/PUBL-81/1002; ISSN-0085-4301) Avail: NTIS HC A04/MF A01 CSCL 03/2

The long propagation paths involved in radio and stellar occultations by turbulent planetary atmospheres require that the classical, weak scattering scintillation theory be expanded to account for the inhomogeneous ambient atmosphere upon which the turbulence is superimposed. Such coupling between the turbulent and the ambient components of refractivity reduces the scintillation index by less than a factor of two in shallow radio occultations. For stellar occultations the reduction varies between this value for very small projected stellar radii, to approximately a factor of 3.6 when the projected stellar radius above the planetary limb greatly exceeds the radius of the free-space Fresnel zone at this distance. More profound changes are found in the scintillation power spectrum, the shape of which depends strongly on both occultation depth and geometry when coupling to the inhomogeneous background is properly accounted for. Second-order, systematic propagation effects calculated from both geometrical optics and a wave-optical formulation show that the average phase velocity is increased

in the presence of turbulence. The finite wavelength dependence of the phase path bias implies that an initially non-dispersive medium becomes slightly dispersive by the addition of turbulence. Atmospheric profiles derived from occultations by turbulent planetary atmospheres differ only slightly from those of the corresponding non-turbulent atmosphere when the weak scattering condition is satisfied. GRA

**N81-32847#** California Univ., Berkeley. Lawrence Berkeley Lab.

**THEORETICAL AND OBSERVATIONAL ANALYSIS OF INDIVIDUAL IONIZING PARTICLE EFFECTS IN BIOLOGICAL TISSUE**

Alan Caril Nelson Nov. 1980 164 p refs  
(Contract W-7405-eng-48)

(LBL-11147-Rev) Avail: NTIS HC A08/MF A01

The microstructural damage to living tissue caused by heavy ion radiation was investigated. The corneal tissue of the living rat was exposed to various charged particle beams at different energies. X-rays were used on corneas to compare with the heavy ion irradiated corneas. The samples were subjected to graded ethanol dehydration and liquid carbon dioxide critical point drying. Scanning electron microscopy of corneal epithelium revealed heavy ion irradiation of the tissue. Lesions with circular symmetry occurred on the external plasma membranes of corneal epithelium which were irradiated with heavy ions, but similar lesions were not observed on the plasma membranes of X-ray irradiated or nonirradiated control samples. DOE

**N81-32848#** California Univ., Berkeley. Lawrence Berkeley Lab. Biology and Medicine Div.

**BIOLOGICAL EFFECTS OF HIGH DC MAGNETIC FIELDS**

Tom S. Tenforde Jun. 1981 48 p

(Contract W-7405-eng-48)

(DE81-028904; LBL-12954) Avail: NTIS HC A03/MF A01

An evaluation made of magnetic field effects on a broad range of physiological functions in laboratory mammals, including the measurement of circadian rhythms using noninvasive recording techniques. Results of investigations of magnetic field effects on the conformation of DNA, and on the growth and development of plants and insects are reported. Figures and tables provide a brief summary of some representative observations in each of the research areas described. No significant alterations were observed in any of the physiological parameters examined, with the exception of major changes that occur in the electrocardiogram during magnetic field exposure. This phenomenon is attributable to electrical potentials that are induced during pulsatile blood flow in the aorta and in other major vessels of the circulatory system. DOE

**N81-32849#** Johns Hopkins Univ., Baltimore, Md. School of Hygiene and Public Health.

**MOLECULAR BASIS OF THE MUTAGENIC AND LETHAL EFFECTS OF ULTRAVIOLET IRRADIATION**

1981 9 p refs

(Contract DE-AS02-76EV-02814)

(DE81-028535; DOE/EV-02814/3)

Avail: NTIS

HC A02/MF A01

In the last few years it became increasingly apparent that the enzymatic reactions leading to the incision of ultraviolet (UV) irradiated DNA are more complicated than the original single step model suggested. There may be at least two mechanisms to account for the multigenic control of this rate-limiting process. This mechanism is examined directly in mammalian cells by genetic complementation and immunological analysis of repair deficient human cell lines derived from patients with the repair deficiency xeroderma pigmentosum. DOE

**N81-32850#** Connecticut Univ., Farmington. School of Medicine.

**TOXICOLOGY AND METABOLISM OF NICKEL COMPOUNDS Progress Report, 1 Dec. 1980 - 30 Nov. 1981**

F. William Sunderman, Jr. 31 Jul. 1981 16 p refs

(Contract DE-AS02-76EV-03140)

(DE81-028924; DOE/EV-03140/T2)

Avail: NTIS

HC A02/MF A01

The toxicology and metabolism of nickel compounds (e.g., NiCl<sub>2</sub>, Ni<sub>3</sub>S<sub>2</sub> and Ni(CO)<sub>4</sub>) were investigated in rats. A provisional reference method for analysis of nickel in whole blood by electrothermal atomic absorption spectrometry was developed. Five macromolecular (63)Ni-binding constituents in rat kidney

cytosol were partially characterized. A spectrophotometric assay for N-acetyl-(ALPHA)-D-glucosaminidase (NAG) activity in urine was developed, and the NAG assay was applied to investigate nickel nephropathy in rats. The time-course, dose-response, and organ specificity of Ni(II)-induction of heme oxygenase activity in rats was elucidated. Intrarenal injection of Ni<sub>3</sub>S<sub>2</sub> in rats was demonstrated to result in renal glomerulomegaly and mesangial hyperplasia, sialyl hyperplasia, and generalized arteriosclerosis. The dissolution rates of 17 nickel compounds were determined in water, rat serum and renal cytosol. NiTc, NiSb and NiAs8 were discovered to be carcinogenic following intramuscular injection in Fischer rats. Nickel concentrations were surveyed in serum and urine of workers in two shipyards. DOE

**N81-32851#** Cornell Univ., Ithaca, N. Y. Dept. of Physical Biology.

**MOLECULAR MECHANISMS OF THE EPITHELIAL TRANSPORT OF TOXIC METAL IONS, PARTICULARLY MERCURY, CADMIUM, LEAD, ARSENIC, ZINC AND COPPER Comprehensive Progress Report, 1 Jan. 1979 - 31 Jul. 1981**

Robert H. Wasserman and Curtis S. Fullmer 1981 72 p refs  
(Contract DE-AS02-76EV-02792)

(DE81-029091; DOE/EV-02792/T1)

Avail: NTIS

HC A04/MF A01

Investigations have been continued to elucidate the mode of transepithelial transport of potentially toxic metal ions across the gastrointestinal tract, as well as their interactions with biological processes and other metal ions. Primary attention for this report period has been given to lead, cadmium and zinc. DOE

**N81-32852\*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

**SIMULATED SPACEFLIGHT EFFECTS ON MATING AND PREGNANCY OF RATS**

Eric E. Sabelman (California Univ. at San Francisco), Peter V. Chetirkin, and Robin M. Howard Sep. 1981 44 p refs

(NASA-TM-81326; A-8461) Avail: NTIS HC A03/MF A01  
CSCL 06C

The mating of rats was studied to determine the effects of: simulated reentry stresses at known stages of pregnancy, and full flight simulation, consisting of sequential launch stresses, group housing, mating opportunity, diet, simulated reentry, and postreentry isolation of male and female rats. Uterine contents, adrenal mass and abdominal fat as a proportion of body mass, duration of pregnancy, and number and sex of offspring were studied. It is found that: (1) parturition following full flight simulation was delayed relative to that of controls; (2) litter size was reduced and resorptions increased compared with previous matings in the same group of animals; and (3) abdominal fat was highly elevated in animals that were fed the Soviet paste diet. It is suggested that the combined effects of diet, stress, spacecraft environment, and weightlessness decreased the probability of mating or of viable pregnancies in the Cosmos 1129 flight and control animals. E.A.K.

**N81-32853\*#** Southwest Foundation for Research and Education, San Antonio, Tex.

**EVALUATION OF THE CNS AND CARDIOVASCULAR EFFECTS OF PROLONGED EXPOSURE TO BROMOTRIFLUOROMETHANE (CBrF<sub>3</sub>) Final Technical Report, 1 Mar. 1980 - 1 May 1981**

Irving Geller, Cynthia Garcia, Chester Gleiser, Richard Haines, Jr., Murray Hamilton, Roy Hartmann, Jr., Victor Mendez, Alan Samuels, and Maria San Miguel 1 May 1981 237 p refs

(NASA-CR-161078) Avail: NTIS HC A11/MF A01  
CSCL 06T

The proposed use of bromotrifluoromethane (CBrF<sub>3</sub>) as a fire extinguishant in aircraft, spacecraft and submarines has stimulated increasing interest and research in the toxicological properties of this compound. In a spacecraft, because of its unique recirculating life support system, the introduction of CBrF<sub>3</sub> by leakage or intentional discharge, will result in continuous exposure of crewman to low concentrations of this compound for periods of up to 7 days, or possibly even longer. The effects of low concentrations of CBrF<sub>3</sub>, under continuous exposure conditions, on the CNS and cardiovascular systems of animals to enable an assessment of these risks were investigated. T.M.

**N81-32854#** Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.

**COMPARATIVE STUDY OF METHODS OF IDENTIFICATION OF MODELS OF HUMAN REGULATORS [VERGLEICHENDE UNTERSUCHUNG VON IDENTIFIKATIONVERFAHREN FUER REGLER-MENSCH-MODELLE]**

Norbert Ninz 1980 209 p refs In GERMAN (ILR-48; ISSN-0341-0587; ISBN-3-7983-0701-6) Avail: NTIS HC A10/MF A01

Various techniques applicable to the determination of the parameters of a quasi-linear system were utilized to analyze human identification processes. The techniques studied included the maximum likelihood estimator, the Kalmar filter, and the cross-power density method. The productivity of the identification processes is addressed. Transl. by E.A.K

**N81-32866# Battelle Pacific Northwest Labs., Richland, Wash. CHEMICAL CHARACTERIZATION AND TOXICOLOGIC EVALUATION OF AIRBORNE MIXTURES Final Report, 1 Oct. 1979 - 30 Jul. 1980**

John E. Ballou Apr. 1981 78 p refs (Contract DAMD17-79-C-9160; DA Proj. 3S1-62780-A-843) (AD-A102678) Avail: NTIS HC A05/MF A01 CSCL 19/1

Generators were constructed to produce both petroleum (SGF-2) and red phosphorus/butyl rubber (RP/BR) smoke aerosols. The petroleum smoke generator produced smoke concentrations of 2 to 10 mg/1 for several hours. The Battelle exposure chamber was used to expose male and female Sprague-Dawley rats to the petroleum aerosol at concentrations of 2.65 to 10.73 mg/1 for periods of 1 to 6 hours. Animal deaths occurred only in the 6 hour exposure to 10.73 mg/1. Rats were exposed to 3.15, 4.33, 5.36 and 8.46 mg/1 for 1 hour and 1.53 mg/1 for 4 hours. The 4.33 mg/1 exposure produced 50% mortality. Of the 40 animals exposed for 1 hour, 23 died within 14 days. All of these died on days 1, 2, 6, 8, 9, 10, or 11. Observed pathology, included marked erosion and edema of the laryngeal and proximal tracheal region. E.A.K.

**N81-32866# Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.**

**ASSESSMENT OF HEALTH IMPACTS FROM ELECTRICAL-POWER TRANSMISSION LINES**

Morton W. Miller 1980 16 p refs

(Contract DE-AC02-76EV-03490) (UR-3490-2024) Avail: NTIS HC A02/MF A01

The types of investigations undertaken to test for possible biological effects of extremely low frequency (ELF) electric fields were numerous. However, neither animal and plant experimentation nor clinical studies nor experience with operating extremely high voltage (EHV) transmission lines have to date provided convincing evidence of a harmful effect from exposure to electric fields associated with transmission lines in spite of numerous attempts to find such effects. Analysis of internal fields and currents supports these observations as the levels appear to be too low to affect mammalian cells. Thus, while one can never prove the negative (i.e., that there is no effect), the overwhelming body of evidence indicates that the electric fields associated with high voltage lines have no deleterious biological effects. DOE

**N81-32867# Argonne National Lab., Ill. Div. of Biological and Medical Research.**

**BIOMEDICAL EFFECTS ASSOCIATED WITH ENERGY-TRANSMISSIONS SYSTEMS; EFFECTS OF 60-Hz ELECTRIC FIELDS ON CIRCADIAN AND ULTRADIAN PHYSIOLOGICAL AND BEHAVIORAL FUNCTIONS IN SMALL RODENTS Technical Report, 1 Jan. - 31 Dec. 1980**

C. F. Ehret, R. S. Rosenberg, G. A. Sacher, P. H. Duffy, K. R. Groh, and J. J. Russell 1980 85 p refs

(Contract W-31-109-eng-38) (DE81-027655; DOE/TIC-1027653) Avail: NTIS HC A05/MF A01

The effects of extremely low frequency (ELF) electric fields on transient patterns of circadian rhythms of physiological and behavioral end points were investigated. This project is developing a data base to determine the exposure conditions that disturb the highly characteristic waveforms of ultradian, circadian, and infradian rhythms. The following conclusions were reached: under a variety of exposure conditions the circadian regulatory system of the rat remained intact; brief ELF exposures at field strengths above 35 kV/m, presented during the inactive phase of the circadian cycle, produced a transient arousal in mice, characterized by increases in motor activity, carbon dioxide

production, and oxygen consumption; the transient arousal habituated rapidly; no significant effects were seen in the second, third, or fourth exposure of mice using a one hour on, one hour off protocol; and there were no circadian aftereffects of the intermittent ELF stimulus in mice, based on measures of rhythms of activity and gas metabolisms. DOE

**N81-32858# California Univ., Riverside. Biomedical Sciences Div.**

**TISSUE INTERACTION WITH NONIONIZING ELECTROMAGNETIC FIELDS Final Report, 1 Oct. 1978 - 13 Feb. 1981**

W. R. Adey, S. M. Bawin, A. F. Lawrence, S. Lin-Liu, R. A. Luber, R. L. Lundak, P. M. Sagan, and A. R. Sheppard Feb. 1981 174 p refs Prepared in cooperation with Veterans Administration Hospital, Loma Linda, Calif.

(Contract DE-AT01-79ET-29078) (DE81-027654; DOE/ET-29078/T1) Avail: NTIS HC A08/MF A01

Studies of the effects of environmental low frequency electromagnetic fields on isolated cellular systems and tissue preparations derived from brain, bone, blood, and pancreas are reported. Behavioral effects of 60 Hz fields were examined in monkeys. Bioeffects of low level microwave fields modulated at 60 Hz and other ELF frequencies were also examined. Findings emphasize a key role for cell membrane surfaces in detecting ELF environmental fields. DOE

**N81-32859# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.**

**THE NEURONAL POOL AS A FUNCTION UNIT IN THE CENTRAL NERVOUS SYSTEM (CNS)**

Anders Lansner 1980 34 p refs

(TRITA-NA-8009) Avail: NTIS HC A03/MF A01

The principles of information processing applied by these functional subunits are discussed starting from what is known about the properties of single neurons and synapses. The question of how quality, intensity and spatial properties of stimuli are coded in the trains of nerve impulses passed on along the nerve tracts is briefly treated. The information put into the neuronal pool via parallel nerve fibers is viewed as an input pattern. Each input pattern activates only a few of the neurons in the neuronal pool. Due to simultaneous presynaptic and postsynaptic activity these neurons become functionally connected to each other forming so called neuronal ensembles. The neuronal ensembles are postulated to make up the basic elements of activity in the neuronal pool and to influence each other mainly through parallel and serial association. Author (ESA)

**N81-32860# Conference of Radiation Control Program Directors, Inc., Rockville, Md.**

**CRITERIA FOR ADEQUATE RADIATION CONTROL PROGRAMS (X RAY): A REPORT OF TASK FORCE 2A Final Report**

Dept. of Health and Human Services Apr. 1981 20 p refs (Contract FDA-223-79-6010)

(PB81-197881; FDA/BRH-81/58; DHHS/PUB/FDA-81-8160) Avail: NTIS HC A02/MF A01 CSCL 06R

This guide was developed by the Task Force on Criteria for Adequate Radiation Control Programs (X Ray) at the direction of the Conference of Radiation Control Program Directors. This document presents the guidance of the Task Force as a result of its research and deliberations. It presents a method for determining the quality and quantity of the human resources necessary for the successful operation of a balanced, thorough and yet efficient X-ray control program at the state level. This report should serve as the basis by which state radiation control agencies, legislative bodies, as well as the public can make realistic evaluations regarding the adequacy of X-ray control programs. GRA

**N81-32861# Chinese Medical Association, Beijing.**

**CHINESE MEDICAL JOURNAL. VOLUME 94, NUMBER 4. APRIL 1981**

Apr. 1981 80 p refs

(PB81-204752) Avail: NTIS HC A05/MF A01 CSCL 06E

Contents include clinical reactogenicity and immunogenicity of five live measles vaccine strains, observations on red cell membrane of paroxysmal nocturnal hemoglobinuria, congenital aneurysm of thoracic aorta radiologic pathologic study of 8 cases; seroepidemiologic study of epidemic hemorrhagic fever with renal

syndrome in China; diagnosis and surgical treatment of early esophageal carcinoma; a five year report on community control of hypertension, stroke and coronary heart disease in the Shijingshan People's Commune, Beijing; and a study of increased griseolulvin bioavailability with p-hydroxy acetophenone. Nonsurgical traditional Chinese medicine in extradural hematomas is described. GRA

**N81-32862#** Bureau of Radiological Health, Rockville, Md. Div. of Compliance.

**ROUTINE COMPLIANCE TESTING FOR DIAGNOSTIC X-RAY SYSTEMS**

Dec. 1980 190 p Supersedes FDA-77-8001 (PB81-201501; FDA/BRH-81/62; DHHS/PUB/FDA-81-8161; FDA-77-8001) Avail: NTIS HC A09/MF A01 CSCL 06L

Procedures for the routine compliance testing of Diagnostic X-Ray Systems were described. The manual has two major subject areas: (1) testing procedures and (2) test equipment. Procedures efficient testing against many performance requirements and applicable to many different types of X-ray systems and each component of the routine compliance test system and described. The procedures and routine test equipment were used for screening diagnostic X-ray systems for evidence of noncompliance with the performance standard. GRA

**N81-32863#** Colorado Univ. at Boulder. Inst. of Cognitive Science.

**COMPREHENSION AND ANALYSIS OF INFORMATION IN TEXT. 4: DECISION AND VERIFICATION PROCESSES**

Technical Report, 1 May 1980 - 26 May 1981

Steve Antos (Ben Gurion Univ. of the Negev, Israel), Lyle E. Bourne, Jr., Ely Kozminsky (Ben Gurion Univ. of the Negev, Israel), and Walter Kintsch May 1981 54 p refs (Contract N00014-78-C-0433; NR Proj. 157-422) (AD-A102677; ICS-TR-104-ONR) Avail: NTIS HC A04/MF A01 CSCL 05/10

Reading texts for the purpose of making decisions was studied in a laboratory analog of a complex, natural, information-analytic domain. Subjects acting as stock brokers were trained in the first two sessions to categorize and evaluate stock report-type information. In addition, they learned to infer information from text-explicit facts. In Session three, subjects read texts and made decisions to Buy or Not Buy based on a conjunctive rule that was either given to the subject before (RB) or after (RA) reading the text. In Session 4, subjects read texts and then were presented probes that were to be verified as to either having or not having been presented in the previously read texts. Performance in all tasks was measured in terms of response latency, as well as accuracy. The results demonstrated that a specialized control schema for text comprehension develops that is based on the nature of the decision task. For example, readers in the RA versus the RB condition develop different text analysis techniques that are apparent in the decision, as well as the verification task performance. Most of the results are interpretable in terms of a model which suggests that purposes and goals relevant to the text comprehension process are incorporated into long-term memory (i.e., knowledge structures). The integration of these knowledge structures with current short-term information provides the basis of a task-appropriate text representation. Author (GRA)

**N81-32864#** Texas Christian Univ., Fort Worth. Inst. of Behavioral Research.

**AGGREGATION BIAS IN ESTIMATES OF PERCEPTUAL AGREEMENT**

Lawrence R. James (Georgia Inst. of Technology) 1 Aug. 1981 22 p refs (Contract N00014-80-C-0315; NR Proj. 170-904) (AD-A102726; IBR-81-12) Avail: NTIS HC A02/MF A01 CSCL 05/1

It is shown that estimates of agreement based on group mean scores have been incorrectly interpreted as applying to perceptual agreement among individuals. Of initial importance is a study by Drexler (1977), who concluded that a considerable proportion of the variance in climate perceptions is accounted for by organizational membership. This conclusion has been employed recently by other authors to support the assumption that individuals in the same environment tend to agree with respect to climate perceptions. The present paper demonstrates that Drexler's analysis provided inflated estimates of agreement among individuals. The logic of the approach is then extended to other studies in which inflated estimates of agreement appeared likely. Author (GRA)

**N81-32865** Aeronautical Research Labs., Melbourne (Australia). **EVALUATIONS OF A MODIFIED CREW SEAT FOR THE IROQUOIS**

B. A. J. Clark and S. R. Sarraillhe May 1980 42 p refs (ARL/APP-Report-80; AR-001-815) Copyright. Avail: Issuing Activity

The aircrew of Iroquois helicopters criticized aspects of the comfort and safety provided by the crew seats and additional faults were identified in crash investigations. The complaints include: (1) lack of protection against hyperextension of the neck (whiplash) and against impact onto the shoulder strap guide at the top of the backrest; (2) discomfort and pain during and after use of the crew seats; and (3) lack of provision for occasional wearing of parachutes. Studies of a modified crew seat show that the proposed head restraint is adequately strong and should reduce the likelihood of hyperextension injury. Replacement of the net seat by a foam cushion did not give a reliable improvement in comfort, nor did it improve the crash protection. Continued use of either crew seat in the aircraft is likely to lead to chronic backache in some pilots. Further modifications are suggested. A.R.H.

**N81-32866\*#** United Technologies Corp., Windsor Locks, Conn. **EXTRAVEHICULAR CREWMAN WORK SYSTEM (ECWS) STUDY PROGRAM: PREBREATHE ELIMINATION STUDY Final Report**

Richard L. Wilde Aug. 1981 269 p refs (Contract NAS9-15290)

(NASA-CR-167390; DRL-T-1286) Avail: NTIS HC A12/MF A01 CSCL 05H

The study examined impacts of changing Orbiter cabin pressure and EMU EVA pressure to eliminate pure O2 prebreathing prior to EVA. The investigation defines circumscribing physiological boundaries and identifies changes required within Orbiter to reduce cabin pressure. The study also identifies payload impacts, payload flight assignment constraints, and impacts upon EMU resulting from raising EVA pressure. The study presents the trade-off which optimizes the choice of reduced cabin pressure and increased EVA pressure. T.M.

**N81-32867#** Ballistic Research Labs., Aberdeen Proving Ground, Md.

**ANALYSIS OF MAN-IN-THE-LOOP CONTROL SYSTEMS IN THE PRESENCE OF NONLINEARITIES**

Robert T. Gschwind and Irving L. Chidsey Jun. 1981 45 p Supersedes ARBRL-MR-03110 (DA Proj. 1L1-61102-A-91A)

(AD-A102574; ARBRL-MR-03110) Avail: NTIS HC A03/MF A01 CSCL 05/9

The BRL and HEL are jointly investigating the effects of system nonlinearities on the accuracy of turret control systems with human operators in the loop. The system response at very low rates (one milliradian per second and less) is degraded because of the increased relative importance of nonlinear elements such as coulomb friction, backlash, and dead space. Good low rate response is necessary for accurate tracking of long range targets with laser designators and guided missile directors. This report describes the first phase of the BRL contribution to the joint project. This phase developed a simplified simulation of a turret control with a human transfer function. There is an adaptive algorithm to adjust the coefficients of the human transfer function to account for changes in the system characteristics. Backlash, coulomb friction, and dead space are introduced and their effects on system response and loop performance are documented. The next phase will adjust the simulation to agree with the system response of a concurrent turret measurement program. It will compare the loop performance to a concurrent experiment with a real man-in-the-loop. It will relate loop performance (tracking accuracy) to system response at low rates. Author (GRA)

**N81-32868#** Purdue Univ., Lafayette, Ind. Lab. for Applied Industrial Control.

**MAN-MACHINE SIMULATIONS IN INDUSTRIAL SYSTEMS. VOLUME 1: NARRATIVE M.S. Thesis**

Gary Irving Davis and James R. Buck Dec. 1980 277 p refs (Contract DE-AS07-80CS-40361; Grant NSF APR-73-07822) (DE81-027882; DOE/CS-40361/T6-Vol-1) Avail: NTIS HC A13/MF A01

Computer simulation is discussed and an alternative to methodologies upon relied. The development of computer simulation models suitable for representing human operators in

industrial process simulations are developed and presented. Use of these models is demonstrated through the use of a particular simulation technique entitled, 'Systems Analysis of Integrated Networks of Tasks' (SAINT). This simulation pseudo-language is a combination network modeling and simulation technique designed for the analysis of man-machine systems is provided as well as a review of the literature on simulation of man-machine systems. The development of the human operator models (referred to as Smart SAINT) and their use as a design aid is described. DOE

**N81-32869\*** National Aeronautics and Space Administration, Washington, D. C. Office of Space Science.

**PUBLICATIONS OF THE EXOBIOLOGY PROGRAM FOR 1980: A SPECIAL BIBLIOGRAPHY**

Linda G. Pleasant and Donald L. DeVincenzi Aug. 1981 36 p (NASA-TM-83808) Avail: NTIS HC A03/MF A01 CACL 06C

A list of approximately 160 publications resulting from research pursued under the auspices of NASA'S Exobiology Program is given. The publications address chemical evolution, organic geochemistry, origin and evolution of life, planetary environments, life in the universe, and planetary protection. M.G

**N81-33769** Materials Research Labs., Melbourne (Australia). **A COMPARISON OF POSSIBLE METHODS FOR MARINE FOULING ASSESSMENT DURING RAFT TRIALS**

John A. Lewis Apr. 1981 27 p refs (MRL-R-808; AR-002-406; NAV-79/137; DST-77/006) Copyright. Avail: Materials Res. Labs., P.O. Box 50, Ascot Vale, Vic. 3032

Fouling settlement data from HMAS STIRLING (Western Australia), the North Barnard Islands (North Queensland) and Williamstown (Victoria) were to evaluate the suitability of different methods for settlement. Density, cover, frequency and biomass were measured to assess the abundance of settlement on panels immersed during raft trials. Frequency was the most suitable measure of individual species abundance for comparisons. It is found that panel cover and biomass are better indices of total fouling abundance than either density or frequency. E.A.K.

**N81-33770#** Mitre Corp., McLean, Va. Metrek Div. **EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT, DEVELOPMENT OF NEURO-BEHAVIORAL BIOASSAYS IN LABORATORY ANIMALS, DIRECTORY OF INSTITUTIONS/INDIVIDUALS Final Report, Sep. 1978 - Jul. 1980**

Purna Greenaway and James Konz Oct. 1980 106 p (Contract DAMD17-78-C-8068; DA Proj. 3E1-61102-BS-04) (AD-A104225; WP-79W00681) Avail: NTIS HC A06/MF A01 CACL 06/20

This directory catalogues the organizations currently engaged in neurobehavioral bioassay utilization or development and provides information concerning specific measurements performed, test systems employed and compounds tested for the U.S. Army Medical Bioengineering Research and Development Laboratory. Author (GRA)

**N81-33771#** Joint Publications Research Service, Arlington, Va.

**USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 15, NO. 4, JULY - AUGUST 1981**

28 Sep. 1981 155 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 (JPRS-79085) Copyright. Avail: Issuing Activity

The physiological effects of various exobiological phenomena are discussed. Emphasis is placed on: hemodynamic response; lower body negative pressure; and orthostatic tolerance.

**N81-33772#** Joint Publications Research Service, Arlington, Va.

**LINEAR DISCRIMINANT FUNCTION USED TO ASSESS COSMONAUT REACTION TO LBNP**

A. D. Voskresenskiy, V. A. Degtyarev, V. G. Doroshev, N. I. Vikhrov, Zh. V. Barsukova, and N. A. Lapshina *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. -

Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 1-4 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 4-6

Avail: Issuing Activity

Efforts were made to formalize the procedure of summarizing data collected from the measurement of hemodynamic parameters during the lower back negative pressure (LBNP) test. It is shown that linear discriminant function can be used to rate reactions to LBNP. Major emphasis was placed on the acquisition of effective linear discriminant functions to assess the reactions to LBNP from the results of examining cosmonauts who have performed long term orbital flights. R.C.T.

**N81-33773#** Joint Publications Research Service, Arlington, Va.

**COMPARISON OF DIRECT AND INDIRECT METHODS OF MEASURING CARDIAC OUTPUT**

V. G. Doroshev, N. N. Popov, V. P. Katuntsev, N. A. Lapshina, O. B. Kulikov, G. K. Chizhov, V. A. Galichiy, K. S. Yurova, and R. I. Finogenova *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 5-8 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 7-9

Avail: Issuing Activity

Cardiac output was measured in anesthetized dogs directly (by the method of Fick and by electromagnetic flowmetry) and indirectly (by the method of Bremser-Ranke and by rheography). The measurements were carried out before and after drug tests. The absolute values of cardiac output at rest differed depending on the method used. After the drug test, all the methods revealed distinct changes in cardiac output. A good correlation between flowmetric and rheographic methods was demonstrated. Results indicated that both methods can be used in rapidly changing hemodynamic situations. The method of Bremser-Ranke proved more suitable for the processes developing within 30-40 seconds. R.C.T.

**N81-33774#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF NEGATIVE PRESSURE AND OCCLUSION CUFFS ON INTRAVASCULAR PRESSURE IN LEGS OF HEALTHY MAN**

V. Ye. Katkov, V. V. Chestukhin, E. M. Nikolayenko, S. V. Gvozdev, and V. V. Romyantsev *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 9-13 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 9-12

Avail: Issuing Activity

The effect of local negative pressure on the leg (with a bladder sealed above the knee) and occlusion cuffs (located as close as possible to Poupart's ligament) on the leg intravascular pressure was investigated in recumbency. Eight healthy volunteers participated in two experimental runs. Each of the two exposures was used at two levels: local negative pressure at -50 and -100 mm Hg; and occlusion cuffs at +40 and +50 Hg with exposure time averaging 5-7 min. Catheters were inserted into the femoral artery and vein, and arteries and veins of the back of the foot. The arterial pressure remained unchanged during both exposure (local negative pressure and occlusion cuffs). Upon exposure to local negative pressure the venous pressure in the back of the foot (with respect to the atmospheric pressure) did not change and in the femoral vein decreased. Upon exposure to occlusion cuffs the venous pressure in the back of the foot increased noticeably and in the femoral vein decreased slightly. R.C.T.

**N81-33775#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF LOWER BODY NEGATIVE PRESSURE (CHIBIS GARMENT) AND LOCAL NEGATIVE PRESSURE ON CENTRAL CIRCULATION IN HEALTHY MAN**

V. Ye. Katkov, V. V. Chestukhin, E. M. Nikolayenko, S. V. Gvozdev, V. V. Romyantsev, and Ye. V. Kolpakov *In Its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) p 14-21 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug.

1981 p 13-18

Avail: Issuing Activity

Catheters were chronically implanted into pulmonary and radial arteries of 8 healthy volunteers to examine the effect of lower body negative pressure (LBNP in the Chibis suit) and local negative pressure on the leg on central circulation, oxidative metabolism and acid base equilibrium in the blood. In 1 hour head down tests (at -20 deg) the effect of two regimens of LBNP (at -30 and -60 mm Hg) was studied, each exposure averaging 15-20 min. Both LBNP and local negative pressure induced changes in central circulation that were similar qualitatively and dissimilar quantitatively. Author

**N81-33776#** Joint Publications Research Service, Arlington, Va.

**USE OF NUTRIENTS TO CORRECT THE ADRENOCORTICAL SYSTEM**

S. Kalandarov, V. P. Bychkov, I. D. Frenkel, and T. P. Petukhova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 22-26 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 19-22

Avail: Issuing Activity

Two 60 day studies in which 10 healthy volunteers participated were carried out. In both studies stress situations were simulated by a chamber rise to an altitude of 8000 m, anticipation of exposure to acceleration, and psychological tests. The changes found were dependent on both the type of the stressor applied and duration of the exposure. Results indicate that nutrient supplements did not influence the adrenocortical function of the adrenals. R.C.T.

**N81-33777#** Joint Publications Research Service, Arlington, Va.

**ECHOVENTRICULOMETRY USED TO STUDY SPINAL FLUID CIRCULATION DURING REDISTRIBUTION OF FLUIDS IN A CRANIAL DIRECTION**

V. I. Sokolov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 27-29 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 22-23

Avail: Issuing Activity

The possibility of evaluating intracranial spinal fluid pressure by means of echoventriculometry is discussed. Major consideration is given to the capability of the technique to evaluate the functional and adaptive mechanisms involved in maintaining cerebral hemodynamics and dynamics of spinal fluid. Significant results are reported. R.C.T.

**N81-33778#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF ONE DAY IMMERSION ON CARDIORESPIRATORY PARAMETERS OF MAN DURING EXERCISE**

S. M. Belyayev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 30-33 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 24-26

Avail: Issuing Activity

The effect of 1 day water immersion (dry immersion) on cardiorespiratory parameters of test subjects performing submaximal exercises was studied. Individual changes involving increases in heart rate and cardiac load index, and decreases in oxygen pulse and systolic volume were observed. These changes suggest a decline of adaptive ability of the human body to muscular loads after 1 day water immersion. R.C.T.

**N81-33779#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF HYPOKINESIA IN HEAD DOWN POSITION ON MAN'S EQUILIBRIUM FUNCTION**

A. R. Kotovskaya, L. N. Gavrilova, and R. R. Galle *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 34-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 26-29

Avail: Issuing Activity

Six test subjects participating in a 182 day head down study at -4 deg were examined stabilographically before and during the test. During the first 30 days the subjects showed impaired equilibrium which later was relatively stabilized. Continuation of the bed rest study did not impair drastically stability of upright standing. It was shown that the contribution of optic sensors into the recovery of the equilibrium function increased during the second half of the bed rest study. Provocative tests suggest that bed rest related impairment of equilibrium occurs due to vestibular changes and deconditioning. R.C.T.

**N81-33780#** Joint Publications Research Service, Arlington, Va.

**PROGNOSTIC VALUE OF BLOOD CHOLESTEROL LEVEL IN HEALTHY SUBJECTS**

V. V. Vlasov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 39-43 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 30-33

Avail: Issuing Activity

An hypothesis was developed which states that normal values (reference values for healthy individuals) can be statistically formed by screening a random group of people or even as a characteristic of a certain heterogeneous random clinical group (reference group). The records of in hospital examination of 355 pilots and navigators between the ages of 34-36 and 33-41 years were studied. Blood cholesterol level was selected as the analyzed parameter. Results indicate that blood cholesterol concentration in healthy flight personnel 35 years of age differs from the recommended reference range and constitutes 5.78 + or - 0.73 mM/1. Other significant results are reported. R.C.T.

**N81-33781#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF EXERCISE ON REACTIONS TO BREATHING A GAS MIXTURE WITH 5% CARBON DIOXIDE AND 14% OXYGEN**

N. P. Krasnikov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 44-47 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 33-35

Avail: Issuing Activity

The effect of a hypoxic hypercapnic gas mixture (5% CO<sub>2</sub> + 14% O<sub>2</sub>) on the exercising man was studied. At a low work load inhalation of this gas mixture inhibited gas exchange, and after 10 month training stimulated it. Increase in physical endurance was followed by increase in human resistance to O<sub>2</sub> deficiency and CO<sub>2</sub> excess in the breathing mixture. Author

**N81-33782#** Joint Publications Research Service, Arlington, Va.

**SENSITIVITY TO ANTIBIOTICS OF LACTOBACILLI FROM DIGESTIVE TRACT OF SOYUZ-13 AND SALYUT-4 CREW MEMBERS**

A. A. Lentsner, M. E. Tyur, Kh. P. Lentsner, M. E. Mikelsaar, V. M. Shilov, N. N. Lizko, and G. D. Strykh *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 83-87 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 36-39

Avail: Issuing Activity

Sensitivity to 10 antibiotics of 411 lactobacillar strains isolated from the saliva and feces of crewmembers who made 8, 30 and 63 day flights was determined. Antibiotic sensitivity remained unchanged even in the 63 day flight. The antibiotics tested produced different effects on the lactoflora that varied from gentle polymyxin and gentamycin, less gentle neomycin and monomycin, to hazardous penicillin and erythromycin, then rifampicin and levomycetin, and, finally, tetracyclin and oleandomycin. Author

**N81-33783#** Joint Publications Research Service, Arlington, Va.

**STUDY OF DIGESTIVE TRACT MICROFLORA OF SOYUZ-13 AND SALYUT-4 CREWS**

A. A. Lentsner, Kh. P. Lentsner, M. E. Mikelsaar, V. M. Shilov, N. N. Lizko, G. D. Strykh, and V. I. Legenkov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. -

Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 48-52 refs  
Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow),  
v. 15, no. 4, Jul. - Aug. 1981 p 39-43

Avail: Issuing Activity

The species composition and biology of lactoflora of the saliva and feces of crewmembers from 8, 30 and 63 day flights was investigated. Altogether 593 strains of lactobacilli were examined. The space flights did not cause significant changes in physiology, biochemistry, antagonistic properties or lysozyme activity of lactobacilli. They did not change drastically or unify the species composition of the digestive lactoflora. However, transfer of lactobacilli from one crewmember to another cannot be excluded, its probability increasing with flight time. Author

**N81-33784#** Joint Publications Research Service, Arlington, Va.

**EFFECTIVENESS OF DECOMPOSITION OF PLANT WASTE BY MICROORGANISMS UNDER AEROBIC CONDITIONS**

I. L. Chernovich, L. M. Sidorova, and N. A. Maltseva *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 53-59* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 44-45

Avail: Issuing Activity

Degradation of plant wastes by means of microbial coenosis under aerobic conditions was studied. Efficiency of the process increased with increase in time and temperature. Microbial degradation of vegetable wastes was more complete than that of wheat wastes. Author

**N81-33785#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF SEX HORMONES ON SOME PARAMETERS OF CARBOHYDRATE METABOLISM IN THE LUNGS OF HYPOXIC RATS**

N. N. Pribylova *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 60-62* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 45-48

Avail: Issuing Activity

Experiments were carried out to reveal changes in the content of glucose, glycogen, pyruvate and lactate and in the activity of hexokinase and lactate dehydrogenase in the lungs of white rats exposed to 7 and 35 day hypoxia (rise to 9000 m for 6 hours daily) and treated with progesterone and testosterone. Treatment with the steroid hormones during chronic hypoxia increased the pulmonary content of glucose, glycogen, pyruvate, and decreased hexokinase activity and lactate accumulation. Author

**N81-33786#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF CHRONIC GAMMA IRRADIATION ON PROTEIN COMPOSITION AND CHOLESTEROL CONTENT OF CANINE BLOOD**

A. A. Akhunov *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS) 28 Sep. 1981 p 63-67* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 48-50

Avail: Issuing Activity

In a chronic experiment dogs were exposed to radiation in doses of 190, 360, and 560 rad for 3 years. As compared to the unirradiated controls they showed a slower recovery of the albumin and cholesterol content in the blood. The cholesterol content varied, depending on the dose of chronic irradiation, whereas the protein content did not show such a correlation. Author

**N81-33787#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF STATIONARY MAGNETIC FIELD ON THE THYROID**

V. M. Katola, A. D. Chertov, V. I. Kirichenko, A. B. Priogov, and V. I. Molchanov *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 68-70* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 50-52

Avail: Issuing Activity

Rats were exposed to a constant magnetic field of 26268 A/m. Depending on the exposure time, the thyroid gland showed changes in the follicular epithelium height, content of ribonucleoproteins and PAS-positive substance, activity of adenylate cyclase, whereas blood serum exhibited changes in the concentration of thyroid hormones and no changes in the content of thyrotropic hormone. Author

**N81-33788#** Joint Publications Research Service, Arlington, Va.

**MECHANISM OF ADRENOSYMPATHETIC SYSTEM REACTION TO SINGLE EXPOSURE TO VARIABLE MAGNETIC FIELD**

S. A. Sakharova, A. I. Ryzhov, and N. A. Udintsev *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 71-73* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 52-56

Avail: Issuing Activity

In view of the complex nature and functional correlation between the adrenosympathetic system (ASS) and central nervous system, glucocorticoid function of the adrenals and catecholamine (CA) reserves, the role of these relationships in formation of the response of the ASS to a variable magnetic field (VMF) was investigated. Phenobarbital was used to exclude the central nervous system. Rausedyl was used to mobilize reserve catecholamines; dexasone induced compensatory atrophy of the adrenal cortex; after splachnotomy, visible vessels and the lipid capsule were swabbed with formalin. The reaction of the ASS to VMF was absent in experiments where phenobarbital and rausedyl were administered and splachnotomy performed, whereas with administration of dexasone only a mediator part was not involved in the reaction. Experiments with rausedyl demonstrated that the CA reserve levels in organs play an important role in formation and degree of ASS reaction to the stressor, whereas the hemodynamic and morphological changes in cellular elements of organs induced by the field were related to mobilization of reserve CA. M.G.

**N81-33789#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF ATTENUATED GEOMAGNETIC FIELD ON E. COLI RESISTANCE TO ULTRAVIOLET RAYS**

O. A. Alferov and T. V. Kuznetsova *In its USSR Rept. Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 74-79* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 57-58

Avail: Issuing Activity

The effect of an attenuated geomagnetic field on E. coli tolerance to ultraviolet irradiation was studied. The geomagnetic field was shielded to provide 40- and 160-fold attenuation. It was demonstrated experimentally that the 160-fold attenuated field increased E. coli tolerance, whereas the 40-fold attenuated field decreased it. The geomagnetic effect depended on the exposure time, reaching maximum after five passages of E. coli. An additional magnetic field simulating the geomagnetic field generated in a shielded chamber reversed the effect of an attenuated geomagnetic field. M.G.

**N81-33790#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF FLIGHT ABOARD COSMOS-936 BIOSATELLITE ON CONTRACTILE PROPERTIES OF RAT MUSCLE FIBERS**

V. S. Oganov, S. A. Skuratova, and M. A. Shirvinskaya *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 80-82* refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 58-61

Contractile properties of glycerinated fibers of skeletal muscles of rats flown for 18.5 days on Cosmos-936 were investigated. In slow antigravitational muscles (soleus m. and triceps brachii m.), decrease in the amplitude of isometric tension and performance as well as acceleration of the contraction development were observed. A high specificity of reactions of

skeletal muscles to the experimental conditions is indicated, depending on their functional specialization. It is suggested that changes in contractile properties of myofibrillar proteins may contribute to the adaptive rearrangement of functional properties of antigravitational muscles under the influence of space flight. M.G.

**N81-33791#** Joint Publications Research Service, Arlington, Va.

**ARTIFICIAL GRAVITY AS A MEANS OF PREVENTING ATROPHIC SKELETAL CHANGES**

G. P. Stupakov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 88-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 62-63

Avail: Issuing Activity

The efficacy of artificial gravity, created by an onboard centrifuge in the Cosmos-936 biosatellite, as a means of preventing development of osteoporosis in weightlessness was tested. The results indicated that exposure of rats to artificial gravity of 1 g can prevent development of osteoporosis. M.G.

**N81-33792#** Joint Publications Research Service, Arlington, Va.

**STATES OF CATECHOLAMINES AND ENZYMES OF SYNTHESIS THEREOF IN THE ADRENAL MEDULLA OF RATS AFTER FLIGHT ABOARD COSMOS-936 BIOSATELLITE**

R. Kvetnyanski, T. Torda, R. A. Tigranyan, Yu. Chulman, and A. M. Genin *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 91-93 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 64-65

Avail: Issuing Activity

In the adrenals of weightless and centrifuged rats flown for 18.5 days onboard the biosatellite Cosmos-936, indicators of the activity of the adrenomedullary system, i.e., the content of catecholamines and activity of the enzymes involved in their synthesis (tyrosine hydroxylase and dopamine-beta-hydroxylase) were measured. It was found that none of the indicators changed postflight. These findings show that a prolonged exposure of rats to weightlessness does not act as a strong stressor for the adrenomedullary system. M.G.

**N81-33793#** Joint Publications Research Service, Arlington, Va.

**FLOUR BEETLE REPRODUCTION AND MUTABILITY IN WEIGHTLESSNESS (EXPERIMENTS ABOARD SALYUT-6 ORBITAL STATION)**

G. P. Parfenov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 94-100 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 66-70

Avail: Issuing Activity

The effects of weightlessness on reproduction and mutability in beetles were investigated. Experiments with the flour beetle *Tribolium castaneus* showed that in weightlessness these insects completed their cycle of development--from fertilization to the emergence of mature imago of the next generation--in the normal way. Survival of specimens, densities of cultures, duration of development, and frequency of morphoses in flight and control studies were similar. Exposure to weightlessness did not increase the number of genetic changes. M.G.

**N81-33794#** Joint Publications Research Service, Arlington, Va.

**COMPUTER USE FOR AUTOMATIC MEASUREMENT OF SOME PHYSIOLOGICAL PARAMETERS**

V. A. Degtyarev, N. M. Zhurba, Yu. A. Kukushkin, V. G. Doroshev, and N. A. Lapshina *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 101-106 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 70-73

Avail: Issuing Activity

The possibility of automatic processing of some hemodynamic

parameters included in the set of medical monitoring methods for manned orbital station crews was investigated. The physiological parameters of sphygmograms of the carotid, radial, and femoral arteries; kinetocardiograms; tachoscillograms; and electrocardiograms were recorded synchronously with an onboard Polynome-2M apparatus. These curves were then interpreted automatically and the hemodynamic parameters were calculated with a computer. The algorithms are described in some detail. M.G.

**N81-33795#** Joint Publications Research Service, Arlington, Va.

**METHOD FOR EVALUATING RESPIRATORY SYSTEM REACTION TO INCREASING HYPERCAPNIA**

L. A. Ivanov *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 107-111 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, July. - Aug. 1981 p 74-76

Avail: Issuing Activity

The methodology and results of an experiment to test the effect of progressive hypercapnia on pulmonary ventilation are described. According to this method, the subject breathes from a spirometer, from which the CO<sub>2</sub> absorber is removed. A carbograph is connected in parallel with the spirometer in order to record CO<sub>2</sub> concentration concurrently with pulmonary ventilation. One finds the points in the system of coordinates characterizing the correlation between partial CO<sub>2</sub> tension in alveolar air and minute volume by plotting the former on the x-axis and the corresponding later on the y-axis. By drawing a line through these points, one obtains a curve of minute volume as a function of PACO<sub>2</sub>, which reflects the reaction of the respiratory center to CO<sub>2</sub>. The intersection of this line on the x-axis corresponds to the point that characterizes PACO<sub>2</sub> level, at which ventilation equals zero (sensitivity of the respiratory center to CO<sub>2</sub>). M.G.

**N81-33796#** Joint Publications Research Service, Arlington, Va.

**LOG-LINEAR REGRESSION METHOD USED TO ASSESS QUALITY OF AIR SAMPLES IN FLUOROPLASTIC CONTAINERS**

V. Ye. Ryzhkova, Ye. N. Kulkov, and K. N. Mikos *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 112-115 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 76-78

Avail: Issuing Activity

The possibility of using fluoroplastic containers for storage of air samples containing traces of organic matter was investigated. Gas chromatographic analysis of samples from containers was performed immediately after they were filled with a mixture, after 4, 6, 8, and 24 hours on the first day, then once a day for 10 days. The results show that there was virtually no change in concentrations of saturated hydrocarbons (methane, ethane) during storage. There was exponential change in levels of oxygen-containing organic substances (methanol, ethanol, acetone, and ethyl acetate). The change as particularly intensive in the first 6 hours. Regression analysis was performed to demonstrate dependence of concentration on storage time. A log-linear regression model was constructed using the least squares method. M.G.

**N81-33797#** Joint Publications Research Service, Arlington, Va.

**AGE-RELATED CHANGES IN BODY AND VISCERAL WEIGHT OF WISTAR RATS**

G. I. Plakhuta-Plakutina, Ye. I. Alekseyev, G. N. Durnova, Ye. I. Ilina-Kakuyeva, A. S. Kaplanskiy, A. S. Pankova, Ye. A. Savina, V. N. Shvets, and V. I. Yakovleva *In its USSR Rept.: Space Biol. and Aerospace Med.*, Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 116-120 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 79-81

Avail: Issuing Activity

The patterns of growth of the body, absolute and relative weight of internal organs, endocrine glands, different muscles, and linear parameters of the skeleton of the Wistar rat were

investigated. The results indicate that rats grow the most intensively up to the 80th to 90th day of postnatal ontogenesis. Starting in the third month of life there is some stabilization of the relative weight of internal organs. It is recommended to use animals from the age of 3 months in experiments conducted to investigate the effects of various extreme factors on the adult organism. Additional recommendations are given. M.G.

**N81-33798#** Joint Publications Research Service, Arlington, Va.

**METHOD OF TESTING WHITE RAT ELEVATOR RESPONSE**

G. S. Ayzikov, A. S. Markin, A. V. Mokrousova, and I. Yu. Sarkisov *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 121-124 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 82-84*

Avail: Issuing Activity

A device to study the latency period of the elevator reaction (LPER) of white rats is described in detail. The device was developed in accordance with a program of inflight experiments aboard Cosmos-936 and Cosmos-1129 to analyze the state of vestibulomotor reactions of animals. M.G.

**N81-33799#** Joint Publications Research Service, Arlington, Va.

**SUBCUTANEOUSLY IMPLANTED CONNECTOR TO RECORD ARTERIAL PRESSURE AND MAKE ELECTRICAL CONTACT**

Yu. Ya. Gaich, V. S. Baranov, V. V. Suchkov, and O. S. Medvedev *In its USSR Rept. Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 125-127 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 84-85*

Avail: Issuing Activity

The design of a catheter, with a nipple connector on the end, which is completely implanted under the skin is described. The connector could, with minor alteration of design, be used to provide temporary electrical contact. M.G.

**N81-33800#** Joint Publications Research Service, Arlington, Va.

**METHOD FOR ATTACHING CEREBRAL THERMOCOUPLE WIRES TO THE DOG'S SKULL**

O. Ye. Ozerova *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 128-130 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 85-86*

Avail: Issuing Activity

A method for attaching brain thermocouple wires to the dog's skull, which would make it possible to retain natural heat insulation of the brain, is discussed. The hardware and surgical procedures are described in detail. M.G.

**N81-33801#** Joint Publications Research Service, Arlington, Va.

**METHOD FOR EVALUATING RESPIRATORY SYSTEM REACTION TO INCREASING HYPERCAPNIA**

L. A. Ivanov *In its USSR Rept.: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 107-111 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, July. - Aug. 1981 p 74-76*

Avail: Issuing Activity

The methodology and results of an experiment to test the effect of progressive hypercapnia on pulmonary ventilation are described. According to this method, the subject breathes from a spiograph, from which the CO<sub>2</sub> absorber is removed. A carbograph is connected in parallel with the spiograph in order to record CO<sub>2</sub> concentration concurrently with pulmonary ventilation. One finds the points in the system of coordinates characterizing the correlation between partial CO<sub>2</sub> tension in alveolar air and minute volume by plotting the former on the x-axis and the corresponding later on the y-axis. By drawing a line through these points, one obtains a curve of minute volume as a function of PACO<sub>2</sub>, which reflects the reaction of the respiratory center to CO<sub>2</sub>. The intersection of this line on the x-axis corresponds to the point that characterizes PACO<sub>2</sub> level,

at which ventilation equals zero (sensitivity of the respiratory center to CO<sub>2</sub>). M.G.

**N81-33802#** Joint Publications Research Service, Arlington, Va.

**EFFECT OF HYPOXIA ON AFFINITY OF HEMOGLOBIN FOR OXYGEN IN ANIMALS**

V. V. Gladilov *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 p 134-136 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 88-89*

Avail: Issuing Activity

The effect of hypoxia on the oxygen-binding property of hemoglobin was examined with a particular concern for the role of 2,3-diphosphoglyceric acid as the oxygen-affinity regulator. Since the level of this phosphate in the blood of animals of different species and age is not the same, cats, rabbits, and hamsters of differing ages were used. M.G.

**N81-33803#** Joint Publications Research Service, Arlington, Va.

**CHANGES IN RABBIT IMMUNOREACTIVITY AS RELATED TO DURATION OF HYPOKINESIA**

V. V. Tyavokin, V. N. Sizov, G. V. Magnitskaya, and Ye. A. Dleynnikova *In its USSR Rept: Space Biol. and Aerospace Med., Vol. 15, No. 4, Jul. - Aug. 1981 (JPRS-79085) 28 Sep. 1981 137-139 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 15, no. 4, Jul. - Aug. 1981 p 90-91*

Avail: Issuing Activity

The effects of hypokinesia differing in duration and readaptation period on the body's nonspecific defense factors were examined. The tests to determine the intensity of spontaneous immunity included: bactericidal, lysozyme, beta-lysine, blood serum complement activity and neutrophil phagocytic reaction, which consisted of phagocytotic activity, intensity and completion of phagocytosis. M.G.

**N81-33804\*#** National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

**NON-INVASIVE METHOD AND APPARATUS FOR MEASURING PRESSURE WITHIN A PLIABLE VESSEL**

Masashi Shimizu 19 Feb. 1981 14 p  
(NASA-Case-ARC-11264-1; US-Patent-Appl-SN-235866) Avail: NTIS HC A02/MF A01 CSCL 06B

A non-invasive method and apparatus for measuring pressure within a pliable vessel such as a blood vessel are described. The blood vessel is clamped by means of a clamping structure having a first portion housing a pressure sensor, and a second portion extending over the remote side of the blood vessel for pressing the blood vessel into engagement with the pressure sensing device. The pressure sensing device includes a flat deflectable diaphragm portion arranged to engage the blood vessel. In one embodiment, the clamp structure includes first and second semicylindrical members held together by retaining rings. In a second embodiment the clamp structure is of one piece construction having a solid semicylindrical portion and a hollow semicylindrical portion with a longitudinal slot in the hollow semicylindrical portion through which to slip the blood vessel. In a third embodiment, an elastic strap is employed for clamping the blood vessel against the pressure sensing device. NASA

**N81-33805#** Cornell Univ., Ithaca, N. Y.

**PRIMARY EVENTS IN VISION Final Technical Report**

Aaron Lewis 27 Sep. 1980 16 p  
(Contract N00019-79-C-0621)  
(AD-A095369) Avail: NTIS HC A02/MF A01 CSCL 06/16

This report focuses on the fundamental mechanisms by which light energy is converted into a neural response in visual photoreceptor cells. Research in this area has approached the stage that permits the piecing together the molecular mechanisms between absorption of light and the generation of a neural response. Consideration is given to the primary molecule of visual photoreception--rhodopsin. The molecule is composed of a form of vitamin A which is called retinal, and this form of vitamin A is connected through a Shift base-nitrogen linkage to a membrane glycoprotein matrix called opsin. The combination of retinal and opsin is called rhodopsin. The question of light absorption by rhodopsin is discussed. It has been generally accepted that

retinal interaction indeed undergoes structural alteration between rhodopsin and bathorhodopsin. A new aspect represented by the above mechanism is a movement of the proton in the protein. Measurements indicated that, as a result of the absorption of light, one of the first molecular events is the motion of a proton, and this is probably the first ion movement that is initiated by the rhodopsin molecule. Other experiments, are showing that there are several other chemical species activated by the absorption of light in the rhodopsin molecules. GRA

**N81-33806#** Naval Medical Research Inst., Bethesda, Md.  
**HUMAN ENGINEERING EVALUATION OF THE HYPERBARIC RESEARCH FACILITY Final Report**  
 J. I. Brady and M. D. Curley Jul. 1981 69 p refs  
 (AD-A103681; NMRI-81-47) Avail: NTIS HC A04/MF A01 CSCL 14/2

The human engineering evaluation and human factors deficiencies were studied. Recommendations for alterations or additions were made which are grouped under the headings of: work place or watch station, environment, personnel; and emergency systems. The majority of recommendations dealt with control panel layouts, functional grouping, gauge placement, and chamber habitability. At the present time, the most serious problem identified is the excessive noise levels in the control area of the chambers. Octave band analysis reveals that: (1) the primary noise sources are the life support loops and the building air conditioning system, and (2) because of the frequency distribution of the noise, ear protectors are not a viable solution since the peak noise levels fall in the same frequency range as the peak levels in male speech. Light levels throughout the complex generally fall within acceptable limits. The necessity for increased manpower is recommended. The HRF's emergency system displays high attention getting value through both auditory and visual alarms, and good readability. E.A.K.

**N81-33807#** California Univ., San Diego.  
**MEASURING SLEEP BY WRIST ACTIGRAPH Annual Report, 1 Apr. 1980 - 31 Mar. 1981**  
 Daniel F. Kripke, John B. Webster, Daniel J. Mullaney, Sam Messin; and William Mason Mar. 1981 34 p refs  
 (Contract DAMD17-78-C-8040)  
 (AD-A103196; AR-3) Avail: NTIS HC A03/MF A01 CSCL 06/16

A method of monitoring personnel sleep and activity in field conditions needed to promote medical planning for modern combat was investigated. A wearable digital activity system was programmed, tested, and evaluated. A computer process for recognizing sleep from this system was defined. The systems allow collection of data from freely ambulatory subjects who can be scored automatically for sleep/wake with accuracy comparable to EEG scoring. The microprocessor based digital activity monitor is built to specifications, and external activity and illumination transducers are added. Since the errors that occur include both misscoring sleep as wake and vice versa, they tend to cancel. It is concluded that design criteria for a miniaturized wrist mounted activity monitor are suitable for field or combat use. E.A.K.

**N81-33808#** School of Aerospace Medicine, Brooks AFB, Tex.  
**A FAST WALSH TRANSFORM ELECTROCARDIOGRAM DATA COMPRESSION ALGORITHM SUITABLE FOR MICROPROCESSOR IMPLEMENTATION Final Report, Jun. - Aug. 1980**  
 Walter S. Kuklinski and Al M. Zied Jun. 1981 27 p refs  
 (AF Proj. 7755)  
 (AD-A104115; SAM-TR-81-13) Avail: NTIS HC A03/MF A01 CSCL 06/5

The feasibility of using a sequency-ordered Fast Walsh transform algorithm in a transformation-type ECG data compression scheme was demonstrated. The relationship of the mean square error between the original and reconstructed ECG signals as a function of the number of Walsh coefficients retained and the number of bits used to represent each coefficient was determined. A finite impulse response digital low-pass filter was tested as a means of improving the diagnostic characteristics of the reconstructed ECG waveforms. Suggestions for further work in this area are included. Author (GRA)

**N81-33809#** Rochester Univ., N. Y. Dept. of Radiation Biology and Biophysics.

**AEROSOL FACTORS AFFECTING RESPIRATORY DEPOSITION**

P. E. Morrow 1981 13 p refs Presented at the Conf. on Deposition and Clearance of Aerosols in the Human Respiratory Tract, Bad Gleichenberg, Austria, 22 May 1981  
 (Contract DE-AC02-76EV-03490)  
 (DE81-024425; UR-3490-2026; CONF-810594-1) Avail: NTIS HC A02/MF A01

Aerosol deposition in the human respiratory system results from the interaction of the physical properties of the aerosol particles, the constantly changing dynamic character of the respired air, and the special architecture of the conducting airways and pulmonary parenchyma. These aspects fall into two categories: those derived from the aerosol and those associated with the human respiratory system, per se. Particle size is the most significant and in this respect, specifically, the hygroscopicity of particles and the heterodispersity of aerosols. Hygroscopicity is discussed in the context of the inconsistent data on respiratory humidification and temperature and their impact on hygroscopic growth models and particulate deposition estimations. Heterodispersity of aerosols considers the application of several models of respiratory functional anatomy and of aerosol deposition. The mass deposition estimates based on monodisperse particles and these models were found to be satisfactory for heterodisperse aerosols. DOE

**N81-33810#** ELMED G.m.b.H., Augsburg (West Germany).  
**ECG-CONVERTER Final Report**  
 Wolfgang Mueller Bonn Bundesministerium fuer Forschung und Technologie Nov. 1980 23 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie  
 (BMFT-FB-T-80-111; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4.80

A conversion unit was designed which makes it possible to display a person's heart signal on the screen of a normal television (TV) receiver. The ECG signals, picked up from the patient, are amplified and then digitalized and stored in a high-speed random access memory (RAM). This RAM is cyclically read out so that for each line of the TV picture, the total content is checked once. The complete content is fed to a comparator where it is compared with the line valence. In the case of equality, a dot is written at that place in the line. The analog signal is converted to a video signal which fits to any TV standard. After it is modulated with a carrier, this signal can be sent to any TV set and antenna plug. Author (ESA)

**N81-33811#** Akron Univ., Ohio.  
**THE UNIVERSITY OF AKRON URBAN AIR POLLUTION AND HUMAN HEALTH STUDY**  
 Richard A. Mostardi, Daniel L. Ely, Nancy Woebkenberg, Mary Conlon, Marcia Jarrett, and Glenn Atwood Jun. 1981 165 p refs  
 (Grant EPA-R-804526)  
 (PB81-213282; EPA-600/1-81-050) Avail: NTIS HC A08/MF A01 CSCL 06T

The chronic effects of our pollution volunteers from East Cleveland, Ohio and counterparts from Elyria, Ohio was studied. The East Cleveland area was chosen for its proximity to heavy industrial air pollution, and Elyria, because it is an urban area with an excellent record for air quality. Air quality was monitored by two aerometric stations in each city. It is indicated that there are some significant differences in the young age groups for lung function tests and questionnaire responses in favor of Elyria residents. Differences in the older age groups, favor the Cleveland residents. It is suggested that there is some selective migration associated with the Cleveland study area and that there may be an air pollution effect on the younger volunteers. GRA

**N81-33812#** California Univ., Santa Barbara. Inst. of Environmental Stress.  
**EFFECTS OF SULFURIC ACID MIST EXPOSURE ON PULMONARY FUNCTION Final Report, 1 Apr. 1977 - 31 Aug. 1980**  
 Steven M. Horvath, Lawrence J. Folinsbee, and John F. Bedi Jun. 1981 92 p refs  
 (Grant EPA-R-804853)

(PB81-208977; EPA-600/1-81-044) Avail: NTIS  
HC A05/MF A01 CSCL 06F

Effects of 2 hr exposure to sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) on pulmonary functions in male nonsmokers were examined. Mass media diameter was 0.92 micrometer, a sequence of 20 min exercise and 20 min rest was repeated three times during each exposure. Pulmonary functions were measured preexposure and postexposure. No significant changes in pulmonary functions were observed for H<sub>2</sub>SO<sub>4</sub> exposure. An increased prevalence of symptoms, was observed for H<sub>2</sub>SO<sub>4</sub> exposure, suggesting that H<sub>2</sub>SO<sub>4</sub> may have caused some pulmonary irritation though not sufficient to induce functional changes. It is concluded that 2 hr exposure, with intermittent exercise, to H<sub>2</sub>SO<sub>4</sub> in the one micrometer size range and in concentrations up to 1100 micrograms/cu m was relatively minor effects on the pulmonary system. GRA

**N81-33813#** Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

**PROCEDURES FOR EVALUATING NONPERTURBING TEMPERATURE PROBES IN MICROWAVE FIELDS** Final Report

Christian U. Hochuli May 1981 44 p refs Sponsored in part by World Health Organization  
(PB81-205882; FDA/BRH-81/67; DHHS/PUB/FDA-81/8143)  
Avail: NTIS HC A03/MF A01 CSCL 06B

Test procedures performed on nonperturbing thermometer probes specifically intended for use in microwave fields are described. The procedures included tests for: accuracy of temperature measurement, temperature stability over time, and radiofrequency interference in the instrumentation. It is indicated that the newly designed probes are less perturbing in phantoms of simulated muscle tissue irradiated by microwave diathermy applicators and, therefore, are candidates for use in monitoring temperature during hyperthermia treatments. GRA

**N81-33814** British Library Lending Div., Boston Spa (England). **LITERATURE SOURCES IN TOXICOLOGY: A SURVEY**

J. M. Hargreaves Jun. 1980 75 p refs  
(BLL-BLRDR-5542; ISBN-0-905984-59-5; ISSN-0308-2385)  
Copyright. Avail: British Library Lending Div., Boston Spa, Engl.

The survey is divided into the following sections: data bases, data banks, manual sources, institutions and research centers, and toxicology information programs of national and international organizations. Entries in each section are arranged alphabetically. Each entry includes information on coverage, file size, and indexing and searching characteristics. On some cases, selected references are provided to explain further the construction or use of the data files. T.M.

**N81-33815#** Canyon Research Group, Inc., Westlake Village, Calif.

**APPLICATIONS OF ADVANCED EXPERIMENTAL METHODS TO VISUAL TECHNOLOGY RESEARCH SIMULATOR STUDIES: SUPPLEMENTAL TECHNIQUES** Final Report, 26 May 1978 - 31 Mar. 1980

Charles W. Simon Orlando, Fla. Naval Training Equipment Center Jan. 1981 125 p refs  
(Contracts N61339-78-C-0060; N61339-78-C-0096;  
NAVTRAEQUIPC Proj. 4781-6P5)  
(AD-A095633; CWS-01-80; NAVTRAEQUIPC-78-C-0060-3)  
Avail: NTIS HC A06/MF A01 CSCL 05/9

This report is made up of a series of individual papers on techniques to enhance the behavioral research methods being used in the VTRS, or Visual Technology Research Simulator (formerly referred to as AWAVS, or Aviation Wide-Angle Visual System). These methods are applicable to many other topical areas in addition to flight simulation. The techniques discussed, which relate to problems of design, analysis and interpretation, are important addenda to material discussed elsewhere by the author. The following techniques are discussed. What to do when the model for the experimental design inadequately represents the empirical data; Using Yates' algorithm with screening designs; Analyzing residuals; Identifying the experimental conditions in 2 (to the k minus p power) designs when given the defining generators; An economical design for screening interaction effects; Graphic method and internal comparison for multiple response data; The place for replication in economical multifactor research; The significance of tests of statistical significance; Determining the probability of accepting the null hypothesis when in fact it is false; Testing non-additivity in experimental data

from a Latin square design; How to include factors with more than two levels in a screening design; Analyzing extra-period change-over designs; Analyzing serially-balanced sequence designs; and Design economy when experimental factors selectively affect bi-variate criteria. GRA

**N81-33816#** Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

**EFFECT OF DIFFERENT RUNWAY SIZE ON PILOT PERFORMANCE DURING SIMULATED NIGHT LANDING APPROACHES**

Henry W. Mertens and Mark F. Lewis Feb. 1981 21 p refs  
(AD-A103190; FAA-AM-81-6) Avail: NTIS HC A02/MF A01 CSCL 06/16

In Experiment 1, three pilots flew simulated approaches and landings in a fixed-base simulator with a computer-generated-image visual display. Practice approaches were flown with an 8,000-ft-long runway that was either 75, 150, or 300 ft wide; test approaches were to runways with widths of 75, 100, 150, 200, and 300 ft. In Experiment 2, 40 pilots controlled the slant of a moving model runway during simulated night visual approaches. Five different models simulated runways from 100 to 300 ft wide and 3,000 to 9,000 ft long. As predicted, training on a wide runway in Experiment 1 lowered approach angle in approaches to narrower runways; a narrow practice runway also raised approach angles to wider runways. The magnitude of these practice effects increased as distance from runway threshold decreased. There was also a general tendency for approach angles to decrease as runway width decreased. The latter effect was corroborated in Experiment 2; in addition, generated approach angles decreased with increasing runway length. Giving half the pilots information about runway size prior to each approach had no effect on responses. These findings add to the quantitative evidence of danger in night visual approaches due to visual illusions and large variability in the visual perception of approach angle. GRA

**N81-33817#** RAND Corp., Santa Monica, Calif. **SELECTED RESEARCH PUBLICATIONS IN COGNITIVE SCIENCE BY RAND STAFF: 1979-1980**

Sarah Goldin, Barbara Hayes-Roth, Frederick Hayes-Roth, Philip Klahr, Dave McArthur, Kathleen Stasz, Perry Thorndyke, Clairice Veit, Don Waterman, Keith Wescourt et al Feb. 1981 30 p refs

(AD-A103311; RAND/P-5950/12) Avail: NTIS  
HC A03/MF A01 CSCL 05/1

The bibliography presented on the following pages is a compilation of recent publications by some of the Rand researchers in the Information Processing System research program. The bibliography is selective, comprising only those papers concerned with the broad range of topics in Cognitive Science. These topics include the modeling of complex human behaviors, the construction of intelligent computer systems, and the representation of knowledge in human and computer memories. The research draws upon the disciplines of cognitive psychology, educational psychology, computer science, artificial intelligence, and linguistics. GRA

**N81-33818#** Technology Service Corp., Santa Monica, Calif. **ADVANCED COMPUTER IMAGE GENERATION TECHNIQUES EXPLOITING PERCEPTUAL CHARACTERISTICS** Final Report

Anthony J. Stenger, Timothy A. Zimmerlin, James P. Thomas, and Myron Braunstein Aug. 1981 330 p refs  
(Contract F33615-78-C-0020; AF Proj. 6114)  
(AD-A103365; AFHRL-TR-80-61) Avail: NTIS  
HC A15/MF A01 CSCL 09/2

The study objectives involve applying psychological knowledge of visual perception to improve real-time computer image generation (CIG) simulators. The primary objective is to suggest and identify CIG algorithms for visual simulation that improve the training effectiveness of CIG simulators. The secondary objective is to identify areas of basic research in visual perception that have a significant impact on improving CIG technology. The project proceeded in a sequence of three phases. The first phase entailed observing existing CIG simulators. During the second phase existing perceptual knowledge was studied in light of the capabilities and limitations of existing CIG simulators. In the third phase improved CIG algorithms were developed and relevant areas for further perceptual research were identified. Author (GRA)

**N81-33819#** Wisconsin Univ. - Madison. Graduate School of Business.

**ORGANIZATIONAL BEHAVIOR**

Larry L. Cummings and R. B. Dunham 3 Aug. 1981 91 p refs

(Contract N00014-79-C-0750; NR Proj. 170-892)  
(AD-A103625; TR-1-1-8) Avail: NTIS HC A05/MF A01 CSCL 05/1

This paper reviews the literature on organizational behavior from 1977 through the first quarter of 1981 and attempts to be projective and prescriptive as well as descriptive of the work covered. Selected topics reviewed include new overviews and integrations of the field, task design, feedback, organizational structure, technology, and control, new conceptualizations and emerging topical trends. These topics were chosen to reflect both current and controversial issues to recent research. Additionally, this review attempts to bring the macro or organizational side of organizational behavior into focus and analysis and conclusions are drawn concerning theoretical and research needs. Finally, it projects the likely developments within organizational behavior. Author (GRA)

**N81-33820#** School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

**FIELD STUDY DETERMINATION OF VENTILATORY REQUIREMENTS OF MEN RAPIDLY EVACUATING A SPACE LAUNCH COMPLEX Final Report, Jan. - Feb. 1980**

Loren G. Myhre Nov. 1980 24 p

(AF Proj. 7930)  
(AD-A095532; SAM-TR-80-43) Avail: NTIS HC A02/MF A01 CSCL 06/19

Physiological variables, including heart rate and minute ventilation, were monitored for 3 men and 1 woman during field trails simulating the emergency evacuation of Space Launch Complexes (SLC) 4E and 4W at Vandenberg AFB in January 1980. It was concluded that a reasonably fit adult male rapidly evacuating the SLC works at a load approximating 65% of his aerobic capacity. Associated with this level of work is a ventilatory requirement of about 51 liters/min with corresponding peak inspiratory flow rates predicted to average about 180 liters/min. Under these conditions excessive rebreathing of expired air with the concomitant onset of hypoxia was clearly evident when wearing the Robertshaw Air Capsule is deemed to be unsuitable as a respiratory protection device during rapid evacuation of the SLC; its limited air supply (about 5 min) renders it a marginal device for a walking evacuation which requires about 4 min, 19 sec. The degree of protection from airborne contaminants provided by the Robertshaw Air Capsule under work stress conditions simulating both (a) rapid and (b) walking evacuation awaits laboratory testing. GRA

**N81-33821#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

**THE DEVELOPMENT AND AIRBORNE TESTING OF THE PALE SEAT Final Report**

Harald J. vonBeckh 20 Jun. 1981 102 p refs

(ZF61412001)  
(AD-A103663; NADC-81200-60) Avail: NTIS HC A06/MF A01 CSCL 05/8

The development, centrifuge testing and airborne evaluation of the G-protective PALE (Pelvis and Legs Elevating) seat are described. This articulated seat achieves supination by elevating the pelvis and legs forward and upwards, while the head and shoulders barely move. Thus, out-of-the-cockpit vision and vision of displays are unchanged; labyrinthine symptoms are avoided, and head-up displays (HUD) can be easily used because the distance between windshield and eyes does not change. A historical review will list and describe all known seat configurations for prone and supine positioning that reached the stage of the airborne testing. The urgency to provide fighter aircraft with transverse positioned seats is emphasized. It is concluded that squadron of aircraft equipped with these seats will have an advantage in air combat situations. Author (GRA)

**N81-33822#** Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

**DEVELOPMENT OF IMPROVED SH-3 HELICOPTER SEAT CUSHIONS Final Report**

Dan Lorch 17 Jul. 1981 25 p refs

(AD-A103484; NADC-81188-60) Avail: NTIS HC A02/MF A01 CSCL 01/3

The proposed replacement seat cushions are made of closed cell foam and are painted with a flexible coating. Both the seat cushion and back cushion have ridges cut in the foam, and are covered with an open weave space fabric to improve air circulation. Test indicate that these cushions provide considerable improvement in comfort, reduction of maintenance and cost.

Author (GRA)

**N81-33823#** Michigan Univ., Ann Arbor. Human Performance Center.

**THE DEVELOPMENT AND UTILIZATION OF INTEGRATED MULTIDIMENSIONAL DISPLAYS Final Report, 1 Jun. 1976 - 30 Nov. 1980**

Robert G. Pachella Feb. 1981 19 p refs

(Contract N00014-76-C-0648; NR Proj. 197-035)  
(AD-A103170; HPC-67) Avail: NTIS HC A02/MF A01 CSCL 05/8

The purpose of this contract was to establish a program of research that would lead to basic facts about the nature of complex integrated multidimensional displays and their compatibilities with human perceptual abilities. Further, it was our goal to develop a comprehensive theory of multidimensional integrality as well as methodological techniques to investigate these questions. During the four and a half years of the contract's duration nine technical reports were issued and two more reports are in preparation. These detail the various empirical and theoretical pursuits of the principal investigator and his colleagues. A bibliography of these technical reports is appended. In addition to these written reports, contract work was reported orally at 16 scientific meetings and conferences. The research supported by the contract is presented under four major headings: (a) preliminary analyses of dimensional integrality, (b) necessary methodological developments for the study of integrality, (c) empirical findings and theoretical development, and (d) work in preparation. GRA

**N81-33824#** Anthropology Research Project, Yellow Springs, Ohio.

**AN ANTHROPOMETRIC DATA BASE FOR COMMERCIAL DESIGN APPLICATIONS, PHASE 1 Final Report, 1 Sep. 1980 - 28 Feb. 1981**

John T. McConville, Kathleen M. Robinette, and Thomas Churchill 24 Feb. 1981 46 p refs

(Grant NSF DAR-80-09861)  
(PB81-211070; NSF/BNS-81001) Avail: NTIS HC A03/MF A01 CSCL 05E

The feasibility of using for civilian designs the comprehensive body size data presently available to the armed forces was studied. The creation of an anthropometric data base for civilian uses from assembled data that were analyzed and applied to the design of military clothing, equipment, and workspaces is proposed. Statistical matching procedures and regression estimates were used to demonstrate that body sizes of U.S. males of working age, is characterized by information extrapolated from selected military samples. A large number of U.S. women is represented by military body size data, although military data were not available for women over 220 pounds. It is concluded that most commercial and industrial design needs for body size data can be met from the military data. GRA

**N81-33825#** Dynamic Science, Phoenix, Ariz.

**ANTHROPOMORPHIC DUMMY POSITIONING AND REPEATABILITY MEASUREMENTS Final Report, Oct. 1980 - Jan. 1981**

Jan. 1981 60 p

(Contract DT-NH22-80-C-0263)  
(PB81-212367; Rept-3112-81-004; DOT-HS-805882) Avail: NTIS HC A04/MF A01 CSCL 13F

The purpose of the tests conducted was two fold: to determine if the proposed compliance procedure would provide repeatable results; and to see if the requirements can be met without violating the anchorage location requirements specified in FMVSS 210. Repeatability in the positioning of the upper torso of the dummy was poorer for the van and pick-up than for passenger cars. Position of the belt in the belt fit zone is not highly sensitive to variations in dummy position. For standard belt systems tested, modifications made to the seat belt assemblies would still meet the requirements of FMVSS 210. GRA

N81-34136# Southampton Univ. (England). Inst. of Sound and Vibration Research.

**BIODYNAMIC RESPONSE TO WHOLE-BODY VIBRATION**

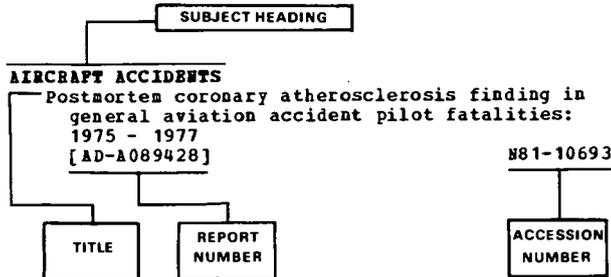
M. J. Griffin *In* The Shock and Vibration Information Center (Defense) The Shock and Vibration Dig., Vol. 13, No. 8 Aug. 1981 p 3-12 refs

Avail: SVIC, Code 5804, Naval Research Lab., Washington, D.C. 20375; \$15.00/set CSCL 05/8

Experimental studies of biodynamic response to vibration and some attempts to model this response are reviewed. It is proposed that biodynamic models should be classified according to their general application. It is shown that the responses of the body to vibration are highly varied and that there is a need for increased availability of experimental biodynamic data. Author

# SUBJECT INDEX

## Typical Subject Index Listing



The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, a title extension is added, separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

## A

- ACCELERATION PROTECTION**  
The development and airborne testing of the PALE seat  
[AD-A103663] N81-33821
- ACCELERATION STRESSES (PHYSIOLOGY)**  
Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration  
N81-49952  
Use of nutrients to correct the adrenocortical system --- acceleration stresses (physiology)  
N81-33776
- ACCIDENT PREVENTION**  
Routine compliance testing for diagnostic X-ray systems  
[PB81-201501] N81-32862
- ACTUATORS**  
Robotic actuators - A technology assessment  
N81-47988
- ADRENAL GLAND**  
Use of nutrients to correct the adrenocortical system --- acceleration stresses (physiology)  
N81-33776  
Mechanism of adrenosympathetic system reaction to single exposure to variable magnetic field  
N81-33788  
States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792
- AEROBES**  
Effectiveness of decomposition of plant waste by microorganisms under aerobic conditions  
N81-33784
- AEROSOLS**  
Chemical characterization and toxicologic evaluation of airborne mixtures  
[AD-A102678] N81-32855  
Aerosol factors affecting respiratory deposition  
[DE81-024425] N81-33809
- AEROSPACE MEDICINE**  
A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system  
N81-47194  
Relative efficacy of the proposed Space Shuttle antimotion sickness medications  
[IAF PAPER 81-177] N81-47391
- Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future  
[IAF PAPER 81-250] N81-47424  
Space settlements - The medical perspective  
N81-48868  
Medical considerations for manned interstellar flight  
N81-49918  
USSR report: Space biology and aerospace medicine, volume 15, no. 4, July - August 1981  
[JPRS-79085] N81-33771  
Mechanism of adrenosympathetic system reaction to single exposure to variable magnetic field  
N81-33788  
Effect of attenuated geomagnetic field on E. coli resistance to ultraviolet rays  
N81-33789  
Effect of flight aboard Cosmos-936 biosatellite on contractile properties of rat muscle fibers  
N81-33790  
Artificial gravity as a means of preventing atrophic skeletal changes  
N81-33791  
States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792  
Flour beetle reproduction and mutability in weightlessness (experiments aboard Salyut-6 orbital station)  
N81-33793  
Computer use for automatic measurement of some physiological parameters  
N81-33794  
Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33795  
Method of testing white rat elevator response  
N81-33798  
Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33801  
Changes in rabbit immunoreactivity as related to duration of hypokinesia  
N81-33803  
The development and airborne testing of the PALE seat  
[AD-A103663] N81-33821
- AFERENT NERVOUS SYSTEMS**  
Determination of otolith afferent response parameters using small amplitude sinusoidal roll and pitch tilts  
N81-47672
- AFTERIMAGES**  
Moving and the motion after-effect  
N81-47665
- AGE FACTOR**  
Age-related changes in body and visceral weight of Wistar rats  
N81-33797
- AGING (BIOLOGY)**  
Effects of ethidium bromide on development and aging of Drosophila - Implications for the free radical theory of aging  
N81-48056
- AIR POLLUTION**  
The University of Akron urban air pollution and human health study  
[PB81-213282] N81-33811
- AIR QUALITY**  
The University of Akron urban air pollution and human health study  
[PB81-213282] N81-33811

- AIR SAMPLING**  
Log-linear regression method used to assess quality of air samples in fluoroplastic containers  
N81-33796
- AIRCRAFT ACCIDENT INVESTIGATION**  
A histopathological study of coronary arteries in aircrew fatalities during 1962-1978  
A81-49951
- AIRCRAFT DESIGN**  
Real time simulation of OAS Phase I controls and displays --- Offensive Avionics System from human engineering standpoint  
A81-46375
- AIRCRAFT LANDING**  
Effect of different runway size on pilot performance during simulated night landing approaches  
[AD-A103190] N81-33816
- AIRCRAFT PILOTS**  
Analytic derivation of training transfer effectiveness ratios /TERS/ for new training systems --- for Navy pilots  
A81-48360  
Backache in helicopter pilots  
A81-49953
- ALGORITHMS**  
A Fast Walsh transform electrocardiogram data compression algorithm suitable for microprocessor implementation  
[AD-A104115] N81-33808
- ALTITUDE SIMULATION**  
Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber  
A81-49955
- ALTITUDE TOLERANCE**  
Oxygen provision to humans under conditions of high-altitude flight  
A81-47150
- AMPHETAMINES**  
Relative efficacy of the proposed Space Shuttle antimotion sickness medications  
[IAF PAPER 81-177] A81-47391
- ANALOG TO DIGITAL CONVERTERS**  
ECG-converter --- normal television receiver interface  
[BMFT-FB-T-80-111] N81-33810
- ANGULAR VELOCITY**  
Moving and the motion after-effect  
A81-47665
- ANIMALS**  
Development of an Animal Holding Facility for Space Shuttle studies  
[IAF PAPER 81-171] A81-47389  
Effect of hypoxia on affinity of hemoglobin for oxygen in animals  
N81-33802
- ANTHROPOMETRY**  
An anthropometric data base for commercial design applications, phase 1  
[PB81-211070] N81-33824
- ANTIBIOTICS**  
Sensitivity to antibiotics of lactobacilli from digestive tract of Soyuz-13 and Salyut-4 crew members  
N81-33782
- ARM (ANATOMY)**  
A novel design for a robot arm  
A81-47990
- ARRHYTHMIA**  
Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions  
A81-49327  
Cardiac arrhythmias in service personnel - An electrophysiologic evaluation  
A81-49956
- ARTERIOSCLEROSIS**  
The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847
- ARTIFICIAL GRAVITY**  
Artificial gravity as a means of preventing atrophic skeletal changes  
N81-33791
- ARTIFICIAL INTELLIGENCE**  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311] N81-33817
- ARTIFICIAL SATELLITES**  
Spacecraft and stellar occultations by turbulent planetary atmospheres. A theoretical investigation of various wave propagation effects and their impact on derived profiles of refractivity, temperature and pressure  
[AD-A103069] N81-32846
- ASTRONAUT PERFORMANCE**  
Simple technique to evaluate on the ground the energetic expenditure of physical exercise carried out in weightlessness  
[IAF PAPER 81-170] A81-47388  
Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future  
[IAF PAPER 81-250] A81-47424  
On increasing reliability of cosmonaut-operator's activity  
[IAF PAPER 81-255] A81-47427
- ASTRONAUTS**  
Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach  
[IAF PAPER 81-175] A81-47390
- ATMOSPHERIC TURBULENCE**  
Spacecraft and stellar occultations by turbulent planetary atmospheres. A theoretical investigation of various wave propagation effects and their impact on derived profiles of refractivity, temperature and pressure  
[AD-A103069] N81-32846
- ATROPHY**  
Artificial gravity as a means of preventing atrophic skeletal changes  
N81-33791
- AUSTRALIA**  
A comparison of possible methods for marine fouling assessment during raft trials  
[MRL-R-808] N81-33769
- AUTOREGRESSIVE PROCESSES**  
Experimental studies on the estimation of the dynamic characteristics of the human operator  
A81-48189
- AVIONICS**  
Computer-based simulations for man-computer system design --- for aircraft weapon systems  
A81-48374  
Real time simulation of OAS Phase I controls and displays --- Offensive Avionics System from human engineering standpoint  
A81-48375

**B**

- BACK INJURIES**  
Backache in helicopter pilots  
A81-49953
- BACKGROUND NOISE**  
Efficiency of human visual signal discrimination  
A81-48225
- BEHAVIOR**  
Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents  
[DE81-027655] N81-32857  
Evaluation of short-term bioassays to predict functional impairment, development of neurobehavioral bioassays in laboratory animals, directory of institutions/individuals  
[AD-A104225] N81-33770
- BIBLIOGRAPHIES**  
Publications of the Exobiology Program for 1980: A special bibliography  
[NASA-TM-83808] N81-32869  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311] N81-33817  
Organizational behavior --- bibliographies  
[AD-A103625] N81-33819

- BIOASSAY**  
Evaluation of short-term bioassays to predict functional impairment, development of neurobehavioral bioassays in laboratory animals, directory of institutions/individuals [AD-A104225] N81-33770
- BIOASTRONAUTICS**  
Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/ [IAF PAPER 81-164] A81-47383  
Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies [IAF PAPER 81-165] A81-47384  
Life support system development in West Germany [IAF PAPER 81-167] A81-47386  
Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach [IAF PAPER 81-175] A81-47390  
Space settlements - The medical perspective A81-48868
- BIODYNAMICS**  
Experiment K307: Vertebral body strength of rat spinal columns N81-32837  
Biodynamic response to whole-body vibration N81-34136
- BIOENGINEERING**  
Procedures for evaluating nonperturbing temperature probes in microwave fields [PB81-205882] N81-33813
- BIOMONITORING**  
A new CT collimator for producing two simultaneous overlapping slices from one scan --- for biomedical applications A81-47675  
Method for attaching cerebral thermocouple wires to the dog's skull N81-33800  
Non-invasive method and apparatus for measuring pressure within a pliable vessel [NASA-CASE-ARC-11264-1] N81-33804
- BIOLOGICAL EFFECTS**  
Theoretical and observational analysis of individual ionizing particle effects in biological tissue [LBL-11147-REV] N81-32847  
Biological effects of high DC magnetic fields [DE81-028904] N81-32848  
Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBTF3) [NASA-CR-161078] N81-32853  
Assessment of health impacts from electrical-power transmission lines [UR-3490-2024] N81-32856  
Tissue interaction with nonionizing electromagnetic fields [DE81-027654] N81-32858  
Evaluation of short-term bioassays to predict functional impairment, development of neurobehavioral bioassays in laboratory animals, directory of institutions/individuals [AD-A104225] N81-33770
- BIOLOGICAL EVOLUTION**  
Recent progress in exobiology and planetary biology [IAF PAPER 81-308] A81-47447  
The evolutionary development of vertebrate thermoregulation A81-48119  
Origin of life between Scylla and Charybdis --- computerized simulation of primordial chemical evolution A81-48725  
Geomagnetic field - Its role in the evolution of life and intelligence on earth A81-49917  
Publications of the Exobiology Program for 1980: A special bibliography [NASA-TM-83808] N81-32869
- BIOMASS**  
Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems [IAF PAPER 81-169] A81-47387
- A comparison of possible methods for marine fouling assessment during raft trials [HRL-B-808] N81-33769
- BIOMEDICAL DATA**  
Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents [DE81-027655] N81-32857
- BIOMETRICS**  
Computer use for automatic measurement of some physiological parameters N81-33794  
Subcutaneously implanted connector to record arterial pressure and make electrical contact N81-33799  
Non-invasive method and apparatus for measuring pressure within a pliable vessel [NASA-CASE-ARC-11264-1] N81-33804
- BIOPHYSICS**  
Biological flows [DGLE PAPER 81-001] A81-47574
- BIOSATELLITES**  
Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos' [IAF PAPER 81-179] A81-47393  
Simulated spaceflight effects on mating and pregnancy of rats [NASA-TM-81326] N81-32852
- BLOOD FLOW**  
Biological flows [DGLE PAPER 81-001] A81-47574  
Comparison of direct and indirect methods of measuring cardiac output N81-33773
- BLOOD PLASMA**  
Effects of microwave irradiation on human blood platelets A81-47674
- BLOOD PRESSURE**  
Osmoregulation and interstitial fluid pressure changes in humans during water immersion A81-48075  
Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man N81-33774  
Subcutaneously implanted connector to record arterial pressure and make electrical contact N81-33799  
Non-invasive method and apparatus for measuring pressure within a pliable vessel [NASA-CASE-ARC-11264-1] N81-33804
- BLOOD VESSELS**  
Non-invasive method and apparatus for measuring pressure within a pliable vessel [NASA-CASE-ARC-11264-1] N81-33804
- BLOOD VOLUME**  
Prognostic value of blood cholesterol level in healthy subjects N81-33780
- BODY COMPOSITION (BIOLOGY)**  
Experiment K-316: Effects of weightlessness on body composition in the rat N81-32844
- BODY FLUIDS**  
Echoventriculometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction N81-33777
- BODY MEASUREMENT (BIOLOGY)**  
An anthropometric data base for commercial design applications, phase 1 [PB81-211070] N81-33824
- BODY TEMPERATURE**  
Thermal stress in high speed low level flying A81-49962
- BODY WEIGHT**  
Scaling of metabolic rate on body mass in small laboratory mammals A81-47894  
Age-related changes in body and visceral weight of Wistar rats N81-33797
- BONE DEMINERALIZATION**  
Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3B: Mineralization in the long bones N81-32836

## BONE MARROW

Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832

## BONES

Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 1: Effects of weightlessness on osteoblast differentiation in rat molar periodontium  
N81-32833

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones  
N81-32834

Experiment K307: Vertebral body strength of rat spinal columns  
N81-32837

Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats  
N81-32839

Experiment K-310: The effect of space flight on osteogenesis and dentinogenesis in the mandible of rats. Supplement 1: The effects of space flight on alveolar bone modeling and remodeling in the rat mandible  
N81-32840

Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight  
N81-32842

Experiment K-317: Bone resorption in rats during spaceflight  
N81-32845

Artificial gravity as a means of preventing atrophic skeletal changes  
N81-33791

## BROMIDES

Effects of ethidium bromide on development and aging of Drosophila - Implications for the free radical theory of aging  
A81-48056

## C

## CALCIFICATION

The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847

## CARBOHYDRATE METABOLISM

Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight  
N81-32831

Effect of sex hormones on some parameters of carbohydrate metabolism in the lungs of hypoxic rats  
N81-33785

## CARBON DIOXIDE

Effect of exercise on reactions to breathing a gas mixture with 5% carbon dioxide and 14% oxygen  
N81-33781

## CARDIAC VENTRICLES

Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions  
A81-49327

Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning  
A81-49328

## CARDIOGRAPHY

Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber  
A81-49955

## CARDIOVASCULAR SYSTEM

Biological effects of high DC magnetic fields [DE81-028904]  
N81-32848

Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBrF3) [NASA-CR-161078]  
N81-32853

Comparison of direct and indirect methods of measuring cardiac output  
N81-33773

Effect of one day immersion on cardiorespiratory parameters of man during exercise  
N81-33778

## CATECHOLAMINE

States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792

## CATHETERIZATION

Subcutaneously implanted connector to record arterial pressure and make electrical contact  
N81-33799

## CELLS (BIOLOGY)

Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies [IAF PAPER 81-165]  
A81-47384

## CENTRAL NERVOUS SYSTEM

Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBrF3)  
N81-32853

The neuronal pool as a function unit in the Central Nervous System (CNS) [TRITA-NA-8009]  
N81-32859

## CENTRIFUGES

Biocentrifuge system capable of exchanging specimen cages while in operational mode [NASA-CASE-MFS-23825-1]  
N81-32829

## CHEMICAL EVOLUTION

Origin of life between Scylla and Charybdis --- computerized simulation of primordial chemical evolution  
A81-48725

## CHEMICAL REACTIONS

Log-linear regression method used to assess quality of air samples in fluoroplastic containers  
N81-33796

## CHINESE PEOPLES REPUBLIC

Chinese Medical Journal. Volume 94, number 4, April 1981 [PB81-204752]  
N81-32861

## CHOLESTEROL

Prognostic value of blood cholesterol level in healthy subjects  
N81-33780

Effect of chronic Gamma irradiation on protein composition and cholesterol content of canine blood  
N81-33786

## CIRCADIAN RHYTHMS

Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents [DE81-027655]  
N81-32857

## CIRCULATORY SYSTEM

Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man  
N81-33775

## CITIES

The University of Akron urban air pollution and human health study [PB81-213282]  
N81-33811

## CLINICAL MEDICINE

Algorithms for the clinical analysis of nystagmus eye movements  
A81-47673

The pharmacological analysis of the stress mechanism and its consequences --- Russian book  
A81-49474

## CLOSED ECOLOGICAL SYSTEMS

Closed ecosystems as the means for the outer space exploration by men / Experimental results, perspectives/ [IAF PAPER 81-164]  
A81-47383

## COCKPITS

Physiological aspects of heat exposure as applied to flying  
A81-49957

## COGNITION

Aggregation bias in estimates of perceptual agreement [AD-A102726]  
N81-32864

- COGNITIVE PSYCHOLOGY**  
Selected research publications in cognitive science by Rand staff: 1979-1980 [AD-A103311] N81-33817
- COLD TOLERANCE**  
Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia A81-48074
- COLLIMATORS**  
A new CT collimator for producing two simultaneous overlapping slices from one scan --- for biomedical applications A81-47675
- COLOR VISION**  
Pilot performance as a function of peripheral cues and color in computer generated images A81-48362
- COMFORT**  
Evaluations of a modified crew seat for the Iroquois [ARL/APP-REPT-80] N81-32865
- COMMAND AND CONTROL**  
Computer-based simulations for man-computer system design --- for aircraft weapon systems A81-48374
- COMMONALITY (EQUIPMENT)**  
Analytic derivation of training transfer effectiveness ratios /TEs/ for new training systems --- for Navy pilots A81-48360
- COMPENSATORY TRACKING**  
A study of the comparative effects of various means of motion cueing during a simulated compensatory tracking task A81-48006  
Experimental studies on the estimation of the dynamic characteristics of the human operator A81-48189
- COMPOSITION (PROPERTY)**  
Prognostic value of blood cholesterol level in healthy subjects N81-33780
- COMPUTER GRAPHICS**  
Pilot performance as a function of peripheral cues and color in computer generated images A81-48362
- COMPUTER SYSTEMS DESIGN**  
The development and utilization of integrated multidimensional displays [AD-A103170] N81-33823
- COMPUTER TECHNIQUES**  
Computer use for automatic measurement of some physiological parameters N81-33794
- COMPUTERIZED SIMULATION**  
Computer controlled electronic warfare simulation for tactical operator training A81-48363  
Computer-based simulations for man-computer system design --- for aircraft weapon systems A81-48374  
Real time simulation of OAS Phase I controls and displays --- Offensive Avionics System from human engineering standpoint A81-48375  
Origin of life between Scylla and Charybdis --- computerized simulation of primordial chemical evolution A81-48725  
Man-machine simulations in industrial systems. Volume 1: Narrative [DE81-027882] N81-32868
- CONCENTRATION (COMPOSITION)**  
Chemical characterization and toxicologic evaluation of airborne mixtures [AD-A102678] N81-32855  
Effect of chronic Gamma irradiation on protein composition and cholesterol content of canine blood N81-33786
- CONTROLLERS**  
Kinesthetic coupling between operator and remote manipulator A81-47986
- CORNEA**  
Theoretical and observational analysis of individual ionizing particle effects in biological tissue [LBL-11147-REV] N81-32847
- CORONARY ARTERY DISEASE**  
Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning A81-49328  
A histopathological study of coronary arteries in aircrew fatalities during 1962-1978 A81-49951
- COSMONAUTS**  
On increasing reliability of cosmonaut-operator's activity [IAF PAPER 81-255] A81-47427
- COSMOS SATELLITES**  
Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos' [IAF PAPER 81-179] A81-47393
- CRANIUM**  
Echoventriculometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction N81-33777
- CRITERIA**  
Criteria for adequate radiation control programs (I Ray): A report of task force 2A [FB81-197881] N81-32860
- CUES**  
A study of the comparative effects of various means of motion cueing during a simulated compensatory tracking task A81-48006  
Pilot performance as a function of peripheral cues and color in computer generated images A81-48362  
Cues reduce direction uncertainty and enhance motion detection A81-49673
- CUSHIONS**  
Development of improved SH-3 helicopter seat cushions [AD-A103484] N81-33822
- CYTOLOGY**  
Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies [IAF PAPER 81-165] A81-47384

## D

- DATA ACQUISITION**  
Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents [DE81-027655] N81-32857  
Measuring sleep by wrist actigraph [AD-A103196] N81-33807
- DATA BASES**  
Literature sources in toxicology: A survey [BLL-BLBDR-5542] N81-33814  
An anthropometric data base for commercial design applications, phase 1 [PB81-211070] N81-33824
- DATA PROCESSING**  
Computer use for automatic measurement of some physiological parameters N81-33794
- DATA REDUCTION**  
A Fast Walsh transform electrocardiogram data compression algorithm suitable for microprocessor implementation [AD-A104115] N81-33808
- DECISION MAKING**  
Comprehension and analysis of information in text. 4: Decision and verification processes [AD-A102677] N81-32863
- DECOMPOSITION**  
Effectiveness of decomposition of plant waste by microorganisms under aerobic conditions N81-33784
- DEOXYRIBONUCLEIC ACID**  
Molecular basis of the mutagenic and lethal effects of ultraviolet irradiation [DE81-028535] N81-32849
- DESIGN**  
An anthropometric data base for commercial design applications, phase 1 [PB81-211070] N81-33824

## DESIGN ANALYSIS

The development and airborne testing of the PALE seat  
[AD-A103663] N81-33821

## DIGESTING

Study of digestive tract microflora of Soyuz-13 and Salyut-4 crews  
N81-33783

## DIGESTIVE SYSTEM

Sensitivity to antibiotics of lactobacilli from digestive tract of Soyuz-13 and Salyut-4 crew members  
N81-33782

## DIGITAL SYSTEMS

Measuring sleep by wrist actigraph  
[AD-A103196] N81-33807

## DIGITAL TO ANALOG CONVERTERS

ECG-converter --- normal television receiver interface  
[BMFT-FB-T-80-111] N81-33810

## DIRECT CURRENT

Biological effects of high DC magnetic fields  
[DE81-028904] N81-32848

## DISEASES

Space settlements - The medical perspective  
A81-48868

## DISPLAY DEVICES

The development and utilization of integrated multidimensional displays  
[AD-A103170] N81-33823

## DIURESIS

Osmoregulation and interstitial fluid pressure changes in humans during water immersion  
A81-48075

## DOGS

Method for attaching cerebral thermocouple wires to the dog's skull  
N81-33800

## DUMMIES

Anthropomorphic dummy positioning and repeatability measurements  
[PB81-212367] N81-33825

## DYNAMIC CHARACTERISTICS

Experimental studies on the estimation of the dynamic characteristics of the human operator  
A81-48189

Effect of hypokinesia in head down position on man's equilibrium function  
N81-33779

## E

## EARTH ATMOSPHERE

Geomagnetic field - Its role in the evolution of life and intelligence on earth  
A81-49917

## ECHOCARDIOGRAPHY

Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions  
A81-49327

Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning  
A81-49328

## EDUCATION

Creation of learning kits  
N81-32570

Teaching/learning principles  
N81-32572

## ELECTRIC FIELDS

Assessment of health impacts from electrical-power transmission lines  
[UR-3490-2024] N81-32856

Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents  
[DE81-027655] N81-32857

## ELECTRIC POWER TRANSMISSION

Assessment of health impacts from electrical-power transmission lines  
[UR-3490-2024] N81-32856

## ELECTROCARDIOGRAPHY

Cardiac arrhythmias in service personnel - An electrophysiologic evaluation  
A81-49956

A Fast Walsh transform electrocardiogram data compression algorithm suitable for microprocessor implementation  
[AD-A104115] N81-33808

ECG-converter --- normal television receiver interface  
[BMFT-FB-T-80-111] N81-33810

## ELECTROENCEPHALOGRAPHY

Measuring sleep by wrist actigraph  
[AD-A103196] N81-33807

## ELECTROMAGNETIC FIELDS

Tissue interaction with nonionizing electromagnetic fields  
[DE81-027654] N81-32858

## ELECTROMAGNETIC RADIATION

A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system  
A81-47194

## ELECTRONIC WARFARE

Computer controlled electronic warfare simulation for tactical operator training  
A81-48363

## ELECTROPHYSIOLOGY

Measuring sleep by wrist actigraph  
[AD-A103196] N81-33807

## ELONGATION

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones  
N81-32834

## EMBRYOLOGY

Experiment K-313: Rat and quail ontogenesis  
N81-32841

Simulated spaceflight effects on mating and pregnancy of rats  
[NASA-TM-81326] N81-32852

## EMERGENCIES

Field study determination of ventilatory requirements of men rapidly evacuating a space launch complex  
[AD-A095532] N81-33820

## ENDOCRINE SECRETIONS

States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792

## ENDOCRINOLOGY

States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792

## ENVIRONMENTAL CONTROL

Space Shuttle life support systems - A status report  
[IAF PAPER 81-181] A81-47394

## ENZYME ACTIVITY

Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos'  
[IAF PAPER 81-179] A81-47393

## ENZYMES

Molecular basis of the mutagenic and lethal effects of ultraviolet irradiation  
[DE81-028535] N81-32849

States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792

## EPITHELIUM

Molecular mechanisms of the epithelial transport of toxic metal ions, particularly mercury, cadmium, lead, arsenic, zinc and copper  
[DE81-029091] N81-32851

## ERGONOMETERS

Simple technique to evaluate on the ground the energetic expenditure of physical exercise carried out in weightlessness  
[IAF PAPER 81-170] A81-47388

## ESCHERICHIA

Effect of attenuated geomagnetic field on E. coli resistance to ultraviolet rays  
N81-33789

## EVACUATING (TRANSPORTATION)

Field study determination of ventilatory requirements of men rapidly evacuating a space launch complex  
[AD-A095532] N81-33820

## EXERCISE PHYSIOLOGY

- Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning  
A81-49328
- Effect of one day immersion on cardiorespiratory parameters of man during exercise  
N81-33778
- Effect of exercise on reactions to breathing a gas mixture with 5% carbon dioxide and 14% oxygen  
N81-33781

## EXOBIOLGY

- Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies  
[IAF PAPER 81-165] A81-47384
- Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems  
[IAF PAPER 81-169] A81-47387
- Development of an Animal Holding Facility for Space Shuttle studies  
[IAF PAPER 81-171] A81-47389
- Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos'  
[IAF PAPER 81-179] A81-47393
- Recent progress in exobiology and planetary biology  
[IAF PAPER 81-308] A81-47447
- Publications of the Exobiology Program for 1980: A special bibliography  
[NASA-TM-83808] N81-32869
- USSR report: Space biology and aerospace medicine, volume 15, no. 4, July - August 1981  
[JPRS-79085] N81-33771
- Effect of attenuated geomagnetic field on E. coli resistance to ultraviolet rays  
N81-33789
- Flour beetle reproduction and mutability in weightlessness (experiments aboard Salyut-6 orbital station)  
N81-33793
- Method of testing white rat elevator response  
N81-33798

## EXPERIMENTATION

- Age-related changes in body and visceral weight of Wistar rats  
N81-33797

## EXPOSURE

- Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBF<sub>3</sub>)  
[NASA-CR-161078] N81-32853

## EXTRATERRESTRIAL LIFE

- Recent progress in exobiology and planetary biology  
[IAF PAPER 81-308] A81-47447
- Publications of the Exobiology Program for 1980: A special bibliography  
[NASA-TM-83808] N81-32869

## EXTRAVEHICULAR ACTIVITY

- Space Shuttle life support systems - A status report  
[IAF PAPER 81-181] A81-47394

## F

## FALLING

- Method of testing white rat elevator response  
N81-33798

## FEEDBACK CONTROL

- Analysis of man-in-the-loop control systems in the presence of nonlinearities  
[AD-A102574] N81-32867

## FERTILIZATION

- Experiment K-313: Rat and quail ontogenesis  
N81-32841

## FIGHTER AIRCRAFT

- Effects of thermal stress on psychological functions and performance  
A81-49958
- Field studies of heat stress in fighter operations in Assam Valley  
A81-49961
- Thermal stress in high speed low level flying  
A81-49962

## FIRE EXTINGUISHERS

- Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBF<sub>3</sub>)  
[NASA-CR-161078] N81-32853

## FLIGHT CREWS

- Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator  
A81-48361

- A histopathological study of coronary arteries in aircrew fatalities during 1962-1978  
A81-49951

- Effects of thermal stress on psychological functions and performance  
A81-49958

- Field studies of heat stress in fighter operations in Assam Valley  
A81-49961

- Study of digestive tract microflora of Soyuz-13 and Salyut-4 crews  
N81-33783

- Development of improved SH-3 helicopter seat cushions  
[AD-A103484] N81-33822

## FLIGHT FITNESS

- Aeromedical evaluation of aircrew with lower limb disabilities  
A81-49954

## FLIGHT SIMULATION

- Simulated spaceflight effects on mating and pregnancy of rats  
[NASA-TM-81326] N81-32852

## FLIGHT SIMULATORS

- Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator  
A81-48361

- Pilot performance as a function of peripheral cues and color in computer generated images  
A81-48362

- Biocentrifuge system capable of exchanging specimen cages while in operational mode  
[NASA-CASE-MFS-23825-1] N81-32829

## FLIGHT STRESS (BIOLOGY)

- Medical considerations for manned interstellar flight  
A81-49918

- Backache in helicopter pilots  
A81-49953

- Physiological aspects of heat exposure as applied to flying  
A81-49957

- Effects of thermal stress on psychological functions and performance  
A81-49958

- Field studies of heat stress in fighter operations in Assam Valley  
A81-49961

- Thermal stress in high speed low level flying  
A81-49962

## FLIGHT TRAINING

- Applications of advanced experimental methods to visual technology research simulator studies: Supplemental techniques  
[AD-A095633] N81-33815

## FLOW DISTRIBUTION

- Echocardiometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction  
N81-33777

## FLOW MEASUREMENT

- Comparison of direct and indirect methods of measuring cardiac output  
N81-33773

## FOULING

- A comparison of possible methods for marine fouling assessment during raft trials  
[NRL-R-808] N81-33769

## FREE RADICALS

- Effects of ethidium bromide on development and aging of Drosophila - Implications for the free radical theory of aging  
A81-48056

## FREQUENCY MEASUREMENT

- A comparison of possible methods for marine fouling assessment during raft trials  
[NRL-R-808] N81-33769

## FREQUENCY RESPONSE

- The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847

Variations in response to whole-body vibration -  
Intensity dependent effects  
A81-48500

**G****GAMMA RAYS**

Effect of chronic Gamma irradiation on protein  
composition and cholesterol content of canine  
blood  
N81-33786

**GAS ANALYSIS**

Log-linear regression method used to assess  
quality of air samples in fluoroplastic containers  
N81-33796

**GAS BAGS**

Log-linear regression method used to assess  
quality of air samples in fluoroplastic containers  
N81-33796

**GAS MIXTURES**

Effect of exercise on reactions to breathing a gas  
mixture with 5% carbon dioxide and 14% oxygen  
N81-33781

**GASTROINTESTINAL SYSTEM**

Molecular mechanisms of the epithelial transport  
of toxic metal ions, particularly mercury,  
cadmium, lead, arsenic, zinc and copper  
[DE81-029091] N81-32851

**GENETICS**

Molecular basis of the mutagenic and lethal  
effects of ultraviolet irradiation  
[DE81-028535] N81-32849

**GEOMAGNETISM**

Geomagnetic field - Its role in the evolution of  
life and intelligence on earth  
A81-49917  
Effect of attenuated geomagnetic field on *E. coli*  
resistance to ultraviolet rays  
N81-33789

**GRAVITATIONAL EFFECTS**

Space settlements - The medical perspective  
A81-48868

**GROUND TRUTH**

Teaching/learning principles  
N81-32572

**GROUP DYNAMICS**

Aggregation bias in estimates of perceptual  
agreement  
[AD-A102726] N81-32864

**GROWTH**

Experiment K-310: The effect of spaceflight on  
osteogenesis and dentinogenesis in the mandibles  
of rats  
N81-32839

**H****HEALTH PHYSICS**

Human engineering evaluation of the hyperbaric  
research facility  
[AD-A103681] N81-33806  
The University of Akron urban air pollution and  
human health study  
[PB81-213282] N81-33811

**HEART FUNCTION**

Characterization of left ventricular mechanical  
function during arrhythmias with two dimensional  
echocardiography. I - Premature ventricular  
contractions  
A81-49327  
Two dimensional echocardiographic evaluation of  
exercise-induced left and right ventricular  
asynergy - Correlation with thallium scanning  
A81-49328

**HEAT TOLERANCE**

Evaluation of thermal strain index for assessment  
of tolerance to heat stress  
A81-49959  
Field studies of heat stress in fighter operations  
in Assam Valley  
A81-49961

**HEAVY IONS**

Theoretical and observational analysis of  
individual ionizing particle effects in  
biological tissue  
[LBL-11147-REV] N81-32847

**HELICOPTER DESIGN**

Backache in helicopter pilots  
A81-49953

**HELICOPTERS**

Development of improved SH-3 helicopter seat  
cushions  
[AD-A103484] N81-33822

**HEMODYNAMIC RESPONSES**

Linear discriminant function used to assess  
cosmonaut reaction to LBNP  
N81-33772  
Comparison of direct and indirect methods of  
measuring cardiac output  
N81-33773  
Computer use for automatic measurement of some  
physiological parameters  
N81-33794

**HEMODYNAMICS**

Biological flows  
[DGLR PAPER 81-001] A81-47574

**HEMOGLOBIN**

Effect of hypoxia on affinity of hemoglobin for  
oxygen in animals  
N81-33802

**HIGH ALTITUDE BREATHING**

Oxygen provision to humans under conditions of  
high-altitude flight  
A81-47150

**HIGH TEMPERATURE ENVIRONMENTS**

Physiological aspects of heat exposure as applied  
to flying  
A81-49957  
Effects of thermal stress on psychological  
functions and performance  
A81-49958  
Microenvironmental protection in military flying  
--- liquid cooled suits for high temperatures  
A81-49960  
Field studies of heat stress in fighter operations  
in Assam Valley  
A81-49961  
Thermal stress in high speed low level flying  
A81-49962

**HISTOLOGY**

A histopathological study of coronary arteries in  
aircrew fatalities during 1962-1978  
A81-49951

**HORMONES**

Effect of sex hormones on some parameters of  
carbohydrate metabolism in the lungs of hypoxic  
rats  
N81-33785

**HUMAN BEHAVIOR**

Organizational behavior --- bibliographies  
[AD-A103625] N81-33819

**HUMAN BODY**

Variations in response to whole-body vibration -  
Intensity dependent effects  
A81-48500

**HUMAN FACTORS ENGINEERING**

On increasing reliability of cosmonaut-operator's  
activity  
[IAP PAPER 81-255] A81-47427  
Kinesthetic coupling between operator and remote  
manipulator  
A81-47986  
Computer-based simulations for man-computer system  
design --- for aircraft weapon systems  
A81-48374  
Real time simulation of OAS Phase I controls and  
displays --- Offensive Avionics System from  
human engineering standpoint  
A81-48375  
Systems engineering models of human-machine  
interaction --- Book  
A81-49885  
Backache in helicopter pilots  
A81-49953  
Aeromedical evaluation of aircrew with lower limb  
disabilities  
A81-49954  
Evaluations of a modified crew seat for the Iroquois  
[ARL/APP-REPT-80] N81-32865  
Man-machine simulations in industrial systems.  
Volume 1: Narrative  
[DE81-027882] N81-32868  
Human engineering evaluation of the hyperbaric  
research facility  
[AD-A103681] N81-33806

- Applications of advanced experimental methods to visual technology reseach simulator studies: Supplemental techniques  
[AD-A095633] N81-33815
- Advanced computer image generation techniques exploiting perceptual characteristics  
[AD-A103365] N81-33818
- Anthropomorphic dummy positioning and repeatability measurements  
[PB81-212367] N81-33825
- HUMAN PATHOLOGY**
- Biological flows  
[DGLR PAPER 81-001] A81-47574
- A histopathological study of coronary arteries in aircrew fatalities during 1962-1978  
A81-49951
- Cardiac arrhythmias in service personnel - An electrophysiologic evaluation  
A81-49956
- Evaluation of thermal strain index for assessment of tolerance to heat stress  
A81-49959
- HUMAN PERFORMANCE**
- Efficiency of human visual signal discrimination  
A81-48225
- Cues reduce direction uncertainty and enhance motion detection  
A81-49673
- Aggregation bias in estimates of perceptual agreement  
[AD-A102726] N81-32864
- Analysis of man-in-the-loop control systems in the presence of nonlinearities  
[AD-A102574] N81-32867
- HUMAN REACTIONS**
- A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system  
A81-47194
- Antiorthostatic hypokinesia as a means of simulating weightlessness  
[IAP PAPER 81-178] A81-47392
- Effects of microwave irradiation on human blood platelets  
A81-47674
- Osmoregulation and interstitial fluid pressure changes in humans during water immersion  
A81-48075
- Variations in response to whole-body vibration - Intensity dependent effects  
A81-48500
- HUMAN TOLERANCES**
- Oxygen provision to humans under conditions of high-altitude flight  
A81-47150
- Human engineering evaluation of the hyperbaric research facility  
[AD-A103681] N81-33806
- HYGROSCOPICITY**
- Aerosol factors affecting respiratory deposition  
[DE81-024425] N81-33809
- HYPERBARIC CHAMBERS**
- Human engineering evaluation of the hyperbaric research facility  
[AD-A103681] N81-33806
- HYPERCAPNIA**
- Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33795
- Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33801
- HYPOKINESIA**
- Antiorthostatic hypokinesia as a means of simulating weightlessness  
[IAP PAPER 81-178] A81-47392
- Effect of hypokinesia in head down position on man's equilibrium function  
N81-33779
- Changes in rabbit immunoreactivity as related to duration of hypokinesia  
N81-33803
- HYPOXIA**
- Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia  
A81-48074
- Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber  
A81-49955
- Effect of sex hormones on some parameters of carbohydrate metabolism in the lungs of hypoxic rats  
N81-33785
- Effect of hypoxia on affinity of hemoglobin for oxygen in animals  
N81-33802
- IMAGE PROCESSING**
- Advanced computer image generation techniques exploiting perceptual characteristics  
[AD-A103365] N81-33818
- IMMUNITY**
- Changes in rabbit immunoreactivity as related to duration of hypokinesia  
N81-33803
- IMPLANTATION**
- Experiment K-313: Bat and quail ontogenesis  
N81-32841
- IMPLANTED ELECTRODES (BIOLOGY)**
- Subcutaneousy implanted connector to record arterial pressure and make electrical contact  
N81-33799
- Method for attaching cerebral thermocouple wires to the dog's skull  
N81-33800
- INFORMATION THEORY**
- Comparative study of methods of identification of models of human regulators  
[ILR-48] N81-32854
- INTELLIGENCE**
- Geomagnetic field - Its role in the evolution of life and intelligence on earth  
A81-49917
- INTERACTIVE CONTROL**
- Systems engineering models of human-machine interaction --- Book  
A81-49885
- INTERCRANIAL CIRCULATION**
- Echocardiometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction  
N81-33777
- INTERSTELLAR TRAVEL**
- Medical considerations for manned interstellar flight  
A81-49918
- J**
- JOINTS (ANATOMY)**
- Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight  
N81-32842
- K**
- KIDNEY DISEASES**
- Toxicology and metabolism of nickel compounds  
[DE81-028924] N81-32850
- L**
- LEARNING**
- Teaching/learning principles  
N81-32572
- LEG (ANATOMY)**
- Aeromedical evaluation of aircrew with lower limb disabilities  
A81-49954
- Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man  
N81-33774
- LESIONS**
- The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847
- LIFE CYCLE COSTS**
- Development of improved SH-3 helicopter seat cushions  
[AD-A103484] N81-33822

## LIFE SCIENCES

- Development of an Animal Holding Facility for Space Shuttle studies  
[IAF PAPER 81-171] A81-47389
- The evolutionary development of vertebrate thermoregulation A81-48119
- LIFE SPAN**  
Effects of ethidium bromide on development and aging of *Drosophila* - Implications for the free radical theory of aging A81-48056
- LIFE SUPPORT SYSTEMS**  
Oxygen provision to humans under conditions of high-altitude flight A81-47150
- Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies  
[IAF PAPER 81-165] A81-47384
- Advanced life support - Orbital work base  
[IAF PAPER 81-166] A81-47385
- Life support system development in West Germany  
[IAF PAPER 81-167] A81-47386
- Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems  
[IAF PAPER 81-169] A81-47387
- Space Shuttle life support systems - A status report  
[IAF PAPER 81-181] A81-47394
- LIPID METABOLISM**  
Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight N81-32831
- LIQUID COOLING**  
Microenvironmental protection in military flying --- liquid cooled suits for high temperatures A81-49960
- LONG DURATION SPACE FLIGHT**  
Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/  
[IAF PAPER 81-164] A81-47383
- Life support system development in West Germany  
[IAF PAPER 81-167] A81-47386
- LOW FREQUENCIES**  
Tissue interaction with nonionizing electromagnetic fields  
[DE81-027654] N81-32858
- LOWER BODY NEGATIVE PRESSURE**  
USSR report: Space biology and aerospace medicine, volume 15, no. 4, July - August 1981 [JPRS-79085] N81-33771
- Linear discriminant function used to assess cosmonaut reaction to LBNP N81-33772
- Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man N81-33774
- Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man N81-33775
- LUNGS**  
Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia A81-48074
- Effect of sex hormones on some parameters of carbohydrate metabolism in the lungs of hypoxic rats N81-33785

## M

- MAGNETIC FIELDS**  
Biological effects of high DC magnetic fields  
[DE81-028904] N81-32848
- Effect of stationary magnetic field on the thyroid N81-33787
- MALES**  
Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man N81-33774
- Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man N81-33775

- Effect of one day immersion on cardiorespiratory parameters of man during exercise N81-33778

## MAMMALS

- Scaling of metabolic rate on body mass in small laboratory mammals A81-47894

## MAN MACHINE SYSTEMS

- Kinesthetic coupling between operator and remote manipulator A81-47986
- A novel design for a robot arm A81-47990
- Experimental studies on the estimation of the dynamic characteristics of the human operator A81-48189
- Computer-based simulations for man-computer system design --- for aircraft weapon systems A81-48374
- Systems engineering models of human-machine interaction --- Book A81-49865
- Comparative study of methods of identification of models of human regulators [ILR-48] N81-32854
- Man-machine simulations in industrial systems. Volume 1: Narrative [DE81-027882] N81-32868
- Effect of different runway size on pilot performance during simulated night landing approaches [AD-A103190] N81-33816
- The development and airborne testing of the PALE seat [AD-A103663] N81-33821
- The development and utilization of integrated multidimensional displays [AD-A103170] N81-33823

## MANIPULATORS

- The application of robotic sensors - A survey and assessment A81-47982
- A novel design for a robot arm A81-47990

## MANNED SPACE FLIGHT

- Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future [IAF PAPER 81-250] A81-47424
- On increasing reliability of cosmonaut-operator's activity [IAF PAPER 81-255] A81-47427
- Medical considerations for manned interstellar flight A81-49918

## MANUAL CONTROL

- Experimental studies on the estimation of the dynamic characteristics of the human operator A81-48189

## MARINE BIOLOGY

- A comparison of possible methods for marine fouling assessment during raft trials [NRL-B-808] N81-33769

## MARINE CHEMISTRY

- A comparison of possible methods for marine fouling assessment during raft trials [NRL-B-808] N81-33769

## MASS

- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones N81-32834

## MASTICATION

- Experiment K-310: The effect of space flight on osteogenesis and dentinogenesis in the mandible of rats. Supplement 1: The effects of space flight on alveolar bone modeling and remodeling in the rat mandible N81-32840

## MATHEMATICAL MODELS

- Systems engineering models of human-machine interaction --- Book A81-49865
- Comparative study of methods of identification of models of human regulators [ILR-48] N81-32854

- MEDICAL EQUIPMENT**  
Measuring sleep by wrist actigraph  
[AD-A103196] N81-33807
- MEDICAL PHENOMENA**  
Human engineering evaluation of the hyperbaric  
research facility  
[AD-A103681] N81-33806
- MEDICAL SCIENCE**  
Chinese Medical Journal. Volume 94, number 4,  
April 1981  
[PB81-204752] N81-32861
- MEMORY**  
Comprehension and analysis of information in text.  
4: Decision and verification processes  
[AD-A102677] N81-32863
- METABOLISM**  
Scaling of metabolic rate on body mass in small  
laboratory mammals  
A81-47894  
Toxicology and metabolism of nickel compounds  
[DE81-028924] N81-32850
- METAL IONS**  
Molecular mechanisms of the epithelial transport  
of toxic metal ions, particularly mercury,  
cadmium, lead, arsenic, zinc and copper  
[DE81-029091] N81-32851
- MICROORGANISMS**  
Study of digestive tract microflora of Soyuz-13  
and Salyut-4 crews  
N81-33783  
Effectiveness of decomposition of plant waste by  
microorganisms under aerobic conditions  
N81-33784
- MICROWAVE EMISSION**  
Procedures for evaluating nonperturbing  
temperature probes in microwave fields  
[PB81-205882] N81-33813
- MICROWAVE FREQUENCIES**  
Effects of microwave irradiation on human blood  
platelets  
A81-47674
- MILITARY AIRCRAFT**  
Microenvironmental protection in military flying  
--- liquid cooled suits for high temperatures  
A81-49960
- MILITARY OPERATIONS**  
Computer controlled electronic warfare simulation  
for tactical operator training  
A81-48363
- MILITARY TECHNOLOGY**  
Real time simulation of OAS Phase I controls and  
displays --- Offensive Avionics System from  
human engineering standpoint  
A81-48375
- MORPHOLOGY**  
Experiment K-308: Automatic analysis of muscle  
fibers from rats subjected to spaceflight  
N81-32838
- MOTION PERCEPTION**  
Moving and the motion after-effect  
A81-47665  
A study of the comparative effects of various  
means of motion cueing during a simulated  
compensatory tracking task  
A81-48006  
Cues reduce direction uncertainty and enhance  
motion detection  
A81-49673
- MOTION SICKNESS DRUGS**  
Relative efficacy of the proposed Space Shuttle  
anti-motion sickness medications  
[IAF PAPER 81-177] A81-47391
- MOTION SIMULATORS**  
A study of the comparative effects of various  
means of motion cueing during a simulated  
compensatory tracking task  
A81-48006
- MUCOUS**  
Experiment K-315: Studies of the nasal mucosa  
N81-32843
- MUSCLES**  
Experiment K-308: Automatic analysis of muscle  
fibers from rats subjected to spaceflight  
N81-32838  
Effect of flight aboard Cosmos-936 biosatellite on  
contractile properties of rat muscle fibers  
N81-33790
- MUSCULAR FUNCTION**  
Effect of flight aboard Cosmos-936 biosatellite on  
contractile properties of rat muscle fibers  
N81-33790
- MUTATIONS**  
Origin of life between Scylla and Charybdis ---  
computerized simulation of primordial chemical  
evolution  
A81-48725  
Molecular basis of the mutagenic and lethal  
effects of ultraviolet irradiation  
[DE81-028535] N81-32849  
Flour beetle reproduction and mutability in  
weightlessness (experiments aboard Salyut-6  
orbital station)  
N81-33793
- N**
- NERVOUS SYSTEM**  
A comparative analysis of the biological effects  
of electromagnetic radiation. I - The nervous  
system  
A81-47194
- NEURAL NETS**  
The neuronal pool as a function unit in the  
Central Nervous System (CNS)  
[TRITA-NA-8009] N81-32859
- NEURONS**  
The neuronal pool as a function unit in the  
Central Nervous System (CNS)  
[TRITA-NA-8009] N81-32859
- NEUROPHYSIOLOGY**  
Determination of otolith afferent response  
parameters using small amplitude sinusoidal roll  
and pitch tilts  
A81-47672
- NICKEL COMPOUNDS**  
Toxicology and metabolism of nickel compounds  
[DE81-028924] N81-32850
- NIGHT FLIGHTS (AIRCRAFT)**  
Effect of different runway size on pilot  
performance during simulated night landing  
approaches  
[AD-A103190] N81-33816
- NONDESTRUCTIVE TESTS**  
The use of ultrasonic spectroscopy to characterize  
calcified lesions  
A81-47847
- NONLINEARITY**  
Analysis of man-in-the-loop control systems in the  
presence of nonlinearities  
[AD-A102574] N81-32867
- NONUNIFORM MAGNETIC FIELDS**  
Mechanism of adrenosympathetic system reaction to  
single exposure to variable magnetic field  
N81-33788
- NOREPINEPHRINE**  
Norepinephrine turnover in lung - Effect of cold  
pressure and chronic hypoxia  
A81-48074
- NOSE (ANATOMY)**  
Experiment K-315: Studies of the nasal mucosa  
N81-32843
- NUCLEOTIDES**  
Origin of life between Scylla and Charybdis ---  
computerized simulation of primordial chemical  
evolution  
A81-48725
- NUTRITIONAL REQUIREMENTS**  
Use of nutrients to correct the adrenocortical  
system --- acceleration stresses (physiology)  
N81-33776
- NYSTAGMUS**  
Algorithms for the clinical analysis of nystagmus  
eye movements  
A81-47673
- O**
- OCCCLUSION**  
Effect of negative pressure and occlusion cuffs on  
intravascular pressure in legs of healthy man  
N81-33774
- OHIO**  
The University of Akron urban air pollution and  
human health study  
[PB81-213282] N81-33811

## OPERATIONS RESEARCH

Organizational behavior --- bibliographies  
[AD-A103625] N81-33819

**OPERATOR PERFORMANCE**  
Experimental studies on the estimation of the  
dynamic characteristics of the human operator  
A81-48189  
Development of a search task for the measurement  
of peripheral visual acuity  
A81-48499

**OPERATORS (PERSONNEL)**  
Kinesthetic coupling between operator and remote  
manipulator  
A81-47986  
Man-machine simulations in industrial systems.  
Volume 1: Narrative  
[DE81-027882] N81-32868

**ORBITAL SPACE STATIONS**  
Advanced life support - Orbital work base  
[IAF PAPER 81-166] A81-47385

**ORBITAL WORKSHOPS**  
Advanced life support - Orbital work base  
[IAF PAPER 81-166] A81-47385

**ORGANIZATIONS**  
Organizational behavior --- bibliographies  
[AD-A103625] N81-33819

**ORGANS**  
Age-related changes in body and visceral weight of  
Wistar rats  
N81-33797

**ORTHOPEDECS**  
Aeromedical evaluation of aircrew with lower limb  
disabilities  
A81-49954

**ORTHOSTATIC TOLERANCE**  
Effect of hypokinesia in head down position on  
man's equilibrium function  
N81-33779

**OSMOSIS**  
Osmoregulation and interstitial fluid pressure  
changes in humans during water immersion  
A81-48075

**OTOLITH ORGANS**  
Determination of otolith afferent response  
parameters using small amplitude sinusoidal roll  
and pitch tilts  
A81-47672

**OXYGEN**  
Effect of exercise on reactions to breathing a gas  
mixture with 5% carbon dioxide and 14% oxygen  
N81-33781  
Effect of hypoxia on affinity of hemoglobin for  
oxygen in animals  
N81-33802

**OXYGEN BREATHING**  
Extravehicular Crewman Work System (ECWS) study  
program: Prebreathe elimination study  
[NASA-CR-167390] N81-32866

**OXYGEN METABOLISM**  
Geomagnetic field - Its role in the evolution of  
life and intelligence on earth  
A81-49917

**OXYGEN SUPPLY EQUIPMENT**  
Oxygen provision to humans under conditions of  
high-altitude flight  
A81-47150

**OXYGENATION**  
Effect of hypoxia on affinity of hemoglobin for  
oxygen in animals  
N81-33802

**OZONE**  
Geomagnetic field - Its role in the evolution of  
life and intelligence on earth  
A81-49917

**PANEL METHOD (FLUID DYNAMICS)**  
A comparison of possible methods for marine  
fouling assessment during raft trials  
[NRL-B-808] N81-33769

**PARAMETER IDENTIFICATION**  
Comparative study of methods of identification of  
models of human regulators  
[ILR-48] N81-32854

**PATHOGENESIS**  
Toxicology and metabolism of nickel compounds  
[DE81-028924] N81-32850

## PERCEPTION

Comprehension and analysis of information in text.  
4: Decision and verification processes  
[AD-A102677] N81-32863

**PERFORMANCE TESTS**  
Space Shuttle life support systems - A status report  
[IAF PAPER 81-181] A81-47394  
Pilot performance as a function of peripheral cues  
and color in computer generated images  
A81-48362  
Cues reduce direction uncertainty and enhance  
motion detection  
A81-49673

**PERIODICALS**  
Chinese Medical Journal. Volume 94, number 4,  
April 1981  
[PB81-204752] N81-32861

**PERSONNEL**  
An anthropometric data base for commercial design  
applications, phase 1  
[PB81-211070] N81-33824

**PERSONNEL MANAGEMENT**  
Organizational behavior --- bibliographies  
[AD-A103625] N81-33819

**PERSONNEL SELECTION**  
Italy's contribution, from a medical standpoint,  
to the space safety of payload scientists, and  
perspectives for the future  
[IAF PAPER 81-250] A81-47424

**PERTURBATION**  
Procedures for evaluating nonperturbing  
temperature probes in microwave fields  
[PB81-205882] N81-33813

**PETROLEUM PRODUCTS**  
Chemical characterization and toxicologic  
evaluation of airborne mixtures  
[AD-A102678] N81-32855

**PHARMACOLOGY**  
The pharmacological analysis of the stress  
mechanism and its consequences --- Russian book  
A81-49474

**PHOTOINTERPRETATION**  
Creation of learning kits  
N81-32570  
Teaching/learning principles  
N81-32572

**PHOTORECEPTORS**  
Primary events in vision  
[AD-A095369] N81-33805

**PHOTOSYNTHESIS**  
Closed ecosystems as the means for the outer space  
exploration by men /Experimental results,  
perspectives/  
[IAF PAPER 81-164] A81-47383

**PHYSICAL EXERCISE**  
Simple technique to evaluate on the ground the  
energetic expenditure of physical exercise  
carried out in weightlessness  
[IAF PAPER 81-170] A81-47388  
Two dimensional echocardiographic evaluation of  
exercise-induced left and right ventricular  
asynergy - Correlation with thallium scanning  
A81-49328

**PHYSIOLOGICAL EFFECTS**  
A comparative analysis of the biological effects  
of electromagnetic radiation. I - The nervous  
system  
A81-47194  
Structural and functional changes in man  
accompanying the weightlessness in 'Skylab'  
flights - A mathematical approach  
[IAF PAPER 81-175] A81-47390  
Antiorthostatic hypokinesia as a means of  
simulating weightlessness  
[IAF PAPER 81-178] A81-47392  
US rat experiments flown on the Soviet satellite  
Cosmos 1129  
[NASA-TM-81289] N81-32830  
Experiment K304: Studies of specific hepatic  
enzymes and liver constituents involved in the  
conversion of carbohydrates to lipids in rats  
exposed to prolonged space flight  
N81-32831  
Experiment K305: Quantitative analysis of  
selected bone parameters  
N81-32832

- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 1: Effects of weightlessness on osteoblast differentiation in rat molar periodontium  
N81-32833
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones  
N81-32834
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3A: Trabecular spacing and orientation in the long bones  
N81-32835
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3B: Mineralization in the long bones  
N81-32836
- Experiment K307: Vertebral body strength of rat spinal columns  
N81-32837
- Experiment K-308: Automatic analysis of muscle fibers from rats subjected to spaceflight  
N81-32838
- Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats  
N81-32839
- Experiment K-310: The effect of space flight on osteogenesis and dentinogenesis in the mandible of rats. Supplement 1: The effects of space flight on alveolar bone modeling and remodeling in the rat mandible  
N81-32840
- Experiment K-313: Rat and quail ontogenesis  
N81-32841
- Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight  
N81-32842
- Experiment K-315: Studies of the nasal mucosa  
N81-32843
- Experiment K-316: Effects of weightlessness on body composition in the rat  
N81-32844
- Experiment K-317: Bone resorption in rats during spaceflight  
N81-32845
- Biological effects of high DC magnetic fields [DE81-028904]  
N81-32848
- Chemical characterization and toxicologic evaluation of airborne mixtures [AD-A102678]  
N81-32855
- Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents [DE81-027655]  
N81-32857
- Evaluation of short-term bioassays to predict functional impairment, development of neurobehavioral bioassays in laboratory animals, directory of institutions/individuals [AD-A104225]  
N81-33770
- USSR report: Space biology and aerospace medicine, volume 15, no. 4, July - August 1981 [JPES-79085]  
N81-33771
- Effect of one day immersion on cardiorespiratory parameters of man during exercise  
N81-33778
- Effect of stationary magnetic field on the thyroid  
N81-33787
- Effect of hypoxia on affinity of hemoglobin for oxygen in animals  
N81-33802
- Changes in rabbit immunoreactivity as related to duration of hypokinesia  
N81-33803
- Aerosol factors affecting respiratory deposition [DE81-024425]  
N81-33809
- PHYSIOLOGICAL RESPONSES**
- Oxygen provision to humans under conditions of high-altitude flight  
A81-47150
- Determination of otolith afferent response parameters using small amplitude sinusoidal roll and pitch tilts  
A81-47672
- Variations in response to whole-body vibration - Intensity dependent effects  
A81-48500
- Space settlements - The medical perspective  
A81-48868
- The pharmacological analysis of the stress mechanism and its consequences --- Russian book  
A81-49474
- Physiological aspects of heat exposure as applied to flying  
A81-49957
- Effects of thermal stress on psychological functions and performance  
A81-49958
- Evaluation of thermal strain index for assessment of tolerance to heat stress  
A81-49959
- Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33795
- Method of testing white rat elevator response  
N81-33798
- Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33801
- PHYSIOLOGICAL TESTS**
- Simple technique to evaluate on the ground the energetic expenditure of physical exercise carried out in weightlessness [IAF PAPER 81-170]  
A81-47388
- Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future [IAF PAPER 81-250]  
A81-47424
- Scaling of metabolic rate on body mass in small laboratory mammals  
A81-47894
- Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration  
A81-49952
- Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber  
A81-49955
- Cardiac arrhythmias in service personnel - An electrophysiologic evaluation  
A81-49956
- PILOT PERFORMANCE**
- A study of the comparative effects of various means of motion cueing during a simulated compensatory tracking task  
A81-48006
- Pilot performance as a function of peripheral cues and color in computer generated images  
A81-48362
- Backache in helicopter pilots  
A81-49953
- Microenvironmental protection in military flying --- liquid cooled suits for high temperatures  
A81-49960
- PILOT TRAINING**
- Analytic derivation of training transfer effectiveness ratios /TEBs/ for new training systems --- for Navy pilots  
A81-48360
- Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator  
A81-48361
- PITCH (INCLINATION)**
- Determination of otolith afferent response parameters using small amplitude sinusoidal roll and pitch tilts  
A81-47672
- PLANETARY ATMOSPHERES**
- Spacecraft and stellar occultations by turbulent planetary atmospheres. A theoretical investigation of various wave propagation effects and their impact on derived profiles of refractivity, temperature and pressure [AD-A103069]  
N81-32846
- PLANTS (BOTANY)**
- Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies [IAF PAPER 81-165]  
A81-47384

## PLASTICS

Log-linear regression method used to assess  
quality of air samples in fluoroplastic containers  
N81-33796

## PLATELETS

Effects of microwave irradiation on human blood  
platelets  
A81-47674

## POLYVINYL CHLORIDE

Development of improved SH-3 helicopter seat  
cushions  
[AD-A103484] N81-33822

## POSITIONING

Anthropomorphic dummy positioning and  
repeatability measurements  
[PB81-212367] N81-33825

## POSTURE

Linear discriminant function used to assess  
cosmonaut reaction to LBEP  
N81-33772

## PREGNANCY

Experiment K-314: Fetal and neonatal rat bone and  
joint development following in Utero spaceflight  
N81-32842

Simulated spaceflight effects on mating and  
pregnancy of rats  
[NASA-TM-81326] N81-32852

## PRESSURE MEASUREMENTS

Non-invasive method and apparatus for measuring  
pressure within a pliable vessel  
[NASA-CASE-ARC-11264-1] N81-33804

## PRESSURE REDUCTION

Extravehicular Crewman Work System (ECWS) study  
program: Prebreathe elimination study  
[NASA-CR-167390] N81-32866

## PRESSURE SENSORS

Non-invasive method and apparatus for measuring  
pressure within a pliable vessel  
[NASA-CASE-ARC-11264-1] N81-33804

## PROMETHAZINE

Relative efficacy of the proposed Space Shuttle  
anti-motion sickness medications  
[IAF PAPER 81-177] A81-47391

## PROPRIOCEPTION

Kinesthetic coupling between operator and remote  
manipulator  
A81-47986

## PROTECTIVE CLOTHING

Microenvironmental protection in military flying  
--- liquid cooled suits for high temperatures  
A81-4960

## PROTEIN METABOLISM

Metabolic changes in the animals subjected to  
flight in the biosatellites 'Cosmos'  
[IAF PAPER 81-179] A81-47393

## PROTEINS

Effect of chronic Gamma irradiation on protein  
composition and cholesterol content of canine  
blood  
N81-33786

## PSYCHOLOGICAL EFFECTS

Medical considerations for manned interstellar  
flight  
A81-49918

## PSYCHOLOGICAL TESTS

Development of a search task for the measurement  
of peripheral visual acuity  
A81-48499

## PSYCHOMOTOR PERFORMANCE

Cues reduce direction uncertainty and enhance  
motion detection  
A81-49673

## PUBLIC HEALTH

Criteria for adequate radiation control programs  
(X Ray): A report of task force 2A  
[PB81-197881] N81-32860

## PULMONARY FUNCTIONS

Method for evaluating respiratory system reaction  
to increasing hypercapnia  
N81-33795

Method for evaluating respiratory system reaction  
to increasing hypercapnia  
N81-33801

The University of Akron urban air pollution and  
human health study  
[PB81-213282] N81-33811

Effects of sulfuric acid mist exposure on  
pulmonary function  
[PB81-208977] N81-33812

## PURSUIT TRACKING

A study of the comparative effects of various  
means of motion cueing during a simulated  
compensatory tracking task  
A81-48006

Experimental studies on the estimation of the  
dynamic characteristics of the human operator  
A81-48189

## R

## RABBITS

Changes in rabbit immunoreactivity as related to  
duration of hypokinesia  
N81-33803

## RADIATION DETECTORS

Routine compliance testing for diagnostic X-ray  
systems  
[PB81-201501] N81-32862

## RADIATION DOSAGE

Criteria for adequate radiation control programs  
(X Ray): A report of task force 2A  
[PB81-197881] N81-32860

Routine compliance testing for diagnostic X-ray  
systems  
[PB81-201501] N81-32862

Effect of chronic Gamma irradiation on protein  
composition and cholesterol content of canine  
blood  
N81-33786

## RADIATION EFFECTS

A comparative analysis of the biological effects  
of electromagnetic radiation. I - The nervous  
system  
A81-47194

Effects of microwave irradiation on human blood  
platelets  
A81-47674

Medical considerations for manned interstellar  
flight  
A81-49918

Theoretical and observational analysis of  
individual ionizing particle effects in  
biological tissue  
[LBL-11147-REV] N81-32847

Effect of attenuated geomagnetic field on *E. coli*  
resistance to ultraviolet rays  
N81-33789

## RADIATION HAZARDS

Routine compliance testing for diagnostic X-ray  
systems  
[PB81-201501] N81-32862

## RADIO FREQUENCY INTERFERENCE

Procedures for evaluating nonperturbing  
temperature probes in microwave fields  
[PB81-205882] N81-33813

## RADIOBIOLOGY

Effects of microwave irradiation on human blood  
platelets  
A81-47674

## RADIOGRAPHY

Routine compliance testing for diagnostic X-ray  
systems  
[PB81-201501] N81-32862

## RATS

Chemical characterization and toxicologic  
evaluation of airborne mixtures  
[AD-A102678] N81-32855

Age-related changes in body and visceral weight of  
Wistar rats  
N81-33797

Method of testing white rat elevator response  
N81-33798

## READING

Comprehension and analysis of information in text.  
4: Decision and verification processes  
[AD-A102677] N81-32863

## REFLEXES

Method of testing white rat elevator response  
N81-33798

## REGRESSION ANALYSIS

log-linear regression method used to assess  
quality of air samples in fluoroplastic containers  
N81-33796

## RELIABILITY ENGINEERING

On increasing reliability of cosmonaut-operator's  
activity  
[IAF PAPER 81-255] A81-47427

- REMOTE MANIPULATOR SYSTEM**  
Kinesthetic coupling between operator and remote manipulator  
A81-47986
- REMOTE SENSING**  
Teaching/learning principles  
N81-32572
- REPRODUCTION (BIOLOGY)**  
Flour beetle reproduction and mutability in weightlessness (experiments aboard Salyut-6 orbital station)  
N81-33793
- RESEARCH**  
Toxicology and metabolism of nickel compounds [DE81-028924]  
N81-32850
- RESEARCH FACILITIES**  
Literature sources in toxicology: A survey [BLL-BLEDR-5542]  
N81-33814
- RESPIRATION**  
Effect of exercise on reactions to breathing a gas mixture with 5% carbon dioxide and 14% oxygen  
N81-33781
- RESPIRATORY PHYSIOLOGY**  
Effects of sulfuric acid mist exposure on pulmonary function [PB81-208977]  
N81-33812
- RESPIRATORY RATE**  
Effects of ethidium bromide on development and aging of *Drosophila* - Implications for the free radical theory of aging  
A81-48056
- RESPIRATORY SYSTEM**  
Effect of one day immersion on cardiorespiratory parameters of man during exercise  
N81-33778  
Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33795  
Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33801  
Aerosol factors affecting respiratory deposition [DE81-024425]  
N81-33809
- RESPONSE BIAS**  
Aggregation bias in estimates of perceptual agreement  
[AD-A102726]  
N81-32864
- RETENTION (PSYCHOLOGY)**  
Comprehension and analysis of information in text. 4: Decision and verification processes  
[AD-A102677]  
N81-32863
- RETINA**  
Primary events in vision  
[AD-A095369]  
N81-33805
- RIBONUCLEIC ACIDS**  
Origin of life between Scylla and Charybdis --- computerized simulation of primordial chemical evolution  
A81-48725
- ROBOTS**  
The application of robotic sensors - A survey and assessment  
A81-47982  
Robotic actuators - A technology assessment  
A81-47988  
A novel design for a robot arm  
A81-47990
- ROLL**  
Determination of otolith afferent response parameters using small amplitude sinusoidal roll and pitch tilts  
A81-47672
- RUNWAY LIGHTS**  
Effect of different runway size on pilot performance during simulated night landing approaches  
[AD-A103190]  
N81-33816
- RURAL AREAS**  
The University of Akron urban air pollution and human health study  
[PB81-213282]  
N81-33811
- S**
- SAFETY FACTORS**  
Evaluations of a modified crew seat for the Iroquois [ABL/APP-REPT-80]  
N81-32865
- Development of improved SH-3 helicopter seat cushions  
[AD-A103484]  
N81-33822
- SALYUT SPACE STATION**  
Sensitivity to antibiotics of lactobacilli from digestive tract of Soyuz-13 and Salyut-4 crew members  
N81-33782  
Study of digestive tract microflora of Soyuz-13 and Salyut-4 crews  
N81-33783
- SCANNERS**  
A new CT collimator for producing two simultaneous overlapping slices from one scan --- for biomedical applications  
A81-47675
- SEARCHING**  
Development of a search task for the measurement of peripheral visual acuity  
A81-48499
- SEAT BELTS**  
Anthropomorphic dummy positioning and repeatability measurements  
[PB81-212367]  
N81-33825
- SEATS**  
Backache in helicopter pilots  
A81-49953  
Evaluations of a modified crew seat for the Iroquois [ABL/APP-REPT-80]  
N81-32865  
The development and airborne testing of the PALE seat  
[AD-A103663]  
N81-33821  
Development of improved SH-3 helicopter seat cushions  
[AD-A103484]  
N81-33822
- SELECTIVE DISSEMINATION OF INFORMATION**  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311]  
N81-33817
- SENSORS**  
The application of robotic sensors - A survey and assessment  
A81-47982
- SEX GLANDS**  
Effect of sex hormones on some parameters of carbohydrate metabolism in the lungs of hypoxic rats  
N81-33785
- SITTING POSITION**  
The development and airborne testing of the PALE seat  
[AD-A103663]  
N81-33821
- SKULL**  
Method for attaching cerebral thermocouple wires to the dog's skull  
N81-33800
- SKYLAB PROGRAM**  
Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach  
[IAP PAPER 81-175]  
A81-47390
- SLEEP**  
Measuring sleep by wrist actigraph  
[AD-A103196]  
N81-33807
- SMOKE**  
Chemical characterization and toxicologic evaluation of airborne mixtures  
[AD-A102678]  
N81-32855
- SORPTION**  
Experiment K-317: Bone resorption in rats during spaceflight  
N81-32845
- SOYUZ SPACECRAFT**  
Sensitivity to antibiotics of lactobacilli from digestive tract of Soyuz-13 and Salyut-4 crew members  
N81-33782  
Study of digestive tract microflora of Soyuz-13 and Salyut-4 crews  
N81-33783
- SPACE COLONIES**  
Advanced life support - Orbital work base [IAP PAPER 81-166]  
A81-47385  
Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems  
[IAP PAPER 81-169]  
A81-47387  
Space settlements - The medical perspective  
A81-48868

## SPACE FLIGHT STRESS

- Relative efficacy of the proposed Space Shuttle antimotion sickness medications [IAF PAPER 81-177] A81-47391
- Metabolic changes in the animals subjected to flight in the biosatellites 'Cosmos' [IAF PAPER 81-179] A81-47393
- Simulated spaceflight effects on mating and pregnancy of rats [NASA-TM-81326] N81-32852
- SPACE SHUTTLE ORBITERS**
- Relative efficacy of the proposed Space Shuttle antimotion sickness medications [IAF PAPER 81-177] A81-47391
- Space Shuttle life support systems - A status report [IAF PAPER 81-181] A81-47394
- Extravehicular Crewman Work System (ECWS) study program: Prebreathe elimination study [NASA-CR-167390] N81-32866
- SPACE SHUTTLES**
- Development of an Animal Holding Facility for Space Shuttle studies [IAF PAPER 81-171] A81-47389
- SPACE SIMULATORS**
- Biocentrifuge system capable of exchanging specimen cages while in operational mode [NASA-CASE-NFS-23825-1] N81-32829
- SPACEBORNE EXPERIMENTS**
- Life support system development in West Germany [IAF PAPER 81-167] A81-47386
- Development of an Animal Holding Facility for Space Shuttle studies [IAF PAPER 81-171] A81-47389
- US rat experiments flown on the Soviet satellite Cosmos 1129 [NASA-TM-81289] N81-32830
- Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight N81-32831
- Experiment K305: Quantitative analysis of selected bone parameters N81-32832
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 1: Effects of weightlessness on osteoblast differentiation in rat molar periodontium N81-32833
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones N81-32834
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3A: Trabecular spacing and orientation in the long bones N81-32835
- Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3B: Mineralization in the long bones N81-32836
- Experiment K307: Vertebral body strength of rat spinal columns N81-32837
- Experiment K-308: Automatic analysis of muscle fibers from rats subjected to spaceflight N81-32838
- Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats N81-32839
- Experiment K-310: The effect of space flight on osteogenesis and dentinogenesis in the mandible of rats. Supplement 1: The effects of space flight on alveolar bone modeling and remodeling in the rat mandible N81-32840
- Experiment K-313: Rat and quail ontogenesis N81-32841
- Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight N81-32842
- Experiment K-315: Studies of the nasal mucosa N81-32843
- Experiment K-316: Effects of weightlessness on body composition in the rat N81-32844
- Experiment K-317: Bone resorption in rats during spaceflight N81-32845
- Flour beetle reproduction and mutability in weightlessness (experiments aboard Salyut-6 orbital station) N81-33793
- SPACECRAFT CABIN ATMOSPHERES**
- Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/ [IAF PAPER 81-164] A81-47383
- Extravehicular Crewman Work System (ECWS) study program: Prebreathe elimination study [NASA-CR-167390] N81-32866
- SPACECRAFT DESIGN**
- Life support system development in West Germany [IAF PAPER 81-167] A81-47386
- SPACECRAFT ENVIRONMENTS**
- Advanced life support - Orbital work base [IAF PAPER 81-166] A81-47385
- Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems [IAF PAPER 81-169] A81-47387
- Space Shuttle life support systems - A status report [IAF PAPER 81-181] A81-47394
- SPACECREWS**
- Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future [IAF PAPER 81-250] A81-47424
- SPACELAB**
- Development of an Animal Holding Facility for Space Shuttle studies [IAF PAPER 81-171] A81-47389
- SPINAL CORD**
- Echocardiulometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction N81-33777
- STATISTICAL ANALYSIS**
- Efficiency of human visual signal discrimination A81-48225
- STELLAR OCCULTATION**
- Spacecraft and stellar occultations by turbulent planetary atmospheres. A theoretical investigation of various wave propagation effects and their impact on derived profiles of refractivity, temperature and pressure [AD-A103069] N81-32846
- STRESS (PHYSIOLOGY)**
- The pharmacological analysis of the stress mechanism and its consequences --- Russian book A81-49474
- Simulated spaceflight effects on mating and pregnancy of rats [NASA-TM-81326] N81-32852
- Field study determination of ventilatory requirements of men rapidly evacuating a space launch complex [AD-A095532] N81-33820
- Biodynamic response to whole-body vibration N81-34136
- STRESS (PSYCHOLOGY)**
- The pharmacological analysis of the stress mechanism and its consequences --- Russian book A81-49474
- SUBMERGED BODIES**
- Osmoregulation and interstitial fluid pressure changes in humans during water immersion A81-48075
- SULFURIC ACID**
- Effects of sulfuric acid mist exposure on pulmonary function [PB81-208977] N81-33812
- SUPERSONIC FLIGHT**
- Thermal stress in high speed low level flying A81-49962
- SYMPATHETIC NERVOUS SYSTEM**
- Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia A81-48074
- Mechanism of adrenosympathetic system reaction to single exposure to variable magnetic field N81-33788

## SYNAPSES

The neuronal pool as a function unit in the Central Nervous System (CNS)  
[TRITA-NA-8009] N81-32859

## SYSTEMS ENGINEERING

Systems engineering models of human-machine interaction --- Book  
A81-45885

## SYSTEMS SIMULATION

Systems engineering models of human-machine interaction --- Book  
A81-45885  
Man-machine simulations in industrial systems.  
Volume 1: Narrative  
[DE81-027882] N81-32868

## T

## TARGET RECOGNITION

Development of a search task for the measurement of peripheral visual acuity  
A81-48499

## TECHNOLOGY ASSESSMENT

Robotic actuators - A technology assessment  
A81-47988

## TECHNOLOGY TRANSFER

Creation of learning kits  
N81-32570  
Teaching/learning principles  
N81-32572

## TECHNOLOGY UTILIZATION

The application of robotic sensors - A survey and assessment  
A81-47982

## TEETH

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 1: Effects of weightlessness on osteoblast differentiation in rat molar periodontium  
N81-32833  
Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats  
N81-32839

## TELEVISION RECEIVERS

ECG-converter --- normal television receiver interface  
[BMPT-PB-T-80-111] N81-33810

## TEMPERATURE CONTROL

Advanced life support - Orbital work base  
[IAF PAPER 81-166] A81-47385

## TEMPERATURE PROBES

Procedures for evaluating nonperturbing temperature probes in microwave fields  
[PB81-205882] N81-33813

## TERMINAL CONFIGURED VEHICLE PROGRAM

Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator  
A81-48361

## THALLIUM ISOTOPES

Two dimensional echocardiographic evaluation of exercise-induced left and right ventricular asynergy - Correlation with thallium scanning  
A81-49328

## THERMOCOUPLES

Method for attaching cerebral thermocouple wires to the dog's skull  
N81-33800

## THERMOREGULATION

The evolutionary development of vertebrate thermoregulation  
A81-48119  
Evaluation of thermal strain index for assessment of tolerance to heat stress  
A81-49959  
Procedures for evaluating nonperturbing temperature probes in microwave fields  
[PB81-205882] N81-33813

## THYROID GLAND

Effect of stationary magnetic field on the thyroid  
N81-33787

## TIBIA

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3A: Trabecular spacing and orientation in the long bones  
N81-32835

## TISSUES (BIOLOGY)

Theoretical and observational analysis of individual ionizing particle effects in biological tissue  
[LBL-11147-REV] N81-32847  
Tissue interaction with ionizing electromagnetic fields  
[DE81-027654] N81-32858

## TOMOGRAPHY

A new CT collimator for producing two simultaneous overlapping slices from one scan --- for biomedical applications  
A81-47675

## TOXIC HAZARDS

Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBrF3)  
[NASA-CR-161078] N81-32853  
Chemical characterization and toxicologic evaluation of airborne mixtures  
[AD-A102678] N81-32855

## TOXICITY

Molecular mechanisms of the epithelial transport of toxic metal ions, particularly mercury, cadmium, lead, arsenic, zinc and copper  
[DE81-029091] N81-32851

## TOXICOLOGY

Toxicology and metabolism of nickel compounds  
[DE81-028924] N81-32850  
Literature sources in toxicology: A survey  
[BLL-BLRDR-5542] N81-33814

## TRAINING ANALYSIS

Analytic derivation of training transfer effectiveness ratios /TERs/ for new training systems --- for Navy pilots  
A81-48360

## TRAINING DEVICES

Creation of learning kits  
N81-32570

## TRAINING SIMULATORS

Computer controlled electronic warfare simulation for tactical operator training  
A81-48363

## TRANSFER OF TRAINING

Analytic derivation of training transfer effectiveness ratios /TERs/ for new training systems --- for Navy pilots  
A81-48360

## TRANSMISSION LINES

Assessment of health impacts from electrical-power transmission lines  
[UR-3490-2024] N81-32856

## TRIBOLIA

Flour beetle reproduction and mutability in weightlessness (experiments aboard Salyut-6 orbital station)  
N81-33793

## U

## UE-1 HELICOPTER

Evaluations of a modified crew seat for the Iroquois  
[ARL/APP-REPT-80] N81-32865

## ULTRASONIC SPECTROSCOPY

The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847

## ULTRASONIC TESTS

Echocardiometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction  
N81-33777

## ULTRAVIOLET RADIATION

Molecular basis of the mutagenic and lethal effects of ultraviolet irradiation  
[DE81-028535] N81-32849  
Effect of attenuated geomagnetic field on E. coli resistance to ultraviolet rays  
N81-33789

## V

## VARIANCE (STATISTICS)

Variations in response to whole-body vibration - Intensity dependent effects  
A81-48500

## VEGETATION GROWTH

## SUBJECT INDEX

## VEGETATION GROWTH

Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems [IAF PAPER 81-169] A81-47387

## VENTILATION

Field study determination of ventilatory requirements of men rapidly evacuating a space launch complex [AD-A095532] N81-33820

## VERTEBRAL COLUMN

Experiment K307: Vertebral body strength of rat spinal columns N81-32837

## VERTEBRATES

The evolutionary development of vertebrate thermoregulation A81-48119

## VERTICAL MOTION

Method of testing white rat elevator response N81-33798

## VESTIBULAR TESTS

Algorithms for the clinical analysis of nystagmus eye movements A81-47673

## VIBRATION EFFECTS

Biodynamic response to whole-body vibration N81-34136

## VIBRATION PERCEPTION

Variations in response to whole-body vibration - Intensity dependent effects A81-48500

## VISUAL ACUITY

Efficiency of human visual signal discrimination A81-48225  
Development of a search task for the measurement of peripheral visual acuity A81-48499

## VISUAL AIDS

Creation of learning kits N81-32570

## VISUAL DISCRIMINATION

Efficiency of human visual signal discrimination A81-48225

## VISUAL FIELDS

Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration A81-49952

## VISUAL PERCEPTION

Moving and the motion after-effect A81-47665

Primary events in vision [AD-A095369] N81-33805

Applications of advanced experimental methods to visual technology reseach simulator studies: Supplemental techniques [AD-A095633] N81-33815

Effect of different runway size on pilot performance during simulated night landing approaches [AD-A103190] N81-33816

Advanced computer image generation techniques exploiting perceptual characteristics [AD-A103365] N81-33818

The development and utilization of integrated multidimensional displays [AD-A103170] N81-33823

## VISUAL SIGNALS

Cues reduce direction uncertainty and enhance motion detection A81-49673

## VISUAL STIMULI

Moving and the motion after-effect A81-47665

## VITAMINS

Molecular mechanisms of the epithelial transport of toxic metal ions, particularly mercury, cadmium, lead, arsenic, zinc and copper [DB81-029091] N81-32851

## W

## WALSH FUNCTION

A Fast Walsh transform electrocardiogram data compression algorithm suitable for microprocessor implementation [AD-A104115] N81-33808

## WASTES

Effectiveness of decomposition of plant waste by microorganisms under aerobic conditions N81-33784

## WATER PRESSURE

Osmoregulation and interstitial fluid pressure changes in humans during water immersion A81-48075

## WAVE PROPAGATION

Spacecraft and stellar occultations by turbulent planetary atmospheres. A theoretical investigation of various wave propagation effects and their impact on derived profiles of refractivity, temperature and pressure [AD-A103069] N81-32846

## WEAPON SYSTEMS

Computer-based simulations for man-computer system design --- for aircraft weapon systems A81-48374

## WEIGHTLESSNESS

Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies [IAF PAPER 81-165] A81-47384

Simple technique to evaluate on the ground the energetic expenditure of physical exercise carried out in weightlessness [IAF PAPER 81-170] A81-47388

Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach [IAF PAPER 81-175] A81-47390

US rat experiments flown on the Soviet satellite Cosmos 1129 [NASA-TN-81289] N81-32830

Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight N81-32831

Experiment K305: Quantitative analysis of selected bone parameters N81-32832

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 1: Effects of weightlessness on osteoblast differentiation in rat molar periodontium N81-32833

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones N81-32834

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3A: Trabecular spacing and orientation in the long bones N81-32835

Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3B: Mineralization in the long bones N81-32836

Experiment K307: Vertebral body strength of rat spinal columns N81-32837

Experiment K-308: Automatic analysis of muscle fibers from rats subjected to spaceflight N81-32838

Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats N81-32839

Experiment K-310: The effect of space flight on osteogenesis and dentinogenesis in the mandible of rats. Supplement 1: The effects of space flight on alveolar bone modeling and remodeling in the rat mandible N81-32840

Experiment K-313: Rat and quail ontogenesis N81-32841

Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight N81-32842

Experiment K-315: Studies of the nasal mucosa N81-32843

Experiment K-316: Effects of weightlessness on body composition in the rat N81-32844

Experiment K-317: Bone resorption in rats during  
spaceflight N81-32845

Artificial gravity as a means of preventing  
atrophic skeletal changes N81-33791

States of catecholamines and enzymes of synthesis  
thereof in the adrenal medulla of rats after  
flight aboard Cosmos-936 biosatellite N81-33792

Flour beetle reproduction and mutability in  
weightlessness (experiments aboard Salyut-6  
orbital station) N81-33793

**WEIGHTLESSNESS SIMULATION**

Antiorthostatic hypokinesia as a means of  
simulating weightlessness  
[IAF PAPER 81-178] A81-47392

## X

## X RAY APPARATUS

A new CT collimator for producing two simultaneous  
overlapping slices from one scan --- for  
biomedical applications A81-47675

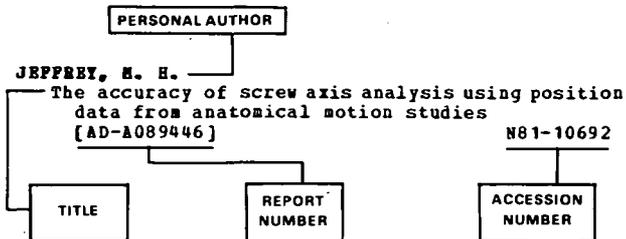
Routine compliance testing for diagnostic X-ray  
systems  
[PB81-201501] N81-32862

## X RAYS

Criteria for adequate radiation control programs  
(X Ray): A report of task force 2A  
[PB81-197881] N81-32860

# PERSONAL AUTHOR INDEX

## Typical Personal Author Index Listing



The title of the document is used to provide the user with a brief description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

## A

- ABRAHAM, S.**  
Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight  
N81-32831
- ADACHI, E. B.**  
Experiment K-317: Bone resorption in rats during spaceflight  
N81-32845
- ADAVAL, S. K.**  
A histopathological study of coronary arteries in aircrew fatalities during 1962-1978  
A81-49951
- ADEY, H. B.**  
Tissue interaction with nonionizing electromagnetic fields  
[DE81-027654]  
N81-32858
- AKHUNOV, A. A.**  
Effect of chronic Gamma irradiation on protein composition and cholesterol content of canine blood  
N81-33786
- ALEKSEYEV, Y. I.**  
Age-related changes in body and visceral weight of Wistar rats  
N81-33797
- ALPEROV, O. A.**  
Effect of attenuated geomagnetic field on E. coli resistance to ultraviolet rays  
N81-33789
- ALI, A. K.**  
Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration  
A81-49952
- AMICONI, G.**  
Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach  
[IAF PAPER 81-175]  
A81-47390
- ANDERSON, C. D.**  
Pilot performance as a function of peripheral cues and color in computer generated images  
A81-48362
- ANTYPOV, V. V.**  
A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system  
A81-47194
- AETOS, S.**  
Comprehension and analysis of information in text. 4: Decision and verification processes  
[AD-A102677]  
N81-32863
- ARNAUD, C. D.**  
Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832
- Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight  
N81-32842
- ASCENZI, P.**  
Structural and functional changes in man accompanying the weightlessness in 'Skylab' flights - A mathematical approach  
[IAF PAPER 81-175]  
A81-47390
- ASHWORTH, B. B.**  
A study of the comparative effects of various means of motion cueing during a simulated compensatory tracking task  
A81-48006
- ATWOOD, G.**  
The University of Akron urban air pollution and human health study  
[PB81-213282]  
N81-33811
- AYZIKOV, G. S.**  
Method of testing white rat elevator response  
N81-33798

## B

- BACHERT, R. F.**  
Computer-based simulations for man-computer system design  
A81-48374
- BACON, B.**  
Experiment K-310: The effect of space flight on osteogenesis and dentinogenesis in the mandible of rats. Supplement 1: The effects of space flight on alveolar bone modeling and remodeling in the rat mandible  
N81-32840
- BALL, K.**  
Cues reduce direction uncertainty and enhance motion detection  
A81-49673
- BALLOU, J. E.**  
Chemical characterization and toxicologic evaluation of airborne mixtures  
[AD-A102678]  
N81-32855
- BARANOV, V. S.**  
Subcutaneously implanted connector to record arterial pressure and make electrical contact  
N81-33799
- BARLOW, H. B.**  
Efficiency of human visual signal discrimination  
A81-48225
- BARSUKOVA, Z. V.**  
Linear discriminant function used to assess cosmonaut reaction to LBNP  
N81-33772
- BAWIE, S. B.**  
Tissue interaction with nonionizing electromagnetic fields  
[DE81-027654]  
N81-32858
- BAYLINK, D. J.**  
Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832
- BEDI, J. P.**  
Effects of sulfuric acid mist exposure on pulmonary function  
[PB81-208977]  
N81-33812

- BEECROFT, S.**  
Real time simulation of OAS Phase I controls and displays  
A81-48375
- BEIER, J.**  
Relative efficacy of the proposed Space Shuttle anti-motion sickness medications  
[IAF PAPER 81-177] A81-47391
- BEJCZY, A. K.**  
Kinesthetic coupling between operator and remote manipulator  
A81-47986
- BELEN, R. R.**  
Biocentrifuge system capable of exchanging specimen cages while in operational mode  
[NASA-CASE-MPS-23825-1] N81-32829
- BELLAMY, L. J.**  
Development of a search task for the measurement of peripheral visual acuity  
A81-48499
- BELYAYEV, S. M.**  
Effect of one day immersion on cardiorespiratory parameters of man during exercise  
N81-33778
- BERRY, W. E.**  
Development of an Animal Holding Facility for Space Shuttle studies  
[IAF PAPER 81-171] A81-47389
- BLACK, F. O.**  
Algorithms for the clinical analysis of nystagmus eye movements  
A81-47673
- BLANKENHORN, D. H.**  
The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847
- BOABER, P.**  
Variations in response to whole-body vibration - Intensity dependent effects  
A81-48500
- BOKOVIKOV, A. K.**  
On increasing reliability of cosmonaut-operator's activity  
[IAF PAPER 81-255] A81-47427
- BOURNE, L. E., JR.**  
Comprehension and analysis of information in text. 4: Decision and verification processes  
[AD-A102677] N81-32863
- BOYMAN, G. H.**  
Development of an Animal Holding Facility for Space Shuttle studies  
[IAF PAPER 81-171] A81-47389
- BOYKIN, W. H.**  
The application of robotic sensors - A survey and assessment  
A81-47982
- BOYKIN, W. H., JR.**  
Robotic actuators - A technology assessment  
A81-47988
- BRADY, J. I.**  
Human engineering evaluation of the hyperbaric research facility  
[AD-A103681] N81-33806
- BRAUNSTEIN, M.**  
Advanced computer image generation techniques exploiting perceptual characteristics  
[AD-A103365] N81-33818
- BRESCH, C.**  
Origin of life between Scylla and Charybdis  
A81-48725
- BUCK, J. E.**  
Man-machine simulations in industrial systems. Volume 1: Narrative  
[DE81-027882] N81-32868
- BURGESS, A. E.**  
Efficiency of human visual signal discrimination  
A81-48225
- BYCHKOV, V. P.**  
Use of nutrients to correct the adrenocortical system  
N81-33776
- C**
- CANN, C. E.**  
Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832
- Experiment K-317: Bone resorption in rats during spaceflight  
N81-32845
- CASTLEMAN, K. R.**  
Experiment K-308: Automatic analysis of muscle fibers from rats subjected to spaceflight  
N81-32838
- CHEBRIAKOV, I. M.**  
Oxygen provision to humans under conditions of high-altitude flight  
A81-47150
- CHEBNOVICH, I. L.**  
Effectiveness of decomposition of plant waste by microorganisms under aerobic conditions  
N81-33784
- CHESTOV, A. D.**  
Effect of stationary magnetic field on the thyroid  
N81-33787
- CHESTUKHIN, V. V.**  
Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man  
N81-33774
- Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man  
N81-33775
- CHEZIRKIN, P. V.**  
Simulated spaceflight effects on mating and pregnancy of rats  
[NASA-TN-81326] N81-32852
- CHIDSEY, I. L.**  
Analysis of man-in-the-loop control systems in the presence of nonlinearities  
[AD-A102574] N81-32867
- CHIN, H. P.**  
The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847
- CHIZHOV, G. K.**  
Comparison of direct and indirect methods of measuring cardiac output  
N81-33773
- CHUBB, G. P.**  
Real time simulation of QAS Phase I controls and displays  
A81-48375
- CHUI, L. A.**  
Experiment K-308: Automatic analysis of muscle fibers from rats subjected to spaceflight  
N81-32838
- CHULMAN, Y.**  
States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792
- CHURCHILL, T.**  
An anthropometric data base for commercial design applications, phase 1  
[PB81-211070] N81-33824
- CLARK, B. A. J.**  
Evaluations of a modified crew seat for the Iroquois  
[ARL/APP-REPT-80] N81-32865
- CONLON, M.**  
The University of Akron urban air pollution and human health study  
[PB81-213282] N81-33811
- CORDAY, E.**  
Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions  
A81-49327
- COURTNEY, A. J.**  
Development of a search task for the measurement of peripheral visual acuity  
A81-48499
- CRAWFORD, B. M.**  
Computer-based simulations for man-computer system design  
A81-48374
- CRAWSHAW, L. I.**  
The evolutionary development of vertebrate thermoregulation  
A81-48119
- CUMMINGS, L. L.**  
Organizational behavior  
[AD-A103625] N81-33819

CURLEY, M. D.  
Human engineering evaluation of the hyperbaric  
research facility  
[AD-A103681] N81-33806

## D

DAVIS, G. I.  
Man-machine simulations in industrial systems.  
Volume 1: Narrative  
[DE81-027882] N81-32868

DAVYDOV, B. I.  
A comparative analysis of the biological effects  
of electromagnetic radiation. I - The nervous  
system A81-47194

DEATON, I. V.  
Computer controlled electronic warfare simulation  
for tactical operator training A81-48363

DEGTIAREV, V. A.  
Linear discriminant function used to assess  
cosmonaut reaction to LBNP N81-33772

Computer use for automatic measurement of some  
physiological parameters N81-33794

DELL, R. B.  
Experiment K305: Quantitative analysis of  
selected bone parameters. Supplement 2: Bone  
elongation rate and bone mass in metaphysis of  
long bones N81-32834

DEHISOV, G. V.  
Closed ecosystems as the means for the outer space  
exploration by men /Experimental results,  
perspectives/  
[IAF PAPER 81-164] A81-47383

DEVINCENZI, D. L.  
Publications of the Exobiology Program for 1980:  
A special bibliography  
[NASA-TM-83808] N81-32869

DIAZ, R. G.  
The application of robotic sensors - A survey and  
assessment A81-47982

Robotic actuators - A technology assessment  
A81-47988

DIWAN, R. H.  
A histopathological study of coronary arteries in  
aircrew fatalities during 1962-1978 A81-49951

DLEVNIKOVA, Y. A.  
Changes in rabbit immunoreactivity as related to  
duration of hypokinesia N81-33803

DOROSHEV, V. G.  
Linear discriminant function used to assess  
cosmonaut reaction to LBNP N81-33772

Comparison of direct and indirect methods of  
measuring cardiac output N81-33773

Computer use for automatic measurement of some  
physiological parameters N81-33794

DOWNEY, J. A.  
The evolutionary development of vertebrate  
thermoregulation A81-48119

DUBOIS, A. B.  
Osmoregulation and interstitial fluid pressure  
changes in humans during water immersion A81-48075

DUFFY, P. H.  
Biomedical effects associated with  
energy-transmissions systems: Effects of 60-Hz  
electric fields on circadian and ultradian  
physiological and behavioral functions in small  
rodents [DE81-027655] N81-32857

DUBHAM, E. B.  
Organizational behavior  
[AD-A103625] N81-33819

DUBAIRAJ, M.  
Cardiac arrhythmias in service personnel - An  
electrophysiologic evaluation A81-49956

DURNOVA, G. M.  
Age-related changes in body and visceral weight of  
Wistar rats N81-33797

## E

EHRET, C. P.  
Biomedical effects associated with  
energy-transmissions systems: Effects of 60-Hz  
electric fields on circadian and ultradian  
physiological and behavioral functions in small  
rodents [DE81-027655] N81-32857

ELWORTH, C. L.  
Pilot performance as a function of peripheral cues  
and color in computer generated images A81-48362

ELY, D. L.  
The University of Akron urban air pollution and  
human health study  
[PB81-213282] N81-33811

ESTES, J. E.  
Creation of learning kits N81-32570

## F

FAGET, M. A.  
Space Shuttle life support systems - A status report  
[IAF PAPER 81-181] A81-47394

FICHTER, E. P.  
A novel design for a robot arm A81-47990

FICKOVA, M.  
Metabolic changes in the animals subjected to  
flight in the biosatellites 'Cosmos'  
[IAF PAPER 81-179] A81-47393

FINOGENOVA, B. I.  
Comparison of direct and indirect methods of  
measuring cardiac output N81-33773

FLEMING, J. E.  
Effects of ethidium bromide on development and  
aging of Drosophila - Implications for the free  
radical theory of aging A81-48056

POLINSBEE, L. J.  
Effects of sulfuric acid mist exposure on  
pulmonary function  
[PB81-208977] N81-33812

FOMICHEVA, V. M.  
Prospects of autotrophic link functioning in  
biological life-support systems based on cell  
biology studies  
[IAF PAPER 81-165] A81-47384

FRENKEL, I. D.  
Use of nutrients to correct the adrenocortical  
system N81-33776

FULLMER, C. S.  
Molecular mechanisms of the epithelial transport  
of toxic metal ions, particularly mercury,  
cadmium, lead, arsenic, zinc and copper  
[DE81-029091] N81-32851

## G

GAICH, Y. Y.  
Subcutaneously implanted connector to record  
arterial pressure and make electrical contact  
N81-33799

GALICHIY, V. A.  
Comparison of direct and indirect methods of  
measuring cardiac output N81-33773

GALLE, B. M.  
Effect of hypokinesia in head down position on  
man's equilibrium function N81-33779

GANNELL, P. M.  
The use of ultrasonic spectroscopy to characterize  
calcified lesions A81-47847

GARCIA, C.  
Evaluation of the CNS and cardiovascular effects  
of prolonged exposure to bromotrifluoromethane  
(CBrF<sub>3</sub>)  
[NASA-CR-161078] N81-32853

- GAVRILOVA, L. N.  
Effect of hypokinesia in head down position on man's equilibrium function  
N81-33779
- GELLEE, I.  
Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBRF3)  
[NASA-CR-161078] N81-32853
- GENIE, A. M.  
States of catecholamines and enzymes of synthesis thereof in the adrenal medulla of rats after flight aboard Cosmos-936 biosatellite  
N81-33792
- GITELSON, I. I.  
Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/  
[IAF PAPER 81-164] A81-47383  
Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems  
[IAF PAPER 81-169] A81-47387
- GLADILOV, V. V.  
Effect of hypoxia on affinity of hemoglobin for oxygen in animals  
N81-33802
- GLAZKOVA, V. A.  
Oxygen provision to humans under conditions of high-altitude flight  
A81-47150
- GLEISER, C.  
Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBRF3)  
[NASA-CR-161078] N81-32853
- GLENN, H. V., JR.  
A new CT collimator for producing two simultaneous overlapping slices from one scan  
A81-47675
- GOLDIN, S.  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311] N81-33817
- GOLOVKIN, L. G.  
Oxygen provision to humans under conditions of high-altitude flight  
A81-47150
- GREENAWAY, P.  
Evaluation of short-term bioassays to predict functional impairment, development of neurobehavioral bioassays in laboratory animals, directory of institutions/individuals  
[AD-A104225] N81-33770
- GRIBOVSKAIA, I. V.  
Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/  
[IAF PAPER 81-164] A81-47383
- GRIFFIN, H. J.  
Biodynamic response to whole-body vibration  
N81-34136
- GROH, K. B.  
Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents  
[DB81-027655] N81-32857
- GSCHEIND, E. T.  
Analysis of man-in-the-loop control systems in the presence of nonlinearities  
[AD-A102574] N81-32867
- GUERET, P.  
Characterization of left ventricular mechanical function during arrhythmias with two dimensional echocardiography. I - Premature ventricular contractions  
A81-49327
- GUPTA, V. K.  
Graduated dynamic end point system 'GRADEPS' for assessment of visual field contraction during +Gz acceleration  
A81-49952  
Field studies of heat stress in fighter operations in Assam Valley  
A81-49961
- GUI, W. W.  
Space Shuttle life support systems - A status report [IAF PAPER 81-181] A81-47394
- GVOZDEV, S. V.  
Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man  
N81-33774  
Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man  
N81-33775
- ## H
- HAGIN, W. V.  
Analytic derivation of training transfer effectiveness ratios /TERS/ for new training systems  
A81-48360
- HAINES, R., JR.  
Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBRF3)  
[NASA-CR-161078] N81-32853
- HAMILTON, M.  
Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBRF3)  
[NASA-CR-161078] N81-32853
- HANKINS, D. B.  
Teaching/learning principles  
N81-32572
- HARGREAVES, J. M.  
Literature sources in toxicology: A survey [BLL-BLRDR-5542] N81-33814
- HARNASCH, D.  
Origin of life between Scylla and Charybdis  
A81-48725
- HARRIS, L. B.  
Moving and the motion after-effect  
A81-47665
- HARTMANN, R., JR.  
Evaluation of the CNS and cardiovascular effects of prolonged exposure to bromotrifluoromethane (CBRF3)  
[NASA-CR-161078] N81-32853
- HAUGSTAD, B. S.  
Spacecraft and stellar occultations by turbulent planetary atmospheres. A theoretical investigation of various wave propagation effects and their impact on derived profiles of refractivity, temperature and pressure  
[AD-A103069] N81-32846
- HAYES-ROTH, B.  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311] N81-33817
- HAYES-ROTH, F.  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311] N81-33817
- HEATH, T. O.  
Variations in response to whole-body vibration - Intensity dependent effects  
A81-48500
- HEINRICH, M. B.  
US rat experiments flown on the Soviet satellite Cosmos 1129  
[NASA-TM-81289] N81-32830
- HELLUMS, J. D.  
Effects of microwave irradiation on human blood platelets  
A81-47674
- HESTERES, J. D.  
The use of ultrasonic spectroscopy to characterize calcified lesions  
A81-47847
- HOCHULI, C. U.  
Procedures for evaluating nonperturbing temperature probes in microwave fields  
[PB81-205882] N81-33813
- HOLTON, E. M.  
Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight  
N81-32842
- HOEDINSKY, J. B.  
Relative efficacy of the proposed Space Shuttle antimotion sickness medications  
[IAF PAPER 81-177] A81-47391

- HORVATH, S. M.**  
Effects of sulfuric acid mist exposure on pulmonary function  
[PB81-208977] N81-33812
- HOUEK, J. A.**  
Development of a multi-media crew-training program for the Terminal Configured Vehicle Mission Simulator  
A81-48361
- HOWARD, B. M.**  
Simulated spaceflight effects on mating and pregnancy of rats  
[NASA-TM-81326] N81-32852
- ILINA-KAKUYEVA, Y. I.**  
Age-related changes in body and visceral weight of Wistar rats  
N81-33797
- IVANOV, L. A.**  
Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33795  
Method for evaluating respiratory system reaction to increasing hypercapnia  
N81-33801
- J**
- JAGOW, R. B.**  
Development of an Animal Holding Facility for Space Shuttle studies  
[IAF PAPER 81-171] A81-47389
- JAMES, L. B.**  
Aggregation bias in estimates of perceptual agreement  
[AD-A102726] N81-32864
- JARRETT, M.**  
The University of Akron urban air pollution and human health study  
[PB81-213282] N81-33811
- JEE, W. S. S.**  
Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832  
Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones  
N81-32834
- JENNINGS, R. J.**  
Efficiency of human visual signal discrimination  
A81-48225
- JOHNSON, T. S.**  
Norepinephrine turnover in lung - Effect of cold pressure and chronic hypoxia  
A81-48074
- JUDY, M. M.**  
Experiment K305: Quantitative analysis of selected bone parameters. Supplement 3A: Trabecular spacing and orientation in the long bones  
N81-32835
- JUKES, T. H.**  
Recent progress in exobiology and planetary biology  
[IAF PAPER 81-308] A81-47447
- K**
- KALANDAROV, S.**  
Use of nutrients to correct the adrenocortical system  
N81-33776
- KAPLANSKIY, A. S.**  
Age-related changes in body and visceral weight of Wistar rats  
N81-33797
- KAPUR, B. B.**  
Backache in helicopter pilots  
A81-49953
- KATKOV, V. Y.**  
Effect of negative pressure and occlusion cuffs on intravascular pressure in legs of healthy man  
N81-33774  
Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man  
N81-33775
- KATOLA, V. M.**  
Effect of stationary magnetic field on the thyroid  
N81-33787
- KATUTSEV, V. P.**  
Comparison of direct and indirect methods of measuring cardiac output  
N81-33773
- KAZARIAN, L. E.**  
Experiment K307: Vertebral body strength of rat spinal columns  
N81-32837
- KEEFE, J. R.**  
Experiment K-313: Rat and quail ontogenesis  
N81-32841
- KHER, H. L.**  
Cardiac arrhythmias in service personnel - An electrophysiologic evaluation  
A81-49956
- KHOSLA, S. S.**  
Osmoregulation and interstitial fluid pressure changes in humans during water immersion  
A81-48075
- KIMMEL, D. B.**  
Experiment K305: Quantitative analysis of selected bone parameters. Supplement 2: Bone elongation rate and bone mass in metaphysis of long bones  
N81-32834
- KINTSCH, W.**  
Comprehension and analysis of information in text. 4: Decision and verification processes  
[AD-A102677] N81-32863
- KIRICHENKO, V. I.**  
Effect of stationary magnetic field on the thyroid  
N81-33787
- KLARR, P.**  
Selected research publications in cognitive science by Rand staff: 1979-1980  
[AD-A103311] N81-33817
- KLEIN, H. P.**  
Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight  
N81-32831
- KOLPAKOV, I. V.**  
Effect of lower body negative pressure (Chibis garment) and local negative pressure on central circulation in healthy man  
N81-33775
- KORBZ, J.**  
Evaluation of short-term bioassays to predict functional impairment, development of neurobehavioral bioassays in laboratory animals, directory of institutions/individuals  
[AD-A104225] N81-33770
- KORDIUM, B. L.**  
Prospects of autotrophic link functioning in biological life-support systems based on cell biology studies  
[IAF PAPER 81-165] A81-47384
- KOTOVSKAYA, A. E.**  
Effect of hypokinesia in head down position on man's equilibrium function  
N81-33779
- KOVEOV, B. G.**  
Closed ecosystems as the means for the outer space exploration by men /Experimental results, perspectives/  
[IAF PAPER 81-164] A81-47383  
Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems  
[IAF PAPER 81-169] A81-47387
- KOZMINSKY, E.**  
Comprehension and analysis of information in text. 4: Decision and verification processes  
[AD-A102677] N81-32863
- KRAFT, C. L.**  
Pilot performance as a function of peripheral cues and color in computer generated images  
A81-48362
- KRAFT, L. M.**  
Experiment K-315: Studies of the nasal mucosa  
N81-32843
- KRASHNIKOV, N. P.**  
Effect of exercise on reactions to breathing a gas mixture with 5% carbon dioxide and 14% oxygen  
N81-33781

- KRIPKE, D. P.**  
Measuring sleep by wrist actigraph  
[AD-A103196] N81-33807
- KRYLOVA, N. V.**  
On increasing reliability of cosmonaut-operator's  
activity  
[IAF PAPER 81-255] A81-47427
- KUKLINSKI, W. S.**  
A Fast Walsh transform electrocardiogram data  
compression algorithm suitable for  
microprocessor implementation  
[AD-A104115] N81-33808
- KUKUSHKIN, Y. A.**  
Computer use for automatic measurement of some  
physiological parameters N81-33794
- KULIKOV, O. B.**  
Comparison of direct and indirect methods of  
measuring cardiac output N81-33773
- KULKOV, Y. B.**  
Log-linear regression method used to assess  
quality of air samples in fluoroplastic containers  
N81-33796
- KUNZRU, G. B.**  
A histopathological study of coronary arteries in  
aircrew fatalities during 1962-1978 A81-49951
- KUPPUSHANY, G.**  
Cardiac arrhythmias in service personnel - An  
electrophysiologic evaluation A81-49956
- KUZNETSOVA, T. V.**  
Effect of attenuated geomagnetic field on E. coli  
resistance to ultraviolet rays N81-33789
- KVETNANSKY, R.**  
Metabolic changes in the animals subjected to  
flight in the biosatellites 'Cosmos'  
[IAF PAPER 81-179] A81-47393
- KVETNYANSKI, R.**  
States of catecholamines and enzymes of synthesis  
thereof in the adrenal medulla of rats after  
flight aboard Cosmos-936 biosatellite N81-33792
- KWOH, Y. S.**  
A new CT collimator for producing two simultaneous  
overlapping slices from one scan A81-47675
- L**
- LANDSBERG, L.**  
Norepinephrine turnover in lung - Effect of cold  
pressure and chronic hypoxia A81-48074
- LANG, T.-W.**  
Characterization of left ventricular mechanical  
function during arrhythmias with two dimensional  
echocardiography. I - Premature ventricular  
contractions A81-49327
- LANSBERG, A.**  
The neuronal pool as a function unit in the  
Central Nervous System (CNS)  
[TRITA-NA-8009] N81-32859
- LAPSHINA, N. A.**  
Linear discriminant function used to assess  
cosmonaut reaction to LBNP N81-33772
- Comparison of direct and indirect methods of  
measuring cardiac output N81-33773
- Computer use for automatic measurement of some  
physiological parameters N81-33794
- LAWRENCE, A. P.**  
Tissue interaction with nonionizing  
electromagnetic fields  
[DE81-027654] N81-32858
- LEGENKOV, V. I.**  
Study of digestive tract microflora of Soyuz-13  
and Salyut-4 crews N81-33783
- LEMONS, D. E.**  
The evolutionary development of vertebrate  
thermoregulation A81-48119
- LENTSNER, A. A.**  
Sensitivity to antibiotics of lactobacilli from  
digestive tract of Soyuz-13 and Salyut-4 crew  
members N81-33782
- Study of digestive tract microflora of Soyuz-13  
and Salyut-4 crews N81-33783
- LENTSNER, M. P.**  
Sensitivity to antibiotics of lactobacilli from  
digestive tract of Soyuz-13 and Salyut-4 crew  
members N81-33782
- Study of digestive tract microflora of Soyuz-13  
and Salyut-4 crews N81-33783
- LEON, H. A.**  
Effects of ethidium bromide on development and  
aging of Drosophila - Implications for the free  
radical theory of aging A81-48056
- LEWIS, A.**  
Primary events in vision  
[AD-A095369] N81-33805
- LEWIS, J. A.**  
A comparison of possible methods for marine  
fouling assessment during raft trials  
[MRL-R-808] N81-33769
- LEWIS, M. P.**  
Effect of different runway size on pilot  
performance during simulated night landing  
approaches  
[AD-A103190] N81-33816
- LIN-LIU, S.**  
Tissue interaction with nonionizing  
electromagnetic fields  
[DE81-027654] N81-32858
- LIN, C. Y.**  
Experiment K304: Studies of specific hepatic  
enzymes and liver constituents involved in the  
conversion of carbohydrates to lipids in rats  
exposed to prolonged space flight N81-32831
- LISOVSKII, G. M.**  
Closed ecosystems as the means for the outer space  
exploration by men /Experimental results,  
perspectives/  
[IAF PAPER 81-164] A81-47383
- Experimental estimation of the functional  
possibilities of higher plants as medium  
regenerators in life support systems  
[IAF PAPER 81-169] A81-47387
- LIZKO, M. M.**  
Sensitivity to antibiotics of lactobacilli from  
digestive tract of Soyuz-13 and Salyut-4 crew  
members N81-33782
- Study of digestive tract microflora of Soyuz-13  
and Salyut-4 crews N81-33783
- LOECH, D.**  
Development of improved SB-3 helicopter seat  
cushions  
[AD-A103484] N81-33822
- LUBER, R. A.**  
Tissue interaction with nonionizing  
electromagnetic fields  
[DE81-027654] N81-32858
- LUBDAK, R. L.**  
Tissue interaction with nonionizing  
electromagnetic fields  
[DE81-027654] N81-32858
- M**
- MACHO, L.**  
Metabolic changes in the animals subjected to  
flight in the biosatellites 'Cosmos'  
[IAF PAPER 81-179] A81-47393
- MAGNITSKALYA, G. V.**  
Changes in rabbit immunoreactivity as related to  
duration of hypokinesia N81-33803
- MAKSHINOV, I. V.**  
Oxygen provision to humans under conditions of  
high-altitude flight A81-47150

- MALIK, H.**  
Backache in helicopter pilots  
A81-49953
- MALTSEVA, N. A.**  
Effectiveness of decomposition of plant waste by  
microorganisms under aerobic conditions  
N81-33784
- MARKIN, A. S.**  
Method of testing white rat elevator response  
N81-33798
- MARKOS, A. T.**  
Development of a multi-media crew-training program  
for the Terminal Configured Vehicle Mission  
Simulator  
A81-48361
- MARTIN, D. J., JR.**  
A study of the comparative effects of various  
means of motion cueing during a simulated  
compensatory tracking task  
A81-48006
- MARTIN, J.**  
Relative efficacy of the proposed Space Shuttle  
anti-motion sickness medications  
[IAF PAPER 81-177]  
A81-47391
- MASON, W.**  
Measuring sleep by wrist actigraph  
[AD-A103196]  
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Mineralization in the long bones  
N81-32836
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exercise-induced left and right ventricular  
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- MCCARTHER, D.**  
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applications, phase 1  
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- MCKISSICK, B. T.**  
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compensatory tracking task  
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arterial pressure and make electrical contact  
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- MEERBAUM, S.**  
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contractions  
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to the space safety of payload scientists, and  
perspectives for the future  
[IAF PAPER 81-250]  
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of prolonged exposure to bromotrifluoromethane  
(CBTF3)  
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- MERTENS, H. W.**  
Effect of different runway size on pilot  
performance during simulated night landing  
approaches  
[AD-A103190]  
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- HERTZ, F. C.**  
Creation of learning kits  
N81-32570
- MESSIN, S.**  
Measuring sleep by wrist actigraph  
[AD-A103196]  
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(CBTF3)  
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digestive tract of Soyuz-13 and Salyut-4 crew  
members  
N81-33782
- Study of digestive tract microflora of Soyuz-13  
and Salyut-4 crews  
N81-33783
- MIKOS, K. W.**  
Log-linear regression method used to assess  
quality of air samples in fluoroplastic containers  
N81-33796
- MILLER, H. W.**  
Assessment of health impacts from electrical-power  
transmission lines  
[UB-3490-2024]  
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radical theory of aging  
A81-48056
- MODUGNO, G. C.**  
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to the space safety of payload scientists, and  
perspectives for the future  
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thermoregulation  
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perspectives for the future  
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mechanism and its consequences  
A81-49474
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selected bone parameters  
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selected bone parameters. Supplement 1:  
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differentiation in rat molar periodontium  
N81-32833
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differentiation in rat molar periodontium  
N81-32833
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[BMPT-PB-T-80-111]  
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Measuring sleep by wrist actigraph  
[AD-A103196]  
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requirements of men rapidly evacuating a space  
launch complex  
[AD-A095532]  
N81-33820

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A81-48189
- NANDA, H. C.  
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A81-49328
- NARAYANAN, G. R.  
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- NAUMANN, A.  
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[DGLR PAPER 81-001]  
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[IAP PAPER 81-165]  
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[LBL-11147-REV]  
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A81-48725
- NIKOLAYENKO, E. M.  
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N81-33774  
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N81-33775
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A81-48500
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N81-33790
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A81-48189
- OKLADNIKOV, I. U. N.  
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[IAP PAPER 81-164]  
A81-47383
- OLCOTT, T. H.  
Development of an Animal Holding Facility for Space Shuttle studies  
[IAP PAPER 81-171]  
A81-47389
- OZEROVA, O. Y.  
Method for attaching cerebral thermocouple wires to the dog's skull  
N81-33800

## P

- PACE, H.  
Scaling of metabolic rate on body mass in small laboratory mammals  
A81-47894  
Experiment K-316: Effects of weightlessness on body composition in the rat  
N81-32844

- PACHELLA, E. G.  
The development and utilization of integrated multidimensional displays  
[AD-A103170]  
N81-33823
- PANKOVA, A. S.  
Age-related changes in body and visceral weight of Wistar rats  
N81-33797
- PANKOVA, I. M.  
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[IAP PAPER 81-164]  
A81-47383
- PARFENOV, G. P.  
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N81-33793
- PARRISH, R. V.  
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A81-48006
- PATERSON, E. T.  
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A81-48868
- PEARSON, W. H.  
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A81-48374
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A81-49327
- PETERKA, E. J.  
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A81-47672
- PETUKHOVA, T. P.  
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N81-33776
- PIANA, M. L.  
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A81-47674
- PITTS, G. C.  
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[IAP PAPER 81-169]  
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N81-33773
- POPOVA, A. P.  
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[IAP PAPER 81-165]  
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A81-49327
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N81-33785
- PRIOGOV, A. B.  
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N81-33787

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- RAHLMANN, D. F.**  
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A81-47894
- RAI, K.**  
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A81-49952
- RAMACCI, C. A.**  
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[PB81-211070] N81-33824
- ROONEY, J. A.**  
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A81-47847
- ROSENBERG, G. D.**  
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N81-32839
- ROSENBERG, R. S.**  
Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents  
[DE81-027655] N81-32857
- ROTONDO, G.**  
Italy's contribution, from a medical standpoint, to the space safety of payload scientists, and perspectives for the future  
[IAP PAPER 81-250] A81-47424
- ROUSE, W. B.**  
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N81-33774  
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N81-33775
- RUSSELL, J. E.**  
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N81-32839
- RUSSELL, J. J.**  
Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents  
[DE81-027655] N81-32857
- RYZHKOVA, V. I.**  
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N81-33796

- RYZHOV, A. I.**  
Mechanism of adrenosympathetic system reaction to single exposure to variable magnetic field  
N81-33788

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- SABELMAN, E. E.**  
Experiment K-314: Fetal and neonatal rat bone and joint development following in Utero spaceflight  
N81-32842  
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[NASA-TM-81326] N81-32852
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Biomedical effects associated with energy-transmissions systems: Effects of 60-Hz electric fields on circadian and ultradian physiological and behavioral functions in small rodents  
[DE81-027655] N81-32857
- SAGAN, P. M.**  
Tissue interaction with nonionizing electromagnetic fields  
[DE81-027654] N81-32858
- SAKHAROVA, S. A.**  
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N81-33788
- SALISBURY, J. K., JR.**  
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A81-47986
- SAMUELS, A.**  
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[NASA-CR-161078] N81-32853
- SARKISOV, I. Y.**  
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N81-33798
- SARRAILHE, S. R.**  
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- SAVINA, Y. A.**  
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N81-33797
- SCANO, A.**  
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[IAP PAPER 81-175] A81-47390
- SCHWARTZ, E.**  
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[IAP PAPER 81-177] A81-47391
- SEKULEB, B.**  
Cues reduce direction uncertainty and enhance motion detection  
A81-49673
- SHEPPARD, A. B.**  
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[DE81-027654] N81-32858
- SHILEBKO, B. P.**  
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[IAP PAPER 81-169] A81-47387
- SHILOV, V. M.**  
Sensitivity to antibiotics of lactobacilli from digestive tract of Soyuz-13 and Salyut-4 crew members  
N81-33782  
Study of digestive tract microflora of Soyuz-13 and Salyut-4 crews  
N81-33783
- SHIMIZU, M.**  
Non-invasive method and apparatus for measuring pressure within a pliable vessel  
[NASA-CASE-ARC-11264-1] N81-33804

- SHIRVINSKAYA, M. A.  
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N81-33790
- SHOJA, S.  
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[IAF PAPER 81-178] A81-47392
- SHUZY, M. A.  
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[IAF PAPER 81-166] A81-47385
- SHVETS, V. M.  
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N81-33797
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[IAF PAPER 81-164] A81-47383  
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[IAF PAPER 81-169] A81-47387
- SIDORENKO, P. G.  
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[IAF PAPER 81-165] A81-47384
- SIDOROVA, L. M.  
Effectiveness of decomposition of plant waste by microorganisms under aerobic conditions  
N81-33784
- SIMMONS, D. J.  
Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats  
N81-32839
- SIMON, C. W.  
Applications of advanced experimental methods to visual technology research simulator studies: Supplemental techniques  
[AD-A095633] N81-33815
- SINGH, B.  
Thermal stress in high speed low level flying  
A81-49962
- SINGH, B.  
Aeromedical evaluation of aircrew with lower limb disabilities  
A81-49954
- SINHA, K. C.  
Evaluation of thermal strain index for assessment of tolerance to heat stress  
A81-49959
- SIZOV, V. M.  
Changes in rabbit immunoreactivity as related to duration of hypokinesia  
N81-33803
- SKOOG, A. I.  
Life support system development in West Germany  
[IAF PAPER 81-167] A81-47386
- SKURATOVA, S. A.  
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N81-33790
- SMIRNOVA, T. A.  
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N81-32844
- SMITH, A. H.  
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A81-47894  
Experiment K-316: Effects of weightlessness on body composition in the rat  
N81-32844
- SMITH, C.  
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N81-32834
- SOKOLOV, V. I.  
Echocardiometry used to study spinal fluid circulation during redistribution of fluids in a cranial direction  
N81-33777
- SOUZA, E. A.  
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[NASA-TM-81289] N81-32830
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[AD-A103365] N81-33818
- STILL, A. W.  
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A81-47665
- STOW, D. A.  
Creation of learning kits  
N81-32570
- STUPAKOV, G. P.  
Artificial gravity as a means of preventing atrophic skeletal changes  
N81-33791
- SUCHKOV, V. V.  
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N81-33799
- SUNDERMAN, F. W., JR.  
Toxicology and metabolism of nickel compounds  
[DE81-028924] N81-32850
- SVRYKH, G. D.  
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N81-33782  
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A81-48189
- TENFORDE, T. S.  
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- TERSKOV, I. A.  
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[IAF PAPER 81-164] A81-47383  
Experimental estimation of the functional possibilities of higher plants as medium regenerators in life support systems  
[IAF PAPER 81-169] A81-47387
- THOMAS, J. P.  
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- THORNDYKE, P.  
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[IAF PAPER 81-179] A81-47393
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N81-32831  
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N81-33792
- TIKHONCHUK, V. S.  
A comparative analysis of the biological effects of electromagnetic radiation. I - The nervous system  
A81-47194

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N81-33792
- TRUBACHEV, I. N.**  
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A81-47383
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A new CT collimator for producing two simultaneous overlapping slices from one scan  
A81-47675
- TURNER, E. T.**  
Experiment K305: Quantitative analysis of selected bone parameters  
N81-32832
- TYAGI, P.**  
Study of apexphonocardiogram and carotid pulsation during short term hypoxia in a decompression chamber  
A81-49955
- TYAVOKIN, V. V.**  
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- TYUR, M. E.**  
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N81-33782
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Experiment K-316: Effects of weightlessness on body composition in the rat  
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[IAF PAPER 81-169]  
A81-47387
- V**
- VAN, P. T.**  
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- VANDERMEULEN, J. P.**  
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- VEIT, C.**  
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A81-49960
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- VIGHERY, A.**  
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- VIKHROV, N. I.**  
Linear discriminant function used to assess cosmonaut reaction to LBNP  
N81-33772
- VLASOV, V. V.**  
Prognostic value of blood cholesterol level in healthy subjects  
N81-33780
- VOLKMAN, C.**  
Experiment K304: Studies of specific hepatic enzymes and liver constituents involved in the conversion of carbohydrates to lipids in rats exposed to prolonged space flight  
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- VONBECKH, H. J.**  
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[AD-A103663]  
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N81-33772
- W**
- WADHAWAN, J. N.**  
Effects of thermal stress on psychological functions and performance  
A81-49958
- WADHAWAN, M. L.**  
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A81-49957
- WAGNER, R. P.**  
Efficiency of human visual signal discrimination  
A81-48225
- WAKE, W. H.**  
Teaching/learning principles  
N81-32572
- WALKER, W. V.**  
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- WALL, C., III**  
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A81-47673
- WASSEMAN, B. H.**  
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[DE81-029091]  
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- WINTER, F.**  
Experiment K-310: The effect of spaceflight on osteogenesis and dentinogenesis in the mandibles of rats  
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- WOEBKENBERG, E.**  
The University of Akron urban air pollution and human health study  
[PB81-213282]  
N81-33811

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 Experiment K305: Quantitative analysis of  
 selected bone parameters  
 N81-32832

Y

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 Age-related changes in body and visceral weight of  
 Wistar rats  
 N81-33797

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 N81-33773

Z

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 A81-49474

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 Computer use for automatic measurement of some  
 physiological parameters  
 N81-33794

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 compression algorithm suitable for  
 microprocessor implementation  
 [AD-A104115] N81-33808

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 exploiting perceptual characteristics  
 [AD-A103365] N81-33818

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