



Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011(258)
May 1984



(NASA-SP-7011(258)) AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 258) (National Aeronautics and Space Administration) 91 p HC \$7.00 N84-24088 Unclas CSCI 06E 00/52 13256

Aerospace Medicine and Biology

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

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 258)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in April 1984 in

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

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 308 reports, articles and other documents announced during April 1984 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964.

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

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. The *IAA* items will precede the *STAR* items within each category.

Six indexes -- subject, personal author, corporate source, contract, report number, and accession number -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1984 Supplements.

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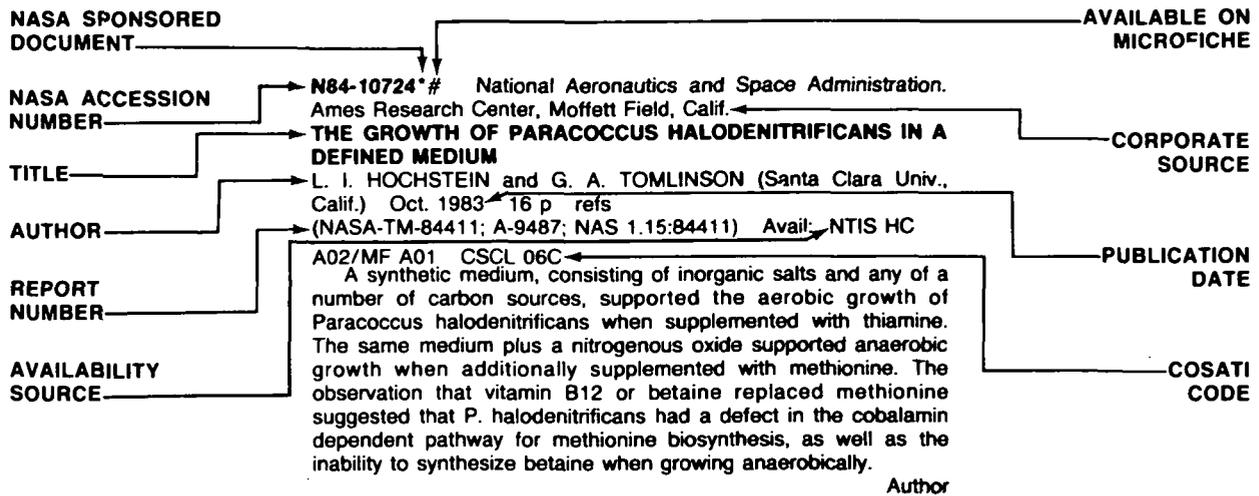
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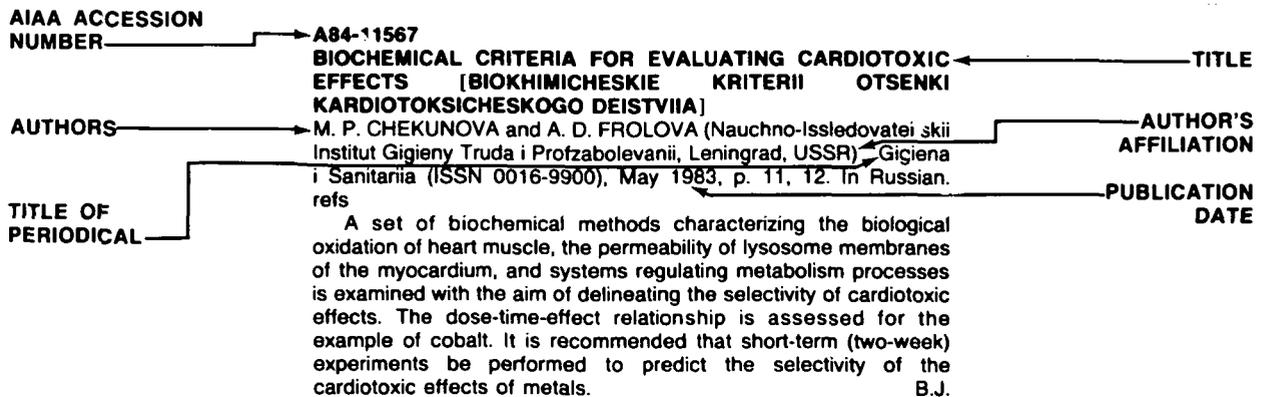
TABLE OF CONTENTS

	Page
Category 51 Life Sciences (General) Includes genetics.	123
Category 52 Aerospace Medicine Includes physiological factors; biological effects of radiation; and weightlessness.	137
Category 53 Behavioral Sciences Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.	151
Category 54 Man/System Technology and Life Support Includes human engineering; biotechnology; and space suits and protective clothing.	157
Category 55 Planetary Biology Includes exobiology; and extraterrestrial life.	166
Subject Index	A-1
Personal Author Index	B-1
Corporate Source Index	C-1
Contract Number Index	D-1
Report Number Index	E-1
Accession Number Index	F-1

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AEROSPACE MEDICINE AND BIOLOGY

(A Continuing Bibliography (Suppl. 258))

MAY 1984

51

LIFE SCIENCES (GENERAL)

Includes genetics.

A84-19599

BEHAVIOR OF BLOOD-SERUM PROTEINS IN RATS EXPOSED TO THE LONG-TERM EFFECT OF AIR IONS [ZACHOWANIE SIE SKLADU BIALEK SUROWICY KRIW U ZWIERZAT EKSPONOWANYCH NA DLUGOTRWALY WPPLYW POWIETRZA ZJONIZOWANEGO]

J. LOSY (Akademia Medyczna, Poznan, Poland) and R. BERNAT Postepy Astronautyki (ISSN 0373-5982), vol. 16, no. 1, 1983, p. 78-83. In Polish. refs

The long-term effect of positive and negative air ions on blood-serum proteins (BSP) was investigated in Wistar rats. The total content of BSP was determined, and proteins were distributed by electrophoresis on polyacrylamide gel. It was shown that positive ions did not change the total content of BSP but rather changed the distribution of protein fractions. Negative ions produced a decrease in the total BSP content, but did not change the percent composition of protein fractions. The effects of positive and negative air ions on the content and distribution of BSP appears to be antagonistic. B.J.

A84-19724

THE EFFECT OF SODIUM HYDROXYBUTYRATE ON RESISTANCE TO HYPOXIA AND BLOOD-PLATELET AGGREGATION IN RATS UNDER DIFFERENT ECOLOGICAL CONDITIONS [VLIANIE OKSIBUTIRATA NATRIIA NA USTOICHIVOST' K GIPOKSII I AGREGATSIU TROMBOTSITOV U KRYV RAZLICHNYKH EKOLOGICHESKIKH USLOVIAKH]

M. A. ALIEV and A. K. BEKBOLOTOVA (Akademiia Nauk Kirgizskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Vysokogor'ia, Kirgiz SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Nov.-Dec. 1983, p. 15-18. In Russian. refs

It is shown that the antihypoxic effect of sodium hydroxybutyrate (SHB) is manifested under low-mountain (about 760 m) and high-mountain (about 2200 m) conditions in rats. No essential disorders in the blood-platelet function were found to occur in such cases. When aborigine rats were moved from medium-altitude (about 1600 m) conditions to high-mountain conditions, the antihypoxic effect of SHB was reduced more than three-fold. The possible mechanisms of the protective effect of SHB are considered. B.J.

A84-19725

ADRENERGIC REACTIVITY OF CORONARY VESSELS AND THE MYOCARDIUM IN OLD DOGS [ADRENERGICHESHAIA REAKTIVNOST' KORONARNYKH SOSUDOV I MIKARDA U STARYKH SOBAK]

A. I. KHOMAZIUK, A. P. NESHCHERET, L. A. IAVORSKII, L. F. IAKUSHEVA, T. M. VOROBIEVA, T. V. GARDASHUK, I. V. SHCHEPELENKO, and L. P. DEREVIANKO (Ministerstvo Zdravookhraneniia Ukrainskoi SSR, Kievskii Nauchno-Isledovatel'skii Institut Endokrinologii i Obmena Veshchestv, Kiev, Ukrainian SSR) Patologicheskaiia Fiziologiia i Eksperimental'naia Terapiia (ISSN 0031-2991), Nov.-Dec. 1983, p. 26-28. In Russian. refs

A84-20187

OXYGEN SUPPLY OF THE BODY IN THE CASE OF AN INCREASE IN THE AFFINITY OF HEMOGLOBIN TO OXYGEN AND A CHANGE IN BLOOD VISCOSITY [KISLORODNOE SNABZHENIE ORGANIZMA PRI POVYSHENII SRODSTVA GEMOGLOBINA K KISLORODU I IZMENENII VIAZKOSTI KROVI]

K. P. IVANOV, A. E. CHUIKIN, O. V. BERKOS, S. V. MOSKOVSKAIA, G. V. SAMSONOV, A. M. STRAGOVICH, N. P. KUZNETSOVA, and L. R. GUDKIN (Akademiia Nauk SSSR, Institut Fiziologii and Institut Vysokomolekuliarnykh Soedinenii, Leningrad, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol. 273, no. 4, 1983, p. 1013-1016. In Russian. refs

A84-20247

THE OLDEST EUKARYOTIC CELLS

G. VIDAL (Lund, Universitet, Lund, Sweden) Scientific American (ISSN 0036-8733), vol. 250, Feb. 1984, p. 48-57.

The fossil record of the first eukaryotic cells is discussed. That these cells were planktonic in nature is shown by the occurrence of their fossils, called acritarchs, in sediments suggesting a free-floating dispersive way of life in open water, and by their cosmopolitan distribution in contemporaneous layers of sediment. In external appearance these acritarchs closely resemble much younger planktonic microfossils. A significant increase in the size of fossil acritarchs some 1.4 billion years ago suggests that eukaryotic organization developed at that time. Most acritarchs are fairly large, thick-walled, distinctively shaped, and ornamented with various external structures. The structures of some evidence the existence of cell processes, vacuoles and other cellular features. The development of these ever more sophisticated forms during the Precambrian era is described. C.D.

A84-20249

THE STRUCTURE OF PROTEINS IN BIOLOGICAL MEMBRANES

N. UNWIN (Stanford University, Stanford, CA) and R. HENDERSON (Medical Research Council, Laboratory of Molecular Biology, Cambridge, England) Scientific American (ISSN 0036-8733), vol. 250, Feb. 1984, p. 78-81, 83, 84 (5 ff.).

A new electron microscopy technique to study the structure of membrane proteins is discussed. Such proteins tend to aggregate into two-dimensional lattices within the membrane or can be induced to form such lattices. An electron micrograph of such a crystalline array is scanned with a microdensitometer, generating a two-dimensional array of numbers representing the photographic

51 LIFE SCIENCES (GENERAL)

density at every point in the picture. Then, a Fourier transform of the array, in effect the numerical analog of the diffraction pattern, is computed. Only that information derived from the regular, repeating features of the object is selected from the transform. This information is finally recombined in a Fourier synthesis which reconstructs the original image without its obscuring noise. A three-dimensional image of the object is obtained by processing a series of views at slightly different angles. The application of this technique to determine the structure of bacteriorhodopsin, connexons, and cytochrome c oxidase is described in detail.

C.D.

A84-20275

PROBLEMS OF THE NATURAL AND MODIFIED RADIATION RESPONSE [PROBLEMY PRIRODNOI I MODIFITSIROVANNOI RADIOCHUVSTVITEL'NOSTI]

M. M. KONSTANTINOVA, ED. and A. M. KUZIN, ED. Moscow, Izdatel'stvo Nauka, 1983, 280 p. In Russian.

The roles that genomes, membranes, reparative enzymes, and endogenic protective agents are believed to play in determining a biological object's sensitivity to radiation are discussed. Attention is also given to the search for means to counter the effect of radiation and to principles that will guide the assessment of the effectiveness of these means. The mechanisms by which protective agents act, on the cellular and the system level, are discussed, along with the selected changes in radiation sensitivity seen in normal and tumoral tissues. The results of studies carried out during the last ten years are summarized, with attention called to the most promising directions in research. Also treated are various practical aspects of the radiation therapy of tumors. No individual items are abstracted in this volume

C.R.

A84-20392

THERMOCHEMICAL MODEL FOR THE CALCULATION OF THE MAXIMUM PERMISSIBLE EXPOSURE OF THE RETINA IN THE NEAR INFRARED RANGE

G. I. ZHELTOV, V. N. GLAZKOV, L. A. LINNIK, G. G. MESHKOV, A. P. PRIVALOV, and V. S. REPIAKH (Akademiia Nauk Belorusskoi SSR, Institut Fiziki, Minsk, Belorussian SSR) (Kvantovaiia Elektronika /Moscow/, vol. 10, Aug. 1983, p. 1684, 1685) Soviet Journal of Quantum Electronics (ISSN 0049-1748), vol. 13, Aug. 1983, p. 1109, 1110. Translation. refs

A84-20521* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

METABOLIC ALKALOSIS DURING IMMOBILIZATION IN MONKEYS (M. NEMESTRINA)

D. R. YOUNG (NASA, Ames Research Center, Biomedical Reserch Div., Moffett Field, CA), I. YEH, and R. S. SWENSON (U.S. Veterans Administration Medical Center, Palo Alto, CA) Calcified Tissue International (ISSN 0008-0594), vol. 35, 1983, p. 472-476. refs

The systemic and renal acid-base response of monkeys during ten weeks of immobilization was studied. By three weeks of immobilization, arterial pH and bicarbonate concentrations were elevated (chronic metabolic alkalosis). Net urinary acid excretion increased in immobilized animals. Urinary bicarbonate excretion decreased during the first three weeks of immobilization, and then returned to control levels. Sustained increases in urinary ammonium excretion were seen throughout the time duration of immobilization. Neither potassium depletion nor hypokalemia was observed. Most parameters returned promptly to the normal range during the first week of recovery. Factors tentatively associated with changes in acid-base status of monkeys include contraction of extracellular fluid volume, retention of bicarbonate, increased acid excretion, and possible participation of extrarenal buffers.

Author

A84-20876

INTERRELATIONSHIP BETWEEN transcortine AND TYPE III GLUCOCORTICOID RECEPTORS AND TYPE II GLUCOCORTICOID RECEPTORS UNDER STRESS [VZAIMOSVIAZ' TRANSKORTINA I GLIUKOKORTIKOIDNYKH RETSEPTOROV TIPA III S GLIUKOKORTIKOIDNYMI RETSEPTORAMI TIPA II PRI STRESSE]

P. P. GOLIKOV, N. I. NIKOLAEVA, and E. G. KIRILLOVA (Moskovskii Nauchno-Issledovatel'skii Institut Skoroi Pomoshchi, Moscow, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 27-30. In Russian. refs

A84-20877

AGE-RELATED CHANGES IN MONOAMINE OXIDASE ACTIVITY IN VISUAL-ANALYZER STRUCTURES IN THE CASE OF LIGHT STIMULI [VOZRASNIE IZMENENIIA AKTIVNOSTI MONOAMINOKSIDAZY V STRUKTURAKH ZRITEL'NOGO ANALIZATORA V USLOVIIAKH SVETOVOGO RAZDRAZHENIIA]

N. K. KERIMOVA and Z. D. PIGAREVA (Akademiia Nauk Azerbaidzhanskoi SSR, Institut Fiziologii, Baku, Azerbaidzhan SSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 37-40. In Russian. refs

Light stimuli were shown to affect the monoamine oxidase activity (MOA) in the mitochondria of the visual-analyzer structures of puppies. The enzymatic activity increased with increasing mitochondrial fraction in the visual cortex and in the lateral geniculate body during the period from 1 day to 21 days after birth. Light stimuli produced a maximal increase in MOA in the anterior colliculus of the visual cortex within 21 days after birth and in the lateral geniculate body 45 days after birth.

B.J.

A84-20879

CHANGERS IN THE CYCLASE SYSTEM OF RAT SKELETAL MUSCLES AND THE CONTENT OF CYCLIC NUCLEOTIDES IN RAT BLOOD PLASMA AFTER THE ADMINISTRATION OF CAFFEINE [IZMENENIIA TSIKLAZNOI SISTEMY SKELETNYKH MYSHTS I SODERZHANIIA TSIKLICHESKIKH NEUKLEOTIDOV V PLAZME KROVI KRYSA PRI PRIEME KOFEINA]

L. V. GORBACHEVSKAIA (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Tuberkuleza, Moscow, USSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 47-51. In Russian.

A84-20880

THE MECHANISM OF THE ENZYMATIC REGULATION OF TYROSINE METABOLISM IN HYPERTHERMIA [K MEKHAZMU FERMENTNOI REGULIATSII OBMENA TIROZINA PRI GIPERTERMII]

KH. KURBANOV, G. KH. CHARYEVA, and A. M. NOVGORODSKAIA (Turkmenskii Meditsinskii Institut, Ashkhabad, Turkmen SSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 69-73. In Russian. refs

The activities of tyrosine aminotransferase and phenylalanine hydroxylase, i.e., enzymes thought to be responsible for tyrosine regulation, were studied in rat liver tissue under conditions of hyperthermia. It is shown that hyperthermia leads to an activation of tyrosine aminotransferase and an inhibition of phenylalanine hydroxylase in the liver tissue, this effect being more pronounced under insolation than under high-temperature exposure inside a chamber. It is concluded that tyrosine aminotransferase and phenylalanine hydroxylase help maintain cell homeostasis during exposure to high temperatures.

V.L.

A84-20881

THE PRESERVATION OF THE 2-S RETINOL RECEPTOR IN THE RAT RETINA IN INJURIES INDUCED BY THE VISIBLE LIGHT [SOKHRANENIE 2S-RETSEPTORA RETINOLA V SETCHATKE KRYA PRI POVREZHDAIUSHCHEM DEISTVII VIDIMOGO SVETA]

B. V. POKROVSKII, M. E. SHABANOVA, B. S. GUSMAN, and B. B. FUKS (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Meditsinskoi Khimii* (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 87-91. In Russian. refs

The interaction between retinol and the 2-S low-molecular receptor was investigated in male rats (140-150 g) continuously exposed to fluorescent light for 21 days. The content of rhodopsin in the retina and morphological features were also determined. The content of rhodopsin decreased to zero within 20 days; the total content of cytosole proteins decreased more slowly and constituted 68-72 percent of the control level after 21 days. Progressive dystrophic changes, observed in rods and cones on the third day of exposure, eventually resulted in their destruction. During all the periods studied, a characteristic 2-S retinol peak was observed on the gradient curves. It is concluded that both retinol and the associated molecular mechanisms are preserved in the damaged retina. V.L.

A84-20882

LIPID PEROXIDATION IN SUBCELLULAR LIVER ORGANELLES IN THERMAL BURNS [PEREKISNOE OKISLENIE LIPIDOV V SUBKLETOCHNYKH ORGANELLAKH PECHENI PRI TERMICHESKOM OZHOGE]

S. A. ARISTARKHOVA, E. B. BURLAKOVA, and T. L. ZAETS (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Voprosy Meditsinskoi Khimii* (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 102-106. In Russian. refs

It has been suggested that thermal burns lead to a disturbance of lipid peroxidation in most organs and tissues. In order to evaluate the role of subcellular liver organelles in the general system of disturbed lipid peroxidation within the cell, a study has been made of the effect of thermal burns on lipid peroxidation in the mitochondria, microsome, and lysosome fractions of the rat liver. It is shown that thermal burns result in a significant activation of lipid oxidation processes in the mitochondria and microsome fractions, while the activity of lipid oxidation in the lysosomes remains low. V.L.

A84-20883

THE ROLE OF CATECHOLAMINES AND VARIOUS SUBTYPES OF BETA ADRENORECEPTORS IN ENSURING THE RESISTANCE OF MICE TO INTENSE COOLING [ZNACHENIE KATKHOLOMINOV I RAZLICHNYKH PODTIPOV BETA-ADRENORETSEPTOROV DLIA USTOICHIVOSTI MYSHEI K OSTROMU INTENSIVNOMU OKHLAZHDENIIU]

N. I. PLOTNIKOV and V. I. KULINSKII (Krasnoyarskii Meditsinskii Institut, Krasnoyarsk, USSR) *Voprosy Meditsinskoi Khimii* (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 122-127. In Russian. refs

During the intense cooling of mice at -17 C, three periods were identified in thermocompensatory reactions. During the first period, the content of noradrenaline remained constant in the vitally important tissues (brain, heart, and brown adipose tissues); during the second period, the content of noradrenaline progressively decreased and became zero by the middle of the third period. The blockage of ganglia and beta adrenoreceptors led to a marked inhibition of thermoproduction and resistance to cooling. The role of beta adrenoreceptors in thermoregulation is discussed, and it is suggested that the beta adrenergic mechanism is the principal mechanism of thermogenesis. V.L.

A84-20888

THE EFFECT OF VIBRATION ON THE IMMUNE RESPONSE INDUCED BY THYMUS-DEPENDENT AND THYMUS-INDEPENDENT ANTIGENS [VLIANIE VIBRATSII NA IMMUNNYI OTVET, INDUTSIROVANNYI TIMUSZAVISIMYM I TIMUSNEZAVISIMYM ANTIGENAMI]

L. E. IUDINA and L. G. PROKOPENKO (Kurskii Meditsinskii Institut, Kursk, USSR) *Gigiena Truda i Professional'nye Zabolevaniia*, July 1983, p. 44, 45. In Russian.

Immune response in Wistar rats to thymus-dependent antigen was found to be sharply inhibited by both the short-term and long-term effects of vibration. This inhibiting effect is mediated by the humoral factor of blood serum. The immune response to thymus-independent antigen is weakened only by the long-term effect of vibration. B.J.

A84-20889

THE RESPONSE OF CELLS TO HYPOXIA [REAKTSIIA KLETOK NA GIPOKSIU]

V. A. SHAKHLAMOV and V. I. SOROKOVOI (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Arkhiv Anatomii, Gistologii i Embriologii* (ISSN 0004-1947), vol. 85, July 1983, p. 12-25. In Russian. refs

A survey is presented of published literature on cellular and molecular mechanisms of pathogenesis relating to hypoxic damage of organs and tissues in mammals. A three-stage scheme for the cellular response to hypoxia is presented, including the compensatory stage, the stage of reversible changes, and the stage of irreversible changes. Special emphasis is placed on the mitochondria, since it is the condition of these structures which determines the reversibility of cell damage at the early stages of reoxygenation. B.J.

A84-20890

THE STRUCTURE OF THE PALISADE NERVE FIBERS OF THE SINUS HAIRS AFTER THE SECTION OF THE INFRAORBITAL NERVE [STRUKTURA PALISADNYKH NERVNYKH VOLOKON SINUOZNYKH VOLOS POSLE PEREREZKI PODGLAZNICHNOGO NERVA]

R. I. VINTER (Kazanskii Meditsinskii Institut, Kazan, USSR) *Arkhiv Anatomii, Gistologii i Embriologii* (ISSN 0004-1947), vol. 85, July 1983, p. 31-36, 109, 110. In Russian. refs

A84-20891

CHANGES IN THE BLOOD CHANNELS OF THE CEREBRAL CORTEX AND HIPPOCAMPUS DURING PHYSICAL EXERCISE [IZMENENIIA KROVENOSNOGO RUSLA KORY POLUSHARII BOL'SHOGO MOZGA I GIPPOKAMPA PRI FIZICHESKOI NAGRUZKE]

V. M. BOEV and I. I. KAGAN (Orenburgskii Meditsinskii Institut, Orenburg, USSR) *Arkhiv Anatomii, Gistologii i Embriologii* (ISSN 0004-1947), vol. 85, July 1983, p. 41-45. In Russian. refs

A84-20892

STRUCTURAL MECHANISMS OF MICROCIRCULATORY LYMPH CHANNELS [STRUKTURNYE MEKHANIZMY REGULIATSII LIMFOMIKROTSIRKULIATORNOGO RUSLA]

L. V. CHERNYSHENKO (Kievskii Meditsinskii Institut, Kiev, Ukrainian SSR) *Arkhiv Anatomii, Gistologii i Embriologii* (ISSN 0004-1947), vol. 85, July 1983, p. 51-55. In Russian. refs

A84-20893

DYNAMICS OF MORPHOLOGICAL CHANGES IN RAT ADRENALS AND LYMPHOID ORGANS UNDER IMMOBILIZATION STRESS [DINAMIKA MORFOLOGICHESKIKH IZMENENII V NADPOCHECHNIKAKH I LIMFOIDNYKH ORGANAKH KRYSA PRI IMMOBILIZATSIONNOM STRESSE]

G. N. DURNOVA, A. S. KAPLANSKII, and E. V. GLAGOLEVA (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 85, July 1983, p. 67-72. In Russian. refs

A comparative morphological and histochemical study was performed to investigate changes in the female-rate adrenals, thymus, and spleen during a 5-hour immobilization and after its termination. During the first 24 hours after the immobilization, changes specific for an acute stress reaction develop in the adrenals and lymphoid organs. These changes reach their maximum at different times in the lymphoid organs and the adrenals, and there is no definite time-correlation between morphological manifestations of the acute stress reaction: delipoidization and hypertrophy of the adrenals and destructive changes in the target organs (the thymus and spleen). B.J.

A84-20894

SPECIFIC CHARACTERISTICS OF THE CHOICE OF OPERATING WAVELENGTHS IN THE STUDY OF SOMATIC MUSCLE FIBERS USING THE TWO-WAVE PHOTOMETRY TECHNIQUE [SPETSIFIKA VYBORA RABOCHIKH DLIN VOLN PRI ISSLEDOVANII SOMATICHESKIKH MYSHECHNYKH VOLOKON S ISPOL'ZOVANIEM DVUKHVOLNOVOGO METODA FOTOMETRII]

G. S. KATINAS and I. P. REKHACHEVA (I Leningradskii Meditsinskii Institut, Leningrad, USSR) Arkhiv Anatomii, Gistologii i Embriologii (ISSN 0004-1947), vol. 85, July 1983, p. 85-88. In Russian.

A84-20896

TRANSFER OF 3H-ALDOSTERONE FROM CYTOSOL RECEPTORS OF TUBULE CELLS OF RAT KIDNEYS TO NUCLEAR RECEPTORS IN THE CASE OF REFLEX AND DENERVATION DYSTROPHY OF THIS ORGAN [PEREDACHA 3H-AL'DOSTERONA S TSITIZOL'NYKH RETSEPTOROV KLETOK KANAL'TSEV POCHEK KRYSA NA IADERNYE PRI REFLEKTORNOI I DENERVATIONNOI DISTROFIIAKH ETOGO ORGANA]

A. A. RODIONOV, I. A. AKIMOV, and I. A. AZHIPA (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia (ISSN 0002-3329), July-Aug. 1983, p. 503-509. In Russian. refs

A84-20897

THE PROBLEM OF SYNERGISM IN RADIOBIOLOGY [PROBLEMA SINERGIZMA V RADIOBIOLOGII]

A. M. KUZIN (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Akademiia Nauk SSSR, Izvestiia, Seriiia Biologicheskaiia (ISSN 0002-3329), July-Aug. 1983, p. 485-502. In Russian. refs

The synergistic phenomena associated with the effect of ionizing radiation and various physical and chemical factors are reviewed. Particular attention is given to the applications of synergistic effects in medicine, agriculture, and pollution control. The possible mechanisms underlying synergistic effects are examined, and the importance of identifying these mechanisms is emphasized. V.L.

A84-20901

MODEL OF THE PACKING OF DNA AND HISTONE OCTAMER IN THE NUCLEOSOME [MODEL' UKLADKI DNK I OKTAMERA GISTONOV V SOSTAVE NUKLEOSOMY]

S. N. KHRAPUNOV, A. V. SIVOLOB, and G. D. BERDYSHEV (Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 573-578. In Russian. refs

A84-20902

INVESTIGATION OF THE MOBILITY OF FREE RADICALS CONNECTED WITH SERUM ALBUMINS AT 30-230 K [IZUCHENIE PODVIZHNOSTI SVOBODNYKH RADIKALOV SVIAZANNYKH S SYVOROTOCHNYMI AL'BUMINAMI PRI 30-230 K]

G. I. LIKHTENShteIN, V. R. BOGATYRENKO, and A. V. KULIKOV (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Chernogolovka, USSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 585-589. In Russian. refs

A84-20903

INVESTIGATION OF THE CONFORMATIONAL STABILITY OF IMMUNOGLOBIN A BY THE METHOD OF MONOMOLECULAR LAYERS [ISSLEDOVANIE KONFORMATSIONNOI USTOICHIVOSTI IMMUNOGLOBULINA A METODOM MONOMOLEKULIARNYKH SLOEV]

L. V. CHASOVNIKOVA, O. V. LOSEVA, and V. V. LAVRENTEV (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 595-598. In Russian. refs

A84-20904

INVESTIGATION OF THE IRON-SULFUR CENTER N-2 FROM NASH-DEHYDROGENASE IN THE CASE OF DIRECT AND REVERSE ELECTRON TRANSPORT IN THE MITOCHONDRIA OF RAT LIVER AND ENDOMYCES MAGNUSII YEASTS [ISSLEDOVANIE ZHELEZOSERNOGO TSENTRA N-2 NADN-DEGIDROGENAZY PRI PRIAMOM I OBRATNOM TRANSPORTE ELEKTRONOV V MITOKHONDRIIAKH PECHENI KRYSA I DROZHZHEI ENDOMYCES MAGNUSII]

D. SH. BURBAEV, L. A. BLIUMENFELD, and R. A. ZVIAGILSKAIA (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki and Institut Biokhimii, Moscow, USSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 606-611. In Russian. refs

A84-20905

PARAMAGNETIC METAL COMPLEXES OF IRON IN REGENERATIVE PROCESSES OF THE LIVER [PARAMAGNITNYE METALLOKOMPLEKSY ZHELEZA V REGENERATORNYKH PROTSESSAKH PECHENI]

V. N. VARFOLOMEV, G. N. BOGDANOV, L. I. SIDORENKO, P. IA. BOIKOV, and I. N. TODOROV (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Chernogolovka, USSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 616-620. In Russian. refs

A84-20906

THE INTERACTION OF ACETYLCHOLINE AND TUBOCURARINE WITH PROTEIN MOLECULES OF THE ACTIN COMPLEX AND PHOSPHATIDYLCHOLINE [VZAIMODEISTVIE ATSETILKHOLINA I TUBOKURARINA S MOLEKULAMI BELKOV AKTINOVOLNOGO KOMPLEKSA I FOSFATIDILKHOLINA]

A. R. EGIAZAROVA and K. SH. NADAREISHVILI (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 625-628. In Russian. refs

A84-20907

COOPERATIVE BINDING OF CALCIUM IONS BY PHOTORECEPTOR MEMBRANES [KOOPERATIVNOE SVIAZYVANIE IONOV KAL'TSIIA FOTORETSEPTORNYMI MEMBRANAMI]

S. A. TALAKO and A. L. BERMAN (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Biofizika (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 653-657. In Russian. refs

A84-20908

KINETICS OF THE PASSIVE TRANSPORT OF CA(2+) IN VESICLES OF MYOMETRIUM SARCOLEMMMA [KINETIKA PASSIVNOGO TRANSPORTA CA(2+) V VEZIKULAKH SARKOLEMMY MIOMETRIIA]S. A. KOSTERIN, M. D. KURSKII, and A. A. KAPLIA (Akademiia Nauk Ukrainskoi SSR, Institut Biokhimii, Kiev, Ukrainian SSR) *Biofizika* (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 658-662. In Russian. refs

A84-20909

A CYTOPLASMIC CHANNEL-FORMING FACTOR IN THE LIVER OF RATS [TSITOPLAZMATICHESKII KANALOBRAZUIUSHCHII FAKTOR PECHENI KRYS]O. V. KRASILNIKOV, V. I. TERNOVSKII, R. R. AZIMOV, and B. A. TASHMUKHAMEDOV (Akademiia Nauk Uzbekskoi SSR, Institut Biokhimii, Tashkent, Uzbek SSR) *Biofizika* (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 663-665. In Russian. refs

A84-20910

THE PERMEABILITY OF SARCOPLASMIC RETICULUM MEMBRANES TO MONOVALENT CATIONS [PRONITSAEMOST' MEMBRAN SARKOPLAZMATICHESKOGO RETIKULUMA DLIA ODNOVALENTNYKH KATIONOV]V. A. PECHATNIKOV, V. V. PLETNEV, and F. F. RIZVANOVA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) *Biofizika* (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 669-673. In Russian. refs

A84-20911

THE POWER-LAW APPROXIMATION AND THE SIMILARITY PROPERTIES OF THE REGULATORY CHARACTERISTICS OF METABOLISM [STEPENNAIA APPROKSIMATSIIA I SVOISTVA PODOBIIA REGULIATORNYKH KHARAKTERISTIK METABOLIZMA]B. N. KHOLODENKO (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR) *Biofizika* (ISSN 0006-3029), vol. 22, July-Aug. 1983, p. 674-681. In Russian. refs

A simple procedure is proposed for determining the parameters and the maximum error of the power-law approximation of rate equations for a large class of enzymatic reactions. A similarity law is stated whereby the dependences of the steady-state flow velocities on the concentration of the key compound in homologous metabolic circuits of different individuals can be made identical through a scale transformation whose coefficients are determined by the individual parameters. The conditions for which this similarity law is satisfied are formulated. V.L.

A84-20912

APPEARANCE OF SELF-OSCILLATIONS IN A DISTRIBUTED SYSTEM WITH MULTIPLE EQUILIBRIA [VOZNIKNOVENIE AVTOKOLEBANII V RASPREDELENNOM SISTEME S MNOZHESTVENNYMI RAVNOVESIIAMI]G. S. MARKMAN and I. U. A. DOMBROVSKII (Rostovskii Gosudarstvennyi Universitet, Rostov-on-Don, USSR) *Biofizika* (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 682-685. In Russian. refs

A mathematical model shows that temporal oscillations of populations can arise due to a drastic spatial nonuniformity of ecological conditions. The elimination of boundaries between local systems with stationary uniform regimes leads to the appearance of high-amplitude self-oscillations in the whole region. This effect is interpreted with reference to the consequences of the application of pest-control chemicals and with reference to the effect of chemotherapy on the immune system. B.J.

A84-20913

POSSIBLE MECHANISM OF A THALAMIC PACEMAKER OF ALPHA RHYTHM AND FUSIFORM ACTIVITY [VOZMOZHNYI MEKHANIZM TALAMICHESKOGO VODITELIA ALPHA-RITMA I VERETENOBRAZNOI AKTIVNOSTI]B. A. SHULIAK (Gosudarstvennyi Komitet SSSR po Gidrometeorologii i Kontroliu Prirodnoi Sredy, Institut Prikladnoi Geofiziki, Moscow, USSR) and V. D. TRUSH (Akademiia Pedagogicheskikh Nauk SSSR, Moscow, USSR) *Biofizika* (ISSN 0006-3029), vol. 28, July-Aug. 1983, p. 686-692. In Russian.

A determinate model based on the mechanism of beat frequencies is proposed for the sigma rhythm (i.e., fusiform activity) on the basis of available experimental data. The model consists of two united identical modules generating harmonic oscillations of alpha rhythms, and the operating mode of the generator is determined by the trigger pulse frequency. Proposed quantitative relationships between sigma-rhythm parameters and the frequencies of the component oscillations are verified by analyzing oscillograms of barbiturate sigma activity in the EEG of dogs. The results obtained confirm the determinate, rather than the stochastic, mechanism for the sigma rhythm. B.J.

A84-21018

TEMPERATURE VARIATIONS IN GROUPS OF MICE OF BOTH SEXES EXPOSED TO NORMOBARIC HYPOXIA AT 10-35 C [VARIATIONS DE LA TEMPERATURE DE GROUPES DE SOURIS DES DEUX SEXES SOUMISES AUNE HYPOXIE NORMOBARE EFFECTUEE ADES TEMPERATURES AMBIANTES COMPRISES ENTRE 10 ET 35 C]V. H. DEMARIA PESCE, M. STUPFEL, V. GOURLET, H. THIERRY, and C. LEMERCERRE (Institut National de la Santeet de la Recherche Medicale, Le Vesinet, Yvelines, France) *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 225-227. In French. refs

A84-21019

VIBRATORY BEHAVIOR OF THE SACROLUMBAR SPINE AFTER REMOVAL OF THE NUCLEUS PULPOSUS [COMPORTEMENT VIBRATOIRE DE LA CHARNIERE LOMBO-SACREE APRES ABLATION DU NUCLEUS PULPOSUS]P. QUANDIEU (Service de Santedes Armees; Centre d'Etudes et de Recherches de Medecine Aerospatiale, Laboratoire Central de Biologie Aerospatiale, Paris, France), J. DIMNET (Lyon, Ecole Centrale, Ecully, Rhone; Centre d'Etudes et de Recherches de Medecine Aerospatiale, Laboratoire Central de Biologie Aerospatiale, Paris, France), and L. PELLIEUX (Centre d'Etudes et de Recherches de Medecine Aerospatiale, Laboratoire Central de Biologie Aerospatiale, Paris, France) *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 228-235. In French. refs

A mechanical model of the human sacrolumbar spinal column is developed, using the results of a study performed in chronically instrumented primates (Quandieu and Pellieux, 1983). The anatomical and physiological characteristics of the spinal structure are reviewed, and the model of the intervertebral segment is described in detail. This segment is treated as a linear low-pass filter with characteristics altered by muscular activity; removal of the nucleus pulposus introduces nonlinearity into the system, with a shift of the resonance toward higher frequencies and increased higher-frequency transmissivity in the disks nearest the sacrum. This model is further refined, and the applicable literature is surveyed. Drawings and diagrams illustrating the model relationships are included. T.K.

51 LIFE SCIENCES (GENERAL)

A84-21033

VENTROLATERAL MEDULLARY SURFACE BLOOD FLOW DETERMINED BY HYDROGEN CLEARANCE

P. J. FEUSTEL, M. J. STAFFORD, J. S. ALLEN, and J. W. SEVERINGHAUS (California, University, San Francisco, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 150-154. refs

(Contract NIH-HL-06285)

The present investigation is concerned with the direct measurement of blood flow in the ventrolateral medullary surface independent of ventilatory system dynamics. It is pointed out that previous direct studies have only measured flow to much larger fractions of the brain. It was decided to employ the H₂ clearance technique because multiple flow determinations can be made in volumes as small as 1 cu mm. Both ventrolateral surface and adjacent white blood flow were found to be significantly increased by both hypercapnia and hypoxia but unchanged by hypocapnia. Ventrolateral surface flow was greater than adjacent white matter flow. It is concluded that ventral medullary surface flow was higher than white matter flow. G.R.

A84-21034

OSCILLATORY MECHANICS OF THE RESPIRATORY SYSTEM IN OZONE-EXPOSED RATS

M. I. KOTLIKOFF, A. C. JACKSON, and J. W. WATSON (California, University, Davis, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 182-186. refs

(Contract NIH-HL-26606; NIH-HL-006281)

A84-21600

CHANGES OF ACID HYDROLASE ACTIVITY IN SKELETAL MUSCLES OF ADAPTED AND NONADAPTED PREADOLESCENT RATS FOLLOWING PHYSICAL EXERCISE [IZMENENIIA AKTIVNOSTI KISLYKH GIDROLAZ V SKELETNYKH MYSHTSAKH NEADAPTIROVANNYKH I ADAPTIROVANNYKH KRYV NEPOLOVOZRELOGO VOZRASTA POSLE ODNOKRATNOI FIZICHESKOI NAGRUZKI]

M. S. KOKICHASHVILI (Tbilisskii Gosudarstvennyi Meditsinskii Institut, Tbilisi, Georgian SSR) *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia* (ISSN 0132-1447), vol. 111, Sept. 1983, p. 645-648. In Russian. refs

A84-21726

THE EFFECT OF UNVARYING AND LOW-FREQUENCY MAGNETIC FIELDS ON BIOLOGICAL SYSTEMS [DEISTVIE POSTOIANNYKH I NIZKOCHESTOTNYKH MAGNITNYKH POLEI NA BIOLOGICHESKIE SISTEMY]

L. A. PIRUZIAN (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) and A. N. KUZNETSOV (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR) *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia* (ISSN 0002-3329), Nov.-Dec. 1983, p. 805-821. In Russian. refs

Results obtained from a number of studies on the mechanisms governing the action of unvarying and low-frequency magnetic fields are summarized. It is noted that in many of the experiments certain effects on model physicochemical systems that have been reported in the literature were not confirmed. Many negative data were obtained with model membrane structures in which the possibility of a magnetic field was not excluded. It is also demonstrated that biological effects cannot result from magnetic fields according to certain of the mechanisms that have been assumed. The effect that unvarying and low-frequency magnetic fields have on certain membranes and tissue structures is delineated. C.R.

A84-21727

EVALUATING THE SAFETY OF DECOMPRESSION ON THE BASIS OF THE NUMBER AND SIZE OF GAS BUBBLES BEING FORMED IN THE BODY [OTSENKA BEZOPASNOSTI DEKOMPRESSII PO KOLICHESTVU I RAZMERAM OBRAZOVAVSHIKHSIA V ORGANIZME GAZOVYKH PUZYR'KOV]

V. P. NIKOLAEV (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia* (ISSN 0002-3329), Nov.-Dec. 1983, p. 822-834. In Russian. refs

An alternative criterion for gauging the safety of decompression is formulated mathematically. The criterion is based on a quantitative assessment of the formation and growth of gas bubbles in the body. On the basis of this criterion and a mathematical model describing the evolution of bubbles in the tissues and the concomitant removal of inert gases from the tissues, an analysis is made of the safety of pressure drops in a hyperbaric atmosphere containing a normal amount of oxygen. An analytic expression is derived which can be used at moderately high pressures to predict the conditions under which there is an equal probability of decompression sickness appearing in the form of articular pains during pressure drops from various levels. C.R.

A84-21728

FEATURES OF THE ULTRASTRUCTURE ORGANIZATION OF YEAST CELLS TAKEN FROM THE ANTARCTIC ICE SHEET [OB OSOBNOSTI AKH UL'TRASTRUKTURNOI ORGANIZATSII DROZHZHEVYKH KLETOK IZ TOLSHCHII ANTARKTICHESKOGO LEDNIKA]

S. S. ABYZOV, I. P. BABEVA, V. I. BIRIUZOVA, N. A. KOSTRIKINA, and E. E. AZIEVA (Akademiia Nauk SSSR, Institut Mikrobiologii; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia* (ISSN 0002-3329), Nov.-Dec. 1983, p. 914-922. In Russian. refs

A84-21730

THE USE OF CARBON MONOXIDE BY BACTERIA OF THE GENUS DESULFOVIBRIO [ISPOL'ZOVANIE OKISI UGLERODA BAKTERIIAMI RODA DESULFOVIBRIO]

F. K. MUKHITOVA, I. N. RIAZANTSEVA, I. I. KARPILOVA, and M. I. BELIAEVA (Akademiia Nauk SSSR, Kazanskii Institut Biologii, Kazan, USSR) *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia* (ISSN 0002-3329), Nov.-Dec. 1983, p. 944-947. In Russian. refs

In their ability to use carbon monoxide, these sulfate-reducing bacteria are distinguished from hydrogen bacteria proper, for which CO is a source of carbon, and from methane-forming bacteria, some of which use carbon monoxide as their sole source of carbon and energy. It is found that molecular hydrogen is oxidized better than carbon monoxide by these sulfate-reducing bacteria. C.R.

A84-21741

EFFECT OF NON-MODE-LOCKED ULTRAVIOLET LASER RADIATION (334 NM) ON THE RETINA

R. E. SCHMIDT and J. A. ZUCILICH (USAF, School of Aerospace Medicine, Brooks AFB, TX) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Feb. 1984, p. 132-135. refs

The eyes of three rhesus monkeys (*Macaca mulatta*) were exposed to nonmode-locked UV radiation at 334 nm. The beam incident at the corneal plane had a diameter of about 2.0 mm and a maximum power of 45-50 mW. Each eye received nine exposures with exposure times ranging from 0.1 to 8.0 s. The animals were euthanized at various times following exposure so that the eyes were examined at approximately 1 h and 1, 2, 5, 7 and 14 d post-exposure. Histologic lesions were primarily seen involving photoreceptors, and were qualitatively similar regardless of duration of exposure; although quantitatively more damage was seen at sites exposed for 4.0 to 8.0 s. The results indicate that retinal sensitivity to UV laser light is a wavelength effect, rather than due to laser mode-locking, which was present in an earlier study (Schmidt and Zuclich, 1980) but absent in this study.

Author

A84-21742

SEX-RELATED FACTORS IN ACUTE HYPOXIA SURVIVAL IN ONE STRAIN OF MICE

M. STUPFEL, V. H. D. PESCE, V. GOURLET, G. BOULEY, A. ELABED, and C. LEMERCERRE (Institut National de la Santeet de la Recherche Medicale, Le Vesinet, Yvelines, France) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 136-140. refs

In mice of different ages from the OF1 mouse strain, males are less resistant than females to a normobaric hypoxia obtained in a few hours by a progressive lowering of normoxic PO₂ with nitrogen flushing. Injection of estradiol to castrated males and spayed females increases hypoxic survival. Neonates which have been injected with a high dose of estradiol show, when adult, a high hypoxic resistance. In adult females, hypoxic survival is lower during diestrus than during estrus. Pregnancy decreases resistance to hypoxia. Experiments performed with males and females of different ages show the effects of sex-related dimorphism and aggressiveness. Hypoximas at various ambient temperatures demonstrate that the sex difference in hypoxic survival persists in spite of variations in rectal temperatures. Author

A84-21800* California Univ., Berkeley.

THE SPATIAL DISTRIBUTION OF FIXED MUTATIONS WITHIN GENES CODING FOR PROTEINS

R. HOLMQUIST, M. GOODMAN (California, University, Berkeley, CA), T. CONROY, and J. CZELUSNIAK (Wayne State University, Detroit, MI) Journal of Molecular Evolution (ISSN 0022-2844), vol. 19, Nov. 1983, p. 437-448. refs
(Contract NGR-05-003-460; NSF PCM-76-08627; NSF DEB-78-10717)

An examination has been conducted of the extensive amino acid sequence data now available for five protein families - the alpha crystallin A chain, myoglobin, alpha and beta hemoglobin, and the cytochromes c - with the goal of estimating the true spatial distribution of base substitutions within genes that code for proteins. In every case the commonly used Poisson density failed to even approximate the experimental pattern of base substitution. For the 87 species of beta hemoglobin examined, for example, the probability that the observed results were from a Poisson process was the minuscule 10 to the -44th. Analogous results were obtained for the other functional families. All the data were reasonably, but not perfectly, described by the negative binomial density. In particular, most of the data were described by one of the very simple limiting forms of this density, the geometric density. The implications of this for evolutionary inference are discussed. It is evident that most estimates of total base substitutions between genes are badly in need of revision.

Author

A84-22447

RHYTHMIC ACTIVITY IN THE VISUAL ANALYZER [RITMICHESKAIA AKTIVNOST' V ZRITEL'NOM ANALIZATORE]

F. IZNAKA (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) and V. I. GUSELNIKOV Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 15, Jan.-Mar. 1984, p. 3-27. In Russian. refs

The literature on rhythmic bioelectric processes in the visual analyzer of vertebrates is reviewed, and some original experimental results on this topic are presented. Attention is given to the phenomenology and possible neurophysiological mechanisms of the combined rhythmic activity of the retina, the optic nerve, and the optic tract. A description is given of spontaneous and evoked rhythmic activity and its possible mechanisms in central parts of the visual analyzer. Rhythmic EEG phenomena in animals are examined which shed light on the origin of the occipital alpha-rhythm in humans. The interaction of various parts of the brain are examined with regard to the generation of rhythmic activity, and attention is given to the functional role of this activity in connection with the processing of information at various levels of the visual system. B.J.

A84-22448

CURRENT IDEAS ON THE GENERAL PROPERTIES OF AND PLASTIC PHENOMENA IN HIPPOCAMPAL NEURONS [SOVREMENNYE PREDSTAVLENIIA OB OBSHCHEKHOI SVOISTVAKH I PLASTICHESKIKH IAVLENIIAKH V NEIRONAKH GIPPOKAMPA]

O. S. VINOGRADOVA (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 15, Jan.-Mar. 1984, p. 28-54. In Russian. refs

Recent literature (mainly from 1974 to 1980) on the neurophysiological analysis of cellular processes in the hippocampus is surveyed. The general properties of neurons of the hippocampus and the dentate regions are examined with special attention given to various excitatory and inhibitory phenomena on dendrites and their role in integrative functions of neurons. Various types of plastic processes are examined including facilitation during stimulation by double impulses, low-frequency depression, and long-lasting potentiation. Consideration is also given to pre- and post-synaptic phenomena, and the morphological and biochemical shifts on which these phenomena are based. B.J.

A84-22450

NEUROPHYSIOLOGICAL ASPECTS OF SPINAL THERMOREGULATORY MECHANISMS [NEIROFIZIOLOGICHESKIE ASPEKTI TERMOREGULIATSIONNYKH MEKHAZIMOV SPINNOGO MOZGA]

S. ZH. TLEULIN (Akademiia Nauk Kazakhskoi SSR, Institut Fiziologii, Alma-Ata, Kazakh SSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 15, Jan.-Mar. 1984, p. 100-114. In Russian. refs

Published works on spinal mechanisms of skin (peripheral) temperature sensitivity are reviewed. A description is given of the participation of afferent, central, and efferent spinal areas in processing impulses arriving from heat-sensitive areas of the skin. A critical analysis of the hypothesis of the direct heat-sensitivity of intrinsic spinal structures is presented. B.J.

A84-22776

THE DYNAMICS OF OXYGEN SATURATION OF THE BRAIN AT INCREASED PRESSURES [DINAMIKA NASYSHCHENIIA MOZGA KISLORODOM PRI POVYSHENNOM DAVLENIII]

IU. IA. KISLIAKOV and IU. I. LUCHAKOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1529-1536. In Russian. refs

A mathematical model that describes the transport dynamics of O₂ in the brain is used in calculating the transitional processes of O₂ tension under stepwise increases in the amount of oxygen in arterial blood and under changes in the main physiological and morphological factors that determine the content of O₂ and the way that it changes in the organs and tissues under these conditions. The model, which incorporates actual data on mass transfer in the microcirculation system, takes the form of differential equations; these are solved by computer through the network method. It is found that a change in the average pO₂ level in the space of the model given stepwise changes in the above factors occurs within a period of time that is an order of magnitude greater than in the case of a normal amount of oxygen. Relationships are established between the parameters of the transition processes of brain tissue saturation by oxygen, on the one hand, and the amount of O₂ in the arterial blood, the rate of blood flow in the capillaries, and the density of the capillaries, on the other. C.R.

51 LIFE SCIENCES (GENERAL)

A84-22777

AN INVESTIGATION OF THE DYNAMICS OF OXYGEN TENSION IN THE HIPPOCAMPUS AND SENSORIMOTOR CORTEX DURING THE SLEEP-WAKEFULNESS CYCLE [ISSLEDOVANIIE DINAMIKI NAPRIAZHENIIA KISLORODA V GIPPOKAMPE I SENSOMOTORNOI KORE VO VREMIIA TSIKLA BODRSTVOVANIE-SON]

L. S. NIKOLAISHVILI, L. SH. GOBECHIIA, and N. P. MITAGVARIIA (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1543-1548. In Russian. refs

A84-22778

THE ELECTRICAL ACTIVITY OF SYMMETRICAL REGIONS OF THE HIPPOCAMPUS [ELEKTRICHESKAIA AKTIVNOST' SIMMETRICHNYKH OBLASTEI GIPPOKAMPOV]

L. R. KVIRKVELIIA, L. I. MESTVIRISHVILI, and G. P. GURTSKAIA (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1549-1555. In Russian. refs

Experiments carried out on cats are described which investigate the tonic interrelation between the posterior and anterior hippocampi of opposite hemispheres. Readings are taken of the EEG activity before and after changes in the level of activation of these structures. Experiments involving electrical stimulation of the reticular formation of the midbrain, together with the results obtained from unilateral novocainization of separate regions of the hippocampus, show that there is a tonic inhibiting interrelation between the hippocampi of opposite hemispheres. The experiments are also seen as suggesting differences in the functional relationships of the anterior and posterior hippocampi with the brain's integrative mechanism. C.R.

A84-22779

THE INFLUENCE OF CENTRAL AND PERIPHERAL SEROTONINERGIC STRUCTURES ON THE CARDIOVASCULAR SYSTEM AND RESPIRATION [VLIANIE TSENTRAL'NYKH I PERIFERICHESKIKH SEROTONINOREAKTIVNYKH STRUKTUR NA SERDECHNO-SOSUDISTUII SISTEMU I DYKHANIE]

V. A. PASTUKHOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1569-1574. In Russian. refs

Experiments carried out on dogs establish that the serotonergic structures of the upper and lower parts of the front region of the limbic cortex have a varied effect on the rhythm of heart contractions and respiration. Whereas the introduction of 200 micrograms of serotonin-adipinate (bilaterally, in 0.02 ml of physiological solution) into the upper part slows down heartbeat and respiration, in the lower part it effects an acceleration. By itself, the physiological solution has no effect. It is also found that the intramuscular injection of serotonin-adipinate in 5-oxytryptophane (0.5 mg/kg) has a short-term effect on heartbeat and respiration. C.R.

A84-22780

THE EFFECT OF AETHIMIZOL ON THE NYSTAGMUS RESPONSE DURING OPTOKINETIC STIMULATION AND IN THE AFTEREFFECT [VLIANIE ETIMIZOLA NA NISTAGMENNYE REAKTSII V PERIOD OPTOKINETICHESKOI STIMULIATSII I V POSLEDEISTVII]

V. P. NEVEROV (Akademiia Nauk SSR, Institut Fiziologii, Leningrad, USSR) and N. A. LOSEV (Akademiia Meditsinskikh Nauk SSSR Institut Eksperimental'noi Meditsiny, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1575-1580. In Russian. refs

Experiments are carried out on rabbits to investigate the dynamics of amplitude and frequency changes in optokinetic nystagmus. The study covers 60 min of continuous optokinetic stimulation and a secondary residual reversion phase of nystagmus, referred to as reversion postoptokinetic nystagmus; the latter extends for 30 min after the cessation of the stimulation. Aethimizol (5 mg/kg) is introduced 20 min before the stimulation and on the 35th minute of the stimulation. It is found that this substance

significantly increases the frequency of optokinetic nystagmus and the amplitude of optokinetic and reversion nystagmus. The frequency of reversion postoptokinetic nystagmus is found to decrease markedly after the introduction of aethimizol. It is believed that aethimizol promotes nystagmus during optokinetic stimulation but weakens the process of asymmetric excitation in nerve centers during prolonged optokinetic stimulation. C.R.

A84-22781

REGULATION OF LOCAL BLOOD FLOW IN THE BRAIN - THE CONCEPT OF HOMEOSTATIC RANGE [REGULIATSIIA MESTNOGO MOZGOVOGO KROVOTOKA - PONIATIE 'GEOMEOSTATICHESKOGO DIAPAZONA']

N. P. MITAGVARIIA, V. T. BEGIASHVILI, and V. G. MELADZE (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tbilisi, Georgian SSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1595-1601. In Russian. refs

Experiments are carried out on cats involving changes in the systemic arterial pressure and asphyxia. Multichannel registration of the intensity of local blood flow in adjacent microscopic regions of the cerebral cortex is effected through the electrochemical generation of hydrogen. On the basis of the results, it is hypothesized that a homeostatic range exists for the intensity of local blood flow and that this range shifts depending on the metabolic needs of nerve tissue and the degree of oxygen saturation of the arterial blood. This hypothesis is able to explain the differences observed in the time and amplitude characteristics of changes in local blood flow in adjacent regions of the cerebral cortex brought about by general effects. It also sheds light on the mechanism by which posthypoxic hyperemia develops. C.R.

A84-22782

THE ACTIVITY OF POTASSIUM IN THE EXTRACELLULAR FLUID OF RATS UNDER CONDITIONS OF A POTASSIUM IMBALANCE [AKTIVNOST' KALIIA VO VNEKLETOCHNOI ZHIDKOSTI KRYSY PRI EGO DISBALANSE V ORGANIZME]

M. M. SOKOLOVA, V. G. LEONTEV, I. G. AVTENEVA, and A. A. PANOV (Akademiia Nauk SSSR, Institut Fiziologii and Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR* (ISSN 0015-329X), vol. 69, Dec. 1983, p. 1621-1625. In Russian. refs

A84-22844

A STUDY OF THE INTERACTION OF GLYCINE AND ITS OLIGOHOMOPEPTIDES WITH FORMALDEHYDE AND ACETALDEHYDE UNDER POSSIBLE PRIMITIVE EARTH CONDITIONS

KH IVANOV, P., O. KH. IVANO (B'lgarska Akademiia na Naukite, Institut po Organichna Khimiia, Sofia, Bulgaria), R. A. SIMEONOVA, and G. D. MIRKOVA (Vissh Khimiko-Tekhnologicheskii Institut, Sofia, Bulgaria) *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 97-108. refs

It is established that glycine and glycine oligohomo peptides interact with formaldehyde and acetaldehyde in a homogeneous weak acid medium (pH 3.3-3.7) at mild temperatures (60-80 C) in the absence of inorganic solid substances. Together with the expected serine and threonine, the formation of alanine, glutamic and aspartic acid, norvaline and isoleucine, as well as four non-protein amino acids is also established. It is suggested that the non-protein amino acids are hydroxymethylserine, hydroxy-methylthreonine, hydroxymethylaspartic acid and gamma-amino-delta-hydroxyvaleric acid. The modes of formation of all protein and non-protein amino acids are discussed. These results strengthen the probability that similar processes may have been one of the pathways for the prebiotic synthesis of amino acids on primitive earth. Author

A84-22845

POSSIBLE MECHANISM FOR ORIGIN OF CHIRAL SPECIFICITY DURING ORIGINS OF LIFE

R. BALASUBRAMANIAN (Madras, University, Madras, India) *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 109-112. refs

A mechanism that would have actively destroyed D-peptides during early evolution and permitted L-peptide development is proposed as an explanation for the L chirality of all organisms on earth. Since the L-peptide and D-peptide producing systems developed autonomously, a natural mutation in the L-peptide system could have effected a killer enzyme (D-peptidase) capable of hydrolyzing or cleaving all D-peptides, or alternatively destroying D cell components, D-amino acids or beta-L-nucleotides, the latter involved in the D-peptide's primitive decoding apparatus. The presence of a D-peptidase-like enzyme in present-day organisms is suggested, and the existence of D-amino acid-containing antibiotics is indicated as supporting the theory. C.M.

A84-22846

STATISTICAL FLUCTUATION VERSUS SPECIFIC MECHANISM AND THE ORIGIN OF THE LEFT-HANDED ASYMMETRY OF PROTEINS

A. K. MANN (Pennsylvania, University, Philadelphia, PA) and H. PRIMAKOFF *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 113-118. Research supported by the U.S. Department of Energy and NSF. refs

An intrinsic weakness in the reasoning that adduces a statistical fluctuation as the origin of a left-handed, prebiotic stereoisomeric asymmetry which might have been the initial asymmetry that led to the left-handed asymmetry of proteins observed now on earth is pointed out. The argument in favor of a statistical fluctuation as the source of the asymmetry depends implicitly on the assumption of a very small number of terrestrial sites at which polymerization leading to protein formation took place. On the other hand, the probability that a left-handed prebiotic asymmetry produced by a specific mechanism was efficacious would have increased linearly with the number of terrestrial sites. Thus, on the basis of the greater likelihood of a large number of possible polymerization sites in the prebiotic era, a random fluctuation is deemed to be a much less probable source of a stereoisomeric asymmetry than a specific mechanism, particularly the mechanism that follows from the parity violating weak interaction. Author

A84-22847

COMPARATIVE ANALYSIS OF THE ROLE OF STATISTICAL FLUCTUATIONS AND FACTOR OF ADVANTAGE (PARITY NON-CONSERVATION) IN THE ORIGINS OF OPTICAL ACTIVITY

L. L. MOROZOV, V. V. KUZMIN, and V. I. GOLDANSKII (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 119-138. refs

Recent theoretical investigations have shown that the most important stages of prebiological evolution could lead to the development of chiral purity even in the absence of any factors of advantage (caused e.g. by the parity violation) for any of the mirror-isometric form as well. Under the certain conditions, a fluctuational inequality of the concentrations of enantiomers is sufficient for mirror symmetry breaking of the initial racemic state. This paper contains an analysis which makes possible to compare the role of the factor of advantage and of the statistical fluctuations in the mirror symmetry breaking during the evolution of the molecular systems. Author

A84-22850

COSMIC VACUUM PREVENTS RADIOPANSPERMIA

M. D. NUSSINOV and S. V. LYSENKO *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 153-164. refs

The radiopanspermia hypothesis is disputed by a mechanism describing the irreversible damage done to vegetative cells and microorganic spores by the combined effects of vacuum and high temperature during the microorganism's initial migration. Prior investigations neglected the effects of heat, produced by the

long-wave (IR) part of the spectrum. Narrow-band filters and contact with metallic rocket components do not permit accurate simulation of the free flight temperature of microorganisms. At a height of 77 km temperature is insufficient to cause cell damage, and beyond this altitude microorganisms are not found. Microorganisms such as conidia exposed on space vehicles exhibit a viability of less than 5×10^{-6} . That terrestrial microorganisms have not been found on the moon or on Mars, further suggest that life on earth did not originate by radiopanspermia. C.M.

A84-22926

T-LYMPHOCYTE DEPENDENCE OF THE PROLIFERATION AND DIFFERENTIATION OF HEMOPOIETIC TRUNK CELLS [T-LIMFOTSITARNAIA ZAVISIMOST' PROTSESSOV PROLIFERATSII I DIFFERENTSIROVKI STVOLOVYKH KROVETVORNYYKH KLETOK]

R. V. PETROV and V. M. MANKO (Ministerstvo Zdravookhraneniia SSSR, Institut Immunologii, Moscow, USSR) *Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia* (ISSN 0031-2991), July-Aug. 1983, p. 3-9. In Russian. refs

A84-22927

THE ROLE OF THE HEPATIC CYTOCHROME P-450 SYSTEM IN THE DEVELOPMENT OF ANAPHYLAXIS [ROL' SISTEMY TSITOKHROMA P-450 PECHENI V RAZVITII ANAFILAKSII]

I. E. KOVALEV, T. G. KHLOPUSHINA, I. N. MAROKKO, and E. M. LYSENKOVA (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR) *Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia* (ISSN 0031-2991), July-Aug. 1983, p. 22-25. In Russian. refs

A84-22928

CORRECTION OF THE CONTACT INTERACTION OF MACROPHAGES WITH NONSYNGENIC LYMPHOID CELLS BY THE COPOLYMER OF ACRYLIC ACID AND N-VINYLPYRROLIDONE [KORREKTSIIA SOPOLIMEROV AKRILOVOI KISLOTY I N-VINILPIRROLIDONA KONTAKTNOGO VZAIMODEISTVIA MAKROFAGOV S NESINGENNYMI LIMFOIDNYMI KLETKAMI]

L. D. GORBACHEVA, T. U. ARIPOVA, and N. T. ISLAMOVA (Ministerstvo Zdravookhraneniia SSSR, Institut Biofiziki, Moscow, USSR) *Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia* (ISSN 0031-2991), July-Aug. 1983, p. 35-38. In Russian. refs

A84-22929

INVESTIGATION OF THE CYTOKINETICS OF THE LYMPHOID ORGANS OF IMMUNE AND NONIMMUNE MICE [IZUCHENIE TSITOKINETIKI LIMFOIDNYKH ORGANOV IMMUNNYKH I NEIMMUNNYKH MYSHEI]

N. B. DMITRIEVA, G. F. MAKSIMOVA, and B. S. UTESHEV (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) *Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia* (ISSN 0031-2991), July-Aug. 1983, p. 43-46. In Russian. refs

An experiment was conducted to study the effect of adriamycin on cell proliferation in the spleen, thymus, and bone marrow, as well as on the antibody-forming and rosette-forming cells of the spleen, during the primary immune response of mice to sheep red-blood cells. Adriamycin was found to have a long-term cytostatic effect; the restoration of proliferation in the thymus and spleen began no earlier than on the sixth to eighth day after a single injection of adriamycin. It is suggested that adriamycin eliminates the short-lived B lymphocyte population from the spleen, which may explain its high immunosuppressive activity when it is injected 3-8 days before the antigen. B.J.

A84-22930

SERUM IMMUNOREGULATORY FACTORS IN TOXIC AFFECTION OF THE LIVER [IMMUNOREGULIATORNYE FAKTORY SYVOROTKI PRI TOKSICHESKOM PORAZHENII PECHENI]

L. G. PROKOPENKO and N. N. KEDROVSKAIA (Kurskii Meditsinskii Institut, Kursk, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1983, p. 56-60. In Russian. refs

A84-22931

THE MODELING OF MULTISIGNAL IMMOBILIZED IMMUNOGENS [MODELIROVANIE MNOGOSIGNAL'NYKH IMMOBILIZOVANNYKH IMMUNOGENOV]

K. P. KASHKIN and A. L. LIOZNER (Ministerstvo Zdravookhraneniia SSSR, Institut Immunologii, Moscow, USSR) Patologicheskaiia Fiziologiiia i Eksperimental'naia Terapiia (ISSN 0031-2991), July-Aug. 1983, p. 73-82. In Russian. refs

The immobilization of antigen (hapten) determinants on a polystyrene sorbent is described as a possible model for obtaining artificial immunogens capable of delivering a prescribed spectrum of signals with the aim of activating B-lymphocytes. An experiment was conducted to study the primary and secondary antibody response of a total population of mice spleen cells to hapten groups in conjunction with proteins, polypeptides, or monoamino acids. It is concluded that the proposed modeling approach shows promise for experimental and clinical development; one of its applications may be the immunization of cells of the lymphoid system outside the body in cases when the in vivo administration of the immunogen is impossible owing to the characteristics of the recipient. B.J.

A84-22934

SEM INVESTIGATION OF THE LABYRINTH OF MACACA MULATTA UNDER HYPOKINETIC CONDITIONS [ISSLEDOVANIE S POMOSHCH'IU SKANIRUIUSHCHEGO MIKROSKOPA LABIRINTA MAKAK MACACA MULATTA, NAKHODIVSHIKHSIA V USLOVIIAKH GIPOKINEZII]

D. V. LYCHAKOV, I. A. VINNIKOV, K. A. KOICHEV, A. BOIADZHIEVA-MIKHAILOVA, and I. KHRISTOV (Akademiiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR; Meditsinskaia Akademiia, Plevni; B'lgarska Akademiia na Naukite, Institut po Morfologiiia, Sofia, Bulgaria) Zhurnal Evoliutsionnoi Biokhimii i Fiziologii (ISSN 0044-4529), vol. 19, July-Aug. 1983, p. 369-373. In Russian. refs

Rhesus monkeys were kept in a horizontal position under clinostatic or antiorthostatic hypokinetic conditions for seven and 19 days. SEM studies were made of the otolithic membrane of the utricle, the receptor surface of the utricle, the crista ampullaris of the lateral semicircular canals, the organ of Corti, the stria vascularis, and the spiral ligament in experimental and control animals. No significant differences were found between the experimental and control animals. B.J.

A84-22935

COMPARATIVE-PHYSIOLOGICAL ASPECTS OF THE FUNCTIONAL STABILITY OF THE BRAIN-CIRCULATION SYSTEM [SRAVNITEL'NO-FIZIOLOGICHESKIE ASPEKTY FUNKSIONAL'NOI USTOICHIVOSTI SISTEMY MOZGOVOGO KROVOOBRAZHENIIA]

IU. E. MOSKALENKO, A. I. KRIVCHENKO, N. A. PAVLOV, and D. KH. GARDOVSKA (Akademiiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Zhurnal Evoliutsionnoi Biokhimii i Fiziologii (ISSN 0044-4529), vol. 19, July-Aug. 1983, p. 374-380. In Russian. refs

The characteristics of the functional stability of the brain-circulation system (i.e., its ability to withstand external actions) in amphibia and birds are compared with the same characteristics in mammals and in human infants. It is shown that the functional-stability limits in vertebrates during changes in systemic arterial pressure are similar in the animals studied, but that the rate of functioning of regulatory mechanisms in amphibia and birds is considerably slower. It is also shown that the features

characterizing the manifestation of the functional stability of the brain-circulation system in human infants are first observed after two months of life, and are fully formed after six-months. B.J.

A84-22939

PREVENTION OF STRESS DISORDERS OF THE CONTRACTILE FUNCTION OF THE MYOCARDIUM USING MEMBRANCE PROTECTORS [PREDUPREZHDENIE STRESSORNYKH NARUSHENII SOKRATITEL'NOI FUNKTSII MIOKARDA S POMOSHCH'IU MEMBRANOPROTEKTOROV]

F. Z. MEERSON, M. G. PSHENNIKOVA, A. ZH. RYSMENDIEV, and E. IA. VORONTSOVA (Akademiiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiiia (ISSN 0022-9040), vol. 23, July 1983, p. 86-90. In Russian. refs

The effect of the preliminary administration of a number of drugs on the disturbance of the myocardium extensibility and contractile function, and the decrease of its resistance to hypoxia and to the calcium excess usually caused by emotional-pain stress, was studied on the isolated rat atrium. The drugs investigated were the adrenoblocker inderal, the lipase inhibitor nicotinamide, and the phospholipase inhibitor chloroquine. These drugs were shown to prevent the aforementioned poststress disturbances without significantly affecting the control animals. Nicotinamide was the most effective: its protective effect on the myocardium was accompanied by the prevention of the stress-induced increase of free fatty acids in the blood. B.J.

A84-22940

PREVENTION OF STRESS-INDUCED AND HYPOXIC HEART-DAMAGE BY THE BETA-BLOCKER INDERAL [PREDUPREZHDENIE STRESSORNYKH I GIPOKSICHESKIKH POVREZHDENII SERDTSA S POMOSHCH'IU BETA-BLOKATORA INDERALA]

E. E. USTINOVA (Akademiiia Meditsinskikh Nauk SSSR, Moscow, USSR) Kardiologiiia (ISSN 0022-9040), vol. 23, July 1983, p. 90-93. In Russian. refs

The administration of 1 mg/kg of the beta-blocker inderal before emotional-pain stress was experimentally shown to prevent the poststress damage of contractility in isolated rat hearts. Inderal was found to enhance the heart resistance to hypoxic and reoxygenation damage and to prevent the progress of this damage after stress. B.J.

A84-22941

THE EFFECTS OF VITAMINS A AND E ON THE CONTRACTILE FUNCTION OF THE HEART IN EXPERIMENTAL MYOCARDIAL INFARCTION [VLIANIE VITAMINOV A I E NA SOKRATITEL'NUIU FUNKTSIIU SERDTSA PRI EKSPERIMENTAL'NOM INFARKTE MIOKARDA]

V. A. FROLOV and V. A. KAPUSTIN (Universitet Druzhby Narodov, Moscow, USSR) Kardiologiiia (ISSN 0022-9040), vol. 23, July 1983, p. 93-95. In Russian. refs

Rabbits were treated with vitamins A and E (400 IU/kg and 0.4 mg/kg, respectively) during experimental myocardial infarction, induced through ligation of the anterior descending coronary artery. These animals showed a much more pronounced cardiac contractility as compared to untreated animals with induced infarction or animals treated with much higher doses (10,000 IU/kg and 10 mg/kg, respectively). Vitamins A and E administered in small doses to intact animals and those with experimental myocardial infarction were shown to produce pronounced damage of lysosome membranes, whereas high doses did not produce this sort of damage. B.J.

A84-22943

RESPONSE OF THE PARAVENTRICULAR NUCLEUS OF THE HYPOTHALAMUS AND THE DORSAL HIPPOCAMPUS DURING LONG-TERM ADAPTATION TO HYPOXIA [REAKTSII PARAVENTRIKULIARNOGO IADRA GIPOTALAMUSA I DORSAL'NOGO GIPPOKAMPA PRI DOLGOVREMENNOI ADAPTATSII K GIPOKSII]

IU. M. KOLESNIK and IU. N. ORESTENKO (Zaporozhskii Meditsinskii Institut, Zaporozhe, Ukrainian SSR) Problemy Endokrinologii, vol. 29, July-Aug. 1983, p. 55-59. In Russian. refs

The physiological activity of the hypothalamic paraventricular nucleus and the dorsal hippocampus was studied in 17 Wistar rats under conditions of 30-day barochamber hypoxia (6 hours daily) at a simulated height of 6 km. A cyclicity of changes was found characterized by a prolonged period of nucleus activation with simultaneous protective relieving inhibition of the dorsal hippocampus, followed by a decrease in nucleus activity and marked stimulation of the hippocampus with hyporeactivity of the body on the hypoxia itself. The subsequent wave of nucleus activation was transient and was again accompanied by inhibition of the hippocampus. This cyclicity reflected mechanisms responsible for the formation of adaptation to hypoxia. B.J.

A84-22944

AGE-RELATED FEATURES OF THE RESPONSE OF THE RAT HYPOTHALAMIC-HYPOPHYSIAL NEUROSECRETORY SYSTEM TO PHYSICAL EXERCISE [VOZRASNIE OSOBNOSTI REAKTSII GIPOTALAMO-GIPOFIZARNOI NEIROSEKRETORNOI SISTEMY KRYS NA FIZICHESKUIU NAGRUKU]

O. A. DANILOVA, I. A. DRZHEVETSKAIA, and A. M. KOROVINA (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad; Stavropol'skii Gosudarstvennyi Pedagogicheskii Institut, Stavropol, USSR) Problemy Endokrinologii, vol. 29, July-Aug. 1983, p. 67-71. In Russian. refs

A84-22945

THE ROLE OF CORTICOSTEROIDS IN THE REGULATION OF CELL-MIGRATION PROCESSES IN EMOTIONAL-PAIN STRESS [ROL' KORTIKOSTEROIDOV V REGULIATSII PROTSESOV KLETOCHNOI MIGRATSII PRI EMOTSIONAL'NO-BOLEVOM STRESSE]

B. A. FROLOV and S. N. AFONINA (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Problemy Endokrinologii, vol. 29, July-Aug. 1983, p. 75-79. In Russian. refs

An investigation performed on 186 rats shows that an increase in the adrenocortical and blood-plasma 11-HOCS concentration occurs immediately after emotional-pain stress and 72-96 hours after stress affection. An intensified thymic and splenic repopulation by cells migrating from the bone marrow is found to occur 48-192 hours after emotional-pain stress. It is suggested that the elevation of the corticosteroid level in the organism during late periods after stress is directed toward cell-population recovery. B.J.

N84-16755*# National Aeronautics and Space Administration, Washington, D. C.

STUDIES OF PROTEINOGRAMS IN DERMATOPHYTES BY DISC ELECTROPHORESIS. 1. PROTEIN BANDS IN RELATION TO GROWTH PHASE

P. DANEV, E. FRIEDRICH, and V. BALABANOV Jun. 1983 8 p Transl. into ENGLISH from Dermatol. Venerologiya (Bulgaria), v. 19, no. 2, 1980 p 82-85 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASW-3541) (NASA-TM-77095; NAS 1:15:77095) Avail: NTIS HC A02/MF A01 CSCL 06C

Homogenates were prepared from various growth phases of *Microsporium gypseum* grown on different amino acids as the nitrogen source. When analyzed on 7.5% polyacrylamide disc gels, the water-soluble proteins in these homogenates gave essentially identical banding patterns. Author

N84-16756*# National Aeronautics and Space Administration, Washington, D. C.

BIRTH OF SPACE PLANT GROWING

A. MASHINSKIY and G. NECHITAYLO Nov. 1983 20 p Transl. into ENGLISH from Tekh. Molodezhi (USSR), no. 4, 1983 p 2-7 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASW-3541) (NASA-TM-77244; NAS 1:15:77244) Avail: NTIS HC A02/MF A01 CSCL 06C

The attempts, and successes, to grow plants in space, and get them to fully develop, bloom and produce seeds using orchids are presented. The psychological advantages of the presence of plants onboard space vehicles and space stations is indicated.

E.A.K.

N84-16757# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

BONE MINERAL ANALYSIS OF RAT VERTEBRAE FOLLOWING SPACE FLIGHT: COSMOS 1129

E. P. FRANCE, C. M. OLOFF, and L. E. KAZARIAN Jun. 1983 32 p

(Contract AF PROJ. 7231) (AD-A133178; AFAMRL-TR-83-055) Avail: NTIS HC A03/MF A01 CSCL 06A

The mission of COSMOS 1129 was to investigate the effects of 18.5 days of microgravity and readaptation to Earth's gravity for various organisms. This study describes comparative mineral/element content of vertebral centra for rats flown aboard COSMOS 1129 (F) and rats from a ground based synchronous control study (S). F and S rats were sacrificed on a predetermined readaptive schedule following actual or simulated spaceflight recovery (R) at r+0, R+6, and R+29 days. 947 cleaned individual vertebral centra were harvested from these animals and stored frozen in sterile distilled water to await analysis. In preparation for mineral/element analysis each specimen was dried, weighed and digested in nitric acid. The prepared samples were analyzed for Ca²⁺(+), PO₄⁻(-), K, Na, Ba, Sr, Fl, Mg, Pb, Mn, and Y using either atomic absorption spectrophotometry or colorimetric analysis. Bone mineral/element content was then expressed as a percent of dry bone weight. The paper presents comparative mineral/element content data between F and S for various recovery times. The use of the rat model for further understanding microgravic osteopenia is discussed. GRA

N84-16758# Army Research Inst. of Environmental Medicine, Natick, Mass.

INSULIN AND CORTISOL IMPROVE HEAT TOLERANCE IN ISOLATED PERFUSED RAT LIVER

W. D. BOWERS, JR., I. LEAV, P. DAUM, M. MURPHY, and P. WILLIAMS 16 Sep. 1983 28 p

(Contract DA PROJ. 3M1-61192-BS-10) (AD-A133382; USARIEM-M-46/83) Avail: NTIS HCA03/MFA01 CSCL 06E

Isolated rat livers were perfused at 37, 41, 42, and 43 C with and without insulin and cortisol. Two additional groups were perfused at 42 with either hormone alone. The perfusate contained RBCs, amino acids and albumin in Krebs-Ringer bicarbonate. Bile production was significantly increased by hormones at 37C. Results obtained by others at normal temperature indicating absence of any effect of insulin and cortisol may relate to low hematocrit and/or flow rate in their experiments. Bile production was also increased by hormones at all other temperatures. At 41C, K(+) leakage was the only parameter which indicated injury. Insulin and cortisol significantly reduced K(+) leakage at this temperature compared to those without hormones. At 42C, insulin and cortisol reduced K(+) leakage, increased bile production, reduced transaminase release and improved ultrastructural integrity. The enhanced bile production was due primarily to insulin. A reduction in K(+) leakage required the presence of both insulin and cortisol. Transaminase leakage responded to either hormone alone or in combination, however, only the cortisol treated group showed a statistically significant reduction in transaminase leakage. At 43

51 LIFE SCIENCES (GENERAL)

degrees, irreversible injury was evident and hormones had no beneficial effects. GRA

N84-16759# Missouri Univ., Rolla.
EFFECT OF RADIOFREQUENCY RADIATION ON DNA DUPLEX STABILITY AND REPLICATION Final Report, 30 Apr. 1981 - 30 Nov. 1982

R. F. BROWN and S. V. MARSHALL Aug. 1983 45 p
(Contract F33615-80-C-0613; AF PROJ. 7757)
(AD-A133526; USAFSAM-TR-83-20) Avail: NTIS
HCA03/MFA01 CSCL 06R

Three experimental approaches were used to determine if absorption of continuous wave radiofrequency (RF) photons affect the stability and/or replication of mammalian DNA. Two of the approaches involved experiments with female CD-1 mice, including analyses of RF effects on sister chromatid exchanges (SCE) in bone marrow as one index of DNA stability and RF effects on replication of the animals' marrow and spleen DNA. The third experimental approach consisted of tests to determine if RF exposure causes partial denaturation of double-stranded DNA, monitored in this study by susceptibility of the polymer to hydrolysis by single-strand-specific SI nuclease. The substrate DNA used for this cell-free assay was isolated from Chinese hamster ovary cell cultures labeled with radioactive deoxynucleosides. Irradiated subjects were exposed to incident RF field densities adjusted to be equivalent to absorbed doses in mice of 4 W/kg at each of three test frequencies: 400, 800, and 1200 MHz. The results revealed no reduction in the level of DNA synthesis in either the spleen or the bone marrow of animals exposed to any of the three test frequencies, also no increase in the number of SCE. However, a slight, but consistent, increase in the nuclease susceptibility of isolated DNA appeared to be a result of RFR exposure. GRA

N84-16760# Boston Univ., Mass.
INVESTIGATION OF THE STRUCTURE OF PHOTOSYNTHETIC REACTION CENTERS Progress Report, 6 Jan. - 5 Nov. 1983
H. VANWILLIGEN Nov. 1983 11 p refs
(Contract DE-AC02-81ER-10911)
(DE84-002886; DOE/ER-10911/5) Avail: NTIS HC A02/MF
A01

Dimer formation of tetra (4-sulfonatophenyl) porphyrin and its Zn and Pd complexes has been studied using optical and triplet electron spin resonance spectroscopy. The data give information on dimer geometry as well as on dimerization effects on photo-excited triplet properties. It is found that dimerization effects mimic those associated with a transition from in vitro bacteriochlorophyll monomers to primary donor bacteriochlorophyll in reaction centers of photosynthetic bacteria. An electron nuclear double resonance (ENDOR) study was made of the solvation of a porphyrin cation radical. The study established that the ENDOR technique can provide information on weak interactions between paramagnetic macrocycles and surrounding solvent molecules. ENDOR instrumentation was adapted to accommodate a new Oxford instruments helium cryostat. DOE

N84-16761# Louisiana State Univ., Baton Rouge. Dept. of Chemistry.
PHYSICO-CHEMICAL INVESTIGATION OF SOME AREAS OF FUNDAMENTAL SIGNIFICANCE TO BIOPHYSICS Annual Report, 1982 - 1983
S. P. MCGLYNN 15 Aug. 1983 77 p refs
(Contract DE-AS05-76EV-03018)
(DE83-017404; DOE/EV-03018/247) Avail: NTIS HC A05/MF
A01

Individual reports cover Rydberg states of methyl iodide; photoacoustic spectra of azulene, halogens, and mixed halogens; synthesis and characterization of metalloporphyrin derivatives; and electron/charge transfer in photochemical reactions of 9-phenylanthracene and perylene. DOE

N84-16762# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES. EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, NO. 13
21 Dec. 1983 47 p refs Transl. into ENGLISH from various Russian articles

(JPRS-84991) Avail: NTIS HC A03

The effects of nonionizing radiation on animals and human beings are discussed. The influence of a variable magnetic field on the bactericidal effect of ionizing radiation, animal sensitivity to superhigh frequency electromagnetic fields in correlation to age, and the use of electromagnetic fields in patients following a disruption or cerebral circulation are among the topics discussed. R.J.F.

N84-16763# Joint Publications Research Service, Arlington, Va.
PERMEABILITY OF SODIUM SULFACYL THROUGH MEMBRANE STRUCTURES DIFFERING IN DEGREE OF ORGANIZATION WITH EXPOSURE TO LOW-FREQUENCY MAGNETIC FIELD

V. V. DUNAYEV and A. V. KARPENKO *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 13 (JPRS-84991) p 1-5 21 Dec. 1983 refs Transl. into ENGLISH from Farmakol. i Toksikol. (USSR), v. 46, no. 1, Jan. - Feb. 1983 p 62-65
Avail: NTIS HC A03

The effect of a variable magnetic field, in modes used for clinical magnetotherapy, on permeability of membrane structures differing in level of organization and on binding of blood plasma proteins and erythrocytes by sodium sulfacyl, which was chosen as a marker of permeability because of its relative neutrality and lack of capacity for selective accumulation in tissues or organs, was studied. Experiments were conducted on 41 Wistar rats of both sexes weighing 200-230 g. The animals in the experimental group, which were placed in boxes made of dielectric material with holes, were exposed to a variable magnetic field at a frequency of 50 Hz, with maximum induction of 100 G, generated by 2 electromagnets with 100 times 100 mm core and gap between them, in two procedures: 15 minutes for the anterior and 15 minutes for the posterior half of the trunk. Control animals were kept under similar conditions but were not exposed to the magnetic field. R.J.F.

N84-16764# Joint Publications Research Service, Arlington, Va.
CHANGE IN IMMUNOBIOLOGICAL REACTIVITY UNDER THE EFFECT OF COMBINED EXPOSURE TO MICROWAVES, INFRASOUND AND GAMMA RADIATION

Y. G. GRIGORYEV, G. V. BATANOV, and V. S. STEPANOV *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 13 (JPRS-84991) p 6-10 21 Dec. 1983 refs Transl. into ENGLISH from Radiobiol. (USSR), v. 23, no. 3, May - Jun. 1983 p 406-409
Avail: NTIS HC A03

An attempt was made to assess the effect of microwaves combined with gamma radiation and infrasound on experimental animals according to immunological parameters. It was found that immunocompetent cells were sensitive to microwaves, whereas infrasound had a greater effect on humoral activity. R.J.F.

N84-16765# Joint Publications Research Service, Arlington, Va.
INFLUENCE OF VARIABLE MAGNETIC FIELD ON BACTERICIDAL EFFECT OF IONIZING RADIATION

M. A. TUMANYAN and I. I. SAMOYLENKO *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 13 (JPRS-84991) p 11-15 21 Dec. 1983 refs Transl. into ENGLISH from Radiobiol. (USSR), v. 23, no. 3, May - Jun. 1983 p 415-419
Avail: NTIS HC A03

The objective was to investigate the effects of a variable magnetic field and combination of magnetic and radiation factors on bacteria differing in radioresistance, in order to determine whether it is possible to lower the sterilizing dose for radiation sterilization. R.J.F.

N84-16766# Joint Publications Research Service, Arlington, Va.
ANIMAL SENSITIVITY TO SUPER-HIGH FREQUENCY ELECTROMAGNETIC FIELDS IN CORRELATION TO AGE

I. P. KOZYARIN and I. I. SHVAYKO *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 13 (JPRS-84991) p 21-28 21 Dec. 1983 refs Transl. into ENGLISH from Gigiyena i Sanit. (USSR), no. 3, Mar. 1983 p 86-89

Avail: NTIS HC A03

A study of the effect of a super-high frequency electromagnetic field (SHF EMF) on animals at various ontogenetic stages is discussed. The aim of the research was to develop the scientific foundations for setting hygienic norms for SHF EMF for populations living in areas where sources of SHF irradiation are located (radio relays lines, television transmitting centers, radar stations), taking into account age-related characteristics. It was concluded that disruptions in the body's functional status and individual systems are in direct correlation to the intensity of SHF radiation. The greatest sensitivity to SHF irradiation is seen in sexually immature animals. In order to establish scientific substantiation and determine the maximum allowable levels of SHF EMF in populated areas, it is necessary to take into account the variations in sensitivity that are dependent on age. R.J.F.

N84-16767# Joint Publications Research Service, Arlington, Va.
NEW TRENDS IN STANDARDIZATION OF ELECTROMAGNETIC MICROWAVE RADIATION

B. M. SAVIN, K. V. NIKONOVA, Y. A. LOBANOVA, M. N. SADCHIKOVA, and Y. K. LEBED *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 13 (JPRS-84991) p 29-33 21 Dec. 1983 refs Transl. into ENGLISH from Gigiyena Truda i Prof. Zabolevaniya (USSR), no. 3, Mar. 1983 p 1-4

Avail: NTIS HC A03

A new approach to standardizing exposure levels of human beings to microwave radiation is discussed. This new approach take into consideration intensity and length of irradiation and corresponds with contemporary ideas on the energy dependence of the biological effects of radiofrequency exposure. By maintaining a maximum allowable intensity of 1 mW/cm squared, its introduction provides more adequate evaluation of radiation conditions by more differentiated determination of maximum allowable values of electromagnetic field duration. R.J.F.

N84-16768# Joint Publications Research Service, Arlington, Va.
USE OF ELECTROMAGNETIC FIELD IN PATIENTS FOLLOWING A DISRUPTION OF CEREBRAL CIRCULATION

N. I. STRELKOVA, S. G. MASLOVSKAYA, A. G. GAVRILKOV, and Y. N. STRELTSOVA *In its* USSR Rept.: Life Sci. Effects of Nonionizing Electromagnetic Radiation, No. 13 (JPRS-84991) p 34-38 21 Dec. 1983 refs Transl. into ENGLISH from Sov. Med. (USSR), no. 5, May 1983 p 35-38

Avail: NTIS HC A03

The use of electromagnetic decimeter waves and an alternating magnetic field in treating patients who have brain circulation disruptions due to trauma from injuries or surgery is discussed. Venous congestion was noted in 68% of patients before treatment. Under the effect of decimeter wave exposure, a statistically reliable (P 0.002) increase in the brain circulation in the affected hemisphere occurred, with a reduction in venous congestion in comparison to the contralateral side. R.J.F.

N84-16769# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL. 17, NO. 6, NOVEMBER - DECEMBER 1983 94 P

O. G. GAZENKO, ed. 17 Jan. 1984 161 p refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmich. Med. (Moscow), v. 17, no. 6, Nov. - Dec. 1983

(JPRS-USB-84-001) Avail: NTIS HC A08

Various topics in aerospace medicine are discussed. Hypokinesia, weightlessness simulation, orthostatic tolerance,

acceleration protection, space suits, diuresis, radiation shielding, and resonant frequencies are among the topics discussed.

N84-16782# Joint Publications Research Service, Arlington, Va.
EFFECT OF PERIODIC ACCELERATIONS OF 5 G ON KINETICS OF ERYTHROCYTE HEMOLYSIS IN WHITE RATS

A. G. AGAMALYAN and S. S. OGANESYAN *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 88-92 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviaosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 60-62

Avail: NTIS HC A08

The effect of daily acceleration of 5 G applied for 25 min on the kinetic parameters of erythrocyte hemolysis was studied on 30 white Wistar rats. The animals were accelerated in a centrifuge with a 3.25 m rotor for two weeks. Hemolysis was recorded in a modified device that permitted phase analysis of the resultant curves. The selected kinetic parameters varied in a different degree and recovered during readaptation in a nonuniform manner. This is associated with various changes in different components of the regulation of erythrocyte hemolytic resistance. Author

N84-16783# Joint Publications Research Service, Arlington, Va.
NEURONAL-VASCULAR RELATIONS IN LATERAL GENICULATE BODY AND SUPERIOR COLLICULI OF CATS AFTER EXPOSURE TO ACCELERATIONS

I. V. BOYARKINA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 93-96 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 63-65

Avail: NTIS HC A08

Thirty-nine cats were exposed to accelerations of 10 g for one or several days. Their neuronalvascular relations in the subcortical optic centers were investigated using ink gelatin injections and Nissl's method. During one day back to chest, chest to back and head to feet acceleration and many day head to feet and chest to back acceleration neuronalvascular relations decreased, whereas during one day feet to head and many day, chest to back and feet to head acceleration they increased. During one day centrifugation edematous neurons and during many day centrifugation swollen neurons may occur. Author

N84-16784# Joint Publications Research Service, Arlington, Va.
STUDY OF VIBRATION RESONANCE FREQUENCIES IN RATS

I. B. USHAKOV, N. V. SOLOSHENKO, and A. P. KOZLOVSKIY *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 97-101 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 66-68

Avail: NTIS HC A08

Using piezoelectric transducers, resonance frequencies of different body parts of rats exposed to whole-body vertical vibration were measured. The exposure was as follows: acceleration--8 m/sec, head--75-80 Hz, chest--225-230 Hz, and abdomen--27-29 Hz. An attempt was made to determine roughly an interspecies (man-rat) coefficient with respect to resonance frequencies which was estimated to be 0.2-0.25. Author

N84-16785# Joint Publications Research Service, Arlington, Va.
COMPARATIVE CHARACTERISTICS OF ERYTHRON REACTIONS TO HYPOXIC HYPOXIA, IMMOBILIZATION AND HIGH-INTENSITY STATIONARY MAGNETIC FIELD

S. A. GREBENNIKOV and A. D. PAVLOV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 102-106 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 68-71

Avail: NTIS HC A08

The comparative study of the effects of hypoxic hypoxia, immobilization and a constant magnetic field of high-strength (80 and 240 kA/m) has shown that the latter exerts an erythropoiesis-stimulating effect in rats. This manifests as an increase in the absolute count of reticulocytes in blood and in the

51 LIFE SCIENCES (GENERAL)

count of erythroid cells in bone marrow 72 hours after the 4-hour exposure to a constant magnetic field. Author

N84-16789# Joint Publications Research Service, Arlington, Va. **EXPERIMENTALLY PRODUCED BIPED MONKEYS AS A MODEL FOR MULTIPURPOSE RESEARCH IN GRAVITY BIOLOGY AND PHYSIOLOGY**

G. S. BELKANIYA and V. A. DARTSMELIYA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 125-131 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 81-85

Avail: NTIS HC A08

At the present time there is a rather large armamentarium of experimental resources for investigation of the effects of altered ambient gravity on animals. It includes diverse models that are used in ground-based experiments and in spaceflights. However, all this is used primarily to demonstrate the effects of weightlessness, i.e., relative or absolute decline of the effect of gravity on the body. Intensification of research in this direction is due to the practical demands of cosmonauts, the need to make it possible for man to spend a long time in space. For expressly this reason there are so diversified experimental and clinical models and studies of physiological effects of weightlessness. At the same time, in spite of the interest of researchers in the problem of accelerations and hypergravity, rotation on a centrifuge is still the only experimental means of making studies in this direction. The model with inclined suspension of monkeys is more adequate to some extent in this respect. As for the centrifuge model to test the effects of increased gravity, even in the case of slow rotation the occurring angular accelerations have an appreciable effect on the animal and modify significantly the effects of hypergravity.

B.W.

N84-17803# Materials Research Labs., Melbourne (Australia). **THE RESPONSE OF RATS TO CUTANEOUS DOSING WITH TRICHOHECENE MYCOTOXINS**

H. D. CRONE Oct. 1983 22 p (MRL-R-902; AR-003-798) Avail: NTIS HC A02/MF A01

T-2 toxin and diacetoxyscirpenol (DAS) formed deep necrotic ulcers on rat skin at doses of 2 micrograms and 6 micrograms respectively. Verrucaric acid and Floridin A were relatively ineffective at producing skin lesions. The percutaneous LD₅₀ of T-2 or DAS was found to be well in excess of 10 mg/kg. DMSO had no marked effect in increasing wound severity or systemic toxicity as opposed to ethyl acetate as the application vehicle. No synergism between T-2 and DAS was found. Histological examination of skin lesions revealed the typical inflammatory reaction that is also caused by thermal burns or other necrotizing agents. Thin layer chromatography of the toxins is described, as a method to check purity and stability. Author

N84-17804*# National Aeronautics and Space Administration, Washington, D. C.

THE EFFECT OF VARIOUS CARBON SOURCES ON THE GROWTH OF SINGLE-CELLED CYANOPHYTA

I. A. AVILOV and E. S. SIDORENKOVA Jul. 1983 15 p refs Transl. into ENGLISH from Vestn. Leningr. Univ., Ser. Biol. (USSR), no. 15, 1980 p 97-103 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASW-3541) (NASA-TM-77090; NAS 1.15:77090) Avail: NTIS HC A02/MF A01 CSCL 06C

In 19 strains of unicellular blue-green algae, belonging to general *Synechococcus*, *Synechocystis*, *Aphanocapsa* and *Aphanothece*, the capacity of growth under mixotrophic conditions in mineral media with organic carbon sources (carbohydrates, polyols) was investigated. At moderate light intensity (1200 lx) and 0.5% of carbon source there was revealed: (1) Stimulation of growth; (2) Partial or complete inhibition of growth; (3) No influence of carbohydrate and polyols on the growth of some algae strains. Three physiological groups for the investigated strains have been outlined on the basis of data obtained. The possibility of using

the differences revealed in classification of unicellular blue-green algae is discussed. Author

N84-17805# Information Ventures, Inc., Philadelphia, Pa. **BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION, VOLUME 7, NUMBER 2-4, JULY - DECEMBER 1982**

B. H. KLEINSTEIN Jul. 1983 186 p

(Contract N00014-83-C-0004)

(AD-A134674) Avail: NTIS HC A09/MF A01 CSCL 06R

The literature digest contains original abstracts of English and foreign-language research literature, current research summaries, news items and announcements and information on relevant meetings and conferences. Subject and author indices are provided for all literature abstracts. Original abstracts are prepared based on data presented in the text, tables, and figures in the document. Where appropriate, quantitative data such as wavelength or frequency modulation, pulse width, duty cycle, incident power density, specific absorption rate, drugs or other stimuli, exposure duration and regime, and end point are included in each abstract.

Author (GRA)

N84-17806# Kentucky Univ., Lexington. Dept. of Anatomy. **STUDIES OF ELECTRICALLY STIMULATED RAT LIMB AND PERIPHERAL NERVE REGENERATION Final Technical Report, May 1979 - Jun. 1983**

S. D. SMITH and W. G. WINTER 25 Aug. 1983 38 p

(Contract N00014-79-C-0332)

(AD-A134358; REPT-6) Avail: NTIS HC A03/MF A01 CSCL 06P

This report covers research into the stimulated regeneration of subadult rat limbs and peripheral nerves. Regeneration of limbs was stimulated by implants of direct current devices delivering 10 to the minus 6th power A/sq mm, by pulsed magnetic fields delivered as short trains of asymmetric pulses repeating at 15 Hz, and by a combination of the two. Direct current fields produced significant amounts of new tissue organized into proximo-distal groupings reminiscent of carpal elements. PMF produced large amounts of new tissue, chiefly muscle. Peripheral nerve regeneration was also elicited by the implantation of D.C. devices (galvanic) and by PMF. Both methods produced significantly improved nerve regeneration. Several new techniques for stimulation and for evaluation of the response have been developed, but for this report, integrated monophasic compound action potentials (IMCAPS) were the chief means of evaluation. Improvements in regeneration of the order of 20% were found.

GRA

N84-17807# Argonne National Lab., Ill. Div. of Biological and Medical Research.

COMPARISON OF ORGANISMS AND CELL TYPES USING TWO-DIMENSIONAL ELECTROPHORESIS

N. L. ANDERSON 1983 22 p refs Presented at the Biol. and Characterization of Cultured Vertebrate Cell Lines Symp., Bethesda, Md., 2 Oct. 1983

(Contract W-31-109-ENG-38)

(DE84-003574; CONF-8310221-1) Avail: NTIS HC A02/MF A01

Various approaches to the use of two dimensional electrophoretic patterns for the quantitation of protein taxonomic distances are discussed. In comparisons of closely related organisms approximately 1/3 of all single base substitutions may be detected in approximately 3×10^6 base pairs of coding DNA. This represents the highest data rate available in any genomic surveillance technique aimed at measuring single base changes. In comparisons of more distantly related organisms, current 2-D gels allow exploitation of a range of spot overlap extending from about 2.6% to greater than or equal to 90%. Within this range, evolutionary distances characteristics of family, genus, and species differences may be measurable directly in terms of base substitutions per nucleotide averaged over very large amounts of coding DNA. DOE

N84-17808# Johns Hopkins Univ., Baltimore, Md. Dept. of Biology.

BIOCHEMICAL INDICATORS OF THERMAL STRESS: SELECTED GENETIC AND PHYSIOLOGICAL PARAMETERS Final Report

D. A. POWERS May 1983 80 p refs
(PB84-100122; PPSP/PPRP-75) Avail: NTIS HC A05/MF A01 CSCL 06T

The model species *Fundulus heteroclitus* was sampled from the intake and thermally elevated discharge water of five power plants and twenty-five other areas in the Chesapeake Bay which are not associated with power plants. Genetic and physiological measurements were made on sampled populations and differences correlated with environmental temperature, oxygen and/or salinity. Finally, attempts to sort out some of these variables were made by employing laboratory experiments at the whole organism, cellular, and biochemical levels. GRA

N84-17809# Kentucky Univ., Lexington. Coll. of Pharmacy.
RABBIT NEUROBEHAVIORAL TOXICITY FROM ALUMINUM Final Report

R. A. YOKEL May 1983 28 p refs
(Contract PHS-MH-34188)
(PB84-103266; NIMH-83-335) Avail: NTIS HC A03/MF A01 CSCL 06T

A model for the production of neurobehavioral toxicity induced by systematic aluminum exposure was developed. Nictitating membrane extension conditioning was used to assess the influence of the aluminum treatment on learning (acquisition and conditioned response) and memory (retention of the response 10 days after acquisition) in the adult rabbit. Tissue aluminum level were determined 5 weeks after the completion of aluminum treatment in 5 CNS regions and nine peripheral tissues. The presence of neurofibrillary tangles was assessed in the brains of some of the treated and control rabbits. GRA

N84-17810# Purdue Univ., Lafayette, Ind. Dept. of Chemistry.
IN VITRO CHLOROPHYLL PHOTOSYNTHETIC REACTION Annual Report, Jan. - Dec. 1983

F. K. FONG, A. J. ALFANO, and M. S. SHOWELL Aug. 1983 71 p refs Sponsored by Gas Research Inst.
(PB84-104892; GRI-81/0124) Avail: NTIS HC A04/MF A01 CSCL 07E

The photosynthetic mechanism using elementary constituents of *in vivo* photosystems is reconstituted. The mechanisms of plant photosynthesis were unraveled. An array of experimental results was obtained making use of various instrumental methods: (1) Electron spin resonance and photogalvanic current measurements provide evidence for a particularly effective contribution from a dimeric aggregate of hydrated chlorophyll to *in vitro* photosynthetic activity; (2) Gas chromatographic and ion cyclotron resonance measurements support the *in vitro* photosystem's ability to catalyze water splitting; (3) Fluorescence lifetime measurements were made to examine the excited singlet and triplet paths of the hydrated chlorophyll aggregates; (4) From the observation of oscillatory delayed fluorescence in monomeric hydrated chlorophyll it has been concluded that the smallest hydrated Chl a complex capable of photocatalyzing water splitting is a dimer. GRA

N84-17853*# Georgia Inst. of Tech., Atlanta.
TECHNIQUES FOR THE INORGANIC ANALYSIS IN A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM Final Report

In its Inorg. Anal. in a Controlled Ecol. Life Support System 12 p Jun. 1983
Avail: NTIS HC A02/MF A01 CSCL 06K

Sample preparation, instrumental analysis, a direct injection device for IC/ICP interfacing, a hydraulic jet bend impaction device, monodisperse aerosol generator, and low gravity environments are discussed. N.W.

N84-17854*# Georgia Inst. of Tech., Atlanta.
STANDARD RESEARCH MATERIALS: FECES AND URINE Final Report

In its Inorg. Anal. in a Controlled Ecol. Life Support System 9 p Jun. 1983 refs

Avail: NTIS HC A02/MF A01 CSCL 06P

Preparation of the standard research materials, preparation of the samples for analysis, elemental analysis, composition of standard research materials, and methodology are discussed.

N.W.

52

AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and weightlessness.

A84-20018
TEXTURE CHANGES VERSUS SIZE CHANGES AS STIMULI FOR MOTION IN DEPTH

K. I. BEVERLEY and D. REGAN (Dalhousie University, Halifax, Canada) Vision Research (ISSN 0042-6989), vol. 23, no. 12, 1983, p. 1387-1389, 1391-1399. Sponsorship: Natural Sciences and Engineering Research Council of Canada. refs
(Contract NSERC-A-0323; AF-AFOSR-78-3711)

As an object approaches the eye, its retinal image size grows larger and its surface texture appears to grow coarser. These two visual correlates of motion are compared in their effectiveness as stimuli for motion in depth. In some experiments texture and object size both expanded or both contracted; in other experiments the two stimuli were pitted against each other. When texture and size change as for a rigid, nonrotating real-world object, an untextured square can be a more effective stimulus for motion in depth than the same square with texture. One way of describing this finding is to calculate the departure from linear summation of texture and size contributions. The departure is greatest when texture is static, being even greater than when texture changes in the opposite direction to size. Author

A84-20019
MECHANISMS OF VISUAL SENSITIVITY - BACKGROUNDS AND EARLY DARK ADAPTATION

W. S. GEISLER (Texas, University, Austin, TX) Vision Research (ISSN 0042-6989), vol. 23, no. 12, 1983, p. 1423-1432. refs
(Contract NIH-EY-02688)

There is substantial physiological and psychophysical evidence for an adaptation mechanism whose effect, under many circumstances, is equivalent to placing a neutral density filter in front of the eye. Furthermore, this mechanism is of sufficient strength to predict the generalized Weber's law for increment thresholds on steady backgrounds. However, it was shown that an additional transient mechanism (with a time-course of around 100 msec) is also needed to account for the increment-threshold results. The effect of this mechanism on increment thresholds during early dark adaptation was parametrically examined. Several models for the transient mechanism were considered. The one best able to account for the results consists of a subtractive inhibitory stage operating prior to a saturating nonlinearity. Author

A84-20021

SMOOTH PURSUIT EYE MOVEMENTS IN RESPONSE TO PREDICTABLE TARGET MOTIONS

A. T. BAHILL (Carnegie-Mellon University; Pittsburgh, University, Pittsburgh, PA) and J. D. MCDONALD (Carnegie-Mellon University, Pittsburgh, PA) *Vision Research* (ISSN 0042-6989), vol. 23, no. 12, 1983, p. 1573-1583. refs
(Contract NSF ECS-81-21259)

The human smooth pursuit eye movement system has a latency of about 150 msec. However, this study shows that humans can learn to perform zero-latency tracking of targets that move with continuous velocity and amplitude-limited acceleration. Superposition of eye velocity and target velocity records, for unique target waveforms, demonstrated that the subject was using the correct waveform and not just approximating it with a sinusoid or some other simple waveform. Calculation of the mean square error between target and eye position gave a quantitative measure of how well the human can track. The mean square error between target and eye position was 0.32 sq deg for 1000 sec of steady-state tracking by seven subjects. For several cycles at a time all subjects were able to reduce this error to less than 0.1 sq deg. Author

A84-20080

CIRCADIAN RHYTHMS AND DISTURBED SLEEP - ITS RELEVANCE TO TRANSPORT OPERATIONS

N. NICHOLSON (RAF, London, England) and B. M. STONE (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) *International Journal of Aviation Safety* (ISSN 0264-6803), vol. 1, Dec. 1983, p. 301-309.

Alertness is a vital factor for the satisfactory performance of operations in aviation. However, alertness is affected by the circadian rhythms of man and by his need for sleep. The present investigation is concerned with these factors. Circadian variations in human performance are examined, taking into account the representation of the regular cyclical changes of a circadian rhythm by a sinusoidal curve. When duty begins at midnight, performance decrements during long periods of work are likely to be much larger than when performance starts at noon. Attention is given to problems caused by loss of sleep, difficulties related to the use of shift systems, and problems caused by the irregularity of work over several days. G.R.

A84-20082

FIT TO FLY?

P. HEARN (RAF, London, England) *International Journal of Aviation Safety* (ISSN 0264-6803), vol. 1, Dec. 1983, p. 332-334.

The present investigation is concerned with questions regarding the fitness of a person for flying. It is pointed out that there are three basic fitness principles. Fitness is relative to a specific task, fitness to perform that task is not purely 'physical', and, according to the third principle, fitness is not the product of exercise alone, it is created or lost - through total 'life style'. Attention is given to the establishment of basic levels of general fitness in the Royal Air Force, the aircrew factors, the significance of fatigue, the effect of stress, the characteristics of the 'G' factor, and the factors which are important in a survival situation. G.R.

A84-20086

THE HUMAN ELEMENT IN AIR TRAFFIC CONTROL - AEROMEDICAL ASPECTS, PROBLEMS, AND PRESCRIPTIONS

S. R. MOHLER (Wright State University, Dayton, OH) *International Journal of Aviation Safety* (ISSN 0264-6803), vol. 1, Dec. 1983, p. 367-373. refs

During periods of reduced visibility, air traffic controllers are the most critical factor in aircraft collision avoidance. Controllers also largely determine efficiency in the mass movement of aircraft on instrument flight plans. Individual and group controller health and well-being are essential to the sustained efficient and safe operation of these aircraft in the National Airspace System. Impairments of mental function due to illness, fatigue, drugs, excessive stress, alcohol or other factors are major threats to air safety. This paper covers certain identified factors regarding

controller characteristics and health that bear upon the safety and efficiency of flight activities. Some possible remedies for specific problems are provided. Author

A84-20286

HIGH-FREQUENCY VESTIBULO-OCULAR REFLEX ACTIVATION THROUGH FORCED HEAD ROTATION IN MAN

G. M. GAUTHIER, J.-P. PIRON, J.-P. ROLL, E. MARCHETTI, and B. MARTIN (Aix-Marseille I, Universite, Marseille, France) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Jan. 1984, p. 1-7. Research supported by the Societe Nationale Industrielle Aerospatiale and Centre National de la Recherche Scientifique. refs

The effect of forced vertical-axis head rotation on vestibuloocular-reflex gain (VORG) and phase (VORP) is investigated experimentally in four (male and female) subjects. Rotation through 2 deg at frequencies of 0.5-30 Hz is transmitted through a cushioned helmet and bite bar and controlled to compensate for inertial and neck-muscle effects. Right-eye position is monitored by an IR photoelectric device in darkness and during fixation of stationary or moving electroluminescent-diode targets. A second set of trials involves subjective estimation of the amplitude of the target instability. Eye-movement recordings are shown, and the results are presented in graphs. VORG decreases from 2 to 8 Hz but then increases monotonically to about 3-4 at 25-30 Hz, while VORP has a maximum of about 90 deg, at about 20 Hz; perceived visual instability is significantly affected. The implications for visually-controlled-tracking performance in vibrating environments are explored. T.K.

A84-20287

SPINAL REFLEX ALTERATIONS AS A FUNCTION OF INTENSITY AND FREQUENCY OF VIBRATION APPLIED TO THE FEET OF SEATED SUBJECTS

B. J. MARTIN, J.-P. ROLL, and G. M. GAUTHIER (Institut National de Recherche et de Securite, Vandoeuvre-les-Nancy, Meurthe-et-Moselle; Aix-Marseille I, Universite, Marseille, France) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Jan. 1984, p. 8-12. Research supported by the Institut National de Recherche et de Securite and Centre National de la Recherche Scientifique. refs

The effect of vibration amplitude, acceleration, and frequency on the amplitude of the electrically induced spinal reflex is investigated experimentally in 10 healthy male and female subjects aged 18-30. Vibration at 10-60 Hz and + or - 0.1, 0.25, and 0.5 g is applied to the feet of seated subjects (knee angle 120 deg, ankles 90 deg, vibrator at 45 deg from vertical), and surface electrodes are used to stimulate (1 msec, 0.3 Hz) and measure the soleus-muscle spinal-reflex response. The results of 21 experimental series per subject are presented in graphs and discussed. Vibration is found to decrease the response, which is lowest at 10-30 Hz, increases again beyond 20-30 Hz at constant acceleration, but remains depressed up to 60 Hz at constant amplitude. It is inferred that the response depression is mainly related to amplitude. The avoidance of vibration in the 10-30-Hz range in designing vehicles is recommended. T.K.

A84-20289

PATTERNS OF SKIN TEMPERATURE AND SURFACE HEAT FLOW IN MAN DURING AND AFTER COLD WATER IMMERSION

L. D. REED, S. D. LIVINGSTONE, and R. E. LIMMER (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Jan. 1984, p. 19-23. refs

The region of the lateral thorax, previously identified as an area of high heat transfer during cold-water immersion, was investigated using heat-flow discs and thermography to determine values of local heat flow and surface temperature before, during, and after immersion. The effect of different positions of the arms on local heat flow from the torso was also investigated. No large site-to-site variation in local heat flow was detected for immersion in water temperatures in the range 18.7-24 C. When the arms

were positioned close to the torso, there was a marked decrease in local heat flow and an increase in local surface temperatures. Thermographic examinations revealed local regions of elevated temperature after the arms were briefly held against the body in the postimmersion stage. In this circumstance, erroneous results can follow from the assumption that an elevated surface temperature always constitutes a signal of increased regional heat flow. Author

A84-20291
SPINAL INJURY IN A U.S. ARMY LIGHT OBSERVATION HELICOPTER

D. F. SHANAHAN and G. R. MASTROIANNI (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, AL) (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Jan. 1984, p. 32-40. refs

All accident reports involving U.S. Army OH-58 series helicopters were analyzed to determine vertical and horizontal velocity change at impact and the relationship of this kinematic data to the production of spinal injury. This analysis determined that spinal injury is related primarily to vertical velocity change at impact and is relatively independent of horizontal velocity change. The dramatic increase in the rate of spinal injury occurring just above the design sink speed of the aircraft landing gear (3.7 m/s) suggests that the fuselage and seat provide little additional impact attenuation capability above that of the gear alone. It is concluded that if this aircraft were modified to provide protection to the occupants for impacts up to 9.1 m/sec approximately 80 percent of all spinal injury incurred in survivable accidents could be substantially mitigated. The incorporation of energy-absorbing seats is recommended. Author

A84-20293
PREVALENCE OF FATTY LIVER IN HEALTHY MALE ADULTS ACCIDENTALLY KILLED

K. E. UNDERWOOD GROUND (RAF, Institute of Pathology and Tropical Medicine, Aylesbury, Bucks., England) (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Jan. 1984, p. 59-61. refs

This paper details the histopathologic features of livers in 166 adult healthy British males between the ages of 18 and 58 yr (mean age 29 yr) accidentally killed. The fatty changes are graded and 35 (21 percent) are considered to be abnormal. Of the 35 cases, 13 cases show fatty changes unassociated with any other histopathological liver findings and 7 show abnormal liver pathology without fatty changes. Possible etiological factors are discussed. Author

A84-20294
APPLICATIONS OF GAS CHROMATOGRAPHIC HEAD SPACE ANALYSIS TO AVIATION ACCIDENT TOXICOLOGY

R. W. MAYES (RAF, Institute of Pathology and Tropical Medicine, Aylesbury, Bucks., England) (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Jan. 1984, p. 62-64. refs

The detection of volatile substances in post mortem material from aviation accidents by gas chromatography using a head-space sampling technique (HST) is discussed, and sample results are presented. In the HST, a small tissue sample is digested by enzymes in a closed vial to allow release of retained volatiles, and the gas phase is injected into the gas chromatograph for analysis. HST allows the identification in lung tissue of substances inhaled by the victim. For example, CO excess is found in samples from two persons known to have died of CO poisoning and from an aircraft crewman killed in an accident, but not in two control samples, permitting the inference that CO inhalation may have been a cause of the accident. The use of HST to identify other substances which may be present in an aircraft-cockpit atmosphere is considered. It is shown that the HST is inadequate for detecting alcohol in blood samples if aircraft-fuel contamination is present;

in such cases, extraction and direct injection give good results.

T.K.

A84-20878

NEUTRAL GLYCOLIPIDS IN THE BLOOD OF NORMAL INDIVIDUALS AND INDIVIDUALS SUFFERING FROM HYPERTENSION [NEITRAL'NYE GLIKOLIPIDY KROVI V NORME I PRI GIPERTONICHESKOI BOLEZNI]

O. P. SOTSKII, G. M. SARKISOVA, V. G. PAKHLEVANIAN, V. M. ARUTIUNIAN, and G. A. EGANIAN (Erevanskii Meditsinskii Institut, Yerevan, Armenian SSR) Voprosy Meditsinskoi Khimii (ISSN 0042-8809), vol. 29, July-Aug. 1983, p. 44-47. In Russian. refs

The overall quantity of hexosylceramides in the blood of individuals suffering from hypertension is investigated, with an assessment also made of the composition of the blood. It is found that individuals with hypertension have higher levels of hexosylceramides than do normal individuals. In view of the greater increase of hexosylceramides in the plasma than in the erythrocyte mass and the intense interchange between the monoand dihexosylceramides of the plasma and erythrocytes, it is thought possible that the increase in the monohexosylceramides of the erythrocytes derives from the monohexosylceramides of the plasma. C.R.

A84-20884

THE DOSE-EFFECT RELATIONSHIP IN EXPOSURE TO NOISE [SOOTNOSHENIE DOZA-EFFEKTA PRI VOZDEISTVII SHUMA]

Z. Z. BRUSKIN (Omskii Meditsinskii Institut, Omsk, USSR) Gigiena Truda i Professional'nye Zabolevaniia, July 1983, p. 15-17. In Russian. refs

The objective of the study was to obtain a regression equation for predicting the cumulative effect due to exposure to noise. The study involved a statistical analysis of data in the literature on the frequency of hearing loss and neurovascular disorders due to exposure to noise of varying intensity and length. It is shown that a loudness-related parameter reflecting the subjective perception of sound by man, in addition to the physical parameters of sound, provides an adequate description of the dose-effect relationship. The regression equation based on this parameter accurately predicts both the frequency of hearing loss and neurovascular disorders caused by prolonged exposure to noise. V.L.

A84-20886

CLINICAL PROBLEMS OF MEDICAL SERVICES FOR AUTOMOBILE DRIVERS IN AUTOMOBILE TRANSPORT [KLINICHESKIE PROBLEMY AVTODOROZHNOI MEDITSINY]

A. A. PENKNOVICH (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Gorki, USSR) Gigiena Truda i Professional'nye Zabolevaniia, July 1983, p. 30-33. In Russian. refs

The objectives of medical services for automobile drivers are formulated. The need for the further improvement of examination methods for drivers is stressed, including medical examinations before trips, in-patient and out-patient treatment, and investigations of the diseases of drivers. The importance of the organizational and methodological improvement of medical services for automobile transport is emphasized. B.J.

A84-20887

BASIC TASKS IN THE PREVENTION OF OCCUPATIONAL DISEASES DUE TO THE OVERSTRAIN OF THE SENSORIMOTOR SYSTEM DURING PHYSICAL WORK [OSNOVNYE ZADACHI PROFILAKTIKI PROFESSIONAL'NYKH ZABOLEVANIÍ OT PERENAPRIAZHENIIA SENSOMOTORNOI SISTEMY PRI FIZICHESKOI RABOTE]

L. E. MILKOV (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Gigiena Truda i Professional'nye Zabolevaniia, July 1983, p. 33-36. In Russian.

A84-20898

PROSPECTS FOR THE USE OF COMPUTER-CONTROLLED TOMOGRAPHY IN OTOLARYNGOLOGY [PERSPEKTIVY ISPOL'ZOVANIIA KOMP'UTERNOI TOMOGRAFII V OTOLARINGOLOGII]

I. A. KURILIN, V. A. ROGOZHIN, and A. S. SUDOMA (Kievskii Meditsinskii Institut; Ministerstvo Zdravookhraneniia Ukrainiskoi SSR, Kiev, Ukrainian SSR) Zhurnal Ushnykh Nosovykh i Gorlovykh Boleznei (ISSN 0044-4650), July-Aug. 1983, p. 6-10. In Russian. refs

A84-20899

INDICES OF THE TEMPORAL CHARACTERISTICS OF THE ACOUSTIC REFLEX IN WORKERS WITH NORMAL AND IMPAIRED HEARING EXPOSED TO HIGH LEVELS OF NOISE [POKAZATELI VREMENNYKH KHARAKTERISTIK AKUSTICHESKOGO VREMENNOY RABOCHIKH 'SHUMOVYKH' PROFESSII S NORMAL'NOI I NARUSHENNOI SLUKHOVOI FUNKTSIEI]

T. V. SHIDLOVSKAIA, A. I. BAKSHEEV, and O. A. STEPANENKO (Kievskii Nauchno-Issledovatel'skii Institut Otolaringologii, Kiev, Ukrainian SSR) Zhurnal Ushnykh Nosovykh i Gorlovykh Boleznei (ISSN 0044-4650), July-Aug. 1983, p. 41-45. In Russian. refs

A84-20914

A COMPARISON OF THE PERFORMANCE OF WEIGHT LIFTERS OF VARIOUS CLASSES IN CLASSICAL AND AUXILIARY EXERCISES [ZAVISIMOST' DOSTIZHENII V KLASSICHESKIKH I VSPOMOGATEL'NYKH UPRAZHNENIIAKH TIAZHELOATLETOV RAZNYKH VESOVYKH KATEGORII]

V. G. OLESHKO (Kievskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Kiev, Ukrainian SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), July 1983, p. 8, 9. In Russian.

A84-20915

AN ATTEMPT TO CARRY OUT IMMUNOCORRECTION IN THE CASE OF SECONDARY IMMUNODEFICIT IN ATHLETES (PRELIMINARY REPORT) [OPYT PROVEDENIIA IMMUNOKORREKTSII PRI VTORICHNOM IMMUNODEFITSITE U SPORTSMENOV]

I. D. SURKINA, I. V. BORODIN, L. N. OVCHARENKO, G. S. ORLOVA, and E. P. SHUMAI (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), July 1983, p. 18-20. In Russian. refs

An experiment was performed to study the effectiveness of levamisol in increasing immunological reactivity during athletic activity. Previous studies have shown that the proliferation capacity of T-lymphocytes is reduced during strenuous physical exercise. In the present study it is shown that the activity of the membrane receptor apparatus of these cells is also inhibited. This can lead to changes in a number of important immunogenesis processes and thus can produce disorders in the immunological reactivity of the body. The effect of levamisol on the T-system of athletes during athletic activity is shown to be analogous to that arising in pathological states accompanying disorders of this immune system. B.J.

A84-20916

CHARACTERISTICS OF THE EKG AND MECHANICAL ACTIVITY OF THE HEART FOR TALL ATHLETES [OSOBENNOSTI EKG I MEKHANICHESKOI AKTIVNOSTI SERDTSIA VYSOKOROSLYKH SPORTSMENOV]

Z. B. BELOTSERKOVSKII, V. G. LIUBINA, I. I. KARTYSHEVA, and T. I. KORNIENKO (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), July 1983, p. 21-23. In Russian. refs

A84-20917

INDUSTRIAL GYMNASICS IN CONDITIONS OF A HOT CLIMATE [PROIZVODSTVENNAIA GIMNASTIKA V USLOVIAKH ZHARKOGO KLIMATA]

G. N. SADIKOV, B. IA. NOSENKO, and A. M. VOLKOV (Akademiia Nauk Turkmenskoi SSR, Institut Fiziologii i Eksperimental'noi Patologii Aridnoi Zony; Turkmenskii Sovet Professional'nykh Soiuzov, Turkmen SSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), July 1983, p. 29-31. In Russian. refs

A84-21013

EFFECTS OF +GZ ACCELERATIONS OF LONG DURATION ON THE CIRCULATORY PRESSURE DISTRIBUTION [EFFETS DES ACCELERATIONS +GZ DE LONGUE DUREE SUR LA REPARTITION DES PRESSIONS DANS LA CIRCULATION]

P. BORREDON (Service de Santes des Armees, Centre d'Etudes et de Recherches de Medecine Aeronautique, Paris, France) Medecine Aeronautique et Spatiale, vol. 22, 3rd Quarter, 1983, 206-210, In French. refs

The cardiovascular effects of exposure to vertical accelerations of 6 G or more for periods in excess of 15 sec are characterized in general terms. Exposure of this severity is encountered with advanced combat aircraft such as the F-16 and Mirage 2000 and is addressed by NATO Standardization Agreement 3826. It has been shown that the heart and arterial-pressure system are especially affected; an attempt is made to explain this finding, reviewing evidence of pressure differentials among the body regions. The physical equation of Bernoulli is applied to a simplified circulation model, and it is noted that arterial and venous pressures in the head, thorax, and lower limbs vary in supine, standing, and standing-immersion positions. According to the model, sustained +Gz acceleration will produce a drop in pressure in the region between the base of the heart and the base of the skull which can elicit a powerful inotropic reaction of the myocardium followed by a general sympathetic response. Repeated exposure can then lead to permanent or semipermanent changes in the cardiovascular system. T.K.

A84-21014

RHYTHM ANOMALIES OBSERVED IN THE COURSE OF 24-HOUR EKG'S IN HEALTHY YOUNG MALES - REPORT OF 100 CASES [ANOMALIES RYTHMIQUES OBSERVEES AU COURS DE L'E.C.G. DE 24 HEURES CHEZ L'HOMME ADULTE JEUNE SAIN - A PROPOS DE 100 CAS]

A. SEIGNEURIC, C. GRAS, and G. LEGUAY (Hopital d'Instruction des Armees Larrey, Versailles, France) Medecine Aeronautique et Spatiale, vol. 22, 3rd Quarter, 1983, p. 211-214. In French.

Continuous 24-h EKG's were obtained from 100 healthy male volunteers aged 18-40 (mean 27) and analyzed for anomalies of conduction or excitation. The subjects were screened for any history or symptoms of cardiac dysfunction. The results are presented in tables and compared to those of Brodsky et al. (1977) and Djiane et al. (1979). The excitability anomalies are found to be frequent but always benign, while the observed episodes of sinus bradycardia and auriculoventricular block are attributed to vagus effects. The quantitative results are considered useful in developing screening criteria for aircraft crew. T.K.

A84-21015

ISOLATED MESOTELESYSTOLIC CLICK AND THE FITNESS OF FLIGHT PERSONNEL [CLIC MESOTELESYSTOLIQUE ISOLEET APTITUDE DU PERSONNEL NAVIGANT (PN)]

H. ILLE, A. DIDIER, J. BRUNOT, J. MARTIN, J. BERNARD, and P. BLANC (Centre Principal d'Expertises Medicales du Personnel Navigant, Paris, France) Medecine Aeronautique et Spatiale, vol. 22, 3rd Quarter, 1983, p. 214-217. In French.

The results of a follow-up study of 84 flight personnel in whom isolated mesotelesystolic clicks (IMC) were detected on routine auscultation are presented. The 70 male and 14 female subjects were followed for an average of 4.4 years, and 1D and 2D echocardiography was performed in 51 cases, revealing mitral-valve prolapse in 35 cases and no defect in the other 16 cases. No sudden flight incapacity occurred during the follow-up period, but

mitral-insufficiency murmurs developed in 7 cases. It is recommended that initial flight-personnel examinations include a phonocardiogram with a methoxamine test, with echocardiogram required if an IMC is found. Isolated MVP should disqualify candidates from piloting high-performance aircraft but can be allowed for less demanding flight activity. T.K.

A84-21022
PHYSIOLOGICAL RESPONSE IN MIRAGE AIRCRAFT PILOTS
[REPOSE PHYSIOLOGIQUE DE PILOTES D'AVIONS
MIRAGE]

J. A. MERCURI, R. D. R. MARCHESCHI, and H. C. FERNANDEZ (Institut National de Medecine Aeronautique et Spatiale, Buenos Aires, Argentina) *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 256-259. In French. refs

Plasma prolactin and cortisol, blood glucose, and urinary noradrenaline and adrenaline were measured in 40 Mirage pilots immediately before and after an 80-min standard acrobatic test mission, and 24-26-h EKGs were obtained. The results are presented graphically and discussed. The pilots generally, adapted well to the flight stresses, and good agreement is found with the results of earlier studies. No changes in EKG morphology are observed, and the increase in prolactin is shown to be significantly correlated to the increase in heart rate during the acrobatic portion of the flight. T.K.

A84-21026
HEMODYNAMIC AND HUMORAL EFFECTS OF
PROSTAGLANDIN INHIBITION IN EXERCISING HUMANS

J. STAESSEN, A. CATTART, R. FAGARD, P. LIJNEN, E. MOERMAN, A. DE SCHAEPEYVER, and A. AMERY (Leuven, Katholieke Universiteit, Louvain; Gent, Rijksuniversiteit, Ghent, Belgium) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 39-45. Research supported by the Nationaal Fonds voor Wetenschappelijke Onderzoek. refs

A84-21027
PLASMA OSMOLALITY, VOLUME, AND RENIN ACTIVITY AT
THE 'ANAEROBIC THRESHOLD'

G. W. GLEIM, P. M. ZABETAKIS, E. E. DEPASQUALE, M. F. MICHELIS, and J. A. NICHOLAS (Lenox Hill Hospital, New York; New York Medical College, Valhalla, NY) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 57-63. Research supported by the Frances Spingold Foundation, Inc. refs

The present investigation is concerned with the response of renin during progressive dynamic exercise and isokinetic exercise. It was one of the objectives of the investigation to define the relationship of lactate, plasma volume, and plasma osmolality to renin release during dynamic and isokinetic exercise. A second aim was the definition of the interrelationship of these changes with the cardiovascular events occurring at the 'anaerobic threshold' (AT) considered by Wasserman et al. (1973). The results obtained in the investigation indicate that the AT represents a pivotal point during exercise associated with an abrupt increase in plasma renin activity and with further increases in plasma osmolality. G.R.

A84-21028
HYDRATION AND VASCULAR FLUID SHIFTS DURING
EXERCISE IN THE HEAT

M. N. SAWKA, R. P. FRANCESCONI, N. A. PIMENTAL, and K. B. PANDOLF (U.S. Army, Research Institute of Environmental Medicine, Natick, MA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 91-96. refs

The present study has the primary objective to determine the effects of hydration level on vascular fluid shifts during exercise in the heat. The effect of gender on these fluid shifts was also investigated. The subjects employed in the tests included six male and six female volunteers. It was found that hemoconcentration occurs when subjects are hypohydrated and are performing light

intensity exercise in the heat. A decrease in total plasma protein was observed under these test conditions. Gender does not alter vascular fluid shifts during exercise in the heat when subjects are matched with respect to fitness level. It is concluded that hydration level alters vascular fluid shifts during exercise in a hot environment. G.R.

A84-21029
TISSUE PRESSURE AND PLASMA ONCOTIC PRESSURE
DURING EXERCISE

Y. MOHSENIN (John B. Pierce Foundation Laboratory, New Haven, CT) and R. R. GONZALEZ (Yale University, New Haven, CT) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 102-108. refs

(Contract NIH-HL-17407; PHS-OH-00836)

The present investigation is concerned with a measurement of the forces which oppose plasma volume loss during intense exercise of short duration. Six healthy males were used as subjects in the experiments. Factors causing fluid filtration during exercise are discussed, taking into account capillary hydrostatic pressure, capillary permeability, and tissue osmolality. Factors opposing fluid filtration during exercise are also examined, giving attention to interstitial fluid pressure, and plasma colloid osmotic pressure. It was found that during maximal exercise fluid flux from the intravascular space is prevented by elevation of transvascular colloid osmotic pressure and increased interstitial fluid pressure. The magnitude of these forces can match the elevation of capillary hydrostatic pressure during exercise. G.R.

A84-21030
RED CELL FUNCTION AT EXTREME ALTITUDE ON MOUNT
EVEREST

R. M. WINSLOW (U.S. Public Health Service, Div. of Host Factors, Atlanta, GA), M. SAMAJA (CNR, Centro de Fisiologia del Lavoro Muscolare, Milan, Italy), and J. B. WEST (California, University, La Jolla, CA) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 109-116. refs

It is pointed out that the erythropoietic system can participate in adaptation to high altitude in at least two ways, including increased red cell number, and shifts in the position of the hemoglobin-O₂ equilibrium curve (OEC). A unique opportunity to study the red cell response and OEC at extreme altitude in 20 climbers and scientists was provided by the American Medical Research Expedition to Everest (AMREE). All AMREE members were males with ages in the range from 26 to 52 years. Attention is given to hematologic measurements, blood gases and acid-base status, tonometry flasks, hemoglobin saturation, and mean corpuscular hemoglobin concentration. The obtained results suggest that, at extreme altitude, the blood O₂ equilibrium curve shifts progressively leftward because of respiratory alkalosis. This left shift protects arterial O₂ saturation at extreme altitude. G.R.

A84-21031*
PHYSICAL FITNESS AND CARDIOVASCULAR RESPONSE TO
LOWER BODY NEGATIVE PRESSURE

P. B. RAVEN, D. ROHM-YOUNG, and C. G. BLOMQUIST (Texas College of Osteopathic Medicine, Fort Worth; Southwestern Medical School, Dallas, TX) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 138-144. Research supported by the Harry S. Moss Foundation. refs

(Contract NIH-AG-01450; NSG-9026)

Klein et al. (1977) have questioned the concept of endurance training as an appropriate means of preparing for prolonged space flights. Their opinion was mainly based on reports of endurance athletes who had a decreased tolerance to orthostatic or gravitational stress induced by lower body negative pressure (LBNP), upright tilt, or whole body water immersion. The present investigation had the objective to determine if the hemodynamic response to LBNP is different between a high and average fit group of subjects. In addition, the discrete aspect of cardiovascular

function which had been altered by chronic training was to be identified. On the basis of the results of experiments conducted with 14 young male volunteers, it is concluded that the reflex response to central hypovolemia is altered by endurance exercise training. G.R.

A84-21032**ALTERATIONS IN BLOOD VOLUME FOLLOWING SHORT-TERM SUPRAMAXIMAL EXERCISE**

H. J. GREEN, J. A. THOMSON, M. E. BALL, R. L. HUGHSON, M. E. HOUSTON, and M. T. SHARRATT (Waterloo, University, Waterloo, Ontario, Canada) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 145-149. Research supported by the Natural Sciences and Engineering Research Council. refs

A84-21035**TEMPERATURE EFFECT ON THE HUMAN DIVE RESPONSE IN RELATION TO COLD WATER NEAR-DROWNING**

J. S. HAYWARD, C. HAY, B. R. MATTHEWS, C. H. OVERWEEL, and D. D. RADFORD (Victoria, University, Victoria, British Columbia, Canada) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 202-206. Research supported by the Natural Sciences and Engineering Research Council of Canada. refs

The present study has the objective to examine the effect of water temperature on breath-hold duration of totally submerged humans and to relate the results of the examination to the intensity of their diving bradycardia under the same circumstances. Maximum breath-hold duration (BHD) and diving bradycardia were measured in 160 humans who were submerged in water at temperatures in the range from 0 to 35 C. The results of the study do not confirm an important role for the dive response in the increased resuscitability of persons show have nearly drowned in cold water. G.R.

A84-21036**VARIABLE INHIBITION BY FALLING CO₂ OF HYPOXIC VENTILATORY RESPONSE IN HUMANS**

L. G. MOORE, R. E. MCCULLOUGH, J. B. SAMPSON, J. T. MAHER, J. V. WEIL, R. F. GROVER, J. K. ALEXANDER, J. T. REEVES (Colorado, University, Denver, CO; U.S. Army, Research Institute of Environmental Medicine, Natick, MA; Baylor College of Medicine, Houston, TX), and S. Y. HUANG *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 1207-210. refs (Contract NIH-HL-14985; DAMD-81-C-1057)

In the usual procedure for the measurement of the acute ventilatory response to hypoxia, end-tidal CO₂ tension is held constant (isocapnia) by adding CO₂ to the inspired air. However, it is pointed out, isocapnia is not present during acute exposure to high altitude where hypoxia coexists with changing end-tidal CO₂ tension. The present investigation is concerned with a measurement of the ventilatory response to progressive hypoxia in a manner analogous to high altitude. Because the end-tidal CO₂ tension varies during the test, the use of the term 'poikilocapnia' (from the Greek work poikilos, meaning varied) is proposed. In tests, involving 14 healthy persons as subjects, it was found that the poikilocapnic hypoxic ventilatory response was determined by two factors, including sensitivity to isocapnic hypoxia acting to increase ventilation and sensitivity to CO₂ acting to decrease the hypoxic ventilatory response. G.R.

A84-21037**ISOPOTIC DETERMINATION OF AMINO ACID-UREA INTERACTIONS IN EXERCISE IN HUMANS**

R. R. WOLFE, M. H. WOLFE, E. R. NADEL, and J. H. F. SHAW (Harvard University; Shriners Burns Institute, Boston, MA; Shriners Burns Institute, Galveston, TX; John B. Pierce Foundation Laboratory; Yale University, New Haven, CT) *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology* (ISSN 0161-7567), vol. 56, Jan. 1984, p. 221-229. refs (Contract NIH-GM-00455-05; NIH-GM-21700-08)

According to Zuntz (1900), the increased energy demands during exercise are not met even in part by the oxidation of essential amino acids. However, recent studies suggest that protein catabolism and amino acid oxidation may be accelerated in exercise. The results obtained in a study by Wolfe et al. (1982) led to certain difficulties. The present investigation was undertaken to resolve these difficulties. The results of the current investigation have confirmed earlier observations that decarboxylation of leucine is increased in light exercise but urea production is not. It is felt to be likely that the urea production rate accurately reflects the rate of net protein catabolism. G.R.

A84-21675**AGING PROBLEMS AND THEIR IMPACT ON PILOT PERFORMANCE**

A. W. GUBSER (Swiss Air Force, Institute of Aviation Medicine, Duebendorf, Switzerland) *Cockpit*, vol. 18, Oct.-Dec. 1983, p. 4-8.

The aging effects on physiological systems important to aircraft pilots, except vision, may be alleviated by regular physical exercise and by avoiding cigarette smoking and obesity. Cerebral circulation is of maximum importance to compensate for age-induced decreased cerebral performance. Older pilots do not perform as well as younger pilots on new and more complex tasks, though due to experience older pilots perform as well as or even better on accustomed tasks. Physical exercise has the following benefits: reduction of arteriosclerosis affecting the brain; improved general vision; and maintenance of the musculoskeletal system which otherwise thickens, calcifies and becomes porotic. In particular the outer eye muscles responsible for fine eye movement may be affected, causing reduced vision. However, in conclusion it must be remembered that aging is an individual process. C.M.

A84-21735**STANDARDIZATION OF UNITS AND SYMBOLS - REVISED**

W. C. KAUFMAN, F. W. BAUMGARDNER, K. K. GILLINGHAM, S. A. NUNNELEY, J. C. PITTMAN, JR., and F. STOFFEL *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Feb. 1984, p. 93-100. refs

Standardized measurement units, symbols, and subscripts for use in publications on aerospace medicine are presented in tables, extending and revising the list of Kaufman (1973). The tables cover principal physical quantities; physical and physiological subscripts; pressure, altitude, and exercise; gas-phase and blood-phase respiration; thermal parameters; and statistics. Conversion tables using the absolute joule, the mean calorie, and the mean BTU are included for the most commonly used pressure, energy, work, heat-exchange, and general physical units. T.K.

A84-21736**ADAPTATION TO IRREGULARITY OF REST AND ACTIVITY**

A. N. NICHOLSON, B. M. STONE, R. G. BORLAND, and M. B. SPENCER (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Feb. 1984, p. 102-112. refs

The adaptation to a 9-d schedule of irregular rest and activity was studied. Sleep was recorded; patterns of oral temperature, urinary excretion, and performance at a series of tasks were measured. The relationships between circadian rhythmicity, length of time on task, and cumulative sleep loss were examined.

Author

A84-21737* Louisiana State Univ., Shreveport.
SIDE EFFECTS OF ANTIMOTION SICKNESS DRUGS
 C. D. WOOD, J. E. MANNO, B. R. MANNO, H. M. REDETZKI, M. D. WOOD, and W. A. VEKOVIUS (Louisiana State University,, Shreveport, LA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 113-116. refs (Contract NAS9-16801)

The effects on operational proficiency of the antimotion sickness drugs scopolamine, promethazine and d-amphetamine are tested using a computerized pursuit meter. Proficiency is not significantly affected by oral doses of 0.25 mg or 0.50 mg scopolamine but is decreased by oral or I.M. doses of 25 mg promethazine. The performance decrement associated with 25 mg oral promethazine is prevented when combined with 10 mg oral d-amphetamine. The combination of 25 mg I.M. promethazine, 25 mg oral promethazine and 10 mg d-amphetamine produces less performance decrement than oral or I.M. doses of promethazine alone, though more performance decrement than a placebo. I.M. promethazine is adsorbed slowly and consequently may provoke drowsiness. C.M.

A84-21738
HELICOPTER PILOT BACK PAIN - A PRELIMINARY STUDY

D. F. SHANAHAN and T. E. READING (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, AL) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 117-121. refs

Because of the high prevalence of back pain experienced by U.S. Army helicopter pilots, a study was conducted to ascertain the feasibility of reproducing these symptoms in the laboratory. A mock-up of a UH-1H seat and control configuration was mounted to a multiaxis vibration simulator (MAVS). Eleven subjects were tested on the apparatus for two 120-min periods. During one period, the MAVS was programmed to reproduce vibrations recorded from a UH-1H in cruise flight. The subjects received no vibration during the other test period. All subjects reported back pain, which they described as identical to the pain they experience during flight, during one or more of their test periods. There was no statistical difference between the vibration and nonvibration test conditions (greater than 0.05) in terms of time of onset of pain or intensity of pain as measured by a visual analog scale. It appears the vibration at the frequencies and amplitudes tested plays little or no role in the etiology of the back symptoms reported by these pilots. It is proposed that the primary etiological factor for these symptoms is the poor posture pilots are obliged to assume for extended periods while operating helicopters. Author

A84-21740
PLASMA SUBSTRATE RESPONSE IN MEN AND WOMEN DURING MARATHON RUNNING

G. H. HARTUNG (Baylor University, Houston, TX), L. G. MYHRE, S. A. NUNNELEY, and D. M. TUCKER (USAF, School of Aerospace Medicine, Brooks AFB, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 128-131. refs

Venous blood samples from three male and four female subjects were taken in conjunction with a 26.2-mi marathon race prior to the start (control), at 17 mi, and immediately after the finish. Plasma concentrations of glucose and free fatty acids (FFA) were determined, and the ratio of unsaturated to saturated FFA (U/S FFA) was calculated. Compared to the control value, glucose was unchanged at the finish despite a slight increase at 17 mi (not significant). FAA increased significantly (p less than 0.05) from control to finish and from 17 mi to finish in both groups. The U/S FFA ratio also increased progressively from control to finish. No significant differences were found between male and female groups for any of the measured values. It is concluded that blood glucose is maintained at normal levels during prolonged heavy exercise in trained women as in men, and that FFA availability increases with time during strenuous exercise in both sexes. Author

A84-21743
FLYING PERSONNEL AND OCCLUSAL/MANDIBULAR DYSFUNCTION

B. B. JACOBUS (USAF, Hospital Laughlin, Laughlin AFB, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 141, 142. refs

To determine if aircrew members are prone to stress-induced occlusal/mandibular dysfunction, a total of 775 student pilots, instructor pilots and nonflying personnel were screened by questionnaire. Results show that both instructor pilot and general air force base population groups have more occlusal/mandibular dysfunction than student pilots. Due to physical requirements, student pilots are considered to be in better physical and mental condition than the general base population, accounting for the latter's susceptibility. Instructor pilots, though at first in excellent condition, experience a decreased ability to resist stress explained by age and the cumulative effects of long-term stress. Physicians are urged to be aware of the various symptoms when treating flying personnel. C.M.

A84-21744
OTHEMATOMA ASSOCIATED WITH ILL-FITTING HELMET AND HIGH G LOAD - A CASE REPORT

J. C. F. M. AGHINA (Royal Netherlands Air Force, Medical Services,, Volkel AFB, Netherlands) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 143, 144. refs

A84-21745
A REVIEW OF VISION PHYSIOLOGY

D. A. TIPTON (Wright State University, Dayton, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Feb. 1984, p. 145-149. refs

Visual acuity, night vision, dark adaptation and acceleration effects on vision are reviewed for the purpose of understanding vision in the field of aviation medicine. Visual acuity is discussed in relation to rod and cone distribution in which the upper limit of rod vision alone is 20/200, a 20 percent efficiency level. Other factors affecting visual acuity are the secondary neuronal cell layer in the retina; healthy, diseased or injured eye optics; and environmental or physical factors. The varying distributions of rods and cones, which define photopic, mesopic and scotopic vision, as well as their subsequent effects on night vision and dark adaptation are discussed. During scotopic vision (pure rod function) scanning techniques are recommended to offset the fading out of a dim light fixed on the retina. Review of acceleration effects includes G-tolerance levels, +Gz and grey-outs or blackouts, -Gz and 'red outs', transverse acceleration and corneal tearing, and the Gy environment. C.M.

A84-22449
WORK STRESS [NAPRIAZHENNOST' TRUDA]

K. M. SMIRNOV (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Okhrany Truda, Leningrad, USSR) Uspekhi Fiziologicheskikh Nauk (ISSN 0301-1798), vol. 15, Jan.-Mar. 1984, p. 76-99. In Russian. refs

A number of terms and concepts of the physiology of work are defined, including stress, strain, and load. Consideration is then given to the characteristics of strain for various types of work, criteria for evaluating work stress, and the creation of standards with respect to work loads. B.J.

A84-22568
MEDICAL EVALUATION AND THORACIC RADIOPHOTOGRAPHY IN FLIGHT PERSONNEL DURING 1983 [EXPERTISE MEDICALE DU PERSONNEL NAVIGANT ET RADIOGRAPHIE THORACIQUE EN 1983]

A. DIDIER, M. PUECH, H. ILLE, J. P. BURLATON, J. MARTIN, and P. J. METGES (Centre Principal d'Expertise Medicale du Personnel Navigant, Paris, France) Medecine Aeronautique et Spatiale, vol. 22, 3rd Quarter, 1983, p. 318-322. In French. refs

The Centre Principal d'Expertise Medicale du Personnel Navigant recommends continued use of thoracic radiophotography

in physical examinations based on its study of 16,500 asymptomatic flight personnel. Thoracic radiographs were taken of a flight population between the ages of 18 and 65, of which more than 80 percent was male. The 33 pathological cases discovered included five cases of pulmonary tuberculosis, seven cases of thoracic sarcoidosis, and two lung cancers. For several years the incidence of tuberculosis has stabilized, while other thoracic pathology rates have increased regularly. Periodic radiophotography is especially beneficial in a highly motivated population that actively minimizes symptoms. The reliability of the test is disputed, however, since 1 of 33 negative results is false. The test costs are shown to be negligible and it is noted that cumulative radiation doses must be taken into consideration. C.M.

A84-22569**HEMORRHOID SYMPTOMATOLOGY AND FIGHTER PILOTS [SYMPTOMATOLOGIE HEMORROIDAIRE ET PILOTES DE CHASSE]**

R. C. PERRAUD, C. MAROTEL, G. LE BELLEC, and R. PISSARD *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 328-332. In French. refs

The relationship between the fighter-aircraft environment and mission and the development of hemorrhoids (H) is analyzed, and the results of a survey of pilots are presented. The physiopathology of H is reviewed; the circulatory effects of +Gz acceleration, breathing under pressurization, and anti-G suits are considered; and the typical Mirage-2000 or F-16 mission and pilots' lifestyle are examined. A group of 70 pilots and a control group of 70 males of similar age distribution were surveyed by questionnaire, and an increased incidence of H in the pilot group is found to be nonsignificant at a 5-percent level. The role of the physician in diagnosing and treating pilot H is made more difficult both by the pilots' general unwillingness to discuss the symptoms and by their fear of being disqualified (as suggested by the French military health rules). It is recommended that physicians use a degree of discretion in reporting mild H cases officially, while urging the affected pilots to make appropriate changes in diet and exercise. T.K.

A84-22866*#**PHYSIOLOGIC AND BIOCHEMICAL ASPECTS OF SKELETAL MUSCLE DENERVATION AND REINNERVATION**

S. R. MAX and R. F. MAYER IN: *Peripheral Neuropathy*. Volume 1. Philadelphia, PA, W. B. Saunders Co., 1984, p. 400-419. refs (Contract NIH-NS-15760; NIH-NS-15766; NAG2-100)

Some of the physiologic and biochemical changes that occur in mammalian skeletal muscle following denervation and reinnervation are considered and some comparisons are made with changes observed following altered motor function. The nature of the trophic influence by which nerves control muscle properties are discussed, including the effects of choline acetyltransferase and acetylcholinesterase and the role of the acetylcholine receptor. C.D.

A84-22932**THE USE OF PORTABLE BIOENGINEERING FEEDBACK DEVICES IN A SYSTEM OF ACTIVE RESTORATIVE THERAPY FOR PATIENTS WITH POSTSTROKE MOTOR DISTURBANCES [PRIMENENIE PORTATIVNYKH BIOTEKHNICHESKIKH USTROISTV S OBRATNOI SVIAZ'IU V SISTEME AKTIVNOI VOSTANOVITEL'NOI TERAPII U BOL'NYKH S POSTINSUL'TNYMI DVIGATEL'NYMI NARUSHENIAMI]**

T. D. DEMIDENKO, R. I. LVOVA, I. U. S. ININ, N. M. IAKOVLEV, and O. V. BOGDANOV (*Leningradskii Nauchno-Issledovatel'skii Psikhonevrologicheskii Institut; Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR*) *Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova* (ISSN 0044-4588), vol. 83, no. 8, 1983, p. 1121-1126. In Russian. refs

A84-22933**CLINICAL-PHYSIOLOGICAL ANALYSIS OF SLEEP DISORDERS IN PATIENTS WITH NEUROTIC STATES [KLINIKO-FIZIOLOGICHESKII ANALIZ NARUSHENII SNA U BOL'NYKH S POGRANICHNYMI SOSTOIANIAMI]**

V. S. ROTENBERG and M. G. TSETLIN (*I Moskovskii Meditsinskii Institut, Moscow, USSR*) *Zhurnal Nevropatologii i Psikhatrii im. S. S. Korsakova* (ISSN 0044-4588), vol. 83, no. 8, 1983, p. 1212-1218. In Russian. refs

A84-22936**COMPUTER TOMOGRAPHY IN THE DIAGNOSIS OF NEOPLASMS IN THE ACCESSORY NASAL SINUSES [KOMP'YUTERNAIA TOMOGRAFIIA V DIAGNOSTIKE NOVOBRAZOVANII PRIDATOCHNYKH PAZUKH NOSA]**

N. A. PREOBRAZHENSKII, I. KH. RABKIN, V. E. DOBROTIN, A. I. U. IUDIN, and N. P. ERMAKOV (*Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR*) *Vestnik Otorinolaringologii* (ISSN 0042-4668), July-Aug. 1983, p. 42-45. In Russian. refs

A84-22937**CURRENT ASPECTS OF THE DRUG THERAPY OF CHRONIC CARDIAC INSUFFICIENCY [SOVREMENNYE ASPEKTY FARMAKOTERAPII KHRONICHESKOI SERDECHNOI NEDOSTATOCHNOSTI]**

L. I. OLBINSKAIA *Kardiologiya* (ISSN 0022-9040), vol. 23, July 1983, p. 5-11. In Russian. refs

A84-22938**DIASTOLIC FILLING OF THE HEART VENTRICLES [DIASTOLICHESKOE ZAPOLNENIE ZHELUDOKHOV SERDTSA]**

V. I. ASTAFEV, N. P. KUZNETSOV, T. E. KURILSKAIA, and K. A. KURILSKII (*Akademiia Meditsinskikh Nauk SSSR, Irkutsk, USSR*) *Kardiologiya* (ISSN 0022-9040), vol. 23, July 1983, p. 82-86. In Russian. refs

Experiments performed on three groups of sick persons show that negative subatmospheric pressure developing in the heart ventricles during the rapid-filling phase is evidence of the active diastole and inflated capacity of the heart chambers. The diastolic activity of the heart is found to increase as a consequence of insufficient blood inflow to the ventricles combined with inadequate venous return or a narrowed atrioventricular orifice. It is assumed that the diastolic activity of the heart is an adaptive-compensatory mechanism, adequately stabilizing circulation under changing hemodynamic conditions. B.J.

N84-16770# Joint Publications Research Service, Arlington, Va. PRACTICAL APPLICATIONS OF ADVANCES IN AVIATION MEDICINE

P. V. VASILYEV and A. A. GYURDZHIAN *In its USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001)* p 1-10 17 Jan. 1984 refs Transl. into ENGLISH from *Kosmich. Biol. i Aviakosmicheskaya Med. (USSR)*, v. 17, no. 6, Nov. - Dec. 1983 p 4-10

Avail: NTIS HC A08

The inclusion of aviation as one of the medical disciplines in the Universal Decimal Classification is discussed. The development of aviation medicine as a discipline is reviewed. New directions in research are discussed. R.J.F.

N84-16771# Joint Publications Research Service, Arlington, Va. SHIELDING PART OF BONE MARROW AS A METHOD OF LOCAL PROTECTION AGAINST COSMIC RADIATION

Y. I. VOROBYEV, V. I. YEFIMOV, and V. S. SHASHKOVL *In its USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001)* p 11-23 17 Jan. 1984 refs Transl. into ENGLISH from *Kosmich. Biol. i Aviakosmicheskaya Med. (USSR)*, v. 17, no. 6, Nov. - Dec. 1983 p 10-17

Avail: NTIS HC A08

Existing data on bone marrow partial shielding in animal studies with reference to partial-body protection in space radiobiology and medicine are discussed. Analysis of the reported data indicates

the efficacy of the method to protect animals (including dogs) exposed to gamma-radiation and high-energy protons. Experimental findings that demonstrate the effectiveness of bone marrow partial shielding show that this method may be used for partial-body protection in space flight. R.J.F.

N84-16772# Joint Publications Research Service, Arlington, Va.
FLUID INTAKE AT HIGH ALTITUDES

Y. B. GIBBENREYTER, M. S. BELAKOSKIY, and S. V. CHIZHOV
In its USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 24-29 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 17-21
Avail: NTIS HC A08

Data on the water balance, factors responsible for water requirements and methods of maintaining optimum water balance in humans at high altitudes are given. To sum up the data on fluid metabolism, it can be stated that there is a substantial increase in fluid outlay by the body in a high-altitude environment. This must be compensated by adequately increased fluid intake to avoid development of a fluid deficiency and dehydration of the body, which has an adverse effect on well-being, morale and work capacity of mountaineers. The fluid balance should be maintained by means of both increased fluid intake and use of known methods of more conservative expenditure of fluid. A mountain climber must make the necessary effort and spend the necessary time to see that he has an adequate supply of water, to the extent this is possible, even if this means spending time scheduled for sleep, rest and work on the climb. During mountain expeditions, it is recommended to take 3 liters water per person in the form of beverages and food, and at least 4 liters per day when physically active at high altitudes. R.J.F.

N84-16773# Joint Publications Research Service, Arlington, Va.
MENTAL STATUS AND WORK CAPACITY OF SALYUT-6 STATION CREW MEMBERS

V. I. MYASNIKOV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 30-34 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 22-25
Avail: NTIS HC A08

The psychic status and work capacity of prime crewmembers of missions 1 and 5 onboard Salyut-6 were investigated, using objective (scope, time and quality of the work performed) and subjective (fatigue, mood variation, complaints) parameters. Based on these parameters, it was possible to identify several stages in the dynamics of the psychic status and work capacity: stage of acute adaptation, stage of complete compensation (2-3 or 4 months), stage of incomplete compensation (3 or 4-5 months), and stage of final breakaway (last month). These stages reflect the process of psychic and professional adaptation to space flight. The process of adaptation is strongly affected by the rational work-rest cycle, in which the sleep period coincides with that associated with Moscow time, and events of psychological support. The results show that crewmembers may well adapt and work in space flight for a long time. Author

N84-16774# Joint Publications Research Service, Arlington, Va.
CHANGES IN SOME RHEOLOGICAL PARAMETERS OF BLOOD IN EXPERIMENTS SIMULATING WEIGHTLESSNESS

A. P. IVANOV, I. B. GONCHAROV, A. F. DAVYDKIN, and V. I. LAVROV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 35-41 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 25-30
Avail: NTIS HC A08

Changes in blood rheological parameters of 21 male volunteers, aged 25-37 years, were studied. The test subjects were subdivided into three groups. Nine subjects of Group 1 were exposed to head-down tilting (-8 deg) for 14 days, six subjects of Group 2 were exposed to 7-day continuous immersion, and six subjects of Group 3 to intermittent immersion. During head-down tilting the apparent viscosity and hematocrit and then caisson viscosity

increased. By day 7 the coefficient of red blood cell aggregation decreased significantly. These changes persisted till the end of the tilt study. The above rheological parameters returned to normal three days after exposure. During continuous immersion the apparent viscosity showed the largest changes. Three days after the exposure the blood viscosity was much higher than before the study. During intermittent immersion rheological changes were induced by the first 36-hour exposure when shifts in blood viscosity and other parameters were most significant. R.J.F.

N84-16776# Joint Publications Research Service, Arlington, Va.
STUDY OF METABOLIC SEQUELAE OF USING POSITIVE INTRAPULMONARY PRESSURE DURING EXPOSURE TO ACCELERATIONS

J. DOMACZUK *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 48-51 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 33-36
Avail: NTIS HC A08

Metabolic in pilots exposed to linear acceleration with an onset of 0.1 G/sec were studied. The exposure to +Gz increased the content of lactate dehydrogenase and the concentration of lactate dehydrogenase and the concentration of potassium and phosphorus in plasma. Positive pressure breathing of 60 hPa during acceleration enhanced its tolerance by 2.2 G, producing no effect on metabolic changes. R.J.F.

N84-16777# Joint Publications Research Service, Arlington, Va.
EFFECT OF SYDNOCARB ON HEMODYNAMICS AND REDISTRIBUTION OF BLOOD DURING FUNCTIONAL TESTS FOLLOWING SIX-HOUR ANTIORTHOSTATIC HYPOKINESIA

Y. A. MODIN, S. V. ABROSIMOV, G. V. AMELKINA, O. D. ANASHKIN, V. V. ZHIDKOV, V. I. LOBACHIK, L. B. PARSHIN, and V. S. SHASHKOV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 52-57 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 36-39
Avail: NTIS HC A08

Man's orthostatic tolerance and physical work capacity declined in response to 6 hour head down tilt at -15 deg. During tilt tests heart rate increased, blood pressure fell, and blood pooling in the upper body decreased. During exercise tests, the circulating blood volume, total amount of the work performed, and consumed oxygen decreased. Sydnocarb given at a dose of 25 mg during head down tilt did not influence the circulating blood volume and oxygen consumption. All other parameters varied approaching the pretest values. R.J.F.

N84-16778# Joint Publications Research Service, Arlington, Va.
RESPIRATORY TRACT CLOSING VOLUME AND STRUCTURE OF TOTAL LUNG CAPACITY DURING SEVEN-DAY HYPOKINESIA IN HEAD-DOWN POSITION

E. M. NIKOLAYENKO, V. Y. KATKOV, S. V. GVOZDEV, V. V. CHESTUKHIN, M. I. VOLKOVA, and M. I. BERKOVSKAYA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 58-64 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 39-43
Avail: NTIS HC A08

By mass spectrography and pneumotachography, structural variations in total lung capacity (TLC) were investigated in 7 test subjects during 7 day head down tilt at -15 deg. By the 7th hour of head down tilt TLC, vital lung capacity (VLC), functional residual capacity (FRC) and residual volume (RV) decreased significantly and closing volume (CV) increased insignificantly. The CV/FRC ratio grew from 0.82 + or - 0.03 to 1.24 + or 0.08 (P 0.01), indicating the closure of respiratory pathways in certain lung structures within the tidal volume. These changes in the TLC structure persisted till day 7 but the CV/FRC ratio fell down to 1.01 + or - 0.07. The above findings can clarify the mechanism responsible for a lower oxygenation of arterial blood in the head down position. The expiratory closure of the airways within the tidal volume causes regional changes in alveolar ventilation and

52 AEROSPACE MEDICINE

ventilation perfusion relations and, consequently, a larger venous admixture and a smaller oxygen saturation of arterial blood.

R.J.F.

N84-16779# Joint Publications Research Service, Arlington, Va.
EVALUATION OF HUMAN BLOOD MORPHOLOGICAL COMPOSITION DURING EXERCISE IN SEALED CHAMBER WITH DIFFERENT CONCENTRATIONS OF AMMONIA

M. P. KALANDAROVA, V. P. SAVINA, and L. N. MUKHAMEDIYEVA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 65-68 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 43-45
Avail: NTIS HC A08

Test subjects were kept in an enclosure for 17-31 days. The ammonia concentration was maintained at 5.0 + or - 0.1 and 2.1 + or - 0.1 mg/cu m and elevated to 9.8 + or - 0.1 mg/cu m for a short period of time. Following each exercise test on a bicycle ergometer (at 50 and 75% V sub O2 max) performed during this exposure the count of formed elements (leukocytes, neutrophils, lymphocytes, monocytes and platelets) increased as compared to the pretest level. The changes of most formed elements were within physiological variations. The exception was leukocytes, neutrophils, particularly rod neutrophils, and monocytes whose content was higher than normal at certain stages. Author

N84-16780# Joint Publications Research Service, Arlington, Va.
METABOLIC DISTURBANCES IN MAN IN AN ENVIRONMENT WITH LOW AMMONIA LEVEL AND THEIR CORRECTION BY GRADED PHYSICAL EXERCISE

L. N. MUKHAMEDIYEVA, V. V. ZHURAVLEV, Y. I. NIKITIN, K. V. GRISHINA, S. M. IVANOVA, and S. K. SHISHKINA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 69-74 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 16, no. 6, Nov. - Dec. 1983 p 46-49
Avail: NTIS HC A08

In two series of prolonged studies metabolic changes of men kept in an environment with an ammonia concentration of 2 and 5 mg/cu m were investigated. In this chronic study the following changes were seen: acetone in the exhaled air increased; glycolysis and lactate dehydrogenase enhanced; catalase decreased; changes of acid base equilibrium manifested as metabolic acidosis of varying degree. The use of exercises of different workloads showed that those at 50% V sub O2 max were the most beneficial. Author

N84-16781# Joint Publications Research Service, Arlington, Va.
METABOLISM AND NUTRITIONAL STATUS IN EMERGENCY SITUATIONS WITHOUT FOOD SUPPLY OR ON A LOW-CALORIE DIET

I. G. POPOV, P. A. LOZINSKIY, A. A. LATSKEVICH, and I. A. ROMANOVA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 75-87 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 49-60
Avail: NTIS HC A08

The comparative study of the metabolism and nutritional status of test subjects who 3-5 days were in a contingency situation with no or low calorie (300 g chocolate) food available demonstrated the advantage of even this inadequate diet as compared to no food. Author

N84-16787# Joint Publications Research Service, Arlington, Va.
DETECTION OF LATENT ATHEROSCLEROTIC STENOSING LESIONS TO GREAT VESSELS OF THE HEAD IN FLIGHT PERSONNEL

B. K. SEMENOV, L. V. AGAPOVA, L. A. ZHEVLAKOVA, and B. I. PARMENOV-TRIFILOV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 113-117 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 75-77
Avail: NTIS HC A08

In order to detect stenotic lesions of cerebral large vessels, 207 subjects, primarily pilots, were examined by ultrasonic Dopplerography. The first group with cerebral atherosclerosis at stage I included 90 pilots; 20 of them (22%) showed signs of stenotic lesions of the carotid and spinal arteries. The second group with cerebral atherosclerosis at stage II-III included 117 subjects; 14 of them exhibited anterior carotid artery occlusion and 49 stenosis of one or several large vessels. Using clinical data, it was concluded that latent stenosis of cerebral large vessels are frequent in crewmembers even at early stages of cerebral atherosclerosis and, therefore, may be risky for flight safety. Ultrasonic dopplerography, being a fairly simply and accurate technique to detect stenotic vessels, is recommended for large-scale examination of the flying personnel with cerebral atherosclerosis. Author

N84-16788# Joint Publications Research Service, Arlington, Va.
BIOECHOLOCATION METHOD FOR INVESTIGATION OF PARAMETERS OF INTRACRANIAL CIRCULATION OF BLOOD AND FLUID IN MAN

L. G. SIMONOV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 118-124 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 77-81
Avail: NTIS HC A08

Spaceflights are associated with changes in hydrostatic pressure, with drop to zero in weightlessness, which causes redistribution of body fluids and elevation of venous pressure in the upper part of the human body. The observed blood pressure elevation in the jugular vein, by a mean of 6 mm Hg, leads to increased pressure in the cranial cavity which, in turn, has an adverse effect on intracranial circulation. For this reason it is necessary to work out methodological approaches to noninvasive evaluation of parameters of intracranial blood and fluid circulation in man under conditions simulating the effects of weightlessness on man, or during actual spaceflights. There are ground to expect that data can be obtained about changes in pressure in the cranial cavity by means of analysis of amplitude and phase characteristics of signals from intracranial structures using ultrasonic bioecho location of the brain. This possibility has been investigated on healthy subjects and patients with cerebral lesions, with placement of the ultrasonic sensor in the region of the frontal eminence and recording the echo signal from the occipital bone. B.W.

N84-16790* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 253)

Jan. 1984 66 p
(NASA-SP-7011(253); NAS 1.21:7011(253)) Avail: NTIS HC \$7.00 CSCL 06E

This bibliography lists 201 reports, articles and other documents introduced into the NASA scientific and technical information system in December 1983. Author

N84-16791*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

RADIATION PROTECTION FOR MANNED SPACE ACTIVITIES

T. M. JORDAN Mar. 1983 43 p refs

(Contract NAS7-918)

(NASA-CR-173202; JPL-PUB-83-26; NAS 1.26:173202) Avail:

NTIS HC A03/MF A01 CSCL 06R

The Earth's natural radiation environment poses a hazard to manned space activities directly through biological effects and indirectly through effects on materials and electronics. The following standard practices are indicated that address: (1) environment models for all radiation species including uncertainties and temporal variations; (2) upper bound and nominal quality factors for biological radiation effects that include dose, dose rate, critical organ, and linear energy transfer variations; (3) particle transport and shielding methodology including system and man modeling and uncertainty analysis; (4) mission planning that includes active dosimetry, minimizes exposure during extravehicular activities, subjects every mission to a radiation review, and specifies operational procedures for forecasting, recognizing, and dealing with large solar flares.

R.A.K.

N84-16792# Naval Health Research Center, San Diego, Calif.

BENZODIAZEPINE EFFECTS ON AROUSAL THRESHOLD

DURING SLEEP Interim Report, 1980 - 1983

L. C. JOHNSON and C. L. SPINWEBER 11 Aug. 1983 14 p

Presented at the 4th Intern. Congr. on Noise as a Public Health Problem, Turin, 21-25 Jun. 1983

(Contract MR04101)

(AD-A133151; NAVHLTHRSCHC-83-17) Avail: NTIS HC

A02/MF A01 CSCL 06O

In a series of studies, the effects of benzodiazepines on arousal threshold during sleep have been investigated. Two studies, one using flurazepam, 30 mg, over 10 nights and one using triazolam, .5 mg, over 6 nights were conducted in the authors' laboratory. A third study at the University of Florida measured the effects of flurazepam, 30 mg, and pentobarbital, 100 mg, each administered on two nights. All drug threshold levels were compared to placebo values. All three studies found that the sedative hypnotics increased arousal threshold to an intermittent pure tone. The placebo groups' highest mean arousal threshold was 70-75dB, compared to 100-110dB threshold values for the hypnotic group. The increase in arousal threshold occurred during the first hours of sleep, reaching a peak around 120-150 minutes post-ingestion. Return to sleep was also more rapid in medicated subjects, and the reduction in sleep latency followed the same time course as did the change in arousal threshold. Arousal threshold and sleep latency did not differ between drug and placebo groups after 3 hours post-administration. The short acting benzodiazepine, triazolam, and flurazepam with its long acting metabolite did not differ in the magnitude of the elevation of arousal threshold, time course of effects across the night, or type of change over nights of consecutive use.

GRA

N84-16793# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

AGE, ALTITUDE, AND WORKLOAD EFFECTS ON COMPLEX PERFORMANCE

H. W. MERTENS, E. A. HIGGINS, and J. M. MCKENZIE Sep. 1983 18 p

(AD-A133594; FAA-AM-83-15) Avail: NTIS HCA02/MFA01

CSCL 06S

Fifteen healthy men in each of three age groups, 20-29 yrs, 40-49 yrs, and 60-69 yrs, were evaluated regarding complex performance in two altitude conditions (ground level vs. 3,810 m) which were administered during performance testing. Performance was measured during a 3-h test session with the Multiple Task Performance Battery (MTPB) which involved time-shared performance of several flight-related tasks presented in different combinations to vary workload. MTPB tasks consisted of monitoring of warning lights and meters, mental arithmetic, problem solving, visual target identification, and tracking. Heart rate decreased slightly at the 3,810 m altitude in the 60-69 yr group, but increased

significantly at altitude in the two younger groups. Both epinephrine and norepinephrine excretion rates were highest in the 20-29 yr group and lowest in the 40-49 yr group. Age related decrements occurred in monitoring tasks, information-processing tasks, and a tracking task involving psychomotor-coordination. Performance differences occurring as a function of age were evident predominantly at moderate and high workload levels. There were no important effects of altitude on performance. Physiological and biochemical responses had little relation to performance. Implications of these findings for future research relating age to pilot performance are discussed.

GRA

N84-17811# Army Intelligence and Threat Analysis Center, Arlington, Va.

MILITARY MEDICAL JOURNAL, NO. 7, 1983

Apr. 1983 130 p refs Transl. into ENGLISH of Voenno-Med. Zh. (Moscow), no. 7, Jul. 1983

(L-2456) Avail: NTIS HC A07/MF A01

Medical care for troops and the training of medical personnel for the military are discussed. Topics covered include therapy, epidemiology, hygiene, physical fitness, and chemical, surgical, and radiological procedures.

N84-17812# Army Intelligence and Threat Analysis Center, Arlington, Va.

PREVENTION OF FLIGHT FATIGUE BY PHYSICAL TRAINING

M. T. LOZHA *In its* Mil. Med. J., No. 7, 1983 p 71-74 Apr. 1983

Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 7, Jul. 1983 Original language document was announced as A83-58570

Avail: NTIS HC A07/MF A01

An experiment was conducted in order to determine whether physical training in the morning soon after awakening could be useful in preventing flight fatigue. One group (control) performed normal exercises each morning, while the other (experimental) group under supervision by medical personnel, performed a special series of exercises each morning to prevent fatigue. Results showed that after 4 months of training, the experimental group exhibited a significantly better functional condition of the cardiovascular and respiratory systems than the control group. In addition, it was found that the lack of close medical supervision significantly reduced the effectiveness of this exercise program.

A.R.H.

N84-17813# Army Intelligence and Threat Analysis Center, Arlington, Va.

EFFECT OF THE MICROCLIMATE ON THE NIGHT SLEEP AND PHYSICAL FITNESS OF SEAMEN DURING A CRUISE IN THE LOW LATITUDES

G. I. NOVOZHILOV, V. V. PASTUKHOV, and N. N. PLAHOV *In its* Mil. Med. J., No. 7, 1983 p 75-79 Apr. 1983 refs Transl.

into ENGLISH from Voenno-Med. Zh. (Moscow), no. 7, Jul. 1983

Avail: NTIS HC A07/MF A01

Twenty-five seamen aged 18 to 22 years were the subjects in a study to determine how various microclimatic conditions in the sleeping quarters affect the quality of sleep, heat exchange in the body, and autonomic function; and how the quality of sleep influences the physical fitness of seamen during a cruise in the low latitudes. Measurement of the functional condition of the subjects before and after night sleep shows that the sleep of seamen under uncomfortable conditions during a cruise in the low latitudes is shallow, unrefreshing, and accompanied by frequent awakenings. Heat stress develops during the night as shown by higher body temperature after sleep, rapid heart beat, and increased sweating compared to individuals sleeping under comfortable conditions. As a result of heat stress, the energy expended on standard physical exertion increases, especially in the first half of the cruise.

A.R.H.

52 AEROSPACE MEDICINE

N84-17814# Army Intelligence and Threat Analysis Center, Arlington, Va.

MILITARY MEDICAL JOURNAL, NO. 2, 1983

Feb. 1983 134 p refs Transl. into ENGLISH of Voenno-Med. Zh. (Moscow), no. 2, Feb. 1983 (L-2341) Avail: NTIS HC A07/MF A01

Various topics in military medicine are addressed. Specific subject categories include field medical support and medical personnel training, epidemiology and infectious diseases, hygiene and physiology of military labor, flight and naval medicine, and treatment and prophylaxis.

N84-17815# Army Intelligence and Threat Analysis Center, Arlington, Va.

ASSESSMENT OF THE FUNCTIONAL STATE OF THE HEART MUSCLE IN AIRCREW MEMBERS BY MEANS BY BICYCLE ERGOMETRY

E. G. MUKHAMEDOV, A. G. BRYUKHOVETSKIY, and L. P. PUKACH *In its* Mil. Med. J., No. 2, 1983 p 63-66 Feb. 1983 refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 2, Feb. 1983

Avail: NTIS HC A07/MF A01

Studies have shown that, with reduction of the functional capacity of the heart muscle, there is an increase in the duration of the electrical systole and an increase in the systolic index both at rest and with physical loads. Tests were performed the goal of which was to evaluate the functional state of the heart muscle, considering the level of maximum arterial pressure and duration of the electrical systole as the most efficient period of the heart cycle. For analysis, a calculated value, arbitrarily called the 'systolic product' was used. It was calculated by the formula: Systolic product = (AD x Q-T)/RR arbitrary units where AD is the maximum arterial pressure in mm Hg, Q - T is the duration of the electrical systole in seconds, RR is the duration of the cardiac cycle in seconds. The test group included 46 heart patients and 50 healthy aircrew members ranging in age from 25 to 52 years. The results indicate a gradual increase in systolic product with an increase in physical load for both patients and healthy persons; however the increase in patients with atherosclerosis was more pronounced. At rest the systolic product of patients was reliably higher than that of healthy persons. M.G.

N84-17816# Army Intelligence and Threat Analysis Center, Arlington, Va.

THE EFFECT OF SMOKING ON THE NON-SPECIFIC RESISTANCE OF THE ORGANISM OF SEAMEN AT SEA

V. N. BORTNOVSKIY *In its* Mil. Med. J., No. 2, 1983 p 67-70 Feb. 1983 refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 2, Feb. 1983

Avail: NTIS HC A07/MF A01

The effect of smoking during a long voyage on the non-specific anti-infection resistance of the organism of seamen was studied. The test groups included 74 naval specialists ranging in age from 25 to 32 years and including 38 persons who had smoked regularly for at least five years. The leukocyte count, the absorption function of the leukocytes, the intensity of absorption, the adhesive capacity and the digestive activity, and the deep autoflora of the skin were studied. Also, the physical fitness for work, the subjective status of the subjects, and infectious morbidity were considered. The seamen were examined in the period between voyages, at the beginning of the voyage, after one month at sea, at the mid-point of the voyage and at the end of the voyage. The results indicate that smoking during a long sea voyage had a detrimental effect on the non-specific mechanisms of anti-infection protection, reduces fitness for work, and increase infectious pathology. M.G.

N84-17817# Army Intelligence and Threat Analysis Center, Arlington, Va.

MILITARY MEDICAL JOURNAL, NO. 3, 1983

Mar. 1983 139 p refs Transl. into ENGLISH of Voenno-Med. Zh. (Moscow), no. 3, Mar. 1983 (L-2399) Avail: NTIS HC A07/MF A01

Various topics relative to military and aerospace medicine are discussed. Gunshot wounds, blood transfusions, blood plasma, conjunctiva, pulmonary circulation, epidemiology, and therapy are discussed.

N84-17818# Army Intelligence and Threat Analysis Center, Arlington, Va.

INVESTIGATION OF THE MICROCIRCULATION OF THE CONJUNCTIVA IN AIRMEN WITH THE INITIAL SYMPTOMS OF CEREBRAL ATHEROSCLEROSIS

B. I. PARMENOV-TRIFILOV *In its* Mil. Med. J., No. 3, 1983 p 60-63 Mar. 1983 refs Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 3, Mar. 1983 p 44-46 Original language document was announced as A83-30949

Avail: NTIS HC A07/MF A01

The investigation of the microcirculation of the conjunctiva in airmen with the initial symptoms of cerebral atherosclerosis is discussed. The study of the microcirculation of the eye by biomicroscopy of the conjunctiva blood vessels followed by photography is the method of choice for examining flying personnel. It is informative, has no contraindications, produces no complications, and takes little time. The microcirculation of the conjunctiva may be examined for early diagnosis of atherosclerosis in airmen. The method is a supplemental one and the data obtained with it can be used in conjunction with the results of clinical and biochemical examinations to evaluate flight fitness. R.J.F.

N84-17819# Army Intelligence and Threat Analysis Center, Arlington, Va.

CHANGES IN THE T AND B SYSTEMS OF IMMUNITY IN SEAMEN DURING A LONG CRUISE

V. S. NOVIKOV *In its* Mil. Med. J., No. 3, 1983 p 64-66 Mar. 1983 Transl. into ENGLISH from Voenno-Med. Zh. (Moscow), no. 3, Mar. 1983 p 46-47 Original language document was announced as A83-30950

Avail: NTIS HC A07/MF A01

The activity of immune reactions is studied in sailors during extended sea voyages and the physiological significance of these reactions is examined during the adaptation of the sailors to different environmental conditions. The changes in the content of the T, B, and O lymphocytes were determined in 5 sailors (18-21 years of age) at various times before, during, and after an extended sea voyage. Results show that major changes in the functioning of the immune systems occur during the voyages. The content of T lymphocytes in the blood increased after one month at sea which indicates a higher stress on the T immune system during the adaptation to the conditions of sailing. The content of T and B lymphocytes decreased after one month of sailing which indicates a weakening of the functioning of the T and B immune systems. It is concluded that these changes are evidence of the weakening of the antiinfection stability of the subjects and indicate the possibility of increases in autoimmune diseases. Author

N84-17820*# Management and Technical Services Co., Houston, Tex.

ENERGY BALANCE AND THE COMPOSITION OF WEIGHT LOSS DURING PROLONGED SPACE FLIGHT

J. I. LEONARD 20 Oct. 1982 104 p refs (Contract NAS9-12932; NAS9-14523; NAS9-15487; NAS9-16328) (NASA-CR-171745; NAS 1.26:171745; TIR-2114-MED-2012)

Avail: NTIS HC A06/MF A01 CSCL 06S

Integrated metabolic balance analysis, Skylab integrated metabolic balance analysis and computer simulation of fluid-electrolyte responses to zero-g, overall mission weight and tissue losses, energy balance, diet and exercise, continuous changes, electrolyte losses, caloric and exercise requirements, and body composition are discussed. N.W.

N84-17821*# Management and Technical Services Co., Houston, Tex. Dept. of Biomedical Research.

WATER IMMERSION AND ITS COMPUTER SIMULATION AS ANALOGS OF WEIGHTLESSNESS Interim Report

J. I. LEONARD Aug. 1982 66 p refs

(Contract NAS9-16328)

(NASA-CR-171746; NAS 1.26:171746; TIR-2114-MED-2005)

Avail: NTIS HC A04/MF A01 CSCL 06P

Experimental studies and computer simulations of water immersion are summarized and discussed with regard to their utility as analogs of weightlessness. Emphasis is placed on describing and interpreting the renal, endocrine, fluid, and circulatory changes that take place during immersion. A mathematical model, based on concepts of fluid volume regulation, is shown to be well suited to simulate the dynamic responses to water immersion. Further, it is shown that such a model provides a means to study specific mechanisms and pathways involved in the immersion response. A number of hypotheses are evaluated with the model related to the effects of dehydration, venous pressure disturbances, the control of ADH, and changes in plasma-interstitial volume. By inference, it is suggested that most of the model's responses to water immersion are plausible predictions of the acute changes expected, but not yet measured, during space flight. One important prediction of the model is that previous attempts to measure a diuresis during space flight failed because astronauts may have been dehydrated and urine samples were pooled over 24-hour periods. S.L.

N84-17822# Texas Univ., Austin.

MATHEMATICAL SIMULATION OF THE CARDIOPULMONARY SYSTEM Final Report, 1 Oct. 1981 - 31 Aug. 1983

R. E. COLLINS, L. CARMACK, and D. L. MARTIN 19 Aug. 1983 64 p

(Contract AF-AFOSR-0123-79; AF PROJ. 2312)

(AD-A135460; AFOSR-83-0999TR) Avail: NTIS HC A04/MF A01 CSCL 12A

Multi-chamber, lumped parameter models of the pulmonary and circulatory systems have been developed which incorporate effects of whole-body accelerations (WBA) for any body orientation and a variety of breathing maneuvers. The pulmonary model has been used in an extensive study of effects of sustained WBA on pulmonary mechanics and ventilation. This study investigated the effectiveness of altering seat back angle to increase G-tolerance. The development and testing of the separate pulmonary and circulatory models has been reported in previous reports, as well as the above described WBA study. This final report describes latest efforts to incorporate feedback and control mechanisms in the circulatory model to simulate the baroreceptor and chemoreceptor actions regulating blood flow and blood pressure in the human body. This work is not yet complete. Also described is a partially completed study using the pulmonary model to test and implement a non-invasive technique for diagnosing ventilation distribution dysfunctions. Author (GRA)

N84-17823# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

BLOOD FLOW MEASUREMENTS UNDER HIGH-G CONDITIONS: EARLY PREDICTION OF GZ TOLERANCE Interim Report

L. HREBIEN Aug. 1983 28 p

(AD-A134653; NADC-83115-60) Avail: NTIS HC A03/MF A01 CSCL 06S

A method is presented for the prediction of man's +Gz tolerance in human centrifuge experiments without exposing the subject to excessive levels of positive gravity. The parameter that is measured is blood velocity in the temporal artery using an ultrasonic doppler velocimeter. Rather than using the cessation of forward blood velocity as an end point in +Gz tolerance studies, it is possible to use physiologic compensatory responses to decreased cerebral blood pressure as predictors of ultimate cessation of blood flow to the head. Five subjects were exposed to five different +Gz onset ramps and the results are discussed in this report. GRA

N84-17824# Army Research Inst. of Environmental Medicine, Natick, Mass.

OVERUSE INJURIES OF THE LOWER EXTREMITIES ASSOCIATED WITH MARCHING, JOGGING AND RUNNING. A REVIEW

B. H. JONES Oct. 1983 8 p Repr. from Military Medicine, v. 148, Oct. 1983 p 783-787

(Contract DA PROJ. 3E1-62777-A-879)

(AD-A134672; USARIEM-M-9/83) Avail: NTIS HC A02/MF A01 CSCL 06E

Army basic trainees who wore boots through one seven-week basic training cycle were studied. Exercise-related and performance-limiting conditions in female trainees were emphasized. Some comparative data were collected on injuries among male counterparts of these females. The overall incidence of lower extremity injuries to females was 62 percent (215 of 347) and for males 26 percent (202 of 770). The average injury sustained by these women resulted in 13 days of less training time.

N84-17825# Naval Health Research Center, San Diego, Calif. Environmental Physiology Dept.

EXTENDING HUMAN EFFECTIVENESS DURING SUSTAINED OPERATIONS THROUGH SLEEP MANAGEMENT Interim Report

P. NAITOH, C. E. ENGLUND, and D. H. RYMAN Aug. 1983 21 p Presented at NATO Defense Res. Group Seminar on the Human as a Limiting Element in Military Service, Toronto, 2-4 May 1983 Submitted for publication

(Contract F58-528)

(AD-A134782; NAVHLTHRSCHC-83-13) Avail: NTIS HC A02/MF A01 CSCL 05J

Sustained Operations (SUSOPs) represent a prolonged period of continuous work (CW) in the performance of essential services. In many military operations, demands for CW cannot be easily met by orderly sharing of work through arranging soldiers on 'shift or night work' schedules. Especially during times of emergency, military personnel must often work continuously without sleep for long hours at physically demanding tasks while remaining mentally alert. This technical paper summarizes four SUSOP studies, 1 through 4, to describe cognitive performance decrements due to continuously working for two episodes of 20 hours each, with a short sleep period of 3 or 4 hours permitted between these two CWs. This paper also reports on an application of sleep logistics in evaluation of effectiveness of napping in the early morning period so as to counteract performance decrement due to a CW. Short napping of 3 or 4 hours in the early morning was found not to be completely effective in restoring Marine Corps volunteers from fatigue and sleepiness of 20 hours CW, thus making them ready to resume the second 2-hour CW with high quality performance. However, some task performances were found to be improved by napping. These findings suggest that napping can be used as an effective intervention technique for maintaining and even enhancing the cognitive performance during CW. GRA

N84-17826# Army Research Inst. of Environmental Medicine, Natick, Mass.

PHYSIOLOGICAL RESPONSES TO PROLONGED UPPER BODY EXERCISE

N. A. PIMENTAL, M. N. SAWKA, D. S. BILLINGS, and L. A. TRAD Oct. 1983 24 p

(Contract AF PROJ. 3E1-63777-A-879)

(AD-A134811; USARIEM-M-5/84) Avail: NTIS HC A02/MF A01 CSCL 06S

Previous investigations have not examined physiological responses to prolonged upper body exercise. Knowledge of the feasibility of performing this type of exercise and the elicited responses could have application in designing continuous training programs for the upper body muscle groups. Nine male volunteers, with a peak oxygen uptake of 49 + or - 7 for cycle and 35 + or - 6 ml kg min for arm crank exercise, completed four prolonged (60 min) exercise tests. These data demonstrate that upper body exercise can be performed for prolonged periods of time at a

52 AEROSPACE MEDICINE

relative intensity sufficient to elicit a cardiovascular training effect. However, since heart rates are lower during upper than lower body exercise at 60% of peak oxygen uptake, exercise prescriptions which are based on heart rate may need to be modified for upper body exercise. GRA

N84-17827# Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex.
RATIONALE FOR A THRESHOLD LIMIT VALUE (TLV)R FOR JP-4/JET B WIDE CUT AVIATION TURBINE FUEL Final Report

E. C. BISHOP, M. G. MACNAUGHTON, R. T. P. DETREVILLE, and R. B. DRAWBAUGH Apr. 1983 16 p
(AD-A134814; OEHL-83-128EH111DGA) Avail: NTIS HC A02/MF A01 CSCL 06T

This report provides rationale for a Threshold Limit Value (TLV) Superscript R of 700 mg/m³ cu m (200 ppm, 1.5% LEL) and a Short Term Exposure Limit (STEL) of 1050 mg/g cu m (300 ppm 2.3% LEL) as n-hexane with a skin notation for JP-4/Jet B wide cut aviation turbine fuel. This recommendation is based upon a thorough review of the literature and USAF experience with JP-4 exposures. Author (GRA)

N84-17828# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.

TEMPORAL ASPECTS OF EYE MOVEMENT WHEN VIEWING MULTIPLE TARGETS Interim Report, Oct. 1981 - Sep. 1982

Y. Y. ZEEVI, P. A. WETZEL, and L. R. YOUNG Nov. 1983 69 p
(Contract F33615-81-K-0011)
(AD-A134853; AFHRL-TP-83-6) Avail: NTIS HC A04/MF A01 CSCL 05J

A technique of eye position measurement and analysis was used to investigate the time necessary for processing visual information by comparing the mean response latency time of single targets to the response means of other novel stimuli. In all cases, stimuli were visual, context-free, point source targets, randomized for type, order of appearance, and time course. The separation of the visual fields is exploited to selectively present targets to either or both hemispheres. An asymmetry in single target left-right response latency time was observed in nearly all subjects. In all cases, there was a significant increase in response latency time when targets were presented to each hemisphere simultaneously. Delayed bihemispheric stimulation produced changes in response latency that were similar in both directions and the response latency increased still further when targets were presented sequentially. These studies helped to determine the timing of events prior to the execution of a saccade. The single and bihemispheric paradigms have also proven useful in studying the mechanisms and organization of visual information processing. Author (GRA)

N84-17829# Army Cold Regions Test Center, Fort Greely, Ark.
ARCTIC PERSONNEL EFFECTS Final Report
Sep. 1983 25 p
(AD-A134892; TOP-1-1-003) Avail: NTIS HC A02/MF A01 CSCL 06S

This document provides background information on the physiological effects of extreme cold on the human body. A brief overview of some of the physiological problems of operation in a cold environment and the procedures used to overcome these problems are provided along with the detailed techniques and requirements for tests involving the effects of a cold environment on personnel. Author (GRA)

N84-17830# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

THE OBJECTIVE EVALUATION OF AIRCREW PROTECTIVE BREATHING EQUIPMENT. 5: MASK/GOGGLES COMBINATIONS FOR FEMALE CREWMEMBERS

D. DESTIEGUER, J. T. SALDIVAR, E. A. HIGGINS, and G. E. FUNKHOUSER Jul. 1983 12 p
(AD-A134912; FAA-AM-83-14-5) Avail: NTIS HC A02/MF A01 CSCL 06G

A study was conducted to determine the degree of respiratory and visual protection given to the female crewmember by various crew oxygen mask/goggle combinations. The acceptance criteria for the mask/goggle combinations were for 10 of 12 test subjects to maintain a contaminant ratio of 0.05 or less in the oxygen mask and/or simultaneously 0.1 or less in the goggle while wearing eyeglasses. Of the 23 mask/goggle combinations tested with female subjects, 8 failed to meet the acceptance criteria for adequate protection. Comparison tests on anthropometric data from male and female subjects suggest that the failures may be due, in part, to size differences in cranial and facial dimensions. GRA

N84-17831# Army Research Inst. of Environmental Medicine, Natick, Mass.

AUTONOMIC INFLUENCES ON PERIPHERAL CIRCULATORY AND THERMAL RESPONSES TO COLD

C. A. OHATA, G. D. POWERS, and P. H. SCAGLIONE 1981 41 p
(AD-A134444; USARIEM-M-4/84) Avail: NTIS HC A03/MF A01 CSCL 06S

The effects of bilateral denervations of the lumbar sympathetic chain, vagus nerves, and sacral ventral roots on peripheral circulatory and thermal responses during local cold exposure of a cat hindlimb were determined. Cold exposure apparently produced a peripheral vasoconstriction mediated by a somatosympathetic reflex and local mechanisms. Interruption of the L(3) sympathetic chain ipsilateral as well as contralateral to the cold-exposed hindlimb produced a marked reduction in vascular resistance, a femoral arterial hyperemia, and a warming of the footpad and increased heat loss from the footpad. These responses were acute suggesting that local mechanisms can predominate in the absence of neurogenic mechanisms to restore peripheral vasoconstriction. Interruption of the vagus nerves and sacral ventral roots had little effect on the peripheral circulatory and thermal responses to cold. This study identified the primary autonomic pathway mediating peripheral vasoconstriction during cold exposure as the efferent sympathetic nerves. GRA

N84-17832# Pennsylvania Coll. of Optometry, Philadelphia.
ERG (ELECTRORETINOGRAM) IMPLICIT TIME: AN EXPLORATION OF HIGH FREQUENCY WAVELETS RECORDED IN THE HUMAN VISUAL SYSTEM Final Report, 10 May 1979 - 9 May 1983

J. B. SIEGFRIED 15 Oct. 1983 26 p
(Contract DAAG29-79-C-0103)
(AD-A134575; ARO-16272.2-LS) Avail: NTIS HC A03/MF A01 CSCL 06P

Previous research by the author had demonstrated that the spectral sensitivity of the visual system as measured by the visual evoked potential from the human scalp exhibited discrepancies from the spectral sensitivity function as measured by psychophysical techniques. These discrepancies were in the short wavelength (blue) region of the visible spectrum. Such discrepancies were explained by the discovery that blue lights evoked cortical potentials with longer latencies and implicit times than lights which stimulate the middle and long wavelength sensitive mechanisms. The current research deals with a further elucidation of this finding, by studying the fast wavelets (oscillatory potentials) arising in the retina and measured by means of the electroretinogram. High frequency wavelets were also observed at the scalp in the visual evoked potential. GRA

BEHAVIORAL SCIENCES

N84-17833# Texas Univ., Galveston.
FORMATION AND REMODELING OF THE EARLY WOUND MATRIX Semiannual Report
 P. H. WEIGEL, G. M. FULLER, and R. LEBOEUF 1 Nov. 1983
 7 p
 (Contract N00014-82-K-0279)
 (AD-A134576) Avail: NTIS HC A02/MF A01 CSCL 06E

We have proposed that an early event in wound healing involves the synthesis of hyaluronic acid (HA) by blood cells in the clot and that HA specifically interacts with fibrin to create a second matrix within the wound. Peripheral cells then migrate into the wound and begin to remodel the matrix. To test this model we have synthesized a unique derivative of HA, hyaluronate-amine, which has been used to prepare (1) radiiodinated HA to study cell surface receptors, (2) synthetic culture surfaces to study cell interactions with immobilized HA and (3) HA-sepharose, an affinity chromatography media. We have also used the HA-sepharose to show, as predicted by our proposed model, that fibrinogen specifically binds to HA. This is the first demonstration of such an interaction and would be of major significance in understanding the important early events necessary for prompt and efficient wound healing. GRA

N84-17834# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
HUMAN REACTIONS TO TRANSIENT ELECTRIC CURRENTS, VOLUME 8 Annual Report, Jul. 1982 - Jun. 1983
 J. P. REILLY, W. LARKIN, R. J. TAYLOR, V. T. FREEMAN, and L. B. KITTLER Jul. 1983 151 p refs Sponsored in part by the Maryland Power Plant Siting Program and the Canadian Electrical Association
 (PB84-112895; JHU/APL/CPE-8305-VOL-8) Avail: NTIS HC A08/MF A01 CSCL 06T

The report describes research on human sensory responses to transient electrical currents. Stimuli include those that may be encountered with capacitive discharges in high-strength dc or 60-HZ ac oscillatory currents. Measurements of electrical impedance properties of the human body are also described. Parameters studied involve variables of the stimulus (e.g., magnitude, discharge capacitance, time constant, monophasic versus biphasic currents), variables involving the subject (e.g., body location, skin hydration), and variables involving the method of applying the stimulus (e.g., electrode size, spark discharge versus contact current). Sensory reactions are studied for both threshold and suprathreshold currents. A neuroelectric model is developed and applied to a variety of the experimental findings. Author (GRA)

N84-17835# Systems Applications, Inc., San Rafael, Calif.
HUMAN EXPOSURE TO ATMOSPHERIC CONCENTRATIONS TO SELECTED CHEMICALS, VOLUME 1 Interim Report
 G. E. ANDERSON Sep. 1983 230 p refs 2 Vol.
 (Contract EPA-68-02-3066)
 (PB84-102540; SAI-58-EF81-156R2) Avail: NTIS HC A11/MF A01 CSCL 06T

Public exposure to atmospheric concentrations of some forty chemicals is estimated on a nationwide basis. Information that are helpful for determining which of the chemicals to study in more detail and in what order is provided. The emphasis is on estimates that support rough relative comparisons among the chemicals. The study makes free use of such techniques as algorithms for estimating emissions rather than actual emissions data, constructed plant locations rather than actual plant locations, simplified dispersion modeling to estimate ambient air concentrations, and a constructed population file that relief on extrapolation of 1970 Bureau of Census data on where people lived. GRA

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

A84-19600
SELECTION OF MEMBERS OF POLAR EXPEDITIONS AND COSMONAUTS [NABOR UCZESTNIKOW WYPRAW POLARNYCH A SELEKCJA KOSMONAUTOW]
 T. BOSZKIEWICZ (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland) Postepy Astronautyki (ISSN 0373-5982), vol. 16, no. 1, 1983, p. 85-95. In Polish. refs

The development of medical and sociopsychological tests for the selection of members of polar expeditions is discussed. It is noted that such testing can serve as the foundation of cosmonaut selection and can indicate ways of assuring the health of cosmonauts. B.J.

A84-19608#
TRAINING THE HELICOPTER TEST PILOT
 A. W. DEBUSE and J. R. A. WHITNEY (RAF, Empire Test Pilots' School, Boscombe, Hants., England) Association Aeronautique et Astronautique de France, European Rotorcraft Forum, 8th, Aix-en-Provence, France, Aug. 31-Sept. 3, 1982, Paper. 12 p.

The need for specialist rotary wing test pilots has been recognized for a long time. The unacceptable high risk of on the job training for test pilots and the complexity of testing requirements needed to evaluate helicopters has led to the introduction of formal training for helicopter test pilots in the early 1960s. Test pilot training has mainly the objective to develop in a pilot with the correct operational background the specialist skills for making critical and accurate observations while engaged in a demanding flying task. The training for helicopter test pilots is carried out at three places in the free world, which are located in the U.S., France, and the UK. A description is provided of the training of helicopter test pilots at the Empire Test Pilots' School in the UK. The general training methods considered are similar to those of the other two schools. G.R.

A84-20020
EVOKED POTENTIAL CONTRAST SENSITIVITY IN THE PARAFOVEA SPATIAL ORGANIZATION
 M. W. CANNON, JR. (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH) Vision Research (ISSN 0042-6989), vol. 23, no. 12, 1983, p. 1441-1449. refs

Visual evoked potential contrast sensitivity functions (VEP/CSFs) were determined for counterphase flickered sine-wave gratings in circular fields up to 8-deg in diameter centered on the fovea. VEP sources responding to 16 c/deg gratings appeared to be concentrated in the central 2-deg of the visual field while sources responding to lower spatial frequencies appeared to be distributed over progressively wider areas of the visual field as spatial frequency decreased. It was also found that independently determined VEP/CSFs for non-overlapping annular regions of the visual field centered on the fovea summed to equal the VEP/CSF obtained when both regions were stimulated simultaneously. Author

A84-20022
A COMPARISON OF OCULOMOTOR PURSUIT OF A TARGET IN CIRCULAR REAL, BETA OR SIGMA MOTION
 J. VAN DER STEEN, E. P. TAMMINGA, and H. COLLEWIJN (Rotterdam, Universiteit, Rotterdam, Netherlands) Vision Research (ISSN 0042-6989), vol. 23, no. 12, 1983, p. 1655-1661. refs

Pursuit of a point target in real or apparent motion upon a dark, diffusely lighted or structured background was recorded with a scleral coil technique. Smooth and saccadic components were separated and analyzed with computer techniques. Sigma-pursuit was superior to pursuit of beta- or real motion: smooth pursuit gain was higher, saccadic rate was lower and the detrimental

effect of a structured background was smaller. Due to directional errors, smooth pursuit velocity often exceeded target velocity when this was smaller than about 10 deg/sec. However, the smooth component in the correct direction of the target motion had a gain less than or equal to 1.0 decreasing at higher target velocities for all pursuit modes, inclusive sigma-pursuit. Author

A84-20023**FAILURE TO FIND AN ABSOLUTE RETINAL LIMIT OF A PUTATIVE SHORT-RANGE PROCESS IN APPARENT MOTION**

J. T. PETERSIK (Ripon College, Ripon, WI; New England Institute of Applied Biophysics, Worcester, MA), R. PUFAHL, and E. KRASNOFF (Ripon College, Ripon, WI) Vision Research (ISSN 0042-6989), vol. 23, no. 12, 1983, p. 1663-1670. refs

Previous studies of apparent movement have concluded that the short-range process does not operate when stimulus displacements exceed 15-20 arcmin. In the present experiments, a bistable apparent-movement display, one of whose perceptual organizations is mediated by short-range process, was studied. In both experiments it was found that the perceptual organization mediated by the short-range process could be made dominant at stimulus displacements well in excess of the proposed spatial limit, provided the stimulus elements were made larger. It is concluded that the spatial limit of the short-range process is a relative, not absolute, one. Current knowledge regarding the short-range process is reviewed, and an hypothesis regarding the functional utility of the short-range process in compensating for the effects of small eye tremors is advanced. Author

A84-20078**PILOT TRAINING INSTRUCTOR/CHECK PILOT TRAINING MODERN CONCEPTS AND A SYLLABUS OF ESSENTIALS**

R. S. CRUMP (United Airlines, Inc., Chicago, IL) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Dec. 1983, p. 285-290.

A brief review is provided of developments related to pilot training in the past 15 years, taking into account changes beginning in the late 1960's with the introduction of the B-737 and later the B-747 aircraft. The employed training programs were developed by making use of a 'Systems Approach to Flight Operations Training' (SAFOT). The training system utilized was based on behavioral objectives. Specific behaviors are to be those which will insure safe, efficient operation of the aircraft. The change in the role of the pilot is a factor which will affect the training of flight instructors in increasing measure in the 1980's and 90's. A review is provided of the influences which are changing the traditional role of the flight instructor/check airman. Attention is given to flight instructor/check airman selection, questions of crew performance evaluation, and the characteristics of the ideal instructor or check pilot. G.R.

A84-20084**OVER-DEPENDENCE ON AUTOMATICS - THE BLACK BOX ONE MAN BAND**

H. HOPKINS (Flight Safety Committee, Hounslow, Middx., England) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, Dec. 1983, p. 343-348.

The role of automation in industry, and, in particular, in aviation is discussed, taking into account the primary benefits of automation over manual operation, and some potential drawbacks. Applications of automation in aircraft are related to the control of aircraft attitude and flight path, the enhancement of aerodynamics and stability, control/adjustment of system/ engine operation and output, and changeover from defective to serviceable units or modes. Possibilities regarding a crew over-dependence on automatics, and examples of over-dependence in incidents and accidents are examined. Attention is given to questions concerning automatic monitoring, developments leading to cockpits which do not need many systems controls or systems displays, problems of data display, recovery skills and design over-dependence, recovery skills and operational dependence, and the future development of automatic control. G.R.

A84-20621**VISUAL CORTICAL MECHANISMS RESPONSIBLE FOR DIRECTION SELECTIVITY**

L. GANZ (Stanford University, Stanford, CA) (U.S. Air Force and Fonds National de la Recherche Scientifique, Symposium on Movement Perception, Louvain, Belgium, Sept. 1982) Vision Research (ISSN 0042-6989), vol. 24, no. 1, 1984, p. 3-11. refs

The response of some 171 directionally selective (DS) neurons in visual area 17 of the cat was measured. Sequences of long duration (400 msec) stimulus onsets and offsets were employed to analyze the underlying mechanisms. The existence of sub-regions of localized, anisotropic inhibition is corroborated as the basic mechanism of directional tuning. At extremely small and at rather large asynchronies, DS neurons inhibit virtually non-selectively. Optimal directional selectivity occurs when the second response peak of S1 coincides with the first response peak of S2 (usually at an asynchrony of approximately 75 msec). The mechanism appears to involve the linear temporal convolution of impulse response functions. Author

A84-20622#**THE DETECTION OF MOTION IN THE PERIPHERAL VISUAL FIELD**

S. P. MCKEE and K. NAKAYAMA (Smith-Kettlewell Institute of Visual Sciences, San Francisco, CA) (U.S. Air Force and Fonds National de la Recherche Scientifique, Symposium on Movement Perception, Louvain, Belgium, Sept. 1982) Vision Research (ISSN 0042-6989), vol. 24, no. 1, 1984, p. 25-32. Research supported by the Smith-Kettlewell Eye Research Foundation. refs (Contract NIH-5-P30-EY-01186; NIH-1-R01-EY-03884; NIH-1-R01-EY-03976; NIH-EY-02890; AF-AFOSR-82-0345)

To assess the sensitivity of the periphery to motion, differential motion detection and velocity discrimination were measured as a function of eccentricity in the lower visual field. The differential motion threshold, a measure of the ability to detect relative motion (shear) between adjacent visual stimuli, is smaller than the minimum angle of resolution at all retinal loci tested. The target size required to produce the lowest differential motion threshold is surprisingly large, ranging from 1 deg in the fovea to about 20 deg at 40 deg eccentricity. When the peripheral thresholds for differential motion and for resolution are normalized against the fovea and plotted on linear axes, the eccentricity functions are linear. Velocity discrimination is as precise in the periphery as it is in the fovea, amounting to about 6 percent for the optimum velocity range. In the fovea, the minimum Weber fraction is reached at velocities of 5 deg/sec or faster. While the spatial determinants of velocity discrimination follow the change in resolution found with eccentricity, peripheral temporal sensitivity must be nearly equal to foveal temporal sensitivity. Author

A84-20623**FACTORS INFLUENCING VELOCITY CODING IN THE HUMAN VISUAL SYSTEM**

G. A. ORBAN, J. DE WOLF, and H. MAES (Leuven, Katholieke Universiteit, Louvain, Belgium) (U.S. Air Force and Fonds National de la Recherche Scientifique, Symposium on Movement Perception, Louvain, Belgium, Sept. 1982) Vision Research (ISSN 0042-6989), vol. 24, no. 1, 1984, p. 33-39. refs

Differential velocity detection in the fovea was measured over a wide range of velocities (0.25-256 deg/sec). Differential thresholds were minimum (about 6 percent) for intermediate velocities (4-32 deg/sec). Velocity judgments were shown not to depend on duration judgments. The U-shaped curve relating differential velocity detection and velocity was preserved at different background levels and different contrasts. The physiological correlates of these observations are discussed. Author

A84-20624

THE CODING OF VELOCITY OF MOVEMENT IN THE HUMAN VISUAL SYSTEM

P. THOMPSON (York, University, York, England) (U.S. Air Force and Fonds National de la Recherche Scientifique, Symposium on Movement Perception, Louvain, Belgium, Sept. 1982) Vision Research (ISSN 0042-6989), vol. 24, no. 1, 1984, p. 41-45. Sponsorship: Science and Engineering Research Council. refs (Contract SERC-GR/A/73817)

A very simple model of velocity perception which requires only 17 channels is outlined. The important points of the model are that: (1) in each direction of movement just two temporal frequency channels are necessary at any spatial frequency, (2) at low temporal frequencies the spatial frequency domain is encoded by many channels, but only those at low spatial frequencies are direction-specific. Using a detection discrimination technique the supposition that channels which detect high spatial, low temporal frequencies are not direction specific is investigated. Possible reasons for the apparent nondirectional behavior of these channels are investigated: the notion that non-directionality reflects a failure of the stimulus to travel some threshold distance across the retina is rejected, but the proposal that a velocity threshold must be exceeded before the direction of a grating may be identified at detection threshold remains a possibility. Author

A84-20625

COHERENT GLOBAL MOTION PERCEPTS FROM STOCHASTIC LOCAL MOTIONS

D. W. WILLIAMS and R. SEKULER (Northwestern University, Evanston, IL) (U.S. Air Force and Fonds National de la Recherche Scientifique, Symposium on Movement Perception, Louvain, Belgium, Sept. 1982) Vision Research (ISSN 0042-6989), vol. 24, no. 1, 1984, p. 55-62. refs (Contract MDA903-80-C-0154)

A percept of global, coherent motion results when many different localized motion vectors are combined. The percept was studied with dynamic random dot kinematograms whose elements took independent, random walks of constant step size; their directions of displacement were drawn from a uniform distribution. The tendency to see global, coherent flow along the mean of the uniform distribution varied with the range of the distribution. Psychometric functions were obtained with kinematograms having various step sizes and element densities. The changes in the psychometric function with step size and density are consistent with Ullman's 'minimal map theory' of motion correspondence. Author

A84-21648

A SIMULATION STUDY WITH A COMBINED NETWORK AND PRODUCTION SYSTEMS MODEL OF PILOT BEHAVIOR ON AN ILS-APPROACH

B. DOERING (Forschungsinstitut fuer Antropotechnik, Wachtberg-Werthhoven, West Germany) and A. KNAEUPER (Georgia Institute of Technology, Atlanta, GA) Automatica (ISSN 0005-1098), vol. 19, Nov. 1983, p. 741-747. refs

A simulation study was conducted for determining information flow requirements of a pilot-cockpit interface during an ILS-approach. Study steps for modeling, simulating, and analyzing system processes are discussed. Starting with the problem definition which includes relevant flight processes, the network of pilot tasks, and performance measures, the conceptual model of processes is mathematically described by means of algebraic and difference equations as well as production systems. To transform the model into a simulation program, the simulation language SLAM is used. SLAM elements utilized for modeling flight processes and pilot tasks as well as the procedure of model validation are discussed. The analysis of simulation output data, i.e., state trajectories and task timelines, results in the determination of important information requirements useful in early stages of a design project. Author

A84-21649

CONTRIBUTIONS OF CONGRUENT PITCH MOTION CUE TO HUMAN ACTIVITY IN MANUAL CONTROL

S. BALAKRISHNA, J. R. RAOL (National Aeronautical Laboratory, Bangalore, India), and M. S. RAJAMURTHY (McMaster University, Toronto, Canada) Automatica (ISSN 0005-1098), vol. 19, Nov. 1983, p. 749-754. refs

The contribution of pitch motion cues to the performance of human pilots in compensatory tracking task are evaluated from pairs of uniquely planned experiments on a motion based research simulator, which allow separation of the visual responses from combined motion-visual responses. Analytical time series human pilot models of the least squares structure are evaluated from the input-output data and the results are discussed in terms of familiar parameters of pilot models and predictor operator. Beneficial contributions of pitch motion cues and subject differences are presented. Author

N84-16794# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).

STRATEGIES USING AN OBSERVER FOR STEERING A RANDOM MOTION OF A POINT IN A MULTITARGET ENVIRONMENT

Y. YAVIN Nov. 1982 28 p refs

(CSIR-TWISK-285) Avail: NTIS HC A03/MF A01

Consider the random motion of a point M in the plane, and suppose that the velocity $v = (v_1, v_2)$ of M is perturbed by an R(2)-valued Gaussian white noise. It is assumed that l targets are presented in the plane, located at the points $c(1), \dots, c(l)$. The observations available to the point M consist of a sum of measurements, each measurement corresponding to a detection that originated from a target, and all detections arriving at random times; plus an R(2)-valued Gaussian white noise. Using current and past values of these observations, via the introduction of a state observer, the point M wishes, by choosing an appropriate pair (v^*, g^*) (where v^* is a velocity law and g^* is the observer's gain), to steer itself into an ϵ -neighborhood of the point $c(1)$, before it leaves an open and bounded domain which contains all the points $c(1), \dots, c(l)$. Sufficient conditions on (v, g) -weak optimal feedback strategies are derived. An algorithm for computing (v, g) -weak suboptimal strategies is suggested, and these are computed or a variety of cases. Author

N84-16795*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

VISUAL SLANT MISPERCEPTION AND THE BLACK-HOLE LANDING SITUATION

J. A. PERRONE Dec. 1983 15 p refs

(NASA-TM-85866; A-9573; NAS 1.15:85866) Avail: NTIS HC A02/MF A01 CSCL 051

A theory which explains the tendency for dangerously low approaches during night landing situations is presented. The two dimensional information at the pilot's eye contains sufficient information for the visual system to extract the angle of slant of the runway relative to the approach path. The analysis is depends upon perspective information which is available at a certain distance out from the aimpoint, to either side of the runway edgelights. Under black hole landing conditions, however, this information is not available, and it is proposed that the visual system use instead the only available information, the perspective gradient of the runway edgelights. An equation is developed which predicts the perceived approach angle when this incorrect parameter is used. The predictions are in close agreement with existing experimental data. E.A.K.

N84-16796# Chicago Univ., Ill. Center for Decision Research. **A THEORY OF DIAGNOSTIC INFERENCE: JUDGING CAUSALITY**

H. J. EINHORN and R. M. HOGARTH Aug. 1983 70 p

(Contract N00014-81-K-0314)

(AD-A133172) Avail: NTIS HC A04/MF A01 CSCL 05J

Diagnostic inference is concerned with determining the causal process that produced a set of outcomes/results/symptoms. A

model of causal reasoning within diagnosis is presented. We first propose that people use a sequential anchor-and-adjust strategy in discounting an explanation by alternatives. The amount of discounting depends on three factors: the plausibility of alternatives, the initial strength of the hypothesis, and a parameter reflecting the weight given to disconfirmatory evidence. It is then shown that the strength of a causal explanation is highly dependent on an implicit causal background (as in figure/ground relations), and on probabilistic factors called cues-to-causality. The cues considered are temporal order, contiguity, covariation, and similarity of cause and effect. A model for weighting and combining the cues is shown to account for much research in a wide range of fields. The three components of the theory are then tested in a series of experiments and the results are discussed with respect to: the factors that affect the discounting of explanations; issues in combining the cues-to-causality; problems in defining the causal background; and normative questions in assessing the quality of causal judgments. GRA

N84-16797# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine.

RADAR TRAINING FACILITY INITIAL VALIDATION

J. O. BOONE May 1983 29 p
(AD-A133220; FAA-AM-83-9) Avail: NTIS HCA03/MFA01
CSCL 05I

The Radar Training Facility (RTF), part of the Federal Aviation Administration Academy located at the Oklahoma City Mike Monroney Aeronautical Center, is designed to identify, as early as possible, air traffic control specialists who do not demonstrate sufficient potential to perform at radar tasks at the journeyman level. An extensive initial validation effort involving design evaluation, implementation evaluation, and formative evaluation was performed to determine if the system was adequately designed from an educational point of view, if the measures employed were reliable, if the program had a proper concurrent relationship with nonradar Academy measures, and if the difficulty level was appropriate. While the program was not pass/fail during the study, a score of less than 70 was used to calculate experimental pass/fail rates. Data from the initial validation effort indicated that the system was educationally sufficient, reliabilities were low to moderate, the RTF program had a proper concurrent relationship with nonradar measures, and the difficulty level was approximately correct. Information from data collected appeared to be asymptoting, and it was recommended that the program could begin pass/fail. The data for this study were collected prior to the air traffic control specialist's strike, and following the strike the Academy radar phase was sequenced out of the basic training curriculum to a later point (after the developmental ATCS had successfully checked out at the field facility in a nonradar position). GRA

N84-16798# Illinois Univ., Urbana.

IDENTIFYING DIFFERENT ITEM RESPONSE CURVES Interim Report, Oct. 1981 - Jan. 1982

M. V. LEVINE Brooks AFB, Tex. Air Force Human Resources Lab. Sep. 1983 35 p
(Contract F41689-81-C-0012; AF PROJ. 2313)
(AD-A133259; AFHRL-TP-83-33) Avail: NTIS HC A03/MF A01
CSCL 05J

A method is presented for determining whether or not two three-parameter item characteristic curves differ significantly from each other. The method may be used within the context of item response theory to detect evidence of item compromise, change with time, or group-specific differences (e.g., bias). Approximate sampling distributions are given for the test statistic. Two modes of use are distinguished, an exploratory mode in which items are identified for further scrutiny, and a confirmatory mode in which the method may be applied to individual items with higher precision. Demonstrations with actual and simulated data are reported. The method involves the derivation of a measure analogous to chi-square, called a sum of squares (SOS) measure. The SOS measures integrate the difference between item response curves and assess the statistical significance of the resulting area based

not only on its magnitude but also on the accuracy with which the two curves were estimated. Author (GRA)

N84-16799# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

MAZE-SOLVING AS A PERFORMANCE MEASUREMENT TOOL FOR HUMAN OPERATIONS UNDER TIME-STRESS

S. L. WARD and R. J. POTURALSKI Aug. 1983 67 p
(Contract AF PROJ. 7184)
(AD-A133394; AD-E950446; AFAMRL-TR-83-052) Avail: NTIS
HCA04/MFA01 CSCL 05J

This report documents a series of experiments to investigate the usefulness of maze-solving as a performance measurement tool for humans under time-stressed conditions. Three experiments were carried out: the first to establish an appropriate difficulty level for the mazes, the second to test the effect of repeated exposures to the same set of mazes on performance, and the third to measure the effect of time-stress on maze-solving performance. Subjects were asked to solve a maze by guiding a small dot from the beginning of the maze to the goal. Subjects had control over the dot direction but not over its speed. Stress was induced by increasing the dot speed. Results from the first experiment indicated that the largest and most complex maze configuration considered showed the most reliable difference between dot speeds, and this configuration was used in both of the subsequent experiments. The second experiment demonstrated that the same set of mazes could be presented to subjects four or five times with no appreciable learning effects. The third and last experiment quantified the differences in performance due to dot speed. There were significant and reliable differences in score among dot speeds. Errors made in solving mazes were examined qualitatively as well, and the errors found were symptomatic of a shortened planning horizon: incorrect turns at early critical decision points, and attempts to return to the centerline of the maze prematurely. Author (GRA)

N84-16800# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

ANALYSIS OF TUTORED VIDEOTAPE INSTRUCTIONAL DELIVERY SYSTEM Final Report, 1982 - 1983

A. L. MILAM and G. R. CHRISTOPHER Jul. 1983 66 p
(AD-A133441; AD-E750844; AU-AFIT-ED-TR-83-1) Avail: NTIS
HCA04/MFA01 CSCL 05I

A statistical analysis was done of tutored videotape instructional system (TVIDS) for SYS 100, Introduction to Acquisition Management, provided by the School of Systems and Logistics to determine if (1) student groups were comparable in terms of grade/rank, education level, sex, age, and years of logistical experience; (2) student groups were statistically equal in terms of entry level knowledge; (3) student groups were statistically equal in terms of academic achievement; (4) students accepted the tutored videotape instructional system. Data gathering instruments included a demographic questionnaire, end-of-course critique, pretest, and post-test content exam. Analyses were performed using cross-tabulation, chi-square, one-way analysis of variance, and multiple regression. The significance level was established at .05. Results indicated the students were comparable in grade/rank and age. There were statistical differences among course offerings for the educational level of students. Sex and years of logistical experience could not be compared due to the population variances not being equal. In summary, the demographic factors of grade/rank and education level are predictors of academic achievement, and the students do not accept the TVIDS as a mode of instruction. GRA

N84-16801# Naval Personnel Research and Development Center, San Diego, Calif.

PRODUCTIVITY IMPROVEMENT IN A PURCHASE DIVISION: EVALUATION OF A PERFORMANCE CONTINGENT REWARD SYSTEM (PCRS) Final Report, 1979 - 1981

D. M. NEBEKER, B. M. NEUBERGER, and V. N. HULTON Sep. 1983 76 p
(AD-A133589; NPRDC-TR-83-34) Avail: NTIS HCA05/MFA01 CSDL 05I

Performance contingent reward systems (PCRSs) were developed for small purchase buyers and supply clerks in a purchase division of a naval shipyard supply department. The rewards were financial incentives provided to individual civil service employees performing above standard. Description of the system and an evaluation of its effectiveness in increasing productivity and saving costs are provided. Results showed that systems increased productivity substantially and were cost effective.

GRA

N84-16802# Air Force Human Resources Lab., Brooks AFB, Tex.

LOW-LEVEL FLIGHT SIMULATION: VERTICAL CUES Interim Report, Sep. 1980 - Aug. 1981

E. L. MARTIN and E. J. RINALDUCCI Sep. 1983 34 p
(Contract AF PROJ. 1123)
(AD-A133612; AFHRL-TR-83-17) Avail: NTIS HCA03/MFA01 CSDL 05I

This report presents the results of two studies investigating the impact of variations in vertical cue characteristics on pilot performance on a simulated low-level flight task. The studies were conducted in the Advanced Simulator for Pilot Training in its F-16 configuration. Subjects were pilots transitioning to the F-16 aircraft. The experimental task consisted of flying a course that had irregularly placed vertical cues. The pilots' task was to maintain an assigned altitude and airspeed. The pilots' ability to maintain the specified altitude was analyzed for level flight and turning flight. The frequency of terrain crashes was also monitored.

Author (GRA)

N84-17836# Army Intelligence and Threat Analysis Center, Arlington, Va.

MILITARY MEDICAL JOURNAL, NO. 4, 1983

Apr. 1983 133 p refs Transl. into ENGLISH of Voenna-Med. Zh. (Moscow), no. 4, Apr. 1983
(L-2403) Avail: NTIS HC A07/MF A01

Several topics in clinical medicine that relate to military activities are discussed. Flight crew work capacity, cardiology, shock, competition and infectious diseases are discussed.

N84-17837# Army Intelligence and Threat Analysis Center, Arlington, Va.

THE CONCEPT OF WORKING CAPACITY OF THE FLIGHT CREW

N. M. RUDNYY and V. A. BODROV *In its* Mil. Med. J., No. 4, 1983 p 65-72 Apr. 1983 refs Transl. into ENGLISH from Voenna-Med. Zh. (Moscow), no. 4, Apr. 1983
Avail: NTIS HC A07/MF A01

The concept of work capacity, especially as it applies to flight crews, is discussed. It is argued that working capacity should be looked upon as one of the basic social - biological properties of man, reflecting his ability to perform work of specific content under specific conditions of activity for a specific time and with the required effectiveness and quality. The structure of the working capacity of aviation specialists and the classification of flying crew working capacity indices are discussed.

R.J.F.

N84-17838*# Massachusetts Inst. of Tech., Cambridge. Lab. for Man-Machine Systems.

AUTOMATION, SUPERVISORY CONTROL AND WORKLOAD IN FLIGHT MANAGEMENT Final Report, Nov. 1975 - Nov. 1980

T. B. SHERIDAN Apr. 1983 13 p refs
(Contract NSG-2118)
(NASA-CR-166474; NAS 1.26:166474) Avail: NTIS HC A02/MF A01 CSDL 05I

The effect of automation in the cockpit on changing the task of the pilot and effecting his performance is examined. N.W.

N84-17839# Georgia Inst. of Tech., Atlanta. School of Psychology.

VISUAL CUES IN THE SIMULATION OF LOW-LEVEL FLIGHT Final Report, 1 Apr. 1982 - 31 Mar. 1983

E. J. RINALDUCCI 31 May 1983 31 p
(Contract AF-AFOSR-0144-82; AF PROJ. 2313)
(AD-A135461; AFOSR-83-1016TR) Avail: NTIS HC A03/MF A01 CSDL 05H

The research described in this report was directed towards a continued examination of visual cues used by pilots to maintain altitude in low level flight simulation. The first study investigated the use of a psychophysical technique to provide a quick, low-cost evaluation of altitude cues provided by five visual display system conditions in which terrain features were varied in detail, density, and vertical development. Both pilot and non-pilot observers were employed. A second study examined three visual display environments (i.e., a valley floor, a valley floor with walls, and a valley floor with walls and inverted pyramids) using different display modes (i.e., slides, static video, and dynamic video). Differences between pilot and non-pilot subjects were obtained for the accuracy of altitude estimation.

GRA

N84-17840# Pittsburgh Univ., Pa. Learning Research and Development Center.

PROBLEM SOLVING ABILITIES

M. T. H. CHI 5 Oct. 1983 47 p
(Contract N00014-79-C-0215)
(AD-A134717; AD-E301247; UPITT/LRDC/ONR/KBC-8) Avail: NTIS HC A03/MF A01 CSDL 05J

This report provides a general and brief introduction to the current state of our understanding of human problem solving. Over the years, psychologists have learned a lot about the nature of the problem solving process. The importance of the initial representation of a problem was discovered quite a few years ago by the Gestalt School in its examination of insight problems. The actual nature of initial representations and their influence on problem solving was made clear only in the last couple of decades, however, when the notion of a solution space was developed. There was a time, not too long ago, when researchers, especially those in artificial intelligence, thought that effective problem solving might be due mainly to general strategies for guiding search through problem spaces. Early attempts to create computer programs to solve problems, such as the General Problem Solver, took this approach. However, this straightforward picture of problem solving has recently been shown to be far too simple. Specific knowledge of a domain is of overriding importance in the effective solution of problems. In addition, this knowledge must be well-structured so that relevant knowledge can be accessed at the proper time. Research is beginning to uncover just what well-structured means, but considerable work is left to be done on the problem of how we are able to retrieve and use information in a rapid and effective manner.

GRA

53 BEHAVIORAL SCIENCES

N84-17841# Colorado Univ., Boulder. Center for Research on Judgement and Policy.

TASK CONDITIONS VERSUS STABLE INDIVIDUAL DIFFERENCES AS DETERMINANTS OF EXPERTS' JUDGEMENT POLICIES

R. M. HAMM Sep. 1983 37 p

(Contract N00014-81-C-0591)

(AD-A134797; AD-F630168; CRJP-249) Avail: NTIS HC A03/MF A01 CSCL 05J

An analysis of twenty-one highway experts' judgments of the safety of a set of highways, under three different task conditions, was undertaken to determine whether task conditions or stable individual differences in judgment policy had the stronger role in determining the experts' judgment performances. Two analytical approaches were used: comparing the correlations among performances within each individual expert over the different task conditions, and within each task over the different experts, and clustering the performances and inspecting whether clusters were made up primarily of performances from the same individuals or from the same task conditions. While the approach of comparing correlations of performances gave ambiguous results, the clustering approach clearly indicated that task condition, not stable individual judgment policy, determines similarities among judgment performances. Author (GRA)

N84-17842# University of Southern California, Los Angeles. Center for Effective Organizations.

MOTIVATION AND PERFORMANCE APPRAISAL BEHAVIOR

A. M. MOHRMAN, JR. and E. E. LAWLER, III 1981 34 p

(Contract N00014-81-K-0048)

(AD-A134311; G-81-12(19); REPT-14) Avail: NTIS HC A03/MF A01 CSCL 05J

This paper is concerned with what motivates the behavior involved in carrying out performance appraisals (PA) in organizations. Typically, research and theory concerned with motivation has focused on how PA effects the subsequent work behavior of the appraisee; here we will focus on what motivates the PA behaviors themselves. Conducting a PA involves a set of behaviors performed by organizational members. As such, PA behaviors are simply one subset of the total set of role behaviors they perform. Thus, they can be analyzed as any other organizational behavior. PA behavior is a particularly interesting and important type of behavior to study. The particular purposes of PA create contexts that give PA behaviors unique and complex meanings that are worthy of study for what they can teach us about motivation and assessment. In addition, as we come to understand more about the results of certain PA behaviors (such as allowing participation in the process by appraisees) and as we become more concerned with the quality of PA behaviors (e.g., bias in measurement), we also need to be more concerned about what motivates such behaviors so they can be managed. Seeking to manage performance behaviors through PA will come to nought unless these PA behaviors themselves can be managed. GRA

N84-17843# Hershey (Milton S.) Medical Center, Hershey, Pa. Dept. of Behavioral Science.

COGNITION AND AROUSAL AS PREDICTORS OF RISK TAKING: EFFECTS OF LOAD AND COGNITIVE STYLE

S. STREUFERT Aug. 1983 26 p

(Contract N00014-80-C-0581)

(AD-A134324; TR-15-ONR) Avail: NTIS HC A03/MF A01 CSCL 05J

The research investigated the contributions of three cognitive styles (Type A, Cognitive Complexity and the General Incongruity Adaptation Level - GIAL) on risk taking in a visual motor task. The research was further concerned with uncovering possible relationship between these cognitive styles and physiological (cardiovascular) arousal as sources of risky action. Effects of stylistic variables on risk taking appeared frequently at specific task load levels. Only limited relationships between arousal and risk taking were obtained. Arousal did not covary meaningfully with stylistic antecedents of risky behavior. It was concluded that risk taking is primarily cognitive in orientation and interventions to

decrease risk taking on the job should focus on relevant cognitive approaches. GRA

N84-17844# Hershey (Milton S.) Medical Center, Hershey, Pa. Dept. of Behavioral Science.

TASK DIFFERENCES, STYLISTIC CHARACTERISTICS AND PHYSIOLOGICAL AROUSAL

S. C. STREUFERT Aug. 1983 34 p

(Contract N00014-80-C-0581)

(AD-A134335; TR-14-ONR) Avail: NTIS HC A03/MFA01 CSCL 05J

This research was designed to determine the effects of cognitive/behavioral styles, in general, and of the General Incongruity Adaptation Level (GIAL), in particular, on physiological arousal under a variety of task conditions. It was found that load stressors in many cases produce changes in blood pressure levels which appear to parallel previous findings showing them to be related to various indices of task performance. Particularly the GIAL style (and to lesser degrees cognitive complexity and Type A, in that order) appear to mediate when load stressor effects on arousal do occur. The present research provides the basis for planned research efforts which will be concerned with potential covariation of task performance measures (such as risk taking and utilization of strategy) and physiological responsivity, as they are jointly affected by behavioral styles and task stressor (e.g., load) levels. GRA

N84-17845# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.

ANALYSIS OF THE PILOT CONVERSION PROCESS FOR THE AIR FORCE T-46A JET TRAINER AIRCRAFT M.S. Thesis

V. S. JENSEN Sep. 1983 169 p

(AD-A134404; AFIT-LSSR-51-83) Avail: NTIS HC A08/MF A01 CSCL 05I

The objective of this research was to critically evaluate a portion of the Air Training Command T-46A Implementation Master Plan dated 1 March 1983. The process of converting students and instructor pilots from T-37 to T-46A was analyzed for feasibility and sensitivity to changes in certain resources and schedules. A simple analytical approach was used, calculating and comparing flying hours required versus available for various resource situations. The basic plan, as written for Laughlin AFB, is infeasible because of a short-age of flying hours during several months. The primary causes of this imbalance are: use of partial- and no-simulator syllabi; peak flying during the Operational Readiness Assessment (ORA); and the relatively low initial T-46A utilization rate. Some options for making the plan more workable are analyzed, as is a plan to convert without additional instructor pilots. Other approaches are suggested, without analysis. Besides the actual pilot conversion, there are brief analyses and comments on acquiring additional instructor pilots, manning the ORA, and conversion at subsequent bases. The findings are based on specific assumptions which must be clearly understood. The author concludes that the basic plan can be made feasible by applying suggested modifications. Author (GRA)

N84-17846# Hershey (Milton S.) Medical Center, Hershey, Pa. Dept. of Behavioral Science.

EFFECTS OF LOAD, COGNITIVE COMPLEXITY AND TYPE A ON SATISFACTION

S. STREUFERT, S. C. STREUFERT, and R. POGASH Jun. 1983 28 p

(Contract N00014-80-C-0581)

(AD-A134415; TR-ONR-13) Avail: NTIS HC A03/MF A01 CSCL 05J

Effects of information load on satisfaction as modified by type A vs. Type B and by Cognitive Complexity were investigated. Satisfaction decreased with increasing task difficulty (load) but was particularly low for persons of Type A and cognitive simple styles. Similar results were obtained for a measure of Enjoyment Despite Dissatisfaction which accounted for motivation in the face of challenge. Relationships between job and task satisfaction are considered. Author (GRA)

N84-17847# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.

PRELIMINARY FIELD TESTS FOR DETECTING FLYING TARGETS IN FRONT OF A LAND BACKGROUND [FOERBEREDANDE FAELTFOERSOEK AVSEENDE UPPTAECKT AV LUFTMAAL MOT TERRAENGBAKRUNG]

C. WEIKERT Sep. 1982 22 p refs In SWEDISH (FOA-C-56033-H2) Avail: NTIS HC A02/MF A01

Over 100 flights on 3 different tracks were observed by 5 persons using periscopes equipped with a moving target indicator. Flight heights varied from 25 to 50 m. The detection probability rate was determined: 5% for distances over 60 hm and 50% at 46 hm. High angular velocity of the target allows earlier detection. It is noted that light illumination directly towards the target is always more favorable than cross light. Effects of background luminance are reported. Author (ESA)

N84-17848# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.

DETECTION OF FLYING TARGETS IN FRONT OF A LAND BACKGROUND: LABORATORY TESTS [UPPTAECKT AV LUFTMAAL MOT TERRAENGBAKRUNG: LABORATORIEFOERSOEK]

C. WEIKERT Sep. 1982 18 p refs In SWEDISH (FOA-C-56034-H2) Avail: NTIS HC A02/MF A01

Target recognition against a land background was studied using color movies observed by 60 persons, 39 of whom also observed black and white video recordings. The influence of target angular velocity and light incidence were studied. Results show that the higher the target angular velocity is, the earlier detection occurs; better detection performances are noted with an oblique light incidence than with the light towards the observer, which in turn gives better performances than cross-light. For target approaches recorded on video tapes, only light incidence is conclusive, cross-light giving the best results. This is not in accordance with color film tests and ground observations, due probably to contrast differences between the black and white video images and color perception. Author (ESA)

N84-17849# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.

DETECTION OF FLYING TARGETS IN FRONT OF A LAND BACKGROUND: FIELD TESTS [UPPTAECKT AV LUFTMAAL MOT TERRAENGBAKGRUND: FAELTFOERSOEK]

C. WEIKERT Sep. 1982 35 p refs In SWEDISH (FOA-C-56035-H2) Avail: NTIS HC A03/MF A01

The influence of the target type, angular velocity, illumination, and visibility conditions on visual detection of flying targets against a land background was studied. Sixteen observers made 162 determinations with 18 different combinations of target type, angular velocity, and light incidence. Three types of aircrafts were used. Mean detection distance is 101.6 hm. The probability rate of detection before a 60 hm approach is 85%, 91%, and 99% depending on the aircraft type, and a 50% detection rate is noted at distances of 90, 103, and 111 hm. Author (ESA)

N84-17850# California Univ., Irvine. Dept. of Pulmonary and Critical Care Medicine.

BEHAVIORAL CHANGE OF BLOOD LACTATE METABOLISM Final Report

A. F. WILSON Dec. 1982 74 p refs (Contract PHS-MH-29791)

(PB84-100171; NIMH-83-333) Avail: NTIS HC A04/MF A01 CSCL 05J

Possible cellular contributions to behavioral alteration of glycolytic rate in the state of transcendental meditation (TM) were investigated. Specifically, the study was undertaken to: (1) confirm preliminary experiments which indicated that the rate of lactate generation by formed elements of blood may be affected by a relaxed behavioral state; (2) investigate the effect of other common forms of rest/relation states; (3) ascertain whether the effects on generation associated with rest of TM are due to sleep that may occur; (4) investigate more precisely the origin and mechanism of

altered blood glycolysis; (5) study the interrelationship between the primary outcome variable of altered blood glycolysis; and (6) study possible contribution of personality variables to outcome.

GRA

54

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

A84-19640# VISUO-MANUAL TRACKING PERFORMANCE OF MAN SUBMITTED TO VIBRATION

G. M. GAUTHIER, J. P. ROLL, B. MARTIN, J. P. PIRON, E. MARCHETTI, and M. HUGON (Societe Nationale Industrielle, Aerjospatiale, Division Helicopteres, Marignane, Bouches-du-Rhone; Aix-Marseille I, Universite, Marseille, France) Association Aeronautique et Astronautique de France, European Rotorcraft Forum, 8th, Aix-en-Provence, France, Aug. 31-Sept. 3, 1982, Paper. 18 p. refs

The effects of vibration on the visuomanual tracking system and the effect of the vestibuloocular reflex are evaluated experimentally. To test the human vestibuloocular system, helicopter vibration between 0.5 and 30 Hz is simulated, with the head force-rotated by a hard-cushioned helmet and a rigid bite bar. Position and velocity error histograms, pursuitograms, and gain and phase curves are obtained. Vibration causes an increase in both leading and lagging hand tracking errors, outlasting the vibration itself. Eyes rotate over a four to six degree angle while the head moves only 12 degrees. The gain curve increases continuously after 8 Hz and the phase curve is bell-shaped with an apex at 90 degrees around 20 Hz. It is concluded that gain variation at high rotation frequency may cause perceived visual target instability, thereby decreasing human tracking performance in a vibrating environment. C.M.

A84-19647#

ARMY PILOT ERGONOMICS

S. C. STEVENS (U.S. Army, Aviation Research and Development Command, St. Louis, MO) and I. C. STATLER (U.S. Army, Aeromechanics Laboratory, Moffett Field, CA) Association Aeronautique et Astronautique de France, European Rotorcraft Forum, 8th, Aix-en-Provence, France, Aug. 31-Sept. 3, 1982, Paper. 13 p.

As a result of technological developments and changes regarding the battlefield environment, new missions, tactics, and performance requirements have evolved for the helicopter. One example for a new tactic with very exacting requirements is the nap-of-the-earth (NOE) flight. However, the technological equipment which is to enable the helicopter to perform its tasks has frequently been designed without taking into account the human operator's role in the effectiveness of the man-machine system. One important problem is that the channel capacity of the human organism as a processor or receiver of information is limited. An analysis of the situation shows that the human controller might have become the limiting element in the man-machine system required to perform current Army helicopter missions. It is essential that the characteristics of human perception be factored into the cockpit design. There is a need for a system of information display laws similar, conceptually, to the flight control laws. G.R.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

A84-19848

ROBOTS IN SPACE TRAVEL [ROBOTER IN DER RAUMFAHRT]

G. HIRZINGER (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Dynamik der Flugsysteme, Wessling, West Germany) (Hermann-Oberth-Gesellschaft, Raumfahrtkongress, 31st, Bremen, West Germany, Sept. 16-19, 1982) Acta Astronautica (ISSN 0094-5765), vol. 10, Dec. 1983, p. 777-792. In German. refs

Advances in automation of spacecraft, in robot technology, and in artificial intelligence are reviewed and the use of robotics in space flight is discussed. The development of sensors for such application is considered, including television and CCD cameras, moment of force sensors, and tactile sensors. The application of robotic skills to space rendezvous, assembly, and docking, and to exploration of planetary surfaces is addressed. C.D.

A84-20288

BENEFITS OF HELMET-MOUNTED DISPLAY IMAGE STABILISATION UNDER WHOLE-BODY VIBRATION

M. J. WELLS and M. J. GRIFFIN (Southampton, University, Southampton, England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Jan. 1984, p. 13-18. Research supported by the Ministry of Defence (Procurement Executive) and U.S. Air Force. refs

Visual performance with raster-scan-display helmets is evaluated under whole-body vertical vibration at 2.5-25 Hz, and the effectiveness of vertical and horizontal image stabilization by means of accelerometer feedback is investigated. U.S. Air Force and British Mk IV helmets equipped with Hughes and Ferranti displays, respectively, are used in reading-time (RT) and reading-error (RE) tests on 12 male subjects with 20/20 vision. The results are presented graphically and discussed. Vibration causes significant increases in RT and RE, with respective rms peaks of 130 and 30 percent per m/sq sec at about 5 Hz; these increases can be decreased by vertical stabilization alone or (to a greater extent) by vertical and horizontal stabilization (to rms increases of 40 and 10 percent per m/sq sec). Transfer functions relating Z-axis translational acceleration to head-pitch rotational acceleration are also determined. T.K.

A84-20290

A CARDIOVASCULAR MODEL FOR STUDYING IMPAIRMENT OF CEREBRAL FUNCTION DURING +Gz STRESS

D. JARON, T. W. MOORE, and C.-L. CHU (Drexel University, Philadelphia, PA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, Jan. 1984, p. 24-31. refs (Contract N00014-81-K-0391)

A digital computer model of the human cardiovascular system has been developed which can be used for studying impairment of cerebral function during +Gz stress. The model includes simulation of the arterial and venous systems, the heart, baroreceptor control of heart rate, control of venous tone, and the effect of gravity. Model predictions suggest that, for unprotected subjects, carotid pressure at eye level decreases to 50 mm Hg (beginning of peripheral light loss) at approximately 2.7 Gz. The pressure decreases to 20 mm Hg (beginning of central light loss) at approximately 3.6 Gz. An anti-G suit provides an extra 1.1 to 1.5 Gz protection. Even though blood pressure supplying retinal vessels drops significantly at the above G levels, cerebral blood flow is maintained due to protective and compensatory mechanisms. These observations compare favorably with results reported in the literature. The results suggest that this model can be used to improve our understanding of the cardiovascular system's response to +Gz stress. Author

A84-20553

DETERMINATION OF THE CHARACTERISTICS OF INFORMATION RECEPTION BY AN OPERATOR IN MAN-MACHINE SYSTEMS [OPREDELENIE KHARAKTERISTIK PRIEMA INFORMATSII OPERATOROM V SISTEMAKH 'CHELOVEK-MASHINA']

A. M. SHESTOPALOV and I. G. MOISEEV Radiotekhnika (ISSN 0033-8486), Oct. 1983, p. 21-23. In Russian. refs

Aspects of operator behavior in a man-machine system are examined, and the probability characteristics of human reliability in the framework of the real operation of a communications system are assessed. An expression is derived which makes it possible to determine the mean value of the quantity of information received by the operator in a man-machine system which provides for failure-free operation of the system. B.J.

A84-20885

PROSPECTS IN THE DEVELOPMENT OF MEDICAL SERVICES IN AUTOMOBILE TRANSPORT [O NEKOTORYKH PERSPEKTIVAKH RAZVITIIA AVTODOROZHNOI MEDITSINY]

A. I. VAISMAN (Nauchno-Issledovatel'skii Institut Gigieny Truda i Profzabolevanii, Gorki, USSR) Gigiena Truda i Professional'nye Zabolevania, July 1983, p. 27-30. In Russian. refs

It is proposed that medical service in automobile transport be concerned with the total systems analysis of complex, multidimensional, multilevel, and dynamic relationships of the driver's safety as the main link in the system comprising the driver, the automobile, the traffic environment, and biomedical, psychological, and social factors. Ways to standardize working conditions for drivers are formulated, and a scheme of relationships between various factors and the driver's safety is presented. B.J.

A84-20900

THERMOSTATIC SETUP FOR A POLYTHERMAL CALORIC PROBE [TERMOSTATNAIA USTANOVKA DLIA POLITHERMAL'NOI KALORICHESKOI PROBY]

R. M. SHAIMARDANOV (Kuibyshevskii Meditsinskii Institut, Kuibyshev, USSR) Zhurnal Ushnykh Nosovykh i Gorlovykh Boleznei (ISSN 0044-4650), July-Aug. 1983, p. 74, 75. In Russian. refs

The paper describes the design and operation of a thermostatic setup for a polythermal caloric probe devised to study the vestibular analyzer. The proposed automatic device makes it possible to maintain the temperature from 1 to 50 C in the entire fluid volume and heats medicine solutions to body temperature in the course of 4-7 min. The device comprises an electronic thermoregulator and sterilizer and its operating principle is based on the properties of the photodiode incorporated in the circuit. B.J.

A84-20918

A DEVICE FOR ESTIMATING THE COMPOSITION OF ALVEOLAR AIR [USTROISTVO DLIA OTSENKI GAZOVOGO SOSTAVA AL'VEOLIARNOGO VOZDUKHA]

A. B. GANDELSMAN, A. M. CHUKOV, and M. A. SHANSKOV (Gosudarstvennyi Institut Fizicheskoi Kul'tury, Leningrad, USSR) Teoriia i Praktika Fizicheskoi Kul'tury (ISSN 0040-3601), July 1983, p. 52, 53. In Russian.

A84-20924

MATHEMATIC MODELING OF HEAT TRANSFER PROCESSES IN THE HUMAN BODY [MATEMATICHESKOE MODELIROVANIE PROTSESSOV TEPLOBMENA V ORGANIZME CHELOVEKA]

G. N. DULNEV, M. M. KOROTKEVICH, N. V. PILIPENKO, and A. V. SIGALOV (Leningradskii Institut Tochnoi Mekhaniki i Optiki, Leningrad, USSR) Inzhenerno-Fizicheskii Zhurnal (ISSN 0021-0285), vol. 46, Jan. 1984, p. 151-160. In Russian. refs

The existing methods of the mathematical modeling of the human thermal system are reviewed. In particular, attention is given to the derivation of models with distributed parameters, models with concentrated parameters, and models of thermal regulation. Examples of specific models are given and their applications are discussed. A new stepped approach to the modeling of the thermal

response of man is proposed wherein a highly detailed description of the thermal response of individual organs is combined with a description of the human thermal system as a whole. V.L.

A84-21016

AN ALTIMETRIC-DILUTION LAW APPLICABLE TO HIGH-ALTITUDE CLOTHING [ETUDE D'UNE LOI DE DILUTION ALTIMETRIQUE APPLICABLE ADES VETEMENTS DE HAUTE ALTITUDE]

H. MAROTTE, J. COLIN (Service de Santes Armees, Paris, France), and H. VIELLEFOND (Service de Santes Armees, Bretigny-sur-Orge, Essonne, France) *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 217-220. In French.

An altimetric-dilution law is developed for pressure suits and breathing systems to be used in modern high-altitude military aircraft. The design constraints include the use of air/O₂ mixtures to lower costs and the applicability of one dilution system to both low-altitude (mask only) and high-altitude (mask + suit) configurations. The proposed solution involves no O₂ enrichment at low altitudes, pure O₂ supply to the suit above 39,000 ft (corresponding to a cabin altitude of 18,400 ft under the 30-kPa pressurization law employed in French military aircraft), and a suit O₂ concentration equivalent to a mean alveolar O₂ pressure of 8.0 kPa at the aircraft altitude for the intermediate altitude range. The dilution-law curves are shown, and corrections for different suit/mask air-supply ratios are indicated. T.K.

A84-21017

ANALOGICAL SIMULATION MODEL OF THE THERMAL STRESS AFFECTING THE HEAD [MODELE ANALOGIQUE DE SIMULATION DES CONTRAINTES THERMIQUES SUPPORTEES PAR LA TETE]

C. BOUTELIER, M. LONCLE (Centre d'Essais en Vol, Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge, Essonne, France), and J. L. BELARD (Etablissement Technique Central de l'Armement, Service Medical, Arcueil, Vol-de-Morne, France) *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 221-224. In French.

The design and operation of a human-head simulator for evaluating the thermal characteristics of aviation helmets, masks, and ventilation systems are reported. The model is internally heated by IR radiation and includes a breathing simulator. The principal characteristics include heating power variable from 0 to 50 W, ventilation frequency 10-30 cycles/min, frontal-temperature precision + or - 0.1 C, and temperature sensors at various locations. Sample tests in the environments no wind/no sun, wind, and wind + sun and the configurations bare head, mask only, and mask + helmet are reported. T.K.

A84-21020

THE BIOMEDICAL COMPONENT IN AIRCREW WORKLOAD

S. R. MOHLER (Wright State University, Dayton, OH) *Medecine Aeronautique et Spatiale*, vol. 22, 3rd Quarter, 1983, p. 250-253. refs

Recent research on aircrew workload is surveyed, summarizing the findings of Mohler et al. (1981), Sulzer et al. (1981), and Sulzer (1981). Topics discussed include the workload elements (perceptual, cognitive, and motor); factors affecting individual performance (skill level, fitness, fatigue, anxiety, and illness); aircraft characteristics, controls, and displays; mission and environmental factors; types of workload studies (laboratory, simulation, and inflight), crew complement; simulator applications; and subjective and objective workload methodologies. The importance of applying workload information to the design of future aircraft is indicated. T.K.

A84-21056

THE DYNAMICS OF A MANIPULATOR WITH ALLOWANCE FOR THE COMPLIANCE OF THE JOINTS [(O DINAMIKE MANIPULIATORA S UCHETOM PODATLIVOSTI SHARNIROV)]

D. M. GORINEVSKII *Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela* (ISSN 0572-3299), Nov.-Dec. 1983, p. 43-48. In Russian.

A manipulator is analyzed in which one degree of freedom is nonideal, i.e., the angle of one of the joints is equal to the sum of the programmed angle and a deviation from the program. It is assumed that the values of all the programmed angles are specified functions of time and that the deviation results from deformation or free play in the joint or in the actuating mechanisms. The oscillations generated in such a system are investigated using asymptotic methods. The analysis is illustrated by examples. V.L.

A84-21246

BIODYNAMIC RESPONSE OF THE HUMAN BODY IN THE SITTING POSITION WHEN SUBJECTED TO VERTICAL VIBRATION

P. M. DONATI and C. BONTHOUX (Lorraine, Institut National Polytechnique, Nancy, France) *Journal of Sound and Vibration* (ISSN 0022-460X), vol. 90, Oct. 8, 1983, p. 423-442. refs

Previous studies of the location of those areas in which the sensation of vibration is perceived under whole body vertical vibration have underlined the predominance of the relative movement between thorax and pelvis. Experiments were designed to explore systematically the transmissibility between the pelvis and thorax. These were supplemented by measurements of mechanical impedance of the body and absorbed power. To determine the body impedance, a procedure was developed to remove the effect of the load platform itself. Fifteen subjects were presented first with a swept sinusoidal vibration, and then with a broad band random vibration, to see how the wave form of the motion might affect the mechanical response of the body. The results obtained for the seat-to-thorax transmissibility suggest that, within the range of vertical vibration investigated (1-10 Hz, 1.6 m/sec-squared r.m.s.), the human body in the sitting position can be modelled by a linear system with one or two degrees of freedom, according to the subject. Data from the impedance function, which is a more complete description of the response of the body as a mechanical system, lead to systems with one further degree of freedom. Author

A84-21637

HUMAN SYSTEM INTERFACE CONCERNS IN SUPPORT SYSTEM DESIGN

G. JOHANNSEN (Kassel, Universitaet, Kassel, West Germany), J. E. RIJNSDORP (Twente, Technische Hogeschool, Enschede, Netherland), and A. P. SAGE (Virginia, University, Charlottesville, VA) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 595-603. refs

Current research needs and future prospects in the area of support to man-machine system analysis, design, and evaluation are described. We are especially concerned with system design requirements to enable efficient and effective human system interaction. Prospects for enhanced support to the human operator, in problem solving cognitive tasks that involve planning and design as well as physiological tasks that involve controlling, through use of knowledge based systems and decision support systems, are discussed. Author

A84-21638* Georgia Inst. of Tech., Atlanta.

MODELS OF HUMAN PROBLEM SOLVING - DETECTION, DIAGNOSIS, AND COMPENSATION FOR SYSTEM FAILURES

W. B. ROUSE (Georgia Institute of Technology, Atlanta, GA) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 613-625. refs

(Contract MDA903-79-C-0421; NAG2-123)

The role of the human operator as a problem solver in man-machine systems such as vehicles, process plants, transportation networks, etc. is considered. Problem solving is

discussed in terms of detection, diagnosis, and compensation. A wide variety of models of these phases of problem solving are reviewed and specifications for an overall model outlined.

Author

A84-21639
MEASURING, MODELING, AND AUGMENTING RELIABILITY OF MAN-MACHINE SYSTEMS

T. B. SHERIDAN (MIT, Cambridge, MA) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 637-645. refs

In the present investigation, current analytical and empirical trends in dealing with human reliability are reviewed, and the nature and meaning of human errors and man-machine systems reliability are considered. Suggestions are made regarding a number of promising approaches for enhancing the reliability of man-machine systems. Problems of modeling reliability of man-machine systems are explored, taking into account a discrete failure combinatorial model, a time continuum failure model, a Monte Carlo failure simulation, and a normal performance continuum simulation. Attention is given to empirical reliability measurements, and reflections concerning the nature of human error. G.R.

A84-21641
PERSPECTIVE ON HUMAN PERFORMANCE MODELLING

R. W. PEW and S. BARON (Bolt Beranek and Newman, Inc., Cambridge, MA) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 663-676. refs

An overview of, and perspective on, human performance modelling is presented. The role of human performance models in the design process for complex man-machine systems is discussed. Then psychologically-based models and a control-theoretic approach to modelling are reviewed. Finally, a recently developed model that illustrates how features of the two approaches may be synthesized to analyze a wider range of supervisory control problems is described and discussed. Author

A84-21642
MODEL OF THE HUMAN OBSERVER AND DECISION MAKER - THEORY AND VALIDATION

P. H. WEWERINKE (Nationaal Lucht-en Ruimtevaartlaboratorium, Amsterdam, Netherlands) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 693-696. refs

A model of the human decision maker observing a dynamic system is presented. The decision process is described in terms of classical sequential decision theory by considering the hypothesis that an abnormal condition has occurred by means of a generalized likelihood ratio test. For this, a sufficient statistic is provided by the innovation sequence which is the result of the perception and information processing submodel of the human observer. On the basis of only two model parameters the model predicts the decision speed/accuracy trade-off and various attentional characteristics. A preliminary test of the model for single variable failure detection tasks resulted in a very good fit of the experimental data. In a formal validation programme a variety of multivariable failure detection tasks was investigated. A very good overall agreement between the model and experimental results showed the predictive capability of the model. In addition, the specific effect of almost all task variables (number, bandwidth and mutual correlation of display variables and various failure characteristics) was accurately predicted by the model. Author

A84-21643
AN INTERACTIVE SYSTEM FOR SUPPORTING MULTIOBJECTIVE DECISION MAKING

V. WUWONGSE (Asian Institute of Technology, Bangkok, Thailand), S. KOBAYASHI, and A. ICHIKAWA (Tokyo Institute of Technology, Yokohama, Japan) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 697-702. refs

The purpose of this paper is to develop an interactive system for supporting the decision making process under multiple objectives and to empirically evaluate its performance. An interactive algorithm underlying the system is proposed with emphasis on the psychological aspects of the decision maker

(DM). A choice process model is developed, based on pairwise comparison judgments of alternatives, because the judgments are basic and easy for a DM. A corresponding interactive algorithm is implemented and compared with other existing algorithms. Two kinds of comparative experiments, numerical and subject experiments, are conducted to verify the validity of the choice model as well as the practical effectiveness and the convergence of the algorithm. Author

A84-21645
HUMAN DISPLAY MONITORING AND FAILURE DETECTION - CONTROL THEORETIC MODELS AND EXPERIMENTS

W. STEIN (Forschungsinstitut fuer Antropotechnik, Wachtberg-Werthhoven, West Germany) and P. H. WEWERINKE (Nationaal Lucht- en Ruimtevaartlaboratorium, Amsterdam, Netherlands) *Automatica* (ISSN 0005-1098), vol. 19, Nov. 1983, p. 711-718. refs

Two newly developed control theoretic models for human display monitoring and decision making are presented that use the information structure of the well-known optimal control model of human response. Experimental paradigms with six dominant task variables (i.e. number of displayed processes, bandwidths, event probabilities, field of view, process couplings, and failure couplings), deduced from vehicle and process control situations, are the basis for extensive validation studies including eye-movement recordings. The broad coverage of the paradigms and the high degree of data/model correspondence provide the predictive potential for the analysis, design, and evaluation of man-machine systems. The relation of these models to existing prediction schemes is outlined. Author

A84-21739
SIGNIFICANCE OF THE HEADREST GEOMETRY IN +GZ PROTECTIVE SEATS

J. W. BURNS and J. E. WHINNERY (USAF, School of Aerospace Medicine, Brooks AFB, TX) *Aviation, Space, and Environmental Medicine* (ISSN 0095-0562), vol. 55, Feb. 1984, p. 122-127. refs

An X-ray technique was used to determine the vertical hydrostatic-column length (h) between the eye and the prosthetic aortic valve of seven subjects at three different experimental headrest geometries at 30 and 65-deg seatback angles. The h from these subjects was then used to explain relaxed +Gz-tolerance data acquired from other subjects at the same seating geometries. There was a very significant correlation ($r = 0.99$, p much lower than 0.001) between $1/h$ and relaxed +Gz tolerance. Changing the seatback angle from 30 to 65 deg resulted in 35.6 percent, 19.8 percent, and 24.1-percent decreases in h and corresponding 69.2 percent, 30.3 percent and 36.4-percent increases in relaxed +Gz tolerance for the three different headrest geometries, respectively. These data demonstrate that headrest geometry is an important consideration in obtaining the optimum reduction in h within the operational constraints of the cockpit. Author

A84-21882#
THE EFFECT OF COMPUTATIONAL TIME-DELAYS ON PILOT PERFORMANCE IN REAL-TIME FLIGHT SIMULATION

J. A. SEVIER, D. B. MINTURN, D. W. BERNARD, and T. J. POLLARD (Northrop Aerospace Laboratory, Hawthorne, CA) *American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 22nd, Reno, NV, Jan. 9-12, 1984. 7 p. refs* (AIAA PAPER 84-0553)

The results of an experimental study to determine the effects of computational time-delay on a fighter pilot's performance are presented. In this program a fixed-base simulator and a computer model of a fighter aircraft were used to measure the pilot's ability to perform a series of single-axis tracking tasks for two configurations which only differed by the amount of computational or 'transport' delay. Many studies have shown that if the transport-delay is excessive and the pilot's task is sufficiently demanding, such as approach and landing or high frequency target tracking, then for delays in excess of 70 milliseconds (ms), pilot performance degradation becomes increasingly greater, and if too

large, the possibility of pilot-induced-oscillations (PIO) arises. This fact was substantiated in this experimental program as a significant difference in the pilot's ability to track a higher frequency target, oscillating in the pitch-axis only, was detected for the two configurations. A roll-axis tracking task was also utilized in this experiment, but the results of the comparison between the two configurations proved to be insignificant. Author

A84-22272

A QUALITATIVE DISCUSSION OF MECHANISMS OF FEEDBACK AND FEEDFORWARD IN THE CONTROL OF LOCOMOTION
H. HEMAMI and B. T. STOKES (Ohio State University, Columbus, OH) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-30, Nov. 1983, p. 681-688. refs (Contract NSF ECS-82-01240)

A brief discussion of the kinematics and dynamics of biped locomotion is provided. A number of elementary control problems are presented that include breaking or making contact with the environment, in addition to the conventional reflex and point-to-point movements. For this class of control problems, available mathematical methods of maintaining or breaking the support are surveyed, and these results are expressed in the context of experimental tests and results about the functional role of the support forces in stability and the role of skin mechanoreceptors in sensing and processing of these forces. The existence, role, and source of a network of gain controlling mechanisms - the facilitatory-inhibitory system - is reviewed. A gross locomotion model of the central nervous system is presented where the extrapyramidal pathway is modeled with a kinematic model, an inverse system, and a feedback system. These three subsystems correspond, respectively, to the lateral cerebellum, the basal ganglia, and the vermal and/or paravermal cerebellum. Author

A84-22273

AN INHOMOGENEOUS THERMAL BLOCK MODEL OF MAN FOR THE ELECTROMAGNETIC ENVIRONMENT
I. CHATTERJEE and O. P. GANDHI (Utah, University, Salt Lake City, UT) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-30, Nov. 1983, p. 707-715. refs (Contract NOAA-ES-02304)

An inhomogeneous four layer block thermal model of a human body, composed of 476 electromagnetic-sensitive cubical cells has been developed to study the effects of electromagnetic radiation. Varying tissue properties defined by thermal conductivity, specific heat, blood flow rate and metabolic heat production are accounted for by equations. Peripheral cell temperature is weight-averaged for total cell volume and is thereby higher than actual skin temperature. During electromagnetic field exposure, additional factors considered are increased blood flow rate caused by vasodilation and sweat-induced heat loss. Hot spots have been located in the model and numerical results are presented. Subjected to plane wave irradiation, the model's sweating and insensible perspiration cease and all temperatures converge. Testing during electromagnetic hyperthermia shows all temperature body parts to increase approximately at the same rate. C.M.

A84-22274

SCAN-ALONG POLYGONAL APPROXIMATION FOR DATA COMPRESSION OF ELECTROCARDIOGRAMS
M. ISHIJIMA (Tokyo Women's Medical College, Kawada, Japan), S.-B. SHIN, G. H. HOSTETTER, and J. SKLANSKY (California, University, Irvine, CA) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-30, Nov. 1983, p. 723-729. refs (Contract NIH-RR-07008; NIH-CA-32487)

Three fast and efficient 'scan-along' algorithms for compressing digitized electrocardiographic data are described. These algorithms are 'scan-along' in the sense that they produce the compressed data in real time as the electrocardiogram is generated. The algorithms are based on the minimum perimeter polygonal approximation for digitized curves. The approximation restricts the maximum error to be no greater than a specified value. Our algorithms achieve a compression ratio of ten on a database of

8000 5-beat abnormal electrocardiograms sampled at 250 Hz and a compression ratio of eleven on a database of 600 3-beat normal electrocardiograms (different from the preceding database) sampled at 500 Hz. Author

A84-22399

AIRCREW RESTRAINT IMPROVEMENT PROGRAM

J. RODRIGUEZ (U.S. Navy, Naval Air Test Center, Patuxent River, MD) and L. COLUZZI (Sperry Corp., Lexington Park, MD) SAFE Journal, vol. 13, Winter 1983, p. 4-9.

It is pointed out that for current high performance aircraft, mission effectiveness, as well as a successful emergency escape, can be determined by the effectiveness of the restraint system. Current systems used by the Navy may be improved to provide better aircrew restraint. A restraint system meeting current requirements must provide adequate restraint to eliminate movement between the crewmember and the seat in the vertical Z axis, the horizontal X axis, and, to some extent, the lateral Y axis. The present investigation is concerned with the Aircrew Restraint Improvement Program, which was initiated to provide improvements in both a short term and long term approach. A number of currently operational restraint systems and modified derivatives was evaluated to determine if any significant simple and easy to retrofit improvements to Navy aircrew restraint systems could be obtained. G.R.

A84-22567

PROBLEMS POSED BY THE USE OF ONBOARD OXYGEN GENERATORS [PROBLEMES POSES PAR L'EMPLOI DE GENERATEURS D'OXYGENE EMBARQUES]

H. VIEILLEFOND and H. MAROTTE (Centre d'Essais en Vol, Laboratoire de Medecine Aeronautique, Breigny-sur-Orge, Essonne, France) Medecine Aeronautique et Spatiale, vol. 22, 3rd Quarter, 1983, p. 307-311. In French.

Routine and emergency methods of aircraft cabin air circulation are discussed; an oxygen generator that works via chromatography with molecular screens is described in detail. The advantages of a system with molecular screens are easy handling and maintenance, and autonomous functioning as soon as blowers are in operation; the disadvantages are dependence on engine operation and low pressure of the oxygen mixture supplied, which contains at best 90-95 percent oxygen and 5-10 percent argon (a potential embolism inducer). Present technology will be able to improve the system's air quality: hydrocarbons, carbon monoxide, radioactive dust and bacterial particles will be filtered out to a certain extent. Further contamination problems are caused by ozone infiltration and motor fuel and lubricants; air is also degraded by combustion. The article concludes with a 'question and answer' section by specialty personnel. C.M.

A84-22942

A SIMPLE TECHNIQUE OF MULTIPLE CENTRAL STATIC PERIMETRY AND THE FIRST RESULTS OF ITS APPLICATION [PROSTAIA METODIKA MNOZHESTVENNOI TSENTRAL'NOI STATICHESKOI PERIMETRII I PERYVE REZULTATY EE PRIMENENIIA]

V. V. VOLKOV, V. P. SERGEEV, and A. F. BUGROVA (Voenno-Meditsinskaya Akademiya, Leningrad, USSR) Vestnik Oftal'mologii (ISSN 0042-465X), July-Aug. 1983, p. 48-51. In Russian. refs

Multiple central static perimetry is shown to be a simple, relatively reliable, and readily available technique which can be used in hospitals and polyclinics for mass prophylactic examinations. The technique facilitates the early diagnosis of diseases which impair the function of the central area of the retina; of particular importance is that it can rapidly detect defects which are not revealed by other perimetry techniques. B.J.

N84-16775# Joint Publications Research Service, Arlington, Va.
G SUIT OF BLADDERLESS TYPE AS A MEANS OF IMPROVING ORTHOSTATIC STABILITY AFTER WATER IMMERSION HYPOKINESIA ND EXPOSURE TO ACCELERATIONS

Y. B. SHULZHENKO, V. G. KOZLOVA, K. A. KUDRIN, A. S. YAROV, and V. G. PLOKHOVA *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 42-47 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 30-33

Avail: NTIS HC A08

Orthostatic tolerance after 7-day dry immersion and head-to-feet acceleration was investigated on test subjects with and without an antigravity suit of bladderless type. With the suit on, the 20 min tilt test at 70 deg prior to immersion induced less marked changes than without the suit. When the suit was on, cardiovascular reactions to tilt tests after immersion and acceleration improved. The maximum heart rate decreased from 135 plus or minus 4 to 101 plus or minus 5 beats/min (p 0.01), minimum stroke volume increased from 29 plus or minus 2 to 41 plus or minus 3 ml (p 0.05) and pulse pressure grew. Thus, an antigravity suit may help increase initial orthostatic tolerance and maintain it after the combined effect of simulated hypogravity and acceleration.

R.J.F.

N84-16786# Joint Publications Research Service, Arlington, Va.
PLANT WASTE PROCESSING ON A SOLID SUBSTRATE FOR A BIOLOGICAL LIFE-SUPPORT SYSTEM FOR MAN

Y. Y. SHEPELEV, Y. I. SHAYDOROV, and V. V. POPOV *In its* USSR Rept.: Space Biol. and Aerospace Med. (JPRS-USB-84-001) p 107-112 17 Jan. 1984 refs Transl. into ENGLISH from Kosmich. Biol. i Aviakosmicheskaya Med. (USSR), v. 17, no. 6, Nov. - Dec. 1983 p 71-74

Avail: NTIS HC A08

The level of waste processing and utilization of the resultant products in a biological life support system largely determines the degree of system closure. Straw degradation in the humus and an inert substrate was studied when straw was introduced once a month during 3 years. Following 5-6 cycles of straw degradation in the humus, there developed a stable soil biocomplex that functioned as a self-regulation system. After adaptation and completion of the sil biocomplex formation straw degradation in the humus developed at a rate that provided its complete degradation within a certain greenhouse area. Author

N84-16803* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

METHOD AND APPARATUS FOR SIMULATING GRAVITATIONAL FORCES ON A LIVING ORGANISM Patent

W. E. THORNTON, inventor (to NASA) 20 Dec. 1983 9 p Filed 2 Sep. 1982 Supersedes N83-18254 (21 - 8, p 1240) (NASA-CASE-MS-20202-1; US-PATENT-4,421,109; US-PATENT-APPL-SN-414106; US-PATENT-CLASS-128-15R; US-PATENT-CLASS-128-1A; US-PATENT-CLASS-128-38) Avail: US Patent and Trademark Office CSCL 05H

A method and apparatus for simulating gravitational forces on a living organism wherein a series of negative pressures are externally applied to successive length-wise sections of a lower limb of the organism. The pressures decreasing progressively with distance of said limb sections from the heart of the organism. A casing defines a chamber adapted to contain the limb of the organism and is rigidified to resist collapse upon the application of negative pressures to the interior of the chamber. Seals extend inwardly from the casing for effective engagement with the limb of the organism and, in cooperation with the limb, subdivide the chamber into a plurality of compartments each in negative pressure communicating relation with the limb.

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

N84-16804*# Illinois Univ., Urbana-Champaign. Coordinated Science Lab.

MULTILEVEL SEMANTIC ANALYSIS AND PROBLEM-SOLVING IN THE FLIGHT-DOMAIN Final Report, 11 Jul. 1982 - 30 Sep. 1983

R. T. CHIEN 30 Sep. 1982 43 p refs

(Contract NAG1-288)

(NASA-CR-173177; NAS 1.26:173177; T-135) Avail: NTIS HC A03/MF A01 CSCL 05B

The use of knowledge-base architecture and planning control; mechanisms to perform an intelligent monitoring task in the flight domain is addressed. The route level, the trajectory level, and parts of the aerodynamics level are demonstrated. Hierarchical planning and monitoring conceptual levels, functional-directed mechanism rationalization, and using deep-level mechanism models for diagnoses of dependent failures are discussed. N.W.

N84-16805*# Maryland Univ., Princess Anne. Dept. of Natural Sciences.

USE OF MICROWAVES TO IMPROVE NUTRITIONAL VALUE OF SOYBEANS FOR FUTURE SPACE INHABITANTS Final Technical Report, Jan. 1981 - Jun. 1983

G. SINGH 1983 22 p refs

(Contract NSG-7470)

(NASA-CR-175336; NAS 1.26:175336) Avail: NTIS HC A02/MF A01 CSCL 06H

Whole soybeans from four different varieties at different moisture contents were microwaved for varying times to determine the conditions for maximum destruction of trypsin inhibitor and lipoxigenase activities, and optimal growth of chicks. Microwaving 150 gm samples of soybeans (at 14 to 28% moisture) for 1.5 min was found optimal for reduction of trypsin inhibitor and lipoxigenase activities. Microwaving 1 kgm samples of soybeans for 9 minutes destroyed 82% of the trypsin inhibitor activity and gave optimal chick growth. It should be pointed out that the microwaving time would vary according to the weight of the sample and the power of the microwave oven. The microwave oven used in the above experiments was rated at 650 watts 2450 MHz. Author

N84-16806*# National Aeronautics and Space Administration, Washington, D. C.

DEVELOPMENT OF A SYSTEMS THEORETICAL PROCEDURE FOR EVALUATION OF THE WORK ORGANIZATION OF THE COCKPIT CREW OF A CIVIL TRANSPORT AIRPLANE Final Report

M. FRICKE and C. VEES Sep. 1983 153 p refs Transl. into ENGLISH of "Entwicklung Einer Systemtheoretischen Vorgehensweise zur Beurteilung der Arbeitsorganisation der Cockpit-Besatzung von Zivilen Transportflugzeugen" rept. Inst. fuer Luft- und Raumfahrt, Technische Univ., Berlin, May 1983 p 1-145 Transl. by Kanner (Leo) Associates, Redwood City, Calif. (Contract NASW-3541)

(NASA-TM-77359; NAS 1.15:77359) Avail: NTIS HC A08/MF A01 CSCL 05H

To achieve optimum design for the man machine interface with aircraft, a description of the interaction and work organization of the cockpit crew is needed. The development of system procedure to evaluate the work organization of pilots while structuring the work process is examined. Statistical data are needed to simulate sequences of pilot actions on the computer. Investigations of computer simulation and applicability for evaluation of crew concepts are discussed. E.A.K.

N84-16807# Naval Academy, Annapolis, Md. Dept. of Weapons and Systems Engineering.

STABILITY ENHANCEMENT OF A FLEXIBLE ROBOT MANIPULATOR Final Report, 1982 - 1983

T. D. LOOKE 24 Jun. 1983 115 p

(AD-A134185; USNA-TSPR-126) Avail: NTIS HC A06/MF A01 CSCL 12A

A computer software programming technique was developed to compensate a highly oscillatory robot system controlled by a bang-bang input. The assumptions that the system was linear and

had lumped parameter characteristics allowed a fifth order, simplified dynamic model to be derived. Analysis using frequency response methods led to further simplification of the model to a third order system. Based on the third order model, a technique was developed which would compensate the system with a form of deadbeat control. Simulation of the model driven by the compensated bang-bang input verified the deadbeat response. The technique was implemented on an 8080-based microcomputer system which controlled the input. Actual system response to the compensated input was observed to be essentially free of the undesirable oscillatory motions, thus yielding an apparently rigid system. Author (GRA)

N84-16808# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.

GRIPPERS FOR AN UNMANNED FORGING CELL Interim Report

M. R. CUTKOSKY and E. KUROKAWA Apr. 1983 23 p
Sponsored by Navy
(AD-A134237; CMU-RI-TR-83-3) Avail: NTIS HC A02/MF A01
CSCL 06D

The following report describes the design and construction of two grippers for use in a flexible unmanned forging operation. The forging operation employs two large industrial robots, one to load and unload billets from a furnace at over 2000 deg F and a second to remove the forged pieces from a forging machine and present them to a gaging station for inspection. The gripper for the first robot uses special materials and a water cooled shell to withstand the very high temperatures it encounters. It employs a number of sensors to monitor temperatures and loading conditions. The second gripper is an especially flexible design, suited to a wide variety of irregular shapes. The gripper jaws are articulated to conform to the rough forgings produced by the cell. Once the jaws are fully closed they are locked in a place so that the orientation of the part is preserved. Author (GRA)

N84-16809# Sutherland Sproull and Associates, Inc., Pittsburgh, Pa.

WALKING MACHINE CONTROL PROGRAMMING Final Technical Report, 1 Feb. 1982 - 31 Aug. 1983

I. E. SUTHERLAND 31 Aug. 1983 77 p
(Contract MDA903-82-C-0102; DARPA ORDER 4456)
(AD-A134435; SSA-2054) Avail: NTIS HCA05/MFA01 CSCL 05H

The objective of this investigation was to evaluate a 1600 pound, six-legged, gasoline-powered, self-contained, man-carrying, hydraulically-actuated, walking machine built by Sutherland, Sproull and Associates. We were interested in the task of programming the control computer, the problems of operator control, and the performance of the vehicle. The walking machine presents two technical problems. The first is how best to permit the operator to control it. A control stick and two foot pedals provide operator inputs, and we connected them in various ways to give the driver control of the machine's path, direction, and speed. In addition, we experimented with different algorithms to select the particular uses of particular legs. The second technical problem posed by the walking machine comes about because of the topology of the hydraulic circuits that actuate it. Rather than using a separate servomechanism for each joint, the hydraulic circuits of this machine permit actuators from several of its joints to be made a part of a single hydraulic circuit. Parallel connections of actuators permit leg to share load equally; series connections force them to move synchronously. By setting valves to establish series and parallel hydraulic circuits, the control computer can obtain coordinated joint motions without further direct action. We learned a great deal about the strengths and weaknesses of this approach to leg coordination. GRA

N84-16810# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

A TEST OF FITTS' LAW IN TWO DIMENSIONS WITH HAND AND HEAD MOVEMENTS Final Report

R. J. JAGACINSKI (Ohio State Univ., Columbus) and D. L. MONK
Jul. 1983 26 p
(Contract F33615-79-C-0503; AF PROJ. 6893)
(AD-A133347; AFAMRL-TR-83-054) Avail: NTIS HCA03/MFA01
CSCL 06P

Subjects performed two-dimensional discrete movements either with a helmet-mounted sight or with a joystick. Fitts Law was found to be a good predictor of the speed-accuracy tradeoff for both systems. The joystick produced faster movement times than the helmet-mounted sight. For both systems, horizontal and vertical movements were slightly faster than diagonal movements. Two-dimensional generalizations of Fitts' Law were discussed in terms of multi-dimensional scaling. The obtained pattern of movement times was found to be intermediate to the predictions of Euclidean and City-block models of the movement spaces. Muscle coordination strategies were considered and strictly parallel coordination models were rejected. Author (GRA)

N84-16811# Air Force Human Resources Lab., Brooks AFB, Tex.

HUMAN FACTORS PRODUCTS: A ONE-ACT PLAY WITH EPILOGUE Final Technical Paper

W. B. ASKREN Sep. 1983 9 p
(Contract AF PROJ. 1710)
(AD-A133354; AFHRL-TP-83-34) Avail: NTIS HCA02/MFA01
CSCL 05E

This report presents the thesis that the results of human factors research and development should be delivered as discrete products, not merely as a collective technical report. It describes 35 potential products useful for this purpose. Examples of the products are: drawings; handbooks; algorithms; evaluation data; task analysis results; methods; and criteria. GRA

N84-17851 California Univ., Davis.

KINEMATICS AND DYNAMICS OF MULTI-RIGID-BODY OPEN-CHAIN SYSTEMS: APPLICATION TO ROBOT MANIPULATORS Ph.D. Thesis

G. R. PENNOCK 1982 229 p
Avail: Univ. Microfilms Order No. DA8326100

This dissertation is a study of the kinematics and dynamics of multi-rigid-body open-chain systems, in particular, robot manipulators. The kinematics part of this work focuses on the continuous motion and the instantaneous motion of these systems. Using dual-transformation matrices and the Principle of Transference a systematic procedure is established to solve the positioning problem of a robot manipulatory. Analytical expressions are also derived for the differential changes in position and orientation of the end-effector of the manipulator in terms of the differential changes in the joint coordinates. In this study of the instantaneous kinematics of multi-rigid-body open-chain systems the instantaneous kinematics is presented for two-degree-of-freedom and three-degree-of-freedom rigid-body motions. Using dual-numbers and screw calculus, a systematic procedure is established for the determination of canonical coordinate frames and the loci of the absolute instantaneous screw axes of the terminal links. Dissert. Abstr.

N84-17852*# Georgia Inst. of Tech., Atlanta.

INORGANIC ANALYSIS IN A CONTROLLED ECOLOGICAL LIFE SUPPORT SYSTEM Final Report, Mar. 1982 - Jun. 1983

J. L. CARDEN and R. F. BROWNER Jun. 1983 21 p refs
(Contract NAG2-170)
(NASA-CR-173299; NAS 1.26:173299) Avail: NTIS HC A02/MF A01 CSCL 06K

Techniques useful for the elemental analysis of samples of types which might require analysis within a controlled ecological life support system are investigated.

N84-17855*# Life Systems, Inc., Cleveland, Ohio.
ADVANCED AIR REVITALIZATION SYSTEM TESTING Final Report

D. B. HEPPNER, T. M. HALLICK, and F. H. SCHUBERT Jun. 1983 77 p refs
 (Contract NAS2-10961)
 (NASA-CR-166540; NAS 1.26:166540; LSI-TR-406-4) Avail: NTIS HC A05/MF A01 CSCL 06K

A previously developed experimental air revitalization system was tested cyclically and parametrically. One-button startup without manual interventions; extension by 1350 hours of tests with the system; capability for varying process air carbon dioxide partial pressure and humidity and coolant source for simulation of realistic space vehicle interfaces; dynamic system performance response on the interaction of the electrochemical depolarized carbon dioxide concentrator, the Sabatier carbon dioxide reduction subsystem, and the static feed water electrolysis oxygen generation subsystem, the carbon dioxide concentrator module with unitized core technology for the liquid cooled cell; and a preliminary design for a regenerative air revitalization system for the space station are discussed. Author

N84-17856*# Life Systems, Inc., Cleveland, Ohio.
STATIC FEED WATER ELECTROLYSIS SUBSYSTEM TESTING AND COMPONENT DEVELOPMENT Final Report

E. P. KOSZENSKI, F. H. SCHUBERT, and K. A. BURKE Sep. 1983 91 p refs
 (Contract NAS2-11087)
 (NASA-CR-166539; NAS 1.26:166539; LSI-TR-481-4) Avail: NTIS HC A05/MF A01 CSCL 06K

A program was carried out to develop and test advanced electrochemical cells/modules and critical electromechanical components for a static feed (alkaline electrolyte) water electrolysis oxygen generation subsystem. The accomplishments were refurbishment of a previously developed subsystem and successful demonstration for a total of 2980 hours of normal operation; achievement of sustained one-person level oxygen generation performance with state-of-the-art cell voltages averaging 1.61 V at 191 ASF for an operating temperature of 128F (equivalent to 1.51V when normalized to 180F); endurance testing and demonstration of reliable performance of the three-fluid pressure controller for 8650 hours; design and development of a fluid control assembly for this subsystem and demonstration of its performance; development and demonstration at the single cell and module levels of a unitized core composite cell that provides expanded differential pressure tolerance capability; fabrication and evaluation of a feed water electrolyte elimination five-cell module; and successful demonstration of an electrolysis module pressurization technique that can be used in place of nitrogen gas during the standby mode of operation to maintain system pressure and differential pressures. Author

N84-17857*# Life Systems, Inc., Cleveland, Ohio.
ELECTROCHEMICAL CARBON DIOXIDE CONCENTRATOR SUBSYSTEM DEVELOPMENT Final Report

D. B. HEPPNER, M. J. DAHLAUSEN, and F. H. SCHUBERT Nov. 1983 73 p refs
 (Contract NAS2-11129)
 (NASA-CR-166538; NAS 1.26:166538; LSI-TR-482-4) Avail: NTIS HC A04/MF A01 CSCL 06K

The fabrication of a one-person Electrochemical Depolarized Carbon Dioxide Concentrator subsystem incorporating advanced electrochemical, mechanical, and control and monitor instrumentation concepts is discussed. This subsystem included an advanced liquid cooled unitized core composite cell module and integrated electromechanical components. Over 1800 hours with the subsystem with removal efficiencies between 90% and 100%; endurance tests with a Fluid Control Assembly which integrates 11 gas handling components of the subsystem; and endurance testing of a coolant control assembly which integrates a coolant pump, diverter valve and a liquid accumulator were completed. Author

N84-17858*# Purdue Univ., Lafayette, Ind. Dept. of Psychological Sciences.

OBJECTIVE MEASURE OF PILOT WORKLOAD Annual Progress Report, Jan. - Dec. 1983

B. H. KANTOWITZ 1984 93 p refs
 (Contract NCC2-235)
 (NASA-CR-173296; NAS 1.26:173296; APR-2) Avail: NTIS HC A05/MF A01 CSCL 05H

Timesharing behavior in a data-entry task, similar to a pilot entering navigation data into an on-board computer is investigated. Auditory reaction time as a function of stimulus information and dimensionality is examined. This study has direct implications for stimulus selection for secondary tasks used in the GAT flight simulator at Ames Research Center. Attenuation effects of heat and cold stress in a psychological refractory period task were studied. The focus of interest is the general effects of stress on attention rather than upon specific temperature related phenomena. Author

N84-17859*# Behavioral Inst. for Technology and Science, Inc., West Lafayette, Ind.

A THEORETICAL APPROACH TO MEASURING PILOT WORKLOAD Annual Progress Report, Jan. - Dec. 1983

B. H. KANTOWITZ 1984 113 p refs
 (Contract NCC2-228)
 (NASA-CR-173297; NAS 1.26:173297; APR-2) Avail: NTIS HC A06/MF A01 CSCL 05H

Theoretical assumptions used by researchers in the area of attention, with emphasis upon errors and inconsistent assumptions used by some researchers were studied. Two GAT experiments, two laboratory studies and one field experiment were conducted. N.W.

N84-17860# Army Aeronautical Research Lab., Moffett Field, Calif.

IMPACT RESPONSE OF AN ENERGY ABSORBING EARCAP

D. F. SHANAHAN Sep. 1983 47 p
 (Contract AF PROJ. 3M1-61102-BS-10)
 (AD-A134828; USAARL-83-14) Avail: NTIS HC A03/MF A01 CSCL 06Q

Twelve impact tests on instrumented human cadavers were performed at Wayne State University to compare the load attenuating capability of an energy absorbing earcup with that of the standard rigid earcup used in SPH-4 flight helmets. SPH-4 helmeted cadavers were dropped from heights varying from 1.17 to 2.03 m. so as to receive a direct impact to the right side of the helmet. The helmet was equipped with either standard or energy absorbing earcups. Loads were measured at the impact surface and accelerations were measured through a triaxial accelerometer mounted to the cadaver's maxilla. Analysis of the data shows a significant decrease in both peak load and acceleration in the y axis for the energy absorbing earcup equipped helmets over those measured for the standard earcup equipped helmets. GRA

N84-17861# Carnegie-Mellon Univ., Pittsburgh, Pa. Robotics Inst.

AN OPTICAL PROXIMITY SENSOR FOR MEASURING SURFACE POSITION AND ORIENTATION FOR ROBOT MANIPULATION Interim Report

T. KANADE and T. M. SOMMER 5 Sep. 1983 30 p
 (Contract N00014-81-K-0503)
 (AD-A134899; CMU-RI-TR-83-15) Avail: NTIS HC A03/MF A01 CSCL 17H

The authors developed a noncontact proximity sensor which can measure the distance and orientation of a surface in a range of four to five centimeters. The sensor is based on the scheme of active illumination and triangulation. It uses multiple infrared LEDs (light emitting diodes) as the light sources and a PIN-diode area sensor chip for detecting the spot positions. Six LEDs with optics for collimating the beam are mounted at the sensor head. The directions of the beams are aligned to form a cone of light converging at a distance of 4.5 cm from the sensor head. As each LED is sequentially pulsed, the sensor chip detects the

position, in its field of view, of the spot projected by the LED light beam on the object surface. The 3-D location of the spot on the surface can be computed by triangulation. By doing this for six LEDs a set of six 3-D points is obtained. Then by fitting a plane to those points, the distance and orientation of a small portion of the object surface are calculated. Since there is no moving part and the spot position sensor chip is an analog sensor which outputs the position of the spot directly without scanning its field of view, fast operation of the proximity sensor can be realized. Currently the sensor can give approximately 1000 measurements of distance and orientation per second with precision of 0.07 mm for distance and 1.5 deg for surface orientation. This non-contact proximity sensor will be useful for such applications as tracing an object surface by a robot arm with specified distance and orientation relative to the surface.

Author (GRA)

N84-17862# Bendix Corp., Kansas City, Mo.
MEASUREMENT OF ROBOT ACCURACY USING THE LATIN SQUARE THREE-DIMENSIONAL BALL PLATE

J. R. LEMBKE and L. L. JONES Nov. 1983 45 p refs
 (Contract DE-AC04-76DP-00613)
 (DE84-004920; BDX-613-2992) Avail: NTIS HC A03/MF A01

A Latin square three dimensional ball plate (LSBP) was used to characterize the accuracy of a robot. The robot was programmed to partially automate the measurement process. The robot's precision was in the expected range; its accuracy, however, was significantly worse than expected.

DOE

N84-17863# Research Inst. of National Defence, Stockholm (Sweden). Dept. 5.

MAN AND MACHINE. THE ROLE OF HUMAN FACTORS IN SYSTEM DEVELOPMENT

H. FURUSTIG Jul. 1983 81 p refs In SWEDISH; ENGLISH summary
 (FOA-A-56005-H2; ISSN-0281-0239) Avail: NTIS HC A05/MF A01

Human factors (hf) in system development are reviewed. Conventional hf increases personnel safety and comfort, and improves hardware design. System oriented hf facilitates directing hf efforts to the most urgent areas and relates hf recommendations to system effects. Case studies and examples show what happens if hf recommendations are not followed. Qualities of the system development, judgement, and decision making processes are discussed. Conditions within system developing organizations are treated: predominance of method knowledge and perspective, role conflicts, irrationality, restrictions on action, and communication barriers. Problems in hf work are discussed: data relevance, qualities of hf system approach, and difficulties during knowledge transfer. Aspects improving hf specialists' work are: operative knowledge, organizational knowledge, specialist status, management support, praxis, and the need to evaluate and support research.

Author (ESA)

N84-17864# Research Inst. of National Defence, Stockholm (Sweden). Dept. 2.

PROTECTION AGAINST HEAT RADIATION IN THE STEEL INDUSTRY

L. GUSTAVSSON 30 Jun. 1983 33 p refs In SWEDISH; ENGLISH summary Sponsored by Swedish Work Environment Fund
 (FOA-C-20500-E4; ISSN-0347-3694) Avail: NTIS HC A03/MF A01; Research Inst. of National Defence, Stockholm KR 25

A visor with good visual transparency, and giving a high heat radiation attenuation was developed as a prototype and was received very well at tests on work places in the steel industry. It is scratch resistant. This 1 mm thick polycarbonate visor, the outer face of which is covered with a thin gold coating, reduces the thermal radiation 300 times from a steel melting at 1600 C, and allows a visual transmission of 13%

Author (ESA)

N84-17865# Pennsylvania State Univ., University Park.
ELECTRICAL-SHOCK PREVENTION. VOLUME 1: PROTECTION OF MAINTENANCE PERSONNEL Open File Report, 6 Apr. 1981 - 8 Dec. 1982

L. A. MORLEY, T. NOVAK, and F. C. TRUTT 8 Dec. 1982 127 p refs 4 Vol.
 (Contract DE-BM-J0-113009)
 (PB84-102946; BM-OFR-177(1)-83) Avail: NTIS HC A07/MF A01 CSCL 08I

The overall objective of this research was to investigate the application, economic, and safety considerations of electrical-shock prevention techniques applied to surface and underground mines. volume 1 of this four-volume report is primarily concerned with the protection of maintenance personnel. The scope of the work is specified, electrical shock is defined, and needed ground-fault relay characteristics to prevent ventricular fibrillation are established. This is followed by an analysis of ac systems, a comparison of these systems with respect to body currents, the advantages and disadvantages of the various ground-fault protection techniques, and an analysis of dc systems for off-track vehicles. Summaries and synopses of each of the three remaining volumes are included.

GRA

N84-17866# Pennsylvania State Univ., University Park.
ELECTRICAL-SHOCK PREVENTION. VOLUME 2: GROUND-FAULT INTERRUPTING DEVICES Open File Report, 6 Apr. 1981 - 8 Dec. 1982

L. A. MORLEY, F. C. TRUTT, and D. J. RUFFT 8 Dec. 1982 110 p refs 4 Vol.
 (Contract DI-BM-J0-113009)
 (PB84-102953; BM-OFR-177(2)-83) Avail: NTIS HC A06/MF A01 CSCL 08I

Volume 2 of this report is concerned with the application of sensitive ground-fault interrupters (GFI's) to ac utilization circuits in U.S. mines. The main concepts examined are shock prevention and methods to reduce nuisance tripping. The research involved a literature search, input from previous Bureau of Mines contracts, and contacts with electrical manufacturers and mining personnel. Several devices that showed promise were tested and the results indicate the existence of GFI's that may be modified to perform adequately on U.S. mining systems. A set of guidelines covering design, construction specification, and performance tests is included.

GRA

N84-17867# Pennsylvania State Univ., University Park.
ELECTRICAL-SHOCK PREVENTION. VOLUME 3: FAULT PROTECTION FOR MOTION-DRIVE EQUIPMENT Open File Report, 6 Apr. 1981 - 8 Dec. 1982

L. A. MORLEY, F. C. TRUTT, and G. M. BUCHAN 8 Dec. 1982 65 p refs 4 Vol.
 (Contract DI-BM-J0-113009)
 (PB84-102961; BM-OFR-177(3)-83) Avail: NTIS HC A04/MF A01 CSCL 08I

Volume 3 of the report examines the indication versus interruption procedures used on motion-drive power equipment with emphasis on surface excavators. A review of the electromechanical ac-dc conversion used with the Ward-Leonard control system is presented. Protection for the drive-system components are then discussed. Fault sources and calculations for both the ac supply source and dc power loop are introduced to assist in discussing indication and interruption procedures. The dynamic process of the machine is examined and the effects of fault current and position of the machine to allow for an orderly shutdown is determine. Possible indication and interruption porcedures are given for the four-quadrant duty cycle of excavators. The report is concluded by introducing other mining operations that utilize similar motion-drive systems and static (solid-state) drives.

GRA

N84-17868# Pennsylvania State Univ., University Park.
ELECTRICAL-SHOCK PREVENTION. . . . VOLUME 4:
OVERHEAD-LINE CONTACT FATALITIES Open File Report, 6
Apr. 1981 - 8 Dec. 1982
 L. A. MORLEY, F. C. TRUTT, and G. T. HOMCE 8 Dec. 1982
 116 p refs 4 Vol.
 (Contract DI-BM-J0-113009)
 (PB84-102979; BM-OFR-177(4)-83) Avail: NTIS HC A06/MF
 A01 CSCL 08I

Volume 4 of the report examines the problem of indirect contact of overhead high-voltage powerlines by mining personnel. This refers to the contact of energized lines by workers through an intermediate conductor such as a metallic tool or a piece of high-reaching mobile equipment. The shock hazard by such contact has been a major cause of electrical fatalities associated with mining operations. The report is divided into three areas. The first gives a general background of overhead lines, basic characteristics, and associated hazards and describes presently used techniques and devices that attempt to alleviate the contact problem. The second area presents a detailed analysis of 39 overhead-line contact accidents in mining since 1970. The third section used the information in the first two areas to formulate recommendations to prevent these accidents. GRA

N84-17869# West Virginia Univ., Morgantown. Dept. of Electrical Engineering.
ANALYSIS OF ELECTRICAL ACCIDENT PREVENTION
COUNTERMEASURES Open File Report, 30 Sep. 1981 - 29
Nov. 1982
 W. L. COOLEY, W. COLLINS, Z. ELRAZAZ, R. KUMAR, R. MCCONNELL, and M. JERABEK 31 Dec. 1982 359 p refs
 (PB84-102987; BM-OFR-179-83) Avail: NTIS HC A16/MF A01
 CSCL 08I

The report provides a detailed analysis of 23 electrical accident countermeasures contemplated for use in the metal-nonmetal mining industry. The costs and potential benefits of implementing groups of countermeasures are estimated and methods are outlined by which countermeasures can be selected in an effective manner. The analysis is based largely on an extensive electrical accident event tree which is developed in detail. For those countermeasures that are not currently technically feasible, several prototype devices were developed to help speed development. These included a trolley arc eliminator and a safe mine electrician's multimeter. GRA

55

PLANETARY BIOLOGY

Includes exobiology; and extraterrestrial life.

A84-19911
LIFE AS A PLANETARY PHENOMENON
 T. OWEN (New York, State University, Stony Brook, NY)
 Earth-Oriented Applications of Space Technology (ISSN
 0277-4488), vol. 4, no. 1, 1984, p. 31-38.

The success of recent spacecraft from the USA and the USSR has provided a wealth of new data about the planets in the solar system. It is now possible to develop a much better rationale for the reasons that abundant life is only found on earth. Mars, smaller and more distant from the sun, may nevertheless hold clues to the early development of earth's atmosphere. The origin of life on Mars early in that planet's history cannot be ruled out. Titan offers a contemporary example of extremely primitive conditions, where chemical reactions resembling those that preceded the development of life on earth may be occurring today. Venus and Jupiter illustrate the need for a planet to be the right size and the right distance from the sun if chemical evolution leading to the origin of life is to occur. Author

A84-20017
THE ANTHROPIC PRINCIPLE AND ITS IMPLICATIONS FOR
BIOLOGICAL EVOLUTION

B. CARTER (Paris, Observatoire, Meudon, Hauts-de-Seine, France) (Royal Society, Discussion on the Constants of Physics, London, England, May 25, 26, 1983) Royal Society (London), Philosophical Transactions, Series A (ISSN 0080-4614), vol. 310, no. 1512, Dec. 20, 1983, p. 347-363; Discussion, p. 363. refs

The anthropic principle in its weak and strong forms is reviewed, and an application of the former to the problem of the evolution of terrestrial life is presented. The basis of the argument is the remarkable coincidence between the timescale of past biological evolution on earth and the future life expectancy of the sun. There is no particular reason for supposing that evolution on earth should be much slower than the expectation value; on the other hand, the observation that the evolution time is comparable with the time allowed by solar development is just what would be expected if the alternative hypothesis that the intrinsically expected time is much longer than the externally allowed time. The anthropic principle ensures that human evolution must be one of the exceptional cases in which evolution has proceeded much faster than usual. A detailed mathematical argument is made showing that catastrophe had a decisive role in that evolution. C.D.

A84-21025* Chicago Univ., Ill.
MULTIPLE ORIGINS OF LIFE

D. M. RAUP (Chicago, University, Chicago, IL) and J. W. VALENTINE (California, University, Santa Barbara, CA) National Academy of Sciences, Proceedings (ISSN 0027-8424), vol. 80, May 1983, p. 2981-2984. refs
 (Contract NAS2-73)

There is some indication that life may have originated readily under primitive earth conditions. If there were multiple origins of life, the result could have been a polyphyletic biota today. Using simple stochastic models for diversification and extinction, we conclude: (1) the probability of survival of life is low unless there are multiple origins, and (2) given survival of life and given as many as 10 independent origins of life, the odds are that all but one would have gone extinct, yielding the monophyletic biota we have now. The fact of the survival of our particular form of life does not imply that it was unique or superior. Author

A84-21729
A BIOLOGICAL HYPOTHESIS FOR THE ORIGIN OF THE
MODERN HYDROSPHERE OF THE EARTH [BIOLOGICHESKAIA
GIPOTEZA PROISKHOZHENIIA SOVREMENNOI GIDROSFERY
ZEMLI]

G. V. BARINOV (Ukrainian Academy of Sciences, Institute of Southern Seas Biology, Sevastopol, Ukrainian SSR) Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia (ISSN 0002-3329), Nov.-Dec. 1983, p. 940-944. In Russian. refs

The hypothesis relies on Vernadskii's (1978) contention that living matter plays a decisive role in biogeochemical cycles. It also draws on the extensive aerobic and anaerobic chemosynthesis and bacterial photosynthesis in nature, noting that in these processes water is formed as a result of the oxidation of the reduced gases. Another factor is the extensive amount of hydrogen and other reduced gases of a geochemical nature issuing from fissures in the earth's crust and underwater volcanoes. Studies of the terrestrial planets showing an extremely small amount of free water in the atmosphere of these planets and on the surface are also cited, as are recent data on the composition of the waters issuing from fissures in the earth's crust showing them to be salt-saturated solutions. Also cited in the hypothesis are calculations on the extent of the biological water cycle, showing that all the water of the hydrosphere has been photochemically broken down and then resynthesized during respiration about 100 times. C.R.

A84-22843* Alabama Univ., Birmingham.

COMPLEXES OF POLYADENYLIC ACID AND THE METHYL ESTERS OF AMINO ACIDS

M. A. KHALED, D. W. MULINS, JR., M. SWINDLE, and J. C. LACEY, JR. (Alabama, University, Birmingham, AL) *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 87-96. refs (Contract NGR-01-010-001)

A study of amino acid methyl esters binding to polyadenylic acid supports the theory that the genetic code originated through weak but selective affinities between amino acids and nucleotides. NMR, insoluble complex analysis, and ultraviolet spectroscopy are used to illustrate a correlation between the hydrophobicities of A amino acids and their binding constants, which, beginning with the largest, are in the order of Phe (having nominally a hydrophobic AAA anticodon), Ile, Leu, Val and Gly (having a hydrophilic anticodon with no A). In general, the binding constants are twice the values by Reuben and Polk (1980) for monomeric AMP, which suggests that polymer amino acids are interacting with only one base. No real differences are found between poly A binding for free Phe, Phe methyl ester or Phe amide, except that the amide value is slightly lower.

C.M.

A84-22848

CODE DEPENDENT CONSERVATION OF THE PHYSICO-CHEMICAL PROPERTIES IN AMINO ACID SUBSTITUTIONS

M. PIEBER and J. TOHA C. (Universidad de Chile, Santiago, Chile) *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 139-146. Research supported by the Universidad de Chile and OEA. refs

A novel amino acid replacement frequency ring is proposed, for which a conservation of over 90 percent of the most general physico-chemical properties can be deduced. The amino acid chemical similarity ring is also analyzed in terms of the genetic code base probability changes, showing that the discrepancy that exists between the standard deviation value of the amino acid replacement frequency matrix and its respective ideal value is almost equal to that deduced from the corresponding base codon replacement probability matrices. These differences are finally evaluated and discussed in terms of the restrictions imposed by the structure of the genetic code and the physico-chemical dissimilarities between some codons of amino acids which are chemically similar.

Author

A84-22849

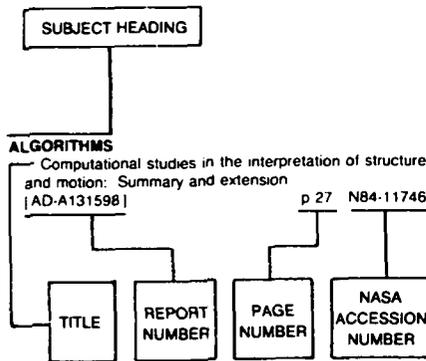
CONSERVATION OF PHYSICO-CHEMICAL AMINO ACID PROPERTIES DURING THE EVOLUTION OF PROTEINS

M. ANGELICA SOTO and J. TOHA C. (Universidad de Chile, Santiago, Chile) *Origins of Life* (ISSN 0302-1688), vol. 13, Dec. 1983, p. 147-152. Research supported by the Universidad de Chile and OEA. refs

Based on a similarity ring constructed from a substitution probability matrix, we have analyzed the conservation of some amino acid properties in the evolution of proteins. Refractive index and bulkiness are highly conserved, hydrophobicity and polarity are fairly well conserved while optical rotation appears to be a less relevant property. On the other hand, the analysis of the correspondence between phenotype and genotype shows that the most frequent amino acid substitutions in proteins do not always correspond to the most feasible codon changes. The apparent disagreement between amino acid substitutions in modern proteins and the primordial amino acid-codon assignment is discussed.

Author

Typical Subject Index Listing



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

A

ABSORBENTS
Problems posed by the use of onboard oxygen generators p 161 A84-22567

ABSORPTION SPECTRA
physico-chemical investigation of some areas of fundamental significance to biophysics [DE83-017404] p 134 N84-16761

ACCELERATION (PHYSICS)
Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782
Neuronal-vascular relations in lateral geniculate body and superior colliculi of cats after exposure to accelerations p 135 N84-16783
Study of vibration resonance frequencies in rats p 135 N84-16784
Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823

ACCELERATION PROTECTION
Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776

ACCELERATION STRESSES (PHYSIOLOGY)
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290
Effects of +Gz accelerations of long duration on the circulatory pressure distribution p 140 A84-21013
Othematoma associated with ill-fitting helmet and high G load - A case report p 143 A84-21744
Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776

ACCELERATION TOLERANCE
Significance of the headrest geometry in +Gz protective seats p 160 A84-21739

G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
Neuronal-vascular relations in lateral geniculate body and superior colliculi of cats after exposure to accelerations p 135 N84-16783
Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

ACCIDENT PREVENTION
Electrical-shock prevention. Volume 1: Protection of maintenance personnel (PB84-102946) p 165 N84-17865
Electrical-shock prevention. Volume 2: Ground-fault interrupting devices (PB84-102953) p 165 N84-17866
Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment (PB84-102961) p 165 N84-17867
Electrical-shock prevention. Volume 4: Overhead-line contact fatalities (PB84-102979) p 166 N84-17868
Analysis of electrical accident prevention countermeasures (PB84-102987) p 166 N84-17869

ACCURACY
Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 N84-17862

ACIDITY
Changes of acid hydrolase activity in skeletal muscles of adapted and nonadapted preadolescent rats following physical exercise p 128 A84-21600

ACIDS
Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833

ACQUISITION
Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 N84-16801

ACROBATICS
Physiological response in Mirage aircraft pilots p 141 A84-21022

ACTIVITY (BIOLOGY)
Rhythmic activity in the visual analyzer p 129 A84-22447
The electrical activity of symmetrical regions of the hippocampus p 130 A84-22778
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
Changes in the T and B systems of immunity in seamen during a long cruise p 148 N84-17819

ACTIVITY CYCLES (BIOLOGY)
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943

ADAPTATION
Adaptation to irregularity of rest and activity p 142 A84-21736

ADRENAL GLAND
Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893

ADRENAL METABOLISM
The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883
Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896

ADRENERGICS
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
Prevention of stress-induced and hypoxic heart-damage by the beta-blocker inderal p 132 A84-22940

AEROSPACE MEDICINE
The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086

Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291
Applications of gas chromatographic head space analysis to aviation accident toxicology p 139 A84-20294
Rhythm anomalies observed in the course of 24-hour EKGs in healthy young males - Report of 100 cases p 140 A84-21014
Isolated mesotelesystolic click and the fitness of flight personnel p 140 A84-21015
The biomedical component in aircrew workload p 159 A84-21020
Physiological response in Mirage aircraft pilots p 141 A84-21022
Standardization of units and symbols - Revised --- for aerospace medicine publications p 142 A84-21735
Othematoma associated with ill-fitting helmet and high G load - A case report p 143 A84-21744
A review of vision physiology p 143 A84-21745
Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568
Hemorrhoid symptomatology and fighter pilots p 144 A84-22569
USSR report: Space Biology and Aerospace Medicine, Vol. 17, No. 6, November - December 1983 94 p [JPRS-USB-84-001] p 135 N84-16769
Practical applications of advances in aviation medicine p 144 N84-16770
Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771
Fluid intake at high altitudes p 145 N84-16772
Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773
Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776
Effect of sydnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antihypokinesia p 145 N84-16777
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
Aerospace Medicine and Biology: A continuing bibliography with indexes (supplement 253) [NASA-SP-7011(253)] p 146 N84-16790
Military Medical Journal, no. 7, 1983 [L-2456] p 147 N84-17811
Prevention of flight fatigue by physical training [L-2341] p 148 N84-17814
Military Medical Journal, no. 3, 1983 [L-2399] p 148 N84-17817

AGE FACTOR
Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944
Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766
Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793

AGING (BIOLOGY)
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
Aging problems and their impact on pilot performance p 142 A84-21675

AIR
Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599

SUBJECT

AIR POLLUTION

Human exposure to atmospheric concentrations to selected chemicals, volume 1 [PB84-102540] p 151 N84-17835

AIR PURIFICATION

Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855

AIR TRAFFIC CONTROL

The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086

AIR TRAFFIC CONTROLLERS (PERSONNEL)

Radar training facility initial validation [AD-A133220] p 154 N84-16797

AIRBORNE EQUIPMENT

Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 N84-17852

AIRCRAFT ACCIDENT INVESTIGATION

Applications of gas chromatographic head space analysis to aviation accident toxicology p 139 A84-20294

AIRCRAFT ACCIDENTS

Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291

AIRCRAFT CONTROL

Over-dependence on automatics - The black box one man band p 152 A84-20084

AIRCRAFT DETECTION

Preliminary field tests for detecting flying targets in front of a land background --- ground observers [FOA-C-56033-H2] p 157 N84-17847

Detection of flying targets in front of a land background: Laboratory tests [FOA-C-56034-H2] p 157 N84-17848

Detection of flying targets in front of a land background: Field tests --- human observers [FOA-C-56035-H2] p 157 N84-17849

AIRCRAFT EQUIPMENT

Analogical simulation model of the thermal stress affecting the head p 159 A84-21017
Problems posed by the use of onboard oxygen generators p 161 A84-22567

AIRCRAFT PILOTS

Army pilot ergonomics p 157 A84-19647
Physiological response in Mirage aircraft pilots p 141 A84-21022

Aging problems and their impact on pilot performance p 142 A84-21675

Helicopter pilot back pain - A preliminary study p 143 A84-21738

Hemorrhoid symptomatology and fighter pilots p 144 A84-22569

Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776

Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

AIRCRAFT SAFETY

Fit to fly? p 138 A84-20082
The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086

ALBUMINS

Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902

ALCOHOLS

Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758

ALERTNESS

Circadian rhythms and disturbed sleep - Its relevance to transport operations p 138 A84-20080

ALGORITHMS

Human factors products: A one-act play with epilogue [AD-A133354] p 163 N84-16811

ALKALOSIS

Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521

ALTITUDE ACCLIMATIZATION

Red cell function at extreme altitude on Mount Everest p 141 A84-21030

Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943

ALUMINUM

Rabbit neurobehavioral toxicity from aluminum [PB84-103266] p 137 N84-17809

ALVEOLAR AIR

A device for estimating the composition of alveolar air p 158 A84-20918

AMBIENT TEMPERATURE

Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018

AMINO ACIDS

The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880

Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037

The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800

Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843

A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844

Code dependent conservation of the physico-chemical properties in amino acid substitutions p 167 A84-22848

Conservation of physico-chemical amino acid properties during the evolution of proteins p 167 A84-22849

AMMONIA

Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779

Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780

AMPLITUDES

Biocholocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788

ANALOG SIMULATION

Analogical simulation model of the thermal stress affecting the head p 159 A84-21017

ANALOGS

Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821

ANAPHYLAXIS

The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927

ANESTHETICS

The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906

ANGLES (GEOMETRY)

Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 N84-16795

ANTIBODIES

The modeling of multisignal immobilized immunogens p 132 A84-22931

ANTIGENS

The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888

APPROACH CONTROL

A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648

APPROXIMATION

The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911

Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274

APTITUDE

Radar training facility initial validation [AD-A133220] p 154 N84-16797

ARCHITECTURE (COMPUTERS)

Multilevel semantic analysis and problem-solving in the flight-domain [NASA-CR-173177] p 162 N84-16804

ARCTIC REGIONS

Arctic personnel effects [AD-A134892] p 150 N84-17829

ARM (ANATOMY)

Physiological responses to prolonged upper body exercise [AD-A134811] p 149 N84-17826

ARMED FORCES (UNITED STATES)

Overuse injuries of the lower extremities associated with marching, jogging and running. A review [AD-A134672] p 149 N84-17824

AROUSAL

Benzodiazepine effects on arousal threshold during sleep [AD-A133151] p 147 N84-16792

Cognition and arousal as predictors of risk taking: Effects of load and cognitive style [AD-A134324] p 156 N84-17843

Task differences, stylistic characteristics and physiological arousal [AD-A134335] p 156 N84-17844

ARTERIOSCLEROSIS

Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787

Investigation of the microcirculation of the conjunctiva in airmen with the initial symptoms of cerebral atherosclerosis p 148 N84-17818

ASPHYXIA

Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781

ASTRONAUT PERFORMANCE

Selection of members of polar expeditions and cosmonauts p 151 A84-19600

ASTRONAUTS

Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

ASTROPHYSICS

The anthropic principle and its implications for biological evolution --- intermediate attitude between primitive anthropocentric prejudice and its antithesis in heading astrophysical restraints for interpreting evolution p 166 A84-20017

ATHLETES

A comparison of the performance of weight lifters of various classes in classical and auxiliary exercises p 140 A84-20914

ATMOSPHERIC COMPOSITION

Human exposure to atmospheric concentrations to selected chemicals, volume 1 [PB84-102540] p 151 N84-17835

ATMOSPHERIC PRESSURE

The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776

AUTOMATA THEORY

The dynamics of a manipulator with allowance for the compliance of the joints p 159 A84-21056

AUTOMATIC CONTROL

Walking machine control programming [AD-A134435] p 163 N84-16809

AUTOMATIC FLIGHT CONTROL

Over-dependence on automatics - The black box one man band p 152 A84-20084

AUTOMATIC PILOTS

Over-dependence on automatics - The black box one man band p 152 A84-20084

AUTOMATION

Over-dependence on automatics - The black box one man band p 152 A84-20084

AUTONOMIC NERVOUS SYSTEM

Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831

AVIONICS

Automation, supervisory control and workload in flight management [NASA-CR-166474] p 155 N84-17838

B

BACK INJURIES

Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291

Helicopter pilot back pain - A preliminary study p 143 A84-21738

BACTERIA

Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 N84-16765

BACTERIOLOGY

The use of carbon monoxide by bacteria of the genus Desulfovibrio p 128 A84-21730

BIBLIOGRAPHIES

Aerospace Medicine and Biology: A continuing bibliography with indexes (supplement 253) [NASA-SP-7011(253)] p 146 N84-16790

Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982 [AD-A134674] p 136 N84-17805

BINDING

Cooperative binding of calcium ions by photoreceptor membranes p 126 A84-20907

BIOASTRONAUTICS

Birth of space plant growing [NASA-TM-77244] p 133 N84-16756

BIOCHEMISTRY

Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599

The problem of synergism in radiobiology p 126 A84-20897

Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and Endomyces magnusii yeasts p 126 A84-20904

A biological hypothesis for the origin of the modern hydrosphere of the earth p 166 A84-21729

The use of carbon monoxide by bacteria of the genus Desulfovibrio p 128 A84-21730

Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866

- Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
- BIOCONTROL SYSTEMS**
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272
- BIODYNAMICS**
High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286
Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287
Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288
Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291
Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034
Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- BIOELECTRIC POTENTIAL**
The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
- BIOELECTRICITY**
Possible mechanism of a thalamic pacemaker of alpha rhythm and fusiform activity p 127 A84-20913
Rhythmic activity in the visual analyzer p 129 A84-22447
The electrical activity of symmetrical regions of the hippocampus p 130 A84-22778
Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815
ERG (Electroretinogram) implicit time: An exploration of high frequency wavelets recorded in the human visual system [AD-A134575] p 150 N84-17832
- BIOFEEDBACK**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- BIOINSTRUMENTATION**
Thermostatic setup for a polythermal caloric probe --- for vestibular analysis p 158 A84-20900
A device for estimating the composition of alveolar air p 158 A84-20918
- BIOLOGICAL EFFECTS**
The effect of unvarying and low-frequency magnetic fields on biological systems p 128 A84-21726
Birth of space plant growing [NASA-TM-77244] p 133 N84-16756
Aerospace Medicine and Biology: A continuing bibliography with indexes (supplement 253) [NASA-SP-7011(253)] p 146 N84-16790
Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791
Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982 [AD-A134674] p 136 N84-17805
- BIOLOGICAL EVOLUTION**
Life as a planetary phenomenon p 166 A84-19911
The anthropic principle and its implications for biological evolution --- intermediate attitude between primitive anthropocentric prejudice and its antithesis in heeding astrophysical restraints for interpreting evolution p 166 A84-20017
The oldest eukaryotic cells p 123 A84-20247
Multiple origins of life p 166 A84-21025
A biological hypothesis for the origin of the modern hydrosphere of the earth p 166 A84-21729
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800
Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843
Possible mechanism for origin of chiral specificity during origins of life p 131 A84-22845
Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846
Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847
- Code dependent conservation of the physico-chemical properties in amino acid substitutions p 167 A84-22848
Conservation of physico-chemical amino acid properties during the evolution of proteins p 167 A84-22849
Cosmic vacuum prevents radiopanspermia p 131 A84-22850
Comparison of organisms and cell types using two-dimensional electrophoresis [DE84-003574] p 136 N84-17807
- BIOLOGICAL MODELS (MATHEMATICS)**
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392
Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901
Appearance of self-oscillations in a distributed system with multiple equilibria --- mathematical model of biosystem-environment interaction p 127 A84-20912
Possible mechanism of a thalamic pacemaker of alpha rhythm and fusiform activity p 127 A84-20913
Mathematic modeling of heat transfer processes in the human body p 158 A84-20924
Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
Multiple origins of life p 166 A84-21025
Evaluating the safety of decompression on the basis of the number and size of gas bubbles being formed in the body p 128 A84-21727
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776
The modeling of multisignal immobilized immunogens p 132 A84-22931
- BIOMAGNETISM**
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- BIOMEDICAL DATA**
The biomedical component in aircrew workload p 159 A84-21020
- BIOMETRICS**
Specific characteristics of the choice of operating wavelengths in the study of somatic muscle fibers using the two-wave photometry technique p 126 A84-20894
- BIOPHYSICS**
Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902
Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903
A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909
physico-chemical investigation of some areas of fundamental significance to biophysics [DE83-017404] p 134 N84-16761
- BLOOD**
Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599
Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
Effect of sydnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777
Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779
Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
Biochelocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788
Behavioral change of blood lactate metabolism [PB84-100171] p 157 N84-17850
- BLOOD CIRCULATION**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
Effects of +Gz accelerations of long duration on the circulatory pressure distribution p 140 A84-21013
Effect of sydnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777
Investigation of the microcirculation of the conjunctiva in airmen with the initial symptoms of cerebral atherosclerosis p 148 N84-17818
Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823
- BLOOD COAGULATION**
The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724
- BLOOD FLOW**
Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781
- BLOOD PLASMA**
Interrelationship between transcortin and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
Changes in the cyclase system of rat skeletal muscles and the content of cyclic nucleotides in rat blood plasma after the administration of caffeine p 124 A84-20879
Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
Plasma substrate response in men and women during marathon running p 143 A84-21740
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776
- BLOOD PRESSURE**
Effects of +Gz accelerations of long duration on the circulatory pressure distribution p 140 A84-21013
Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781
- BLOOD VOLUME**
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
- BLUE GREEN ALGAE**
The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804
- BODY FLUIDS**
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
Tissue pressure and plasma oncotic pressure during exercise p 141 A84-21029
Fluid intake at high altitudes p 145 N84-16772
- BODY MEASUREMENT (BIOLOGY)**
Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823
- BODY SIZE (BIOLOGY)**
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916
- BODY TEMPERATURE**
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813
- BODY WEIGHT**
A comparison of the performance of weight lifters of various classes in classical and auxiliary exercises p 140 A84-20914
- BONE MARROW**
Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929
Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771
- BONE MINERAL CONTENT**
Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757
- BOOTS (FOOTWEAR)**
Overuse injuries of the lower extremities associated with marching, jogging and running. A review [AD-A134672] p 149 N84-17824
- BRADYCARDIA**
Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035
- BRAIN**
Biochelocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788
- BRAIN CIRCULATION**
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290

- Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891
- Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
- The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776
- Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781
- Comparative-physiological aspects of the functional stability of the brain-circulation system p 132 A84-22935
- Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768
- Biocholocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788

BREATHING APPARATUS

- Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776

BUBBLES

- Evaluating the safety of decompression on the basis of the number and size of gas bubbles being formed in the body p 128 A84-21727

BURNS (INJURIES)

- Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882

C**CAFFEINE**

- Changes in the cyclase system of rat skeletal muscles and the content of cyclic nucleotides in rat blood plasma after the administration of caffeine p 124 A84-20879

CALCIUM METABOLISM

- Cooperative binding of calcium ions by photoreceptor membranes p 126 A84-20907
- Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908

CALORIC REQUIREMENTS

- Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781

CARBON

- The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804

CARBON DIOXIDE

- Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855
- Electrochemical carbon dioxide concentrator subsystem development [NASA-CR-166538] p 164 N84-17857

CARBON MONOXIDE

- The use of carbon monoxide by bacteria of the genus Desulfovibrio p 128 A84-21730

CARDIAC VENTRICLES

- Diastolic filling of the heart ventricles p 144 A84-22938

CARDIOLOGY

- Isolated mesoteresystolic click and the fitness of flight personnel p 140 A84-21015

CARDIOVASCULAR SYSTEM

- A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290

- The influence of central and peripheral serotonergic structures on the cardiovascular system and respiration p 130 A84-22779

- Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

CASE HISTORIES

- Othematoma associated with ill-fitting helmet and high G load - A case report p 143 A84-21744

CATALYSTS

- Physico-chemical investigation of some areas of fundamental significance to biophysics [DE83-017404] p 134 N84-16761

CATECHOLAMINE

- The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883

CATIONS

- The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910

CATS

- Neuronal-vascular relations in lateral geniculate body and superior colliculi of cats after exposure to accelerations p 135 N84-16783

CELLS (BIOLOGY)

- The oldest eukaryotic cells p 123 A84-20247
- The structure of proteins in biological membranes p 123 A84-20249

- Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882

- The response of cells to hypoxia p 125 A84-20889

- Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901

- Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908

- The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910

- The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804

- Behavioral change of blood lactate metabolism [PB84-100171] p 157 N84-17850

CEREBRAL CORTEX

- Visual cortical mechanisms responsible for direction selectivity p 152 A84-20621

- Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877

- Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891

- An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 A84-22777

- The influence of central and peripheral serotonergic structures on the cardiovascular system and respiration p 130 A84-22779

CEREBRAL VASCULAR ACCIDENTS

- The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932

CEREBRUM

- Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891

- Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768

CHAINS

- Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 N84-17851

CHEMICAL ANALYSIS

- Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757

- Techniques for the inorganic analysis in a controlled ecological life support system p 137 N84-17853

CHEMICAL BONDS

- Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843

CHEMICAL EFFECTS

- Human exposure to atmospheric concentrations to selected chemicals, volume 1 [PB84-102540] p 151 N84-17835

CHEMICAL EVOLUTION

- A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844

- Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846

- Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847

CHEMORECEPTORS

- Interrelationship between transcortin and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876

- The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883

- Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896

CHIRAL DYNAMICS

- Possible mechanism for origin of chiral specificity during origins of life p 131 A84-22845

- Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846

- Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847

CHLOROPHYLLS

- Investigation of the structure of photosynthetic reaction centers [DE84-002886] p 134 N84-16760

- In vitro chlorophyll photosynthetic reaction [PB84-104892] p 137 N84-17810

CHROMATOGRAPHY

- Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 N84-17852

CHRONIC CONDITIONS

- Current aspects of the drug therapy of chronic cardiac insufficiency p 144 A84-22937

CIRCADIAN RHYTHMS

- Circadian rhythms and disturbed sleep - Its relevance to transport operations p 138 A84-20080

CIRCULATION

- Structural mechanisms of microcirculatory lymph channels p 125 A84-20892

CIRCULATORY SYSTEM

- Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821

CIVIL AVIATION

- Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane [NASA-TM-77359] p 162 N84-16806

CLAMPS

- Grippers for an unmanned forging cell [AD-A134237] p 163 N84-16808

CLASSIFICATIONS

- Practical applications of advances in aviation medicine p 144 N84-16770

- The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804

CLINICAL MEDICINE

- Clinical problems of medical services for automobile drivers in automobile transport p 139 A84-20886

- Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933

- Military Medical Journal, no. 7, 1983 [L-2456] p 147 N84-17811

- Military Medical Journal, no. 4, 1983 [L-2403] p 155 N84-17836

CLOSED ECOLOGICAL SYSTEMS

- Birth of space plant growing [NASA-TM-77244] p 133 N84-16756

- Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 N84-17852

CLOTTING

- Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833

COCKPITS

- Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane [NASA-TM-77359] p 162 N84-16806

- Automation, supervisory control and workload in flight management [NASA-CR-166474] p 155 N84-17838

CODING

- Factors influencing velocity coding in the human visual system p 152 A84-20623

- The coding of velocity of movement in the human visual system p 153 A84-20624

COGNITION

- Cognition and arousal as predictors of risk taking: Effects of load and cognitive style [AD-A134324] p 156 N84-17843

- Task differences, stylistic characteristics and physiological arousal [AD-A134335] p 156 N84-17844

- Effects of load, cognitive complexity and type A on satisfaction [AD-A134415] p 156 N84-17846

COGNITIVE PSYCHOLOGY

- Perspective on human performance modelling p 160 A84-21641

- An interactive system for supporting multiobjective decision making p 160 A84-21643

COLD ACCLIMATIZATION

- Selection of members of polar expeditions and cosmonauts p 151 A84-19600

COLD TOLERANCE

- Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289

- The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883

- Arctic personnel effects [AD-A134892] p 150 N84-17829

- Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831

COLD WATER

- Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035

COLLISION AVOIDANCE

The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086

COLORIMETRY

Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757

COMMUNICATION THEORY

Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553

COMPENSATORY TRACKING

Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649

COMPETITION

Effects of load, cognitive complexity and type A on satisfaction [AD-A134415] p 156 N84-17846

COMPUTER ASSISTED INSTRUCTION

Pilot training instructor/check pilot training modern concepts and a syllabus of essentials p 152 A84-20078

COMPUTER PROGRAMMING

Walking machine control programming [AD-A134435] p 163 N84-16809

COMPUTER PROGRAMS

Stability enhancement of a flexible robot manipulator [AD-A134185] p 162 N84-16807
Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869

COMPUTER SYSTEMS DESIGN

Human system interface concerns in support system design p 159 A84-21637

COMPUTER TECHNIQUES

Prospects for the use of computer-controlled tomography in otolaryngology p 140 A84-20898
Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274
Identifying different item response curves [AD-A133259] p 154 N84-16798

CONCENTRATORS

Electrochemical carbon dioxide concentrator subsystem development [NASA-CR-186538] p 164 N84-17857

CONJUNCTIVA

Investigation of the microcirculation of the conjunctiva in airmen with the initial symptoms of cerebral atherosclerosis p 148 N84-17818

CONTINUOUS RADIATION

Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

CONTRACTION

Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941

CONTROL SIMULATION

A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648

CONTROL STICKS

A test of Fitts' law in two dimensions with hand and head movements [AD-A133347] p 163 N84-16810

CONTROL THEORY

Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645

COORDINATES

Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 N84-17851

CORONARY CIRCULATION

Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725

CORRELATION

Biocholocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788

CORTICOSTEROIDS

Interrelationship between transcortine and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876
The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945

COSMONAUTS

Selection of members of polar expeditions and cosmonauts p 151 A84-19600
Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779

COSMOS 1129 SATELLITE

Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757

COST EFFECTIVENESS

Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 N84-16801

CUES

Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649
Visual cues in the simulation of low-level flight [AD-A135461] p 155 N84-17839

CYCLIC AMP

Changes in the cyclase system of rat skeletal muscles and the content of cyclic nucleotides in rat blood plasma after the administration of caffeine p 124 A84-20879

CYCLIC COMPOUNDS

Code dependent conservation of the physico-chemical properties in amino acid substitutions p 167 A84-22848

Conservation of physico-chemical amino acid properties during the evolution of proteins p 167 A84-22849

CYTOCHROMES

The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927

CYTOLOGY

A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909
Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728
Current ideas on the general properties of and plastic phenomena in hippocampal neurons p 129 A84-22448

T-lymphocyte dependence of the proliferation and differentiation of hemopoietic trunk cells p 131 A84-22926

Correction of the contact interaction of macrophages with nonsyngenic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone p 131 A84-22928

Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929

Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930

SEM investigation of the labyrinth of Macaca mulatta under hypokinetic conditions p 132 A84-22934

The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945

CYTOPLASM

A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909

D**DARK ADAPTATION**

Mechanisms of visual sensitivity - Backgrounds and early dark adaptation p 137 A84-20019

DATA BASES

Human system interface concerns in support system design p 159 A84-21637

DATA COMPRESSION

Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274

DECIMETER WAVES

Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768

DECISION MAKING

Model of the human observer and decision maker - Theory and validation p 160 A84-21642

An interactive system for supporting multiobjective decision making p 160 A84-21643

Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645

A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796

Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 N84-16799

DECOMPOSITION

Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786

DECOMPRESSION SICKNESS

Evaluating the safety of decompression on the basis of the number and size of gas bubbles being formed in the body p 128 A84-21727

DEMOGRAPHY

Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800

DENTISTRY

Flying personnel and occlusal/mandibular dysfunction p 143 A84-21743

DEOXYRIBONUCLEIC ACID

Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901

Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

DEPTH MEASUREMENT

Texture changes versus size changes as stimuli for motion in depth p 137 A84-20018

DETECTION

Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787

DIAGNOSIS

Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936

DIASTOLE

Diastolic filling of the heart ventricles p 144 A84-22938

DIETS

Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781

DILUTION

An allometric-dilution law applicable to high-altitude clothing p 159 A84-21016

DIMERIZATION

Investigation of the structure of photosynthetic reaction centers [DE84-002886] p 134 N84-16760

DIMERS

Investigation of the structure of photosynthetic reaction centers [DE84-002886] p 134 N84-16760

DIRECT CURRENT

Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 N84-17806

DISEASES

Hemorrhoid symptomatology and fighter pilots p 144 A84-22569

Military Medical Journal, no. 3, 1983 [L-2399] p 148 N84-17817

DISPLAY DEVICES

Low-level flight simulation: Vertical cues [AD-A133612] p 155 N84-16802

Visual cues in the simulation of low-level flight [AD-A135461] p 155 N84-17839

DISTANCE MEASURING EQUIPMENT

An optical proximity sensor for measuring surface position and orientation for robot manipulation [AD-A134899] p 164 N84-17861

DIURESIS

Fluid intake at high altitudes p 145 N84-16772

DIVING (UNDERWATER)

Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035

DOSAGE

The dose-effect relationship in exposure to noise p 139 A84-20884

DRUGS

The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724

Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763

DYNAMIC CONTROL

The dynamics of a manipulator with allowance for the compliance of the joints p 159 A84-21056

E**EAR PROTECTORS**

Impact response of an energy absorbing earcup [AD-A134828] p 164 N84-17860

EARTH HYDROSPHERE

A biological hypothesis for the origin of the modern hydrosphere of the earth p 166 A84-21729

ECOLOGY

Appearance of self-oscillations in a distributed system with multiple equilibria --- mathematical model of biosystem-environment interaction p 127 A84-20912

Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786

EDUCATION

Radar training facility initial validation [AD-A133220] p 154 N84-16797

- Overuse injuries of the lower extremities associated with marching, jogging and running. A review
[AD-A134672] p 149 N84-17824
- EFFERENT NERVOUS SYSTEMS**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- EFFLUENTS**
Biochemical indicators of thermal stress: Selected genetic and physiological parameters
[PB84-100122] p 137 N84-17808
- EJECTION SEATS**
Aircrew restraint improvement program p 161 A84-22399
- ELECTRIC CURRENT**
Human reactions to transient electric currents, volume 8
[PB84-112895] p 151 N84-17834
- ELECTRIC DISCHARGES**
Human reactions to transient electric currents, volume 8
[PB84-112895] p 151 N84-17834
- ELECTRIC MOTORS**
Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment
[PB84-102961] p 165 N84-17867
- ELECTRIC POTENTIAL**
Human reactions to transient electric currents, volume 8
[PB84-112895] p 151 N84-17834
Analysis of electrical accident prevention countermeasures
[PB84-102987] p 166 N84-17869
- ELECTRIC POWER PLANTS**
Biochemical indicators of thermal stress: Selected genetic and physiological parameters
[PB84-100122] p 137 N84-17808
- ELECTRIC RELAYS**
Electrical-shock prevention. Volume 1: Protection of maintenance personnel
[PB84-102946] p 165 N84-17865
- ELECTRICAL FAULTS**
Electrical-shock prevention. Volume 2: Ground-fault interrupting devices
[PB84-102953] p 165 N84-17866
Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment
[PB84-102961] p 165 N84-17867
- ELECTROCARDIOGRAPHY**
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916
Rhythm anomalies observed in the course of 24-hour EKGs in healthy young males - Report of 100 cases p 140 A84-21014
Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274
- ELECTROCHEMISTRY**
Electrochemical carbon dioxide concentrator subsystem development
[NASA-CR-166538] p 164 N84-17857
- ELECTROENCEPHALOGRAPHY**
Possible mechanism of a thalamic pacemaker of alpha rhythm and fusiform activity p 127 A84-20913
- ELECTROLYSIS**
Static feed water electrolysis subsystem testing and component development
[NASA-CR-166539] p 164 N84-17856
- ELECTROMAGNETIC FIELDS**
USSR report: Life sciences. Effects of nonionizing electromagnetic radiation, no. 13
[JPRS-84991] p 134 N84-16762
Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768
- ELECTROMAGNETIC INTERACTIONS**
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
- ELECTROMAGNETIC RADIATION**
Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982
[AD-A134674] p 136 N84-17805
- ELECTRON TRANSFER**
Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and *Endomyces magnusii* yeasts p 126 A84-20904
- ELECTRONIC COUNTERMEASURES**
Analysis of electrical accident prevention countermeasures
[PB84-102987] p 166 N84-17869
- ELECTROPHORESIS**
Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase
[NASA-TM-77095] p 133 N84-16755
Comparison of organisms and cell types using two-dimensional electrophoresis
[DE84-003574] p 136 N84-17807
- ELECTRORETINOGRAPHY**
ERG (Electroretinogram) implicit time: An exploration of high frequency wavelets recorded in the human visual system
[AD-A134575] p 150 N84-17832
- ENDOCRINE SYSTEMS**
Water immersion and its computer simulation as analogs of weightlessness
[NASA-CR-171746] p 149 N84-17821
- ENDOCRINOLOGY**
T-lymphocyte dependence of the proliferation and differentiation of hemopoietic trunk cells p 131 A84-22926
- ENVIRONMENTS**
Inorganic analysis in a controlled ecological life support system
[NASA-CR-173299] p 163 N84-17852
- ENZYMATIC ACTIVITY**
Changes in the cyclase system of rat skeletal muscles and the content of cyclic nucleotides in rat blood plasma after the administration of caffeine p 124 A84-20879
The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880
Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and *Endomyces magnusii* yeasts p 126 A84-20904
The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027
Changes of acid hydrolase activity in skeletal muscles of adapted and nonadapted preadolescent rats following physical exercise p 128 A84-21600
Possible mechanism for origin of chiral specificity during origins of life p 131 A84-22845
Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase
[NASA-TM-77095] p 133 N84-16755
- ERROR ANALYSIS**
Measuring, modeling, and gaugmenting reliability of man-machine systems p 160 A84-21639
A theoretical approach to measuring pilot workload
[NASA-CR-173297] p 164 N84-17859
- ERRORS**
Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate
[DE84-004920] p 165 N84-17862
- ERYTHROCYTES**
Red cell function at extreme altitude on Mount Everest p 141 A84-21030
Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782
- ETIOLOGY**
Prevalence of fatty liver in healthy male adults accidentally killed p 139 A84-20293
- EVALUATION**
Aircrew restraint improvement program p 161 A84-22399
- EVOKED RESPONSE (PSYCHOPHYSIOLOGY)**
Evoked potential contrast sensitivity in the parafovea Spatial organization p 151 A84-20020
- EXERCISE PHYSIOLOGY**
A comparison of the performance of weight lifters of various classes in classical and auxiliary exercises p 140 A84-20914
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916
Industrial gymnastics in conditions of a hot climate p 140 A84-20917
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
Tissue pressure and plasma oncotic pressure during exercise p 141 A84-21029
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
- Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037
Plasma substrate response in men and women during marathon running p 143 A84-21740
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944
Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
Overuse injuries of the lower extremities associated with marching, jogging and running. A review
[AD-A134672] p 149 N84-17824
Physiological responses to prolonged upper body exercise
[AD-A134811] p 149 N84-17826
- EXOBIOLGY**
Cosmic vacuum prevents radiopanspermia p 131 A84-22850
Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
Aerospace Medicine and Biology: A continuing bibliography with indexes (supplement 253)
[NASA-SP-7011(253)] p 146 N84-16790
- EXPERT SYSTEMS**
Human system interface concerns in support system design p 159 A84-21637
- EXPLOSIONS**
Electrical-shock prevention. Volume 1: Protection of maintenance personnel
[PB84-102946] p 165 N84-17865
- EXPOSURE**
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
Study of vibration resonance frequencies in rats p 135 N84-16784
Rabbit neurobehavioral toxicity from aluminum
[PB84-103266] p 137 N84-17809
Rationale for a Threshold Limit Value (TLV)R for JP-4/Jet B wide cut aviation turbine fuel
[AD-A134814] p 150 N84-17827
Human exposure to atmospheric concentrations to selected chemicals, volume 1
[PB84-102540] p 151 N84-17835
- EXTINCTION**
Multiple origins of life p 166 A84-21025
- EYE (ANATOMY)**
The structure of the palisade nerve fibers of the sinus hairs after the section of the infraorbital nerve p 125 A84-20890
- EYE DISEASES**
The preservation of the 2-S retinal receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
A simple technique of multiple central static perimetry and the first results of its application --- ophthalmic diagnostic procedure p 161 A84-22942
- EYE MOVEMENTS**
Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021
A comparison of oculomotor pursuit of a target in circular, real, beta or sigma motion p 151 A84-20022
Temporal aspects of eye movement when viewing multiple targets
[AD-A134853] p 150 N84-17828
- EYE PROTECTION**
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

F

- F-16 AIRCRAFT**
Low-level flight simulation: Vertical cues
[AD-A133612] p 155 N84-16802
- FAILURE ANALYSIS**
Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638
Model of the human observer and decision maker - Theory and validation p 160 A84-21642
Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645
- FECES**
Standard research materials: Feces and urine p 137 N84-17854
- FEEDBACK CONTROL**
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272
- FEEDFORWARD CONTROL**
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272

FEMALES

Overuse injuries of the lower extremities associated with marching, jogging and running. A review
[AD-A134672] p 149 N84-17824

The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers
[AD-A134912] p 150 N84-17830

FERMENTATION

The power-law approximation and the similarity properties of the regulatory characteristics of metabolism
p 127 A84-20911

FIGHTER AIRCRAFT

Significance of the headrest geometry in +Gz protective seats
p 160 A84-21739

The effect of computational time-delays on pilot performance in real-time flight simulation
[AIAA PAPER 84-0553] p 160 A84-21882

FINANCIAL MANAGEMENT

Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS)
[AD-A133589] p 155 N84-16801

FLEXIBLE BODIES

Stability enhancement of a flexible robot manipulator
[AD-A134185] p 162 N84-16807

FLIGHT CLOTHING

Impact response of an energy absorbing earcup
[AD-A134828] p 164 N84-17860

FLIGHT CONTROL

Automation, supervisory control and workload in flight management
[NASA-CR-166474] p 155 N84-17838

FLIGHT CREWS

Fit to fly?
p 138 A84-20082

The biomedical component in aircrew workload
p 159 A84-21020

Aircrew restraint improvement program
p 161 A84-22399

Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane
[NASA-TM-77359] p 162 N84-16806

Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry.
p 148 N84-17815

The concept of working capacity of the flight crew
p 155 N84-17837

FLIGHT FATIGUE

Prevention of flight fatigue by physical training
p 147 N84-17812

FLIGHT FITNESS

Fit to fly?
p 138 A84-20082

Isolated mesotelesystolic click and the fitness of flight personnel
p 140 A84-21015

USSR report: Space Biology and Aerospace Medicine, Vol. 17, No. 6, November - December 1983 94 p
[JPRS-USB-84-001] p 135 N84-16769

Investigation of the microcirculation of the conjunctiva in airmen with the initial symptoms of cerebral atherosclerosis
p 148 N84-17818

FLIGHT SAFETY

Circadian rhythms and disturbed sleep - Its relevance to transport operations
p 138 A84-20080

Over-dependence on automatics - The black box one man band
p 152 A84-20084

FLIGHT SIMULATION

The effect of computational time-delays on pilot performance in real-time flight simulation
[AIAA PAPER 84-0553] p 160 A84-21882

Low-level flight simulation: Vertical cues
[AD-A133612] p 155 N84-16802

Visual cues in the simulation of low-level flight
[AD-A135461] p 155 N84-17839

Detection of flying targets in front of a land background: Laboratory tests
[FOA-C-56034-H2] p 157 N84-17848

FLIGHT STRESS (BIOLOGY)

Physiological response in Mirage aircraft pilots
p 141 A84-21022

Flying personnel and occlusal/mandibular dysfunction
p 143 A84-21743

FLIGHT TESTS

Preliminary field tests for detecting flying targets in front of a land background --- ground observers
[FOA-C-56033-H2] p 157 N84-17847

Detection of flying targets in front of a land background: Field tests --- human observers
[FOA-C-56035-H2] p 157 N84-17849

FLIGHT TRAINING

Pilot training instructor/check pilot training modern concepts and a syllabus of essentials
p 152 A84-20078

FLUID DYNAMICS

Biocholocation method for investigation of parameters of intracranial circulation of blood and fluid in man
p 146 N84-16788

FLUID FLOW

Blood flow measurements under high-G conditions: Early prediction of Gz tolerance
[AD-A134653] p 149 N84-17823

FLUID PRESSURE

Tissue pressure and plasma oncotic pressure during exercise
p 141 A84-21029

FLYING PERSONNEL

Isolated mesotelesystolic click and the fitness of flight personnel
p 140 A84-21015

Flying personnel and occlusal/mandibular dysfunction
p 143 A84-21743

Medical evaluation and thoracic radiophotography in flight personnel during 1983
p 143 A84-22568

FOOD INTAKE

Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet
p 146 N84-16781

FORGING

Grippers for an unmanned forging cell
[AD-A134237] p 163 N84-16808

FOSSILS

The oldest eukaryotic cells
p 123 A84-20247

FOVEA

Evoked potential contrast sensitivity in the parafovea
Spatial organization
p 151 A84-20020

FREE RADICALS

Investigation of the mobility of free radicals connected with serum albumins at 30-230 K
p 126 A84-20902

FUNGI

Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase
[NASA-TM-77095] p 133 N84-16755

G

GAS ANALYSIS

A device for estimating the composition of alveolar air
p 158 A84-20918

GAS MIXTURES

An altimetric-dilution law applicable to high-altitude clothing
p 159 A84-21016

GAS TRANSPORT

The dynamics of oxygen saturation of the brain at increased pressures
p 129 A84-22776

GASEOUS FUELS

In vitro chlorophyll photosynthetic reaction
[PB84-104892] p 137 N84-17810

GENETIC CODE

The spatial distribution of fixed mutations within genes coding for proteins
p 129 A84-21800

Complexes of polyadenylic acid and the methyl esters of amino acids
p 167 A84-22843

Possible mechanism for origin of chiral specificity during origins of life
p 131 A84-22845

Code dependent conservation of the physico-chemical properties in amino acid substitutions
p 167 A84-22848

Conservation of physico-chemical amino acid properties during the evolution of proteins
p 167 A84-22849

GENETICS

Correction of the contact interaction of macrophages with nonsynthetic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone
p 131 A84-22928

Biochemical indicators of thermal stress: Selected genetic and physiological parameters
[PB84-100122] p 137 N84-17808

GEOCHEMISTRY

A biological hypothesis for the origin of the modern hydrosphere of the earth
p 166 A84-21729

GLACIERS

Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet
p 128 A84-21728

GLOBULINS

Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers
p 126 A84-20903

GLUCOSE

Plasma substrate response in men and women during marathon running
p 143 A84-21740

GLYCINE

A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions
p 130 A84-22844

GOAL THEORY

An interactive system for supporting multiobjective decision making
p 160 A84-21643

GOGGLES

The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers
[AD-A134912] p 150 N84-17830

GOLD COATINGS

Protection against heat radiation in the steel industry --- protective visor
[FOA-C-20500-E4] p 165 N84-17864

GOVERNMENT PROCUREMENT

Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS)
[AD-A133589] p 155 N84-16801

GRAVITATIONAL EFFECTS

Effects of +Gz accelerations of long duration on the circulatory pressure distribution
p 140 A84-21013

Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position
p 145 N84-16778

Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology
p 136 N84-16789

Method and apparatus for simulating gravitational forces on a living organism
[NASA-CASE-MSC-20202-1] p 162 N84-16803

GROWTH

The effect of various carbon sources on the growth of single-celled cyanophyta
[NASA-TM-77090] p 136 N84-17804

H

HAND (ANATOMY)

A test of Fitts' law in two dimensions with hand and head movements
[AD-A133347] p 163 N84-16810

HANDBOOKS

Human factors products: A one-act play with epilogue
[AD-A133354] p 163 N84-16811

HARNESSES

Aircrew restraint improvement program
p 161 A84-22399

HEAD (ANATOMY)

Analogical simulation model of the thermal stress affecting the head
p 159 A84-21017

Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position
p 145 N84-16778

A test of Fitts' law in two dimensions with hand and head movements
[AD-A133347] p 163 N84-16810

HEAD MOVEMENT

High-frequency vestibulo-ocular reflex activation through forced head rotation in man
p 138 A84-20286

HEALTH PHYSICS

Industrial gymnastics in conditions of a hot climate
p 140 A84-20917

HEART DISEASES

Current aspects of the drug therapy of chronic cardiac insufficiency
p 144 A84-22937

Diastolic filling of the heart ventricles
p 144 A84-22938

Prevention of stress-induced and hypoxic heart-damage by the beta-blocker inderal
p 132 A84-22940

HEART FUNCTION

Characteristics of the EKG and mechanical activity of the heart for tall athletes
p 140 A84-20916

Diastolic filling of the heart ventricles
p 144 A84-22938

Prevention of stress disorders of the contractile function of the myocardium using membrane protectors
p 132 A84-22939

The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction
p 132 A84-22941

Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry
p 148 N84-17815

HEART RATE

Rhythm anomalies observed in the course of 24-hour EKGs in healthy young males - Report of 100 cases
p 140 A84-21014

HEAT ACCLIMATIZATION

Industrial gymnastics in conditions of a hot climate
p 140 A84-20917

HEAT SHIELDING

Protection against heat radiation in the steel industry --- protective visor
[FOA-C-20500-E4] p 165 N84-17864

HEAT TOLERANCE

Patterns of skin temperature and surface heat flow in man during and after cold water immersion
p 138 A84-20289

- Insulin and cortisol improve heat tolerance in isolated perfused rat liver
[AD-A133382] p 133 N84-16758
- HEAT TRANSFER**
Mathematic modeling of heat transfer processes in the human body p 158 A84-20924
- HELICOPTER PERFORMANCE**
Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291
- HELICOPTERS**
Training the helicopter test pilot p 151 A84-19608
- HELMET MOUNTED DISPLAYS**
Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288
A test of Fitts' law in two dimensions with hand and head movements
[AD-A133347] p 163 N84-16810
- HELMETS**
Impact response of an energy absorbing earcup
[AD-A134828] p 164 N84-17860
- HEMATOPOIESIS**
T-lymphocyte dependence of the proliferation and differentiation of hemopoietic trunk cells p 131 A84-22926
- HEMODYNAMIC RESPONSES**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
Effects of +Gz accelerations of long duration on the circulatory pressure distribution p 140 A84-21013
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
Comparative-physiological aspects of the functional stability of the brain-circulation system p 132 A84-22935
Diastolic filling of the heart ventricles p 144 A84-22938
- HEMODYNAMICS**
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290
- HIGH ACCELERATION**
Othematoma associated with ill-fitting helmet and high G load - A case report p 143 A84-21744
- HIGH ALTITUDE BREATHING**
An altimetric-dilution law applicable to high-altitude clothing p 159 A84-21016
- HIGH ALTITUDE ENVIRONMENTS**
The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724
Red cell function at extreme altitude on Mount Everest p 141 A84-21030
Fluid intake at high altitudes p 145 N84-18772
- HIGH TEMPERATURE ENVIRONMENTS**
Industrial gymnastics in conditions of a hot climate p 140 A84-20917
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
- HIGHWAYS**
Task conditions versus stable individual differences as determinants of experts' judgement policies
[AD-A134797] p 156 N84-17841
- HIPPOCAMPUS**
Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891
Current ideas on the general properties of and plastic phenomena in hippocampal neurons p 129 A84-22448
An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 A84-22777
The electrical activity of symmetrical regions of the hippocampus p 130 A84-22778
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943
- HOMEOSTASIS**
The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911
Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781
- HORMONE METABOLISMS**
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944
- HUMAN BEHAVIOR**
Task differences, stylistic characteristics and physiological arousal
[AD-A134335] p 156 N84-17844
Behavioral change of blood lactate metabolism
[PB84-100171] p.157 N84-17850
- HUMAN BEINGS**
Problem solving abilities
[AD-A134717] p 155 N84-17840
- HUMAN BODY**
Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
Arctic personnel effects
[AD-A134892] p 150 N84-17829
- HUMAN FACTORS ENGINEERING**
Army pilot ergonomics p 157 A84-19647
Fit to fly? p 138 A84-20082
The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086
Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553
Measuring, modeling, and gaugmenting reliability of man-machine systems p 160 A84-21639
Model of the human observer and decision maker - Theory and validation p 160 A84-21642
A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648
Aircrew restraint improvement program p 161 A84-22399
Birth of space plant growing
[NASA-TM-77244] p 133 N84-16756
Human factors products: A one-act play with epilogue
[AD-A133354] p 163 N84-16811
Man and machine. The role of human factors in system development
[FOA-A-56005-H2] p 165 N84-17863
- HUMAN PATHOLOGY**
Prevalence of fatty liver in healthy male adults accidentally killed p 139 A84-20293
- HUMAN PERFORMANCE**
Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
Circadian rhythms and disturbed sleep - Its relevance to transport operations p 138 A84-20080
Fit to fly? p 138 A84-20082
Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638
Measuring, modeling, and gaugmenting reliability of man-machine systems p 160 A84-21639
Perspective on human performance modelling p 160 A84-21641
Model of the human observer and decision maker - Theory and validation p 160 A84-21642
Radar training facility initial validation
[AD-A133220] p 154 N84-16797
Maze-solving as a performance measurement tool for human operations under time-stress p 154 N84-16799
[AD-A133394] p 154 N84-16799
Analysis of tutored videotape instructional delivery system
[AD-A133441] p 154 N84-16800
Extending human effectiveness during sustained operations through sleep management
[AD-A134782] p 149 N84-17825
Task conditions versus stable individual differences as determinants of experts' judgement policies
[AD-A134797] p 156 N84-17841
Motivation and performance appraisal behavior
[AD-A134311] p 156 N84-17842
Effects of load, cognitive complexity and type A on satisfaction p 156 N84-17846
[AD-A134415] p 156 N84-17846
Preliminary field tests for detecting flying targets in front of a land background --- ground observers
[FOA-C-56033-H2] p 157 N84-17847
Detection of flying targets in front of a land background: Laboratory tests
[FOA-C-56034-H2] p 157 N84-17848
Detection of flying targets in front of a land background: Field tests --- human observers
[FOA-C-56035-H2] p 157 N84-17849
- HUMAN REACTIONS**
Temporal aspects of eye movement when viewing multiple targets
[AD-A134853] p 150 N84-17828
Human reactions to transient electric currents, volume 8
[PB84-112895] p 151 N84-17834
- HUMAN TOLERANCES**
The dose-effect relationship in exposure to noise p 139 A84-20884
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813
- HYDRATION**
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
- HYDROGEN PRODUCTION**
physico-chemical investigation of some areas of fundamental significance to biophysics
[DE83-017404] p 134 N84-16761
- HYDROPNICS**
Inorganic analysis in a controlled ecological life support system
[NASA-CR-173299] p 163 N84-17852
- HYDROSTATIC PRESSURE**
Method and apparatus for simulating gravitational forces on a living organism
[NASA-CASE-MSC-20202-1] p 162 N84-16803
- HYPERTENSION**
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
- HYPERthermia**
The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
- HYPOCAPNIA**
Variable inhibition by falling CO2 of hypoxic ventilatory response in humans p 142 A84-21036
- HYPOKINESIA**
Interrelationship between transcortin and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876
Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893
SEM investigation of the labyrinth of Macaca mulatta under hypokinetic conditions p 132 A84-22934
Effect of synocarb on hemodynamics and redistribution of blood during functional tests following six-hour antihypostatic hypokinesia p 145 N84-16777
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
- HYPOTHALAMUS**
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943
- HYPOTHERMIA**
Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902
- HYPOXIA**
The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724
The response of cells to hypoxia p 125 A84-20889
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018
Red cell function at extreme altitude on Mount Everest p 141 A84-21030
Variable inhibition by falling CO2 of hypoxic ventilatory response in humans p 142 A84-21036
Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
Prevention of stress-induced and hypoxic heart-damage by the beta-blocker inderal p 132 A84-22940
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943
Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
- IMAGE CONTRAST**
Evoked potential contrast sensitivity in the parafovea
Spatial organization p 151 A84-20200
- IMMOBILIZATION**
Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521
- IMMUNITY**
The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888
The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 N84-17816
Changes in the T and B systems of immunity in seamen during a long cruise p 148 N84-17819
- IMMUNOLOGY**
Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915

- T-lymphocyte dependence of the proliferation and differentiation of hemopoietic trunk cells p 131 A84-22926
- The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927
- Correction of the contact interaction of macrophages with nonsyngenic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone p 131 A84-22928
- Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929
- Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930
- The modeling of multisignal immobilized immunogens p 132 A84-22931
- The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945
- Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 A84-16764
- IMPACT TESTS**
Impact response of an energy absorbing earcup [AD-A134828] p 164 A84-17860
- INCENTIVES**
Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 A84-16801
- INDUSTRIAL SAFETY**
Basic tasks in the prevention of occupational diseases due to the overstrain of the sensorimotor system during physical work p 139 A84-20887
- INFECTIOUS DISEASES**
The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 A84-17816
- INFORMATION RETRIEVAL**
Problem solving abilities [AD-A134717] p 155 A84-17840
- INFORMATION THEORY**
Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553
- INFRARED LASERS**
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392
- INFRASONIC FREQUENCIES**
Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 A84-16764
- INJECTION**
Techniques for the inorganic analysis in a controlled ecological life support system p 137 A84-17853
- INJURIES**
The preservation of the 2-S retinol receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
- Overuse injuries of the lower extremities associated with marching, jogging and running. A review [AD-A134672] p 149 A84-17824
- INORGANIC CHEMISTRY**
Techniques for the inorganic analysis in a controlled ecological life support system p 137 A84-17853
- INORGANIC COMPOUNDS**
Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 A84-17852
- INSOMNIA**
Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933
- INSTRUMENT LANDING SYSTEMS**
A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648
- INSULIN**
Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 A84-16758
- INTERACTIVE CONTROL**
An interactive system for supporting multiobjective decision making p 160 A84-21643
- INTERVALS**
Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 A84-16799
- ION CONCENTRATION**
Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599
- ION DENSITY (CONCENTRATION)**
Cooperative binding of calcium ions by photoreceptor membranes p 126 A84-20907
- ION SELECTIVE ELECTRODES**
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
- IONIC MOBILITY**
Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908
- IONIZING RADIATION**
Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 A84-16764
- Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 A84-16765
- IRON**
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- IRREGULARITIES**
Adaptation to irregularity of rest and activity p 142 A84-21736
- IRREVERSIBLE PROCESSES**
Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 A84-16758
- ISOMERS**
Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846
- Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847
- ISOTOPE LABELING**
Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037
- J**
- JOINTS (ANATOMY)**
The dynamics of a manipulator with allowance for the compliance of the joints p 159 A84-21056
- JP-4 JET FUEL**
Rationale for a Threshold Limit Value (TLV)R for JP-4/JP-8 wide cut aviation turbine fuel [AD-A134814] p 150 A84-17827
- JUDGMENTS**
Task conditions versus stable individual differences as determinants of experts' judgement policies [AD-A134797] p 156 A84-17841
- K**
- KIDNEYS**
Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896
- KINEMATICS**
Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 A84-17851
- L**
- LABYRINTH**
SEM investigation of the labyrinth of Macaca mulatta under hypokinetic conditions p 132 A84-22934
- LACTATES**
Behavioral change of blood lactate metabolism [PB84-100171] p 157 A84-17850
- LANDING AIDS**
Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 A84-16795
- LASER DAMAGE**
Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741
- LASER MODE LOCKING**
Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741
- LATIN SQUARE METHOD**
Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 A84-17862
- LESIONS**
Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741
- Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 A84-16787
- The response of rats to cutaneous dosing with trichothecene mycotoxins [MRL-R-902] p 136 A84-17803
- LIFE SUPPORT SYSTEMS**
Plant waste processing on a solid substrate for a biological life-support system for man p 162 A84-16786
- Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 A84-17852
- LIGHT ADAPTATION**
Mechanisms of visual sensitivity - Backgrounds and early dark adaptation p 137 A84-20019
- LIGHT EMITTING DIODES**
An optical proximity sensor for measuring surface position and orientation for robot manipulation [AD-A134899] p 164 A84-17861
- LIMBS (ANATOMY)**
Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 A84-17806
- Overuse injuries of the lower extremities associated with marching, jogging and running. A review [AD-A134672] p 149 A84-17824
- LIPID METABOLISM**
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
- Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882
- LIVER**
Prevalence of fatty liver in healthy male adults accidentally killed p 139 A84-20293
- Interrelationship between corticosterone and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876
- Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882
- Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and Endomyces magnusii yeasts p 126 A84-20904
- Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909
- The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927
- Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930
- Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 A84-16758
- LOCOMOTION**
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272
- LONG DURATION SPACE FLIGHT**
Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 A84-16757
- LOW ALTITUDE**
Visual cues in the simulation of low-level flight [AD-A135461] p 155 A84-17839
- LOW TEMPERATURE**
Arctic personnel effects [AD-A134892] p 150 A84-17829
- LOWER BODY NEGATIVE PRESSURE**
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
- Method and apparatus for simulating gravitational forces on a living organism [NASA-CASE-MSC-20202-1] p 162 A84-16803
- LUMINAIRES**
The preservation of the 2-S retinol receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
- LUMINOUS INTENSITY**
The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 A84-17804
- LUNGS**
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 A84-16778
- LYMPH**
Structural mechanisms of microcirculatory lymph channels p 125 A84-20892
- LYMPHOCYTES**
Changes in the T and B systems of immunity in seamen during a long cruise p 148 A84-17819
- M**
- MAGNETIC EFFECTS**
The effect of unvarying and low-frequency magnetic fields on biological systems p 128 A84-21726
- MAGNETIC FIELDS**
Permeability of sodium sulfolactyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 A84-16763
- Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 A84-16765

Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
 Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 N84-17806

MALES
 Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780

MAN MACHINE SYSTEMS
 Army pilot ergonomics p 157 A84-19647
 Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553
 Human system interface concerns in support system design p 159 A84-21637
 Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638
 Measuring, modeling, and gauging reliability of man-machine systems p 160 A84-21639
 Perspective on human performance modelling p 160 A84-21641
 Model of the human observer and decision maker - Theory and validation p 160 A84-21642
 An interactive system for supporting multiobjective decision making p 160 A84-21643
 Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645
 A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648
 Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649
 Man and machine. The role of human factors in system development [FOA-A-56005-H2] p 165 N84-17863

MANAGEMENT INFORMATION SYSTEMS
 An interactive system for supporting multiobjective decision making p 160 A84-21643

MANIPULATORS
 The dynamics of a manipulator with allowance for the compliance of the joints p 159 A84-21056
 Stability enhancement of a flexible robot manipulator [AD-A134185] p 162 N84-16807
 Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 N84-17851

MANNED SPACE FLIGHT
 USSR report: Space Biology and Aerospace Medicine, Vol. 17, No. 6, November - December 1983 94 p [JPRS-USB-84-001] p 135 N84-16769
 Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771
 Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791

MANUAL CONTROL
 Perspective on human performance modelling p 160 A84-21641
 Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649

MARINE BIOLOGY
 Biochemical indicators of thermal stress: Selected genetic and physiological parameters [PB84-100122] p 137 N84-17808

MATHEMATICAL MODELS
 The anthropic principle and its implications for biological evolution --- intermediate attitude between primitive anthropocentric prejudice and its antithesis in heeding astrophysical restraints for interpreting evolution p 166 A84-20017
 Model of the human observer and decision maker - Theory and validation p 160 A84-21642
 Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645
 A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796

MECHANICAL DRIVES
 Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment [PB84-102961] p 165 N84-17867

MECHANICAL SHOCK
 Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment [PB84-102961] p 165 N84-17867

MECHANORECEPTORS
 The structure of the palisade nerve fibers of the sinus hairs after the section of the infraorbital nerve p 125 A84-20890

MEDICAL SCIENCE
 Military Medical Journal, no. 7, 1983 [L-2456] p 147 N84-17811
 Military Medical Journal, no. 2, 1983 [L-2341] p 148 N84-17814

MEDICAL SERVICES
 Prospects in the development of medical services in automobile transport p 158 A84-20885
 Clinical problems of medical services for automobile drivers in automobile transport p 139 A84-20886

MEMBRANES
 The structure of proteins in biological membranes p 123 A84-20249
 Cooperative binding of calcium ions by photoreceptor membranes p 126 A84-20907
 A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909
 The effect of unvarying and low-frequency magnetic fields on biological systems p 128 A84-21726
 Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763

MENTAL HEALTH
 Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773

MENTAL PERFORMANCE
 Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553
 Adaptation to irregularity of rest and activity p 142 A84-21736
 Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773
 A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796

METABOLISM
 Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521
 The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911
 Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776
 Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
 Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781
 Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786
 Energy balance and the composition of weight loss during prolonged space flight [NASA-CR-171745] p 148 N84-17820
 Behavioral change of blood lactate metabolism [PB84-100171] p 157 N84-17850

METALS
 Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869

MICE
 Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

MICROBIOLOGY
 Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728
 Cosmic vacuum prevents radiopanspermia p 131 A84-22850
 Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786

MICROSPORES
 Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase [NASA-TM-77095] p 133 N84-16755

MICROWAVES
 Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 N84-16764
 New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
 Use of microwaves to improve nutritional value of soybeans for future space inhabitants [NASA-CR-175336] p 162 N84-16805

MILITARY HELICOPTERS
 Helicopter pilot back pain - A preliminary study p 143 A84-21738

MILITARY OPERATIONS
 Extending human effectiveness during sustained operations through sleep management [AD-A134782] p 149 N84-17825

MILITARY PSYCHOLOGY
 Army pilot ergonomics p 157 A84-19647

MILITARY TECHNOLOGY
 Military Medical Journal, no. 2, 1983 [L-2341] p 148 N84-17814

Military Medical Journal, no. 4, 1983 [L-2403] p 155 N84-17836

MINERAL METABOLISM
 Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and Endomyces magnusii yeasts p 126 A84-20904
 Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
 The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782

MINES
 Electrical-shock prevention. Volume 2: Ground-fault interrupting devices [PB84-102953] p 165 N84-17866

MINES (EXCAVATIONS)
 Electrical-shock prevention. Volume 1: Protection of maintenance personnel [PB84-102946] p 165 N84-17865
 Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868

MINING
 Electrical-shock prevention. Volume 1: Protection of maintenance personnel [PB84-102946] p 165 N84-17865
 Electrical-shock prevention. Volume 2: Ground-fault interrupting devices [PB84-102953] p 165 N84-17866
 Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868
 Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869

MITOCHONDRIA
 Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and Endomyces magnusii yeasts p 126 A84-20904

MOISTURE CONTENT
 Use of microwaves to improve nutritional value of soybeans for future space inhabitants [NASA-CR-175336] p 162 N84-16805

MOLECULAR BIOLOGY
 Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903
 The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906
 Comparison of organisms and cell types using two-dimensional electrophoresis [DE84-003574] p 136 N84-17807

MOLECULAR CHAINS
 Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901

MONITORS
 Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645

MONKEYS
 Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology p 136 N84-16789

MORPHOLOGY
 The structure of proteins in biological membranes p 123 A84-20249
 Structural mechanisms of microcirculatory lymph channels p 125 A84-20892
 Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893
 Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728
 Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779

MOTION PERCEPTION
 Texture changes versus size changes as stimuli for motion in depth p 137 A84-20018
 Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021
 A comparison of oculomotor pursuit of a target in circular real, beta or sigma motion p 151 A84-20022
 Failure to find an absolute retinal limit of a putative short-range process in apparent motion p 152 A84-20023
 The detection of motion in the peripheral visual field p 152 A84-20622
 Factors influencing velocity coding in the human visual system p 152 A84-20623
 The coding of velocity of movement in the human visual system p 153 A84-20624
 Coherent global motion percepts from stochastic local motions p 153 A84-20625

Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649

MOTION SICKNESS DRUGS
Side effects of antimotion sickness drugs p 143 A84-21737

MOTIVATION
Motivation and performance appraisal behavior [AD-A134311] p 156 N84-17842

MUSCLES
Specific characteristics of the choice of operating wavelengths in the study of somatic muscle fibers using the two-wave photometry technique p 126 A84-20894
Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780

MUSCULAR FUNCTION
Kinetics of the passive transport of Ca(2+) in vesicles of myotetrium sarcolemma p 127 A84-20908
Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866
Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

MUSCULOSKELETAL SYSTEM
Changes in the cyclase system of rat skeletal muscles and the content of cyclic nucleotides in rat blood plasma after the administration of caffeine p 124 A84-20879
The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910
Changes of acid hydrolase activity in skeletal muscles of adapted and nonadapted preadolescent rats following physical exercise p 128 A84-21600
Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866

MUTATIONS
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800
Code dependent conservation of the physico-chemical properties in amino acid substitutions p 167 A84-22848
Conservation of physico-chemical amino acid properties during the evolution of proteins p 167 A84-22849

MYOCARDIAL INFARCTION
The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941

MYOCARDIUM
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

N

NAVY
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813

NEAR INFRARED RADIATION
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

NERVES
Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 N84-17806

NEUROLOGY
The dose-effect relationship in exposure to noise p 139 A84-20884
Rabbit neurobehavioral toxicity from aluminum [PB84-103266] p 137 N84-17809

NEUROMUSCULAR TRANSMISSION
The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906

NEURONS
Visual cortical mechanisms responsible for direction selectivity p 152 A84-20621

NEUROPHYSIOLOGY
Visual cortical mechanisms responsible for direction selectivity p 152 A84-20621
Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877
The structure of the palisade nerve fibers of the sinus hairs after the section of the infraorbital nerve p 125 A84-20890
Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896
Current ideas on the general properties of and plastic phenomena in hippocampal neurons p 129 A84-22448

Neurophysiological aspects of spinal thermoregulatory mechanisms p 129 A84-22450
Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944

NIGHT FLIGHTS (AIRCRAFT)
Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 N84-16795

NOISE TOLERANCE
The dose-effect relationship in exposure to noise p 139 A84-20884
Indices of the temporal characteristics of the acoustic reflex in workers with normal and impaired hearing exposed to high levels of noise p 140 A84-20899

NUTRITION
Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781

NYSTAGMUS
The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780

O

OCULOMETERS
High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286

OPERATOR PERFORMANCE
The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086
Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553
Side effects of antimotion sickness drugs p 143 A84-21737

OPERATORS (PERSONNEL)
Prospects in the development of medical services in automobile transport p 158 A84-20885
Clinical problems of medical services for automobile drivers in automobile transport p 139 A84-20886

OPHTHALMOLOGY
A simple technique of multiple central static perimetry and the first results of its application --- ophthalmic diagnostic procedure p 161 A84-22942

OPTICAL ACTIVITY
Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847

OPTICAL TRACKING
Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021
A comparison of oculomotor pursuit of a target in circular real, beta or sigma motion p 151 A84-20022

ORBITAL WORKERS
Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773

ORTHOSTATIC TOLERANCE
G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
Effect of synnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777

OSMOSIS
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027

OTOLARYNGOLOGY
Prospects for the use of computer-controlled tomography in otolaryngology p 140 A84-20898

OTOLOGY
Othematoma associated with ill-fitting helmet and high G load - A case report p 143 A84-21744

OVERVOLTAGE
Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868

OXIDASE
Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877

OXIDATION
Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882

OXYGEN
Static feed water electrolysis subsystem testing and component development [NASA-CR-166539] p 164 N84-17856

OXYGEN ANALYZERS
A device for estimating the composition of alveolar air p 158 A84-20918

OXYGEN CONSUMPTION
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027
The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776
Effect of synnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777

OXYGEN MASKS
The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers [AD-A134912] p 150 N84-17830

OXYGEN SUPPLY EQUIPMENT
Problems posed by the use of onboard oxygen generators p 161 A84-22567

OXYGEN TENSION
The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776
An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 A84-22777

OXYHEMOGLOBIN
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187

OZONE
Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034

P

PAIN
Helicopter pilot back pain - A preliminary study p 143 A84-21738
The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945

PANSPERMIA
Cosmic vacuum prevents radiospERMIA p 131 A84-22850

PARAMAGNETISM
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905

PARANASAL SINUSES
Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936

PARTIAL PRESSURE
Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855

PARTICLE SIZE DISTRIBUTION
Evaluating the safety of decompression on the basis of the number and size of gas bubbles being formed in the body p 128 A84-21727

PATHOGENESIS
Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933
The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 N84-17816

PATHOLOGICAL EFFECTS
Problems of the natural and modified radiation response p 124 A84-20275

PATHOLOGY
Hemorrhoid symptomatology and fighter pilots p 144 A84-22569

PATTERN RECOGNITION
Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638

PENTOBARBITAL
Benzodiazepine effects on arousal threshold during sleep [AD-A133151] p 147 N84-16792

PEPTIDES
Possible mechanism for origin of chiral specificity during origins of life p 131 A84-22845

PERFORMANCE PREDICTION
Perspective on human performance modelling p 160 A84-21641

PERFORMANCE TESTS
Aircrew restraint improvement program p 161 A84-22399
Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793

PERIPHERAL CIRCULATION
Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831

PERIPHERAL VISION

The detection of motion in the peripheral visual field
p 152 A84-20622

PERMEABILITY

A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909
The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910
Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763

PERSONALITY

Effects of load, cognitive complexity and type A on satisfaction
[AD-A134415] p 156 N84-17846

PERSONNEL DEVELOPMENT

Radar training facility initial validation
[AD-A133220] p 154 N84-16797

PERSONNEL MANAGEMENT

Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane
[NASA-TM-77359] p 162 N84-16806
Motivation and performance appraisal behavior
[AD-A134311] p 156 N84-17842

PERSONNEL SELECTION

Selection of members of polar expeditions and cosmonauts p 151 A84-19600
Pilot training instructor/check pilot training modern concepts and a syllabus of essentials
p 152 A84-20078

PHARMACOLOGY

An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
Current aspects of the drug therapy of chronic cardiac insufficiency p 144 A84-22937

PHOTOCHEMICAL REACTIONS

physico-chemical investigation of some areas of fundamental significance to biophysics
[DEB3-017404] p 134 N84-16761

PHOTOMETRY

Specific characteristics of the choice of operating wavelengths in the study of somatic muscle fibers using the two-wave photometry technique p 126 A84-20894

PHOTONS

Effect of radiofrequency radiation on DNA duplex stability and replication
[AD-A133526] p 134 N84-16759

PHOTORECEPTORS

The preservation of the 2-S retinol receptor in the rat retina in injuries induced by the visible light
p 125 A84-20881
Cooperative binding of calcium ions by photoreceptor membranes p 126 A84-20907

PHOTOSYNTHESIS

Investigation of the structure of photosynthetic reaction centers
[DEB4-002886] p 134 N84-16760
In vitro chlorophyll photosynthetic reaction
[PB84-104892] p 137 N84-17810

PHYSICAL EXERCISE

Changes of acid hydrolase activity in skeletal muscles of adapted and nonadapted preadolescent rats following physical exercise p 128 A84-21600
Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779
Prevention of flight fatigue by physical training
p 147 N84-17812
Overuse injuries of the lower extremities associated with marching, jogging and running. A review
[AD-A134672] p 149 N84-17824
Physiological responses to prolonged upper body exercise
[AD-A134811] p 149 N84-17826

PHYSICAL FITNESS
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813

PHYSICAL WORK

Basic tasks in the prevention of occupational diseases due to the overstrain of the sensorimotor system during physical work p 139 A84-20887
Work stress p 143 A84-22449
Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815

PHYSIOCHEMISTRY

Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878

Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903

The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906
The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911

An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037

The effect of unvarying and low-frequency magnetic fields on biological systems p 128 A84-21726
Plasma substrate response in men and women during marathon running p 143 A84-21740
Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780

Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866
Correction of the contact interaction of macrophages with nonsyngenic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone p 131 A84-22928
Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930

PHYSIOLOGICAL EFFECTS

The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724
Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521
The dose-effect relationship in exposure to noise p 139 A84-20884
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018

Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
Side effects of antimotion sickness drugs p 143 A84-21737

The influence of central and peripheral serotonergic structures on the cardiovascular system and respiration p 130 A84-22779

SEM investigation of the labyrinth of Macaca mulatta under hypokinetic conditions p 132 A84-22934
The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941
Benzodiazepine effects on arousal threshold during sleep
[AD-A133151] p 147 N84-16792
Age, altitude, and workload effects on complex performance
[AD-A133594] p 147 N84-16793
Biochemical indicators of thermal stress: Selected genetic and physiological parameters
[PB84-100122] p 137 N84-17808
Prevention of flight fatigue by physical training p 147 N84-17812

The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 N84-17816
Water immersion and its computer simulation as analogs of weightlessness
[NASA-CR-171746] p 149 N84-17821
Physiological responses to prolonged upper body exercise
[AD-A134811] p 149 N84-17826
Arctic personnel effects
[AD-A134892] p 150 N84-17829

PHYSIOLOGICAL RESPONSES

Selection of members of polar expeditions and cosmonauts p 151 A84-19600
The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888
The response of cells to hypoxia p 125 A84-20889
Indices of the temporal characteristics of the acoustic reflex in workers with normal and impaired hearing exposed to high levels of noise p 140 A84-20899
Physiological response in Mirage aircraft pilots p 141 A84-21022
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036

Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246

Changes of acid hydrolase activity in skeletal muscles of adapted and nonadapted preadolescent rats following physical exercise p 128 A84-21600
The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780

Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943
Changes in the T and B systems of immunity in seamen during a long cruise p 148 N84-17819
Autonomic influences on peripheral circulatory and thermal responses to cold
[AD-A134444] p 150 N84-17831

PHYSIOLOGICAL TESTS

Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287
Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289
A simple technique of multiple central static perimetry and the first results of its application --- ophthalmic diagnostic procedure p 161 A84-22942
Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815

PHYSIOLOGY

A review of vision physiology p 143 A84-21745

PIEZOELECTRIC TRANSDUCERS

Study of vibration resonance frequencies in rats p 135 N84-16784

PILOT PERFORMANCE

Army pilot ergonomics p 157 A84-19647
Fit to fly? p 138 A84-20082
Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290
A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648
Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649
Aging problems and their impact on pilot performance p 142 A84-21675
The effect of computational time-delays on pilot performance in real-time flight simulation
[AIAA PAPER 84-0553] p 160 A84-21882
Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787

Age, altitude, and workload effects on complex performance
[AD-A133594] p 147 N84-16793
Low-level flight simulation: Vertical cues
[AD-A133612] p 155 N84-16802
Objective measure of pilot workload
[NASA-CR-173296] p 164 N84-17858
A theoretical approach to measuring pilot workload
[NASA-CR-173297] p 164 N84-17859

PILOT TRAINING

Training the helicopter test pilot p 151 A84-19608
Pilot training instructor/check pilot training modern concepts and a syllabus of essentials p 152 A84-20078
Low-level flight simulation: Vertical cues
[AD-A133612] p 155 N84-16802
Visual cues in the simulation of low-level flight
[AD-A135461] p 155 N84-17839
Analysis of the pilot conversion process for the Air Force T-46A jet trainer aircraft
[AD-A134404] p 156 N84-17845

PILOTS (PERSONNEL)

Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787

PLANETARY ATMOSPHERES

Life as a planetary phenomenon p 166 A84-19911

PLANETARY EVOLUTION

Life as a planetary phenomenon p 166 A84-19911
A biological hypothesis for the origin of the modern hydrosphere of the earth p 166 A84-21729

PLANTS (BOTANY)

Birth of space plant growing
[NASA-TM-77244] p 133 N84-16756
Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786

POLAR REGIONS

Selection of members of polar expeditions and cosmonauts p 151 A84-19600

POLYNUCLEOTIDES

Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843

POLYPEPTIDES

Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901

POPULATIONS

Appearance of self-oscillations in a distributed system with multiple equilibria --- mathematical model of biosystem-environment interaction p 127 A84-20912

PORPHYRINS

Investigation of the structure of photosynthetic reaction centers [DE84-002886] p 134 N84-16760

PORTABLE EQUIPMENT

The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932

POTASSIUM

The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782

PRECAMBRIAN PERIOD

Multiple origins of life p 166 A84-21025

PREDICTIONS

Cognition and arousal as predictors of risk taking: Effects of load and cognitive style [AD-A134324] p 156 N84-17843

PRESSURE EFFECTS

The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776

PRESSURE MEASUREMENT

Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034
 Static feed water electrolysis subsystem testing and component development [NASA-CR-166539] p 164 N84-17856

PRESSURE SUITS

An allometric-dilution law applicable to high-altitude clothing p 159 A84-21016
 Method and apparatus for simulating gravitational forces on a living organism [NASA-CASE-MSC-20202-1] p 162 N84-16803

PRIMITIVE EARTH ATMOSPHERE

A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844

Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846

Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847

PRINCIPLES

The anthropic principle and its implications for biological evolution --- intermediate attitude between primitive anthropocentric prejudice and its antithesis in heeding astrophysical restraints for interpreting evolution p 166 A84-20017

PROBABILITY THEORY

A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796
 Identifying different item response curves [AD-A133259] p 154 N84-16798

PROBLEM SOLVING

Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638

Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793

Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 N84-16799

Multilevel semantic analysis and problem-solving in the flight-domain [NASA-CR-173177] p 162 N84-16804

Problem solving abilities [AD-A134717] p 155 N84-17840

PROSTAGLANDINS

Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026

PROTEIN METABOLISM

Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599
 The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880

The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906

PROTEIN SYNTHESIS

The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800

Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843
 A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844

Possible mechanism for origin of chiral specificity during origins of life p 131 A84-22845

Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846

Code dependent conservation of the physico-chemical properties in amino acid substitutions p 167 A84-22848

Conservation of physico-chemical amino acid properties during the evolution of proteins p 167 A84-22849

PROTEINS

The structure of proteins in biological membranes p 123 A84-20249

Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase [NASA-TM-77095] p 133 N84-16755

PROTOBIOLOGY

A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844

PSYCHIATRY

Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933

PSYCHOLOGICAL FACTORS

A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796

Task conditions versus stable individual differences as determinants of experts' judgement policies [AD-A134797] p 156 N84-17841

PSYCHOLOGICAL TESTS

Identifying different item response curves [AD-A133259] p 154 N84-16798

PSYCHOMETRICS

Coherent global motion percepts from stochastic local motions p 153 A84-20625

PSYCHOMOTOR PERFORMANCE

A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272

PSYCHOTROPIC DRUGS

The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780

PULMONARY FUNCTIONS

Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

PURSUIT TRACKING

Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021
 A comparison of oculomotor pursuit of a target in circular, real, beta or sigma motion p 151 A84-20022

R

RADIATION DOSAGE

Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791

RADIATION EFFECTS

Problems of the natural and modified radiation response p 124 A84-20275
 The problem of synergism in radiobiology p 126 A84-20897

Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741

Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

USSR report: Life sciences. Effects of nonionizing electromagnetic radiation, no. 13 [JPRS-84991] p 134 N84-16762

Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766

Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982 [AD-A134674] p 136 N84-17805

RADIATION HAZARDS

New trends in standardization of electromagnetic microwave radiation p 135 N84-16767

RADIATION PROTECTION

Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791

RADIATION SHIELDING

Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771

Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791

RADIATION TOLERANCE

Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 N84-16765

Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766

RADIO FREQUENCIES

Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982 [AD-A134674] p 136 N84-17805

RADIOBIOLOGY

Problems of the natural and modified radiation response p 124 A84-20275

The problem of synergism in radiobiology p 126 A84-20897

Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771

RADIOGRAPHY

Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568

RANGE

Preliminary field tests for detecting flying targets in front of a land background --- ground observers [FOA-C-56033-H2] p 157 N84-17847

RANGE (EXTREMES)

Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781

RATINGS

Motivation and performance appraisal behavior [AD-A134311] p 156 N84-17842

RATS

Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758

Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782

Study of vibration resonance frequencies in rats p 135 N84-16784

Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785

The response of rats to cutaneous dosing with trichothecene mycotoxins [MRL-R-902] p 136 N84-17803

REACTION KINETICS

Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782

REAL TIME OPERATION

The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882

Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274

REFLEXES

Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287

Indices of the temporal characteristics of the acoustic reflex in workers with normal and impaired hearing exposed to high levels of noise p 140 A84-20899

REGENERATION (PHYSIOLOGY)

Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905

Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 N84-17806

RELIABILITY ANALYSIS

Over-dependence on automatics - The black box one man band p 152 A84-20084

Measuring, modeling, and gaugmenting reliability of man-machine systems p 160 A84-21639

REMOTE MANIPULATOR SYSTEM

Robots in space travel p 158 A84-19848

RENAL FUNCTION

Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821

RESEARCH MANAGEMENT

Standard research materials: Feces and urine p 137 N84-17854

RESONANT FREQUENCIES

Study of vibration resonance frequencies in rats p 135 N84-16784

RESPIRATION

RESPIRATION

Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776

RESPIRATORY IMPEDANCE

Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034

RESPIRATORY PHYSIOLOGY

Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035

Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036

The influence of central and peripheral serotonergic structures on the cardiovascular system and respiration p 130 A84-22779

RESPIRATORY SYSTEM

Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778

RESPONSES

Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828

RETINA

Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

The preservation of the 2-S retinal receptor in the rat retina in injuries induced by the visible light p 125 A84-20881

Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741
A simple technique of multiple central static perimetry and the first results of its application --- ophthalmic diagnostic procedure p 161 A84-22942

RETINAL IMAGES

Failure to find an absolute retinal limit of a putative short-range process in apparent motion p 152 A84-20023

RETINENE

The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941

RHEOLOGY

Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774

RHYTHM (BIOLOGY)

Rhythmic activity in the visual analyzer p 129 A84-22447

RISK

Cognition and arousal as predictors of risk taking: Effects of load and cognitive style [AD-A134324] p 156 N84-17843

ROBOTICS

Grippers for an unmanned forging cell [AD-A134237] p 163 N84-16808

ROBOTS

Robots in space travel p 158 A84-19848
Stability enhancement of a flexible robot manipulator [AD-A134185] p 162 N84-16807
Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 N84-17851

An optical proximity sensor for measuring surface position and orientation for robot manipulation [AD-A134899] p 164 N84-17861

Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 N84-17862

ROTATING ELECTRICAL MACHINES

Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment [PB84-102961] p 165 N84-17867

RUNNING

Plasma substrate response in men and women during marathon running p 143 A84-21740

S

SAFETY

Task conditions versus stable individual differences as determinants of experts' judgement policies [AD-A134797] p 156 N84-17841

Electrical-shock prevention. Volume 2: Ground-fault interrupting devices [PB84-102953] p 165 N84-17866

Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868

SAFETY FACTORS

Evaluating the safety of decompression on the basis of the number and size of gas bubbles being formed in the body p 128 A84-21727

SAFETY MANAGEMENT

Prospects in the development of medical services in automobile transport p 158 A84-20885

SALYUT SPACE STATION

Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773

SCHEDULING

Analysis of the pilot conversion process for the Air Force T-46A jet trainer aircraft [AD-A134404] p 156 N84-17845

SEATS

Significance of the headrest geometry in +Gz protective seats p 160 A84-21739

Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

SEDATIVES

Benzodiazepine effects on arousal threshold during sleep [AD-A133151] p 147 N84-16792

SELF OSCILLATION

Appearance of self-oscillations in a distributed system with multiple equilibria --- mathematical model of biosystem-environment interaction p 127 A84-20912

SEMANTICS

Multilevel semantic analysis and problem-solving in the flight-domain [NASA-CR-173177] p 162 N84-16804

SENSITIVITY

Problems of the natural and modified radiation response p 124 A84-20275

SENSORIMOTOR PERFORMANCE

Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
A comparison of oculomotor pursuit of a target in circular real, beta or sigma motion p 151 A84-20022

Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287

Basic tasks in the prevention of occupational diseases due to the overstrain of the sensorimotor system during physical work p 139 A84-20887

SEROTONIN

The influence of central and peripheral serotonergic structures on the cardiovascular system and respiration p 130 A84-22779

SERUMS

Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599

SEX FACTOR

Plasma substrate response in men and women during marathon running p 143 A84-21740

Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742

SHOCK WAVES

Electrical-shock prevention. Volume 1: Protection of maintenance personnel [PB84-102946] p 165 N84-17865

Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868

SIGNAL PROCESSING

Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274

Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828

SIMILARITY THEOREM

The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911

SIMULATION

Method and apparatus for simulating gravitational forces on a living organism [NASA-CASE-MS-C-20202-1] p 162 N84-16803

SITTING POSITION

Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246

SKIN TEMPERATURE (BIOLOGY)

Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289

Neurophysiological aspects of spinal thermoregulatory mechanisms p 129 A84-22450

SLEEP

Benzodiazepine effects on arousal threshold during sleep [AD-A133151] p 147 N84-16792

Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813

SLEEP DEPRIVATION

Circadian rhythms and disturbed sleep - Its relevance to transport operations p 138 A84-20080

Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933
Extending human effectiveness during sustained operations through sleep management [AD-A134782] p 149 N84-17825

SLOPES

Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 N84-16795

SMOKE

The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 N84-17816

SODIUM COMPOUNDS

Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763

SOLAR ENERGY

In vitro chlorophyll photosynthetic reaction [PB84-104892] p 137 N84-17810

SOLAR SYSTEM

Life as a planetary phenomenon p 166 A84-19911

SOYBEANS

Use of microwaves to improve nutritional value of soybeans for future space inhabitants [NASA-CR-175336] p 162 N84-16805

SPACE FLIGHT

Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology p 136 N84-16789

Energy balance and the composition of weight loss during prolonged space flight [NASA-CR-171745] p 148 N84-17820

SPACE FLIGHT FEEDING

Use of microwaves to improve nutritional value of soybeans for future space inhabitants [NASA-CR-175336] p 162 N84-16805

SPACE FLIGHT STRESS

Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779

SPACE MANUFACTURING

Robots in space travel p 158 A84-19848

SPACE PERCEPTION

Texture changes versus size changes as stimuli for motion in depth p 137 A84-20018

Evoked potential contrast sensitivity in the parafovea Spatial organization p 151 A84-20020

SPACE SUITS

G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775

SPACEBORNE EXPERIMENTS

Birth of space plant growing [NASA-TM-77244] p 133 N84-16756

SPINAL CORD

Neurophysiological aspects of spinal thermoregulatory mechanisms p 129 A84-22450

SPINE

Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287

Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291

Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019

SPLEEN

Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893

Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929

STABILITY

Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

STANDARDIZATION

Standardization of units and symbols - Revised --- for aerospace medicine publications p 142 A84-21735

New trends in standardization of electromagnetic microwave radiation p 135 N84-16767

STANDARDS

Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 N84-17862

STATISTICAL ANALYSIS

Identifying different item response curves [AD-A133259] p 154 N84-16798

STATISTICAL CORRELATION

Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800

STEERING

Strategies using an observer for steering a random motion of a point in a multitarget environment [CSIR-TWISK-285] p 153 N84-16794

STERILIZATION

Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 N84-16765

STEROIDS

Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758

STOCHASTIC PROCESSES

Coherent global motion percepts from stochastic local motions p 153 A84-20625

STRESS (PHYSIOLOGY)

Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521

Interrelationship between transcortin and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876

Basic tasks in the prevention of occupational diseases due to the overstrain of the sensorimotor system during physical work p 139 A84-20887

Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893

An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915

Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028

Work stress p 143 A84-22449

Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944

STRESS (PSYCHOLOGY)

Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

Prevention of stress-induced and hypoxic heart-damage by the beta-blocker inderal p 132 A84-22940

The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945

Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 N84-16799

SUBMERGING

G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775

SULFATES

Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763

SUPERHIGH FREQUENCIES

Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766

SUPPORT SYSTEMS

Human system interface concerns in support system design p 159 A84-21637

SURGERY

Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768

SURVIVAL

Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742

SYMBOLS

Standardization of units and symbols - Revised --- for aerospace medicine publications p 142 A84-21735

SYMPTOMOLOGY

Hemorrhoid symptomatology and fighter pilots p 144 A84-22569

SYNTHESIS (CHEMISTRY)

physico-chemical investigation of some areas of fundamental significance to biophysics [DEB3-017404] p 134 N84-16761

SYSTEM EFFECTIVENESS

Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800

SYSTEM FAILURES

Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638

SYSTEMS ENGINEERING

Human system interface concerns in support system design p 159 A84-21637

SYSTEMS MANAGEMENT

Man and machine. The role of human factors in system development [FOA-A-56005-H2] p 165 N84-17863

SYSTEMS SIMULATION

Measuring, modeling, and augmenting reliability of man-machine systems p 160 A84-21639

Perspective on human performance modelling

p 160 A84-21641

SYSTEMS STABILITY

Stability enhancement of a flexible robot manipulator [AD-A134185] p 162 N84-16807

SYSTOLE

Isolated mesotelesiostolic click and the fitness of flight personnel p 140 A84-21015

Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815

T**TAPE RECORDERS**

Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800

TARGET ACQUISITION

Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021

TARGET RECOGNITION

Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640

The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882

Preliminary field tests for detecting flying targets in front of a land background --- ground observers [FOA-C-56033-H2] p 157 N84-17847

Detection of flying targets in front of a land background: Laboratory tests [FOA-C-56034-H2] p 157 N84-17848

Detection of flying targets in front of a land background: Field tests --- human observers [FOA-C-56035-H2] p 157 N84-17849

TARGETS

Strategies using an observer for steering a random motion of a point in a multitarget environment [CSIR-TWISK-285] p 153 N84-16794

TASKS

Task conditions versus stable individual differences as determinants of experts' judgement policies [AD-A134797] p 156 N84-17841

Task differences, stylistic characteristics and physiological arousal [AD-A134335] p 156 N84-17844

Effects of load, cognitive complexity and type A on satisfaction [AD-A134415] p 156 N84-17846

TELEOPERATORS

Robots in space travel p 158 A84-19848

TEMPERATURE DISTRIBUTION

Mathematic modeling of heat transfer processes in the human body p 158 A84-20924

TEMPERATURE EFFECTS

The problem of synergism in radiobiology p 126 A84-20897

Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035

TEMPERATURE PROBES

Thermostatic setup for a polythermal calorimetric probe --- for vestibular analysis p 158 A84-20900

TERRESTRIAL RADIATION

Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791

TEST PILOTS

Training the helicopter test pilot p 151 A84-19608

THALAMUS

Possible mechanism of a thalamic pacemaker of alpha rhythm and fusiform activity p 127 A84-20913

THERAPY

The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932

Current aspects of the drug therapy of chronic cardiac insufficiency p 144 A84-22937

Military Medical Journal, no. 3, 1983 [L-2399] p 148 N84-17817

THERMAL PROTECTION

Analogical simulation model of the thermal stress affecting the head p 159 A84-21017

Protection against heat radiation in the steel industry --- protective visor [FOA-C-20500-E4] p 165 N84-17864

THERMAL SIMULATION

Analogical simulation model of the thermal stress affecting the head p 159 A84-21017

An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273

THERMAL STRESSES

Biochemical indicators of thermal stress: Selected genetic and physiological parameters [PB84-100122] p 137 N84-17808

THERMAL VACUUM TESTS

Cosmic vacuum prevents radiopanspermia p 131 A84-22850

THERMOCHEMISTRY

Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

THERMOREGULATION

Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289

The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883

Industrial gymnastics in conditions of a hot climate p 140 A84-20917

Mathematic modeling of heat transfer processes in the human body p 158 A84-20924

Analogical simulation model of the thermal stress affecting the head p 159 A84-21017

Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018

Neurophysiological aspects of spinal thermoregulatory mechanisms p 129 A84-22450

Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831

THORAX

Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568

THRESHOLDS (PERCEPTION)

Mechanisms of visual sensitivity - Backgrounds and early dark adaptation p 137 A84-20019

THROMBOCYTES

The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724

THYMUS GLAND

The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888

Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893

Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929

TIME LAG

The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882

TIME SHARING

Objective measure of pilot workload [NASA-CR-173296] p 164 A84-17858

TISSUES (BIOLOGY)

Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187

Tissue pressure and plasma oncotic pressure during exercise p 141 A84-21029

TOBACCO

The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 N84-17816

TOCOPHEROL

The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941

TOLERANCES (PHYSIOLOGY)

Rationale for a Threshold Limit Value (TLV)R for JP-4/JP-8 wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827

TOMOGRAPHY

Prospects for the use of computer-controlled tomography in otolaryngology p 140 A84-20898

Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936

TOXIC DISEASES

Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930

TOXICITY

Rabbit neurobehavioral toxicity from aluminum [PB84-103266] p 137 N84-17809

Rationale for a Threshold Limit Value (TLV)R for JP-4/JP-8 wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827

TOXICOLOGY

Applications of gas chromatographic head space analysis to aviation accident toxicology p 139 A84-20294

Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779

TRAINING AIRCRAFT

Analysis of the pilot conversion process for the Air Force T-46A jet trainer aircraft [AD-A134404] p 156 N84-17845

TRAINING EVALUATION

- Training the helicopter test pilot p 151 A84-19608
- Pilot training instructor/check pilot training modern concepts and a syllabus of essentials p 152 A84-20078
- TRANSPORT AIRCRAFT**
- Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane [NASA-TM-77359] p 162 N84-16806
- TRANSPORTATION**
- Prospects in the development of medical services in automobile transport p 158 A84-20885
- Clinical problems of medical services for automobile drivers in automobile transport p 139 A84-20886
- TROPICAL REGIONS**
- Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813
- TRYP SIN**
- Use of microwaves to improve nutritional value of soybeans for future space inhabitants [NASA-CR-175336] p 162 N84-16805

U

- U.S.S.R.**
- Military Medical Journal, no. 7, 1983 [L-2456] p 147 N84-17811
- ULCERS**
- The response of rats to cutaneous dosing with trichothecene mycotoxins [MRL-R-902] p 136 N84-17803
- ULTRASONIC TESTS**
- Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823
- ULTRAVIOLET LASERS**
- Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741
- UNDERWATER PHYSIOLOGY**
- Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035
- UREAS**
- Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037
- URINE**
- Standard research materials: Feces and urine p 137 N84-17854
- UTERUS**
- Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908

V

- VACUUM EFFECTS**
- Cosmic vacuum prevents radiopanspermia p 131 A84-22850
- VEGETATION GROWTH**
- Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728
- VELOCITY**
- Factors influencing velocity coding in the human visual system p 152 A84-20623
- The coding of velocity of movement in the human visual system p 153 A84-20624
- VELOCITY MEASUREMENT**
- Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823
- VERTEBRAL COLUMN**
- Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
- Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757
- VESTIBULAR NYSTAGMUS**
- High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286
- VESTIBULES**
- Thermostatic setup for a polythermal caloric probe --- for vestibular analysis p 158 A84-20900
- VIBRATION**
- Study of vibration resonance frequencies in rats p 135 N84-16784
- VIBRATION EFFECTS**
- Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
- Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287
- Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288

- The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888
- Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
- VIBRATIONAL STRESS**
- Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246
- VIDEO DATA**
- Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800
- VISIBLE SPECTRUM**
- ERG (Electroretinogram) implicit time: An exploration of high frequency wavelets recorded in the human visual system [AD-A134575] p 150 N84-17832
- VISION**
- Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877
- A review of vision physiology p 143 A84-21745
- Rhythmic activity in the visual analyzer p 129 A84-22447
- ERG (Electroretinogram) implicit time: An exploration of high frequency wavelets recorded in the human visual system [AD-A134575] p 150 N84-17832
- VISORS**
- Protection against heat radiation in the steel industry --- protective visor [FOA-C-20500-E4] p 165 N84-17864
- VISUAL ACUITY**
- Mechanisms of visual sensitivity - Backgrounds and early dark adaptation p 137 A84-20019
- Evoked potential contrast sensitivity in the parafovea Spatial organization p 151 A84-20020
- VISUAL FIELDS**
- The detection of motion in the peripheral visual field p 152 A84-20622
- A simple technique of multiple central static perimetry and the first results of its application --- ophthalmic diagnostic procedure p 161 A84-22942
- VISUAL PERCEPTION**
- Failure to find an absolute retinal limit of a putative short-range process in apparent motion p 152 A84-20023
- Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288
- Visual cortical mechanisms responsible for direction selectivity p 152 A84-20621
- Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 N84-16795
- VISUAL STIMULI**
- Texture changes versus size changes as stimuli for motion in depth p 137 A84-20018
- Factors influencing velocity coding in the human visual system p 152 A84-20623
- The coding of velocity of movement in the human visual system p 153 A84-20624
- Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877
- The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780
- Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828
- VISUAL TASKS**
- Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
- Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021
- A comparison of oculomotor pursuit of a target in circular real, beta or sigma motion p 151 A84-20022

W

- WATER BALANCE**
- Fluid intake at high altitudes p 145 N84-16772
- WATER IMMERSION**
- Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289
- Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821
- WEIGHT REDUCTION**
- Energy balance and the composition of weight loss during prolonged space flight [NASA-CR-171745] p 148 N84-17820

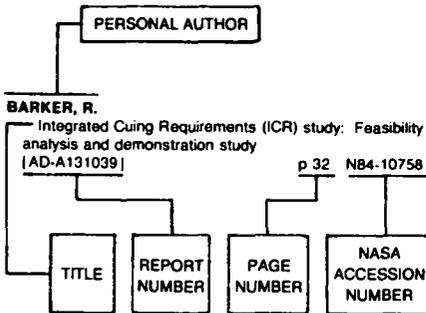
WEIGHTLESSNESS

- Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
- G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia nd exposure to accelerations p 162 N84-16775
- Biocholocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788
- Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology p 136 N84-16789
- Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821
- WEIGHTLESSNESS SIMULATION**
- Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
- G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia nd exposure to accelerations p 162 N84-16775
- Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
- WHITE NOISE**
- Strategies using an observer for steering a random motion of a point in a multitarget environment [CSIR-TWISK-285] p 153 N84-16794
- WORK CAPACITY**
- Industrial gymnastics in conditions of a hot climate p 140 A84-20917
- Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773
- The concept of working capacity of the flight crew p 155 N84-17837
- WORK-REST CYCLE**
- Adaptation to irregularity of rest and activity p 142 A84-21736
- An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 A84-22777
- Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane [NASA-TM-77359] p 162 N84-16806
- WORKLOADS (PSYCHOPHYSIOLOGY)**
- Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891
- The biomedical component in aircrew workload p 159 A84-21020
- Work stress p 143 A84-22449
- Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793
- Effects of load, cognitive complexity and type A on satisfaction [AD-A134415] p 156 N84-17846
- Objective measure of pilot workload [NASA-CR-173296] p 164 N84-17858
- A theoretical approach to measuring pilot workload [NASA-CR-173297] p 164 N84-17859
- WOUND HEALING**
- Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833

Y

- YEAST**
- Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and Endomyces magnusii yeasts p 126 A84-20904
- Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728

Typical Personal Author Index Listing



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

A

ABROSIMOV, S. V.
Effect of synnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777

ABYZOV, S. S.
Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728

AFONINA, S. N.
The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945

AGAMALYAN, A. G.
Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782

AGAPOVA, L. V.
Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787

AGHINA, J. C. F. M.
Othematoma associated with ill-fitting helmet and high G load - A case report p 143 A84-21744

AKIMOV, I. U. A.
Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896

ALEXANDER, J. K.
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036

ALFANO, A. J.
In vitro chlorophyll photosynthetic reaction [PB84-104892] p 137 N84-17810

ALIEV, M. A.
The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724

ALLEN, J. S.
Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033

AMELKINA, G. V.
Effect of synnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777

B

AMERY, A.
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026

ANASHKIN, O. D.
Effect of synnocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777

ANDERSON, G. E.
Human exposure to atmospheric concentrations to selected chemicals, volume 1 [PB84-102540] p 151 N84-17835

ANDERSON, N. L.
Comparison of organisms and cell types using two-dimensional electrophoresis [DE84-003574] p 136 N84-17807

ANGELICA SOTO, M.
Conservation of physico-chemical amino acid properties during the evolution of proteins p 167 A84-20849

ARIPOVA, T. U.
Correction of the contact interaction of macrophages with nonsyngenic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone p 131 A84-22928

ARISTARKHOVA, S. A.
Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882

ARUTUNIAN, V. M.
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878

ASKREN, W. B.
Human factors products: A one-act play with epilogue [AD-A133354] p 163 N84-16811

ASTAFEV, V. I.
Diastolic filling of the heart ventricles p 144 A84-22938

AVILOV, I. A.
The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804

AVTENEVA, I. G.
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782

AZHIPA, I. A. I.
Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896

AZIEVA, E. E.
Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728

AZIMOV, R. R.
A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909

BARINOV, G. V.
A biological hypothesis for the origin of the modern hydrosphere of the earth p 166 A84-21729

BARON, S.
Perspective on human performance modelling p 160 A84-21641

BATANOV, G. V.
Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 N84-16764

BAUMGARDNER, F. W.
Standardization of units and symbols - Revised p 142 A84-21735

BEGIASHVILI, V. T.
Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781

BEKBOLOTOVA, A. K.
The effect of sodium hydroxybutyrate on resistance to hypoxia and blood-platelet aggregation in rats under different ecological conditions p 123 A84-19724

BELAKOSKIY, M. S.
Fluid intake at high altitudes p 145 N84-16772

BELARD, J. L.
Analogical simulation model of the thermal stress affecting the head p 159 A84-21017

BELIAEVA, M. I.
The use of carbon monoxide by bacteria of the genus *Desulfovibrio* p 128 A84-21730

BELKANIYA, G. S.
Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology p 136 N84-16789

BELTSEKOVSKII, Z. B.
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916

BERDYSHEV, G. D.
Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901

BERKOS, O. V.
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187

BERKOVSKAYA, M. I.
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778

BERMAN, A. L.
Cooperative binding of calcium ions by photoreceptor membranes p 126 A84-20907

BERNARD, D. W.
The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882

BERNARD, J.
Isolated mesotelesystolic click and the fitness of flight personnel p 140 A84-21015

BERNAT, R.
Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599

BEVERLEY, K. I.
Texture changes versus size changes as stimuli for motion in depth p 137 A84-20018

BILLINGS, D. S.
Physiological responses to prolonged upper body exercise [AD-A134811] p 149 N84-17826

BIRIUZOVA, V. I.
Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728

BISHOP, E. C.
Rationale for a Threshold Limit Value (TLV)_R for JP-4/Jet B wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827

BLANC, P.
Isolated mesotelesystolic click and the fitness of flight personnel p 140 A84-21015

BLIUMENFELD, L. A.
Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and *Endomyces magnusii* yeasts p 126 A84-20904

- BLOMQVIST, C. G.**
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
- BODROV, V. A.**
The concept of working capacity of the flight crew p 155 N84-17837
- BOEV, V. M.**
Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891
- BOGATYRENKO, V. R.**
Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902
- BOGDANOV, G. N.**
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- BOGDANOV, O. V.**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- BOIADZHEVA-MIKHAILOVA, A.**
SEM investigation of the labyrinth of *Macaca mulatta* under hypokinetic conditions p 132 A84-22934
- BOIKOV, P. IA.**
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- BONTHOUX, C.**
Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246
- BOONE, J. O.**
Radar training facility initial validation [AD-A133220] p 154 N84-16797
- BORLAND, R. G.**
Adaptation to irregularity of rest and activity p 142 A84-21736
- BORODIN, IU. V.**
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
- BORREDON, P.**
Effects of +Gz accelerations of long duration on the circulatory pressure distribution p 140 A84-21013
- BORTNOVSKIY, V. N.**
The effect of smoking on the non-specific resistance of the organism of seamen at sea p 148 N84-17816
- BOSZKIEWICZ, T.**
Selection of members of polar expeditions and cosmonauts p 151 A84-19600
- BOULEY, G.**
Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
- BOUTELIER, C.**
Analogical simulation model of the thermal stress affecting the head p 159 A84-21017
- BOWERS, W. D., JR.**
Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758
- BOYARKINA, I. V.**
Neuronal-vascular relations in lateral geniculate body and superior colliculi of cats after exposure to accelerations p 135 N84-16783
- BROWN, R. F.**
Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759
- BROWNER, R. F.**
Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 N84-17852
- BRUNOT, J.**
Isolated mesotelesystolic click and the fitness of flight personnel p 140 A84-21015
- BRUSKIN, Z. Z.**
The dose-effect relationship in exposure to noise p 139 A84-20884
- BRYUKHOVETSKIY, A. G.**
Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815
- BUCHAN, G. M.**
Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment [PB84-102961] p 165 N84-17867
- BUGROVA, A. F.**
A simple technique of multiple central static perimetry and the first results of its application p 161 A84-22942
- BURBAEV, D. SH.**
Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and *Endomyces magnusii* yeasts p 126 A84-20904
- BURKE, K. A.**
Static feed water electrolysis subsystem testing and component development [NASA-CR-166539] p 164 N84-17856
- BURLAKOVA, E. B.**
Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882
- BURLATON, J. P.**
Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568
- BURNS, J. W.**
Significance of the headrest geometry in +Gz protective seats p 160 A84-21739

C

- CANNON, M. W., JR.**
Evoked potential contrast sensitivity in the parafovea Spatial organization p 151 A84-20020
- CARDEN, J. L.**
Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 N84-17852
- CARMACK, L.**
Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822
- CARTER, B.**
The anthropic principle and its implications for biological evolution p 166 A84-20017
- CATTAERT, A.**
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
- CHARYEVA, G. KH.**
The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880
- CHASOVNIKOVA, L. V.**
Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903
- CHATTERJEE, I.**
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
- CHERNYSHENKO, L. V.**
Structural mechanisms of microcirculatory lymph channels p 125 A84-20892
- CHESTUKHIN, V. V.**
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
- CHI, M. T. H.**
Problem solving abilities [AD-A134717] p 155 N84-17840
- CHIEN, R. T.**
Multilevel semantic analysis and problem-solving in the flight-domain [NASA-CR-173177] p 162 N84-16804
- CHIZHOV, S. V.**
Fluid intake at high altitudes p 145 N84-16772
- CHRISTOPHER, G. R.**
Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800
- CHU, C.-L.**
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290
- CHUIKIN, A. E.**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
- CHUKOV, A. M.**
A device for estimating the composition of alveolar air p 158 A84-20918
- COLIN, J.**
An altimetric-dilution law applicable to high-altitude clothing p 159 A84-21016
- COLLEWIJN, H.**
A comparison of oculomotor pursuit of a target in circular, real, beta or sigma motion p 151 A84-20022
- COLLINS, R. E.**
Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822
- COLLINS, W.**
Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869
- COLUZZI, L.**
Aircrew restraint improvement program p 161 A84-22399
- CONROY, T.**
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800

D

- COOLEY, W. L.**
Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869
- CRONE, H. D.**
The response of rats to cutaneous dosing with trichothecene mycotoxins [MRL-R-902] p 136 N84-17803
- CRUMP, R. S.**
Pilot training instructor/check pilot training modern concepts and a syllabus of essentials p 152 A84-20078
- CUTKOSKY, M. R.**
Grippers for an unmanned forging cell [AD-A134237] p 163 N84-16808
- CZELUSNIAK, J.**
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800
- DAHLAUSEN, M. J.**
Electrochemical carbon dioxide concentrator subsystem development [NASA-CR-166538] p 164 N84-17857
- DANEV, P.**
Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase [NASA-TM-77095] p 133 N84-16755
- DANILOVA, O. A.**
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944
- DARTSMELIYA, V. A.**
Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology p 136 N84-16789
- DAUM, P.**
Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758
- DAVYDKIN, A. F.**
Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
- DE SCHAEPEDRYVER, A.**
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
- DE WOLF, J.**
Factors influencing velocity coding in the human visual system p 152 A84-20623
- DEBUSE, A. W.**
Training the helicopter test pilot p 151 A84-19608
- DEMARIA PESCE, V. H.**
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018
- DEMIDENKO, T. D.**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- DEPASQUALE, E. E.**
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027
- DEREVIANKO, L. P.**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
- DESTIEGUER, D.**
The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers [AD-A134912] p 150 N84-17830
- DETREVILLE, R. T. P.**
Rationale for a Threshold Limit Value (TLV)_R for JP-4/Jet B wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827
- DIDIER, A.**
Isolated mesotelesystolic click and the fitness of flight personnel p 140 A84-21015
- DIMITRIEVA, N. B.**
Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568
- DIMNET, J.**
Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
- DIMITRIEVA, N. B.**
Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929
- DOBROTVIN, V. E.**
Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936
- DOERING, B.**
A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648

- DOMACZUK, J.**
Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776
- DOMBROVSKII, I. A.**
Appearance of self-oscillations in a distributed system with multiple equilibria p 127 A84-20912
- DONATI, P. M.**
Biodynamic response of the human body in the sitting position when subjected to vertical vibration p 159 A84-21246
- DRAWBAUGH, R. B.**
Rationale for a Threshold Limit Value (TLV)R for JP-4/Jet B wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827
- DRZHEVETSKAIA, I. A.**
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944
- DULNEV, G. N.**
Mathematic modeling of heat transfer processes in the human body p 158 A84-20924
- DUNAYEV, V. V.**
Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763
- DURNOVA, G. N.**
Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893
- E**
- EGANIAN, G. A.**
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
- EGIAZAROVA, A. R.**
The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906
- EINHORN, H. J.**
A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796
- ELABED, A.**
Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
- ELRAZAZ, Z.**
Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869
- ENGLUND, C. E.**
Extending human effectiveness during sustained operations through sleep management [AD-A134782] p 149 N84-17825
- ERMAKOV, N. P.**
Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936
- F**
- FAGARD, R.**
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
- FERNANDEZ, H. C.**
Physiological response in Mirage aircraft pilots p 141 A84-21022
- FEUSTEL, P. J.**
Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
- FONG, F. K.**
In vitro chlorophyll photosynthetic reaction [PB84-104892] p 137 N84-17810
- FRANCE, E. P.**
Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757
- FRANCESCO, R. P.**
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
- FREEMAN, V. T.**
Human reactions to transient electric currents, volume 8 [PB84-112895] p 151 N84-17834
- FRICKE, M.**
Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane [NASA-TM-77359] p 162 N84-16806
- FRIEDRICH, E.**
Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase [NASA-TM-77095] p 133 N84-16755
- FROLOV, B. A.**
The role of corticosteroids in the regulation of cell-migration processes in emotional-pain stress p 133 A84-22945
- FROLOV, V. A.**
The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941
- FUKS, B. B.**
The preservation of the 2-S retinol receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
- FULLER, G. M.**
Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833
- FUNKHOUSER, G. E.**
The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers [AD-A134912] p 150 N84-17830
- FURUSTIG, H.**
Man and machine. The role of human factors in system development [FOA-A-56005-H2] p 165 N84-17863
- G**
- GANDELSMAN, A. B.**
A device for estimating the composition of alveolar air p 158 A84-20918
- GANDHI, O. P.**
An inhomogeneous thermal block model of man for the electromagnetic environment p 161 A84-22273
- GANZ, L.**
Visual cortical mechanisms responsible for direction selectivity p 152 A84-20621
- GARDASHUK, T. V.**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
- GARDOVSKA, D. KH.**
Comparative-physiological aspects of the functional stability of the brain-circulation system p 132 A84-22935
- GAUTHIER, G. M.**
Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
- High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286
- Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287
- GAVRILKOV, A. G.**
Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768
- GAZENKO, O. G.**
USSR report: Space Biology and Aerospace Medicine, Vol. 17, No. 6, November - December 1983 94 p [JPRS-USB-84-001] p 135 N84-16769
- GEISLER, W. S.**
Mechanisms of visual sensitivity - Backgrounds and early dark adaptation p 137 A84-20019
- GIBBENREYTER, Y. B.**
Fluid intake at high altitudes p 145 N84-16772
- GILLINGHAM, K. K.**
Standardization of units and symbols - Revised p 142 A84-21735
- GLAGOLEVA, E. V.**
Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893
- GLAZKOV, V. N.**
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392
- GLEIM, G. W.**
Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027
- GOBECHIA, L. SH.**
An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 A84-22777
- GOLDANSKII, V. I.**
Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847
- GOLIKOV, P. P.**
Interrelationship between transcortin and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876
- GONCHAROV, I. B.**
Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
- GONZALEZ, R. R.**
Tissue pressure and plasma oncotic pressure during exercise p 141 A84-21029
- GOODMAN, M.**
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800
- GORBACHEVA, L. D.**
Correction of the contact interaction of macrophages with nonsyngenic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone p 131 A84-22928
- GORBACHEVSKAIA, L. V.**
Changes in the cyclase system of rat skeletal muscles and the content of cyclic nucleotides in rat blood plasma after the administration of caffeine p 124 A84-20879
- GORINEVSKII, D. M.**
The dynamics of a manipulator with allowance for the compliance of the joints p 159 A84-21056
- GOURET, V.**
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018
- Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
- GRAS, C.**
Rhythmic anomalies observed in the course of 24-hour EKGs in healthy young males - Report of 100 cases p 140 A84-21014
- GREBENNIKOV, S. A.**
Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
- GREEN, H. J.**
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
- GRIFFIN, M. J.**
Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288
- GRIGORYEV, Y. G.**
Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 N84-16764
- GRISHINA, K. V.**
Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
- GROVER, R. F.**
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036
- GUBSER, A. W.**
Aging problems and their impact on pilot performance p 142 A84-21675
- GUDKIN, L. R.**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
- GURTSKAIA, G. P.**
The electrical activity of symmetrical regions of the hippocampus p 130 A84-22778
- GUSELNIKOV, V. I.**
Rhythmic activity in the visual analyzer p 129 A84-22447
- GUSMAN, B. S.**
The preservation of the 2-S retinol receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
- GUSTAVSSON, L.**
Protection against heat radiation in the steel industry [FOA-C-20500-E4] p 165 N84-17864
- GVOZDEV, S. V.**
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
- GYURDZHIAN, A. A.**
Practical applications of advances in aviation medicine p 144 N84-16770
- H**
- HALLICK, T. M.**
Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855
- HAMM, R. M.**
Task conditions versus stable individual differences as determinants of experts' judgement policies [AD-A134797] p 156 N84-17841
- HARTUNG, G. H.**
Plasma substrate response in men and women during marathon running p 143 A84-21740
- HAY, C.**
Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035

- HAYWARD, J. S.**
Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035
- HEARN, P.**
Fit to fly? p 138 A84-20082
- HEMAMI, H.**
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272
- HENDERSON, R.**
The structure of proteins in biological membranes p 123 A84-20249
- HEPPNER, D. B.**
Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855
Electrochemical carbon dioxide concentrator subsystem development [NASA-CR-166538] p 164 N84-17857
- HIGGINS, E. A.**
Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793
The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers [AD-A134912] p 150 N84-17830
- HIRZINGER, G.**
Robots in space travel p 158 A84-19848
- HOGARTH, R. M.**
A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796
- HOLMQUIST, R.**
The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800
- HOMCE, G. T.**
Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868
- HOPKINS, H.**
Over-dependence on automatics - The black box one man band p 152 A84-20084
- HOSTETTER, G. H.**
Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274
- HOUSTON, M. E.**
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
- HREBIEN, L.**
Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823
- HUANG, S. Y.**
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036
- HUGHSON, R. L.**
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
- HUGON, M.**
Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
- HULTON, V. N.**
Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 N84-16801
- I**
- IAKOVLEV, N. M.**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- IAKUSHEVA, L. F.**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
- IAVORSKII, L. A.**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
- ICHIKAWA, A.**
An interactive system for supporting multiobjective decision making p 160 A84-21643
- ILLE, H.**
Isolated mesoteresystolic click and the fitness of flight personnel p 140 A84-21015
Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568
- ININ, I. U. S.**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- ISHIJIMA, M.**
Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274
- ISLAMOVA, N. T.**
Correction of the contact interaction of macrophages with nonsyngenic lymphoid cells by the copolymer of acrylic acid and N-vinylpyrrolidone p 131 A84-22928
- IUDIN, A. I. U.**
Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936
- IUDINA, L. E.**
The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888
- IVANO, O. KH.**
A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844
- IVANOV, A. P.**
Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
- IVANOV, K. P.**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
- IVANOV, KH. P.**
A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844
- IVANOVA, S. M.**
Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
- IZNAKA, F.**
Rhythmic activity in the visual analyzer p 129 A84-22447
- J**
- JACKSON, A. C.**
Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034
- JACOBUS, B. B.**
Flying personnel and occlusal/mandibular dysfunction p 143 A84-21743
- JAGACINSKI, R. J.**
A test of Fitts' law in two dimensions with hand and head movements [AD-A133347] p 163 N84-16810
- JARON, D.**
A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290
- JENSEN, V. S.**
Analysis of the pilot conversion process for the Air Force T-46A jet trainer aircraft [AD-A134404] p 156 N84-17845
- JERABEK, M.**
Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869
- JOHANNSEN, G.**
Human system interface concerns in support system design p 159 A84-21637
- JOHNSON, L. C.**
Benzodiazepine effects on arousal threshold during sleep [AD-A133151] p 147 N84-16792
- JONES, B. H.**
Overuse injuries of the lower extremities associated with marching, jogging and running. A review [AD-A134672] p 149 N84-17824
- JONES, L. L.**
Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 N84-17862
- JORDAN, T. M.**
Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791
- K**
- KAGAN, I. I.**
Changes in the blood channels of the cerebral cortex and hippocampus during physical exercise p 125 A84-20891
- KALANDAROVA, M. P.**
Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779
- KANADE, T.**
An optical proximity sensor for measuring surface position and orientation for robot manipulation [AD-A134899] p 164 N84-17861
- KANTOWITZ, B. H.**
Objective measure of pilot workload [NASA-CR-173296] p 164 N84-17858
A theoretical approach to measuring pilot workload [NASA-CR-173297] p 164 N84-17859
- KAPLANSKII, A. S.**
Dynamics of morphological changes in rat adrenals and lymphoid organs under immobilization stress p 126 A84-20893
- KAPLIA, A. A.**
Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908
- KAPUSTIN, V. A.**
The effects of vitamins A and E on the contractile function of the heart in experimental myocardial infarction p 132 A84-22941
- KARPENKO, A. V.**
Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763
- KARPILOVA, I. I. U.**
The use of carbon monoxide by bacteria of the genus *Desulfovibrio* p 128 A84-21730
- KARTYSHEVA, I. I. U.**
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916
- KASHKIN, K. P.**
The modeling of multisignal immobilized immunogens p 132 A84-22931
- KATINAS, G. S.**
Specific characteristics of the choice of operating wavelengths in the study of somatic muscle fibers using the two-wave photometry technique p 126 A84-20894
- KATKOV, V. Y.**
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
- KAUFMAN, W. C.**
Standardization of units and symbols - Revised p 142 A84-21735
- KAZARIAN, L. E.**
Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757
- KEDROVSKAIA, N. N.**
Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930
- KERIMOVA, N. K.**
Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877
- KHALED, M. A.**
Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843
- KHLOPUSHINA, T. G.**
The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927
- KHOLODENKO, B. N.**
The power-law approximation and the similarity properties of the regulatory characteristics of metabolism p 127 A84-20911
- KHOMAZIUK, A. I.**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
- KHRAPUNOV, S. N.**
Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901
- KHRISTOV, I.**
SEM investigation of the labyrinth of *Macaca mulatta* under hypokinetic conditions p 132 A84-22934
- KIRILOVA, E. G.**
Interrelationship between transcortine and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876
- KISLIAKOV, I. U. I. A.**
The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776
- KITTLER, L. B.**
Human reactions to transient electric currents, volume 8 [PB84-112895] p 151 N84-17834
- KLEINSTEIN, B. H.**
Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982 [AD-A134674] p 136 N84-17805
- KNAEUPER, A.**
A simulation study with a combined network and production systems model of pilot behavior on an ILS-approach p 153 A84-21648
- KOBAYASHI, S.**
An interactive system for supporting multiobjective decision making p 160 A84-21643
- KOICHEV, K. A.**
SEM investigation of the labyrinth of *Macaca mulatta* under hypokinetic conditions p 132 A84-22934

- KOKICHASHVILI, M. S.**
Changes of acid hydrolase activity in skeletal muscles of adapted and nonadapted preadolescent rats following physical exercise p 128 A84-21600
- KOLESHNIK, IU. M.**
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943
- KONSTANTINOVA, M. M.**
Problems of the natural and modified radiation response p 124 A84-20275
- KORNIENKO, T. I.**
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916
- KOROTKEVICH, M. M.**
Mathematic modeling of heat transfer processes in the human body p 158 A84-20924
- KOROVINA, A. M.**
Age-related features of the response of the rat hypothalamic-hypophysial neurosecretory system to physical exercise p 133 A84-22944
- KOSTERIN, S. A.**
Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908
- KOSTRIKINA, N. A.**
Features of the ultrastructure organization of yeast cells taken from the Antarctic ice sheet p 128 A84-21728
- KOSZENSKI, E. P.**
Static feed water electrolysis subsystem testing and component development [NASA-CR-166539] p 164 N84-17856
- KOTLIKOFF, M. I.**
Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034
- KOVALEV, I. E.**
The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927
- KOZLOVA, V. G.**
G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
- KOZLOVSKIY, A. P.**
Study of vibration resonance frequencies in rats p 135 N84-16784
- KOZYARIN, I. P.**
Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766
- KRASILNIKOV, O. V.**
A cytoplasmic channel-forming factor in the liver of rats p 127 A84-20909
- KRASNOFF, E.**
Failure to find an absolute retinal limit of a putative short-range process in apparent motion p 152 A84-20023
- KRIVCHENKO, A. I.**
Comparative-physiological aspects of the functional stability of the brain-circulation system p 132 A84-22935
- KUDRIN, K. A.**
G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
- KULIKOV, A. V.**
Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902
- KULINSKII, V. I.**
The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883
- KUMAR, R.**
Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869
- KURBANOV, KH.**
The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880
- KURILIN, I. A.**
Prospects for the use of computer-controlled tomography in otolaryngology p 140 A84-20898
- KURILSKAIA, T. E.**
Diastolic filling of the heart ventricles p 144 A84-22938
- KURILSKII, K. A.**
Diastolic filling of the heart ventricles p 144 A84-22938
- KUROKAWA, E.**
Grippers for an unmanned forging cell [AD-A134237] p 163 N84-16808
- KURSKII, M. D.**
Kinetics of the passive transport of Ca(2+) in vesicles of myometrium sarcolemma p 127 A84-20908
- KUZIN, A. M.**
Problems of the natural and modified radiation response
- The problem of synergism in radiobiology p 126 A84-20897
- KUZMIN, V. V.**
Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847
- KUZNETSOV, A. N.**
The effect of unvarying and low-frequency magnetic fields on biological systems p 128 A84-21726
- KUZNETSOV, N. P.**
Diastolic filling of the heart ventricles p 144 A84-22938
- KUZNETSOVA, N. P.**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
- KVIRKVELIJA, L. R.**
The electrical activity of symmetrical regions of the hippocampus p 130 A84-22778
- L**
- LACEY, J. C., JR.**
Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843
- LARKIN, W.**
Human reactions to transient electric currents, volume 8 [PB84-112895] p 151 N84-17834
- LATSKEVICH, A. A.**
Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781
- LAVRENTEV, V. V.**
Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903
- LAVROV, V. I.**
Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774
- LAWLER, E. E., III**
Motivation and performance appraisal behavior [AD-A134311] p 156 N84-17842
- LE BELLEC, G.**
Hemorrhoid symptomatology and fighter pilots p 144 A84-22569
- LEAV, I.**
Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758
- LEBED, Y. K.**
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
- LEBOEUF, R.**
Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833
- LEQUAY, G.**
Rhythm anomalies observed in the course of 24-hour EKGs in healthy young males - Report of 100 cases p 140 A84-21014
- LEMBKE, J. R.**
Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 N84-17862
- LEMERCERRE, C.**
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018
- Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
- LEONARD, J. I.**
Energy balance and the composition of weight loss during prolonged space flight [NASA-CR-171745] p 148 N84-17820
- Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821
- LEONTEV, V. G.**
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
- LEVINE, M. V.**
Identifying different item response curves [AD-A133259] p 154 N84-16798
- LIJUNEN, P.**
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
- LIKHTEHSHTAIN, G. I.**
Investigation of the mobility of free radicals connected with serum albumins at 30-230 K p 126 A84-20902
- LIMMER, R. E.**
Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289
- LINNIK, L. A.**
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392
- LIOZNER, A. L.**
The modeling of multisignal immobilized immunogens p 132 A84-22931
- LIUBINA, V. G.**
Characteristics of the EKG and mechanical activity of the heart for tall athletes p 140 A84-20916
- LIVINGSTONE, S. D.**
Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289
- LOBACHIK, V. I.**
Effect of synocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777
- LOBANOVA, Y. A.**
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
- LONGLE, M.**
Analogical simulation model of the thermal stress affecting the head p 159 A84-21017
- LOOKE, T. D.**
Stability enhancement of a flexible robot manipulator [AD-A134185] p 162 N84-16807
- LOSEV, N. A.**
The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780
- LOSEVA, O. V.**
Investigation of the conformational stability of immunoglobulin A by the method of monomolecular layers p 126 A84-20903
- LOSÝ, J.**
Behavior of blood-serum proteins in rats exposed to the long-term effect of air ions p 123 A84-19599
- LOZHA, M. T.**
Prevention of flight fatigue by physical training p 147 N84-17812
- LOZINSKIY, P. A.**
Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781
- LUCHAKOV, IU. I.**
The dynamics of oxygen saturation of the brain at increased pressures p 129 A84-22776
- LVOVA, R. I.**
The use of portable bioengineering feedback devices in a system of active restorative therapy for patients with poststroke motor disturbances p 144 A84-22932
- LYCHAKOV, D. V.**
SEM investigation of the labyrinth of Macaca mulatta under hypokinetic conditions p 132 A84-22934
- LYSENKO, S. V.**
Cosmic vacuum prevents radiopanspermia p 131 A84-22850
- LYSENKOVA, E. M.**
The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927
- M**
- MACNAUGHTON, M. G.**
Rationale for a Threshold Limit Value (TLV)R for JP-4/Jet B wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827
- MAES, H.**
Factors influencing velocity coding in the human visual system p 152 A84-20623
- MAHER, J. T.**
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036
- MAKSIMOVA, G. F.**
Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929
- MANKO, V. M.**
T-lymphocyte dependence of the proliferation and differentiation of hemopoietic trunk cells p 131 A84-22926
- MANN, A. K.**
Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846
- MANNO, B. R.**
Side effects of anti-motion sickness drugs p 143 A84-21737
- MANNO, J. E.**
Side effects of anti-motion sickness drugs p 143 A84-21737
- MARCHESCHI, R. D. R.**
Physiological response in Mirage aircraft pilots p 141 A84-21022

MARCHETTI, E.
 Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
 High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286

MARKMAN, G. S.
 Appearance of self-oscillations in a distributed system with multiple equilibria p 127 A84-20912

MAROKKO, I. N.
 The role of the hepatic cytochrome P-450 system in the development of anaphylaxis p 131 A84-22927

MAROTEL, C.
 Hemorrhoid symptomatology and fighter pilots p 144 A84-22569

MAROTTE, H.
 An altimetric-dilution law applicable to high-altitude clothing p 159 A84-21016
 Problems posed by the use of onboard oxygen generators p 161 A84-22567

MARSHALL, S. V.
 Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

MARTIN, B.
 Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
 High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286

MARTIN, B. J.
 Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287

MARTIN, D. L.
 Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822

MARTIN, E. L.
 Low-level flight simulation: Vertical cues [AD-A133612] p 155 N84-16802

MARTIN, J.
 Isolated mesotelesystolic click and the fitness of flight personnel p 140 A84-21015
 Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568

MASHINSKIY, A.
 Birth of space plant growing [NASA-TM-77244] p 133 N84-16756

MASLOVSKAYA, S. G.
 Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768

MASTROIANNI, G. R.
 Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291

MATTHEWS, B. R.
 Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035

MAX, S. R.
 Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866

MAYER, R. F.
 Physiologic and biochemical aspects of skeletal muscle denervation and reinnervation p 144 A84-22866

MAYES, R. W.
 Applications of gas chromatographic head space analysis to aviation accident toxicology p 139 A84-20294

MCCONNELL, R.
 Analysis of electrical accident prevention countermeasures [PB84-102987] p 166 N84-17869

MCCULLOUGH, R. E.
 Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036

MCDONALD, J. D.
 Smooth pursuit eye movements in response to predictable target motions p 138 A84-20021

MCGLYNN, S. P.
 physico-chemical investigation of some areas of fundamental significance to biophysics [DE83-017404] p 134 N84-16761

MCKEE, S. P.
 The detection of motion in the peripheral visual field p 152 A84-20622

MCKENZIE, J. M.
 Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793

MEERSON, F. Z.
 Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

MELADZE, V. G.
 Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781

MERCURI, J. A.
 Physiological response in Mirage aircraft pilots p 141 A84-21022

MERTENS, H. W.
 Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793

MESHKOV, G. G.
 Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

MESTVIRISHVILI, L. I.
 The electrical activity of symmetrical regions of the hippocampus p 130 A84-22778

METGES, P. J.
 Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568

MICHELIS, M. F.
 Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027

MILAM, A. L.
 Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800

MILKOV, L. E.
 Basic tasks in the prevention of occupational diseases due to the overstrain of the sensorimotor system during physical work p 139 A84-20887

MINTURN, D. B.
 The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882

MIRKOVA, G. D.
 A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844

MITAGVARIIA, N. P.
 An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 A84-22777
 Regulation of local blood flow in the brain - The concept of homeostatic range p 130 A84-22781

MODIN, Y. A.
 Effect of sydncarb on hemodynamics and redistribution of blood during functional tests following six-hour antihorstatic hypokinesia p 145 N84-16777

MOERMAN, E.
 Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026

MOHLER, S. R.
 The human element in air traffic control - Aeromedical aspects, problems, and prescriptions p 138 A84-20086
 The biomedical component in aircrew workload p 159 A84-21020

MOHRMAN, A. M., JR.
 Motivation and performance appraisal behavior [AD-A134311] p 156 N84-17842

MOHSEIN, Y.
 Tissue pressure and plasma oncotic pressure during exercise p 141 A84-21029

MOISEEV, I. U. G.
 Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553

MONK, D. L.
 A test of Fitts' law in two dimensions with hand and head movements [AD-A133347] p 163 N84-16810

MOORE, L. G.
 Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036

MOORE, T. W.
 A cardiovascular model for studying impairment of cerebral function during +Gz stress p 158 A84-20290

MORLEY, L. A.
 Electrical-shock prevention. Volume 1: Protection of maintenance personnel [PB84-102946] p 165 N84-17865
 Electrical-shock prevention. Volume 2: Ground-fault interrupting devices [PB84-102953] p 165 N84-17866
 Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment [PB84-102961] p 165 N84-17867
 Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868

MOROZOV, L. L.
 Comparative analysis of the role of statistical fluctuations and factor of advantage (parity non-conservation) in the origins of optical activity p 131 A84-22847

MOSKALENKO, I. U. E.
 Comparative-physiological aspects of the functional stability of the brain-circulation system p 132 A84-22935

MOSKOVSKAIA, S. V.
 Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187

MUKHAMEDIYEVA, L. N.
 Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779
 Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780

MUKHAMEDOV, E. G.
 Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815

MUKHITOVA, F. K.
 The use of carbon monoxide by bacteria of the genus Desulfovibrio p 128 N84-17730

MULINS, D. W., JR.
 Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843

MURPHY, M.
 Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758

MYASNIKOV, V. I.
 Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773

MYHRE, L. G.
 Plasma substrate response in men and women during marathon running p 143 A84-21740

N

NADAREISHVILI, K. SH.
 The interaction of acetylcholine and tubocurarine with protein molecules of the actin complex and phosphatidylcholine p 126 A84-20906

NADEL, E. R.
 Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037

NAITOH, P.
 Extending human effectiveness during sustained operations through sleep management [AD-A134782] p 149 N84-17825

NAKAYAMA, K.
 The detection of motion in the peripheral visual field p 152 A84-20622

NEBEKER, D. M.
 Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 N84-16801

NECHITAYLO, G.
 Birth of space plant growing [NASA-TM-77244] p 133 N84-16756

NESHCHERET, A. P.
 Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725

NEUBERGER, B. M.
 Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 N84-16801

NEVEROV, V. P.
 The effect of aethimizol on the nystagmus response during optokinetic stimulation and in the aftereffect p 130 A84-22780

NICHOLAS, J. A.
 Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027

NICHOLSON, A. N.
 Adaptation to irregularity of rest and activity p 142 A84-21736

NICHOLSON, N.
 Circadian rhythms and disturbed sleep - Its relevance to transport operations p 138 A84-20080

NIKITIN, Y. I.
 Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780

NIKOLAEV, V. P.
 Evaluating the safety of decompression on the basis of the number and size of gas bubbles being formed in the body p 128 A84-21727

NIKOLAEVA, N. I. U.
 Interrelationship between transcortine and type III glucocorticoid receptors and type II glucocorticoid receptors under stress p 124 A84-20876

- NIKOLAISHVILI, L. S.**
An investigation of the dynamics of oxygen tension in the hippocampus and sensorimotor cortex during the sleep-wakefulness cycle p 130 N84-22777
- NIKOLAYENKO, E. M.**
Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
- NIKONOVA, K. V.**
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
- NOSENKO, B. IA.**
Industrial gymnastics in conditions of a hot climate p 140 A84-20917
- NOVAK, T.**
Electrical-shock prevention. Volume 1: Protection of maintenance personnel [PB84-102946] p 165 N84-17865
- NOVGORODSKAIA, A. M.**
The mechanism of the enzymatic regulation of tyrosine metabolism in hyperthermia p 124 A84-20880
- NOVIKOV, V. S.**
Changes in the T and B systems of immunity in seamen during a long cruise p 148 N84-17819
- NOVOZHILOV, G. I.**
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813
- NUNNELEY, S. A.**
Standardization of units and symbols - Revised p 142 A84-21735
Plasma substrate response in men and women during marathon running p 143 A84-21740
- NUSSINOV, M. D.**
Cosmic vacuum prevents radiopanspermia p 131 A84-22850
- O**
- OGANESYAN, S. S.**
Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782
- OHATA, C. A.**
Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831
- OLBINSKAIA, L. I.**
Current aspects of the drug therapy of chronic cardiac insufficiency p 144 A84-22937
- OLESHKO, V. G.**
A comparison of the performance of weight lifters of various classes in classical and auxiliary exercises p 140 A84-20914
- OLOFF, C. M.**
Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757
- ORBAN, G. A.**
Factors influencing velocity coding in the human visual system p 152 A84-20623
- ORESTENKO, IU. N.**
Response of the paraventricular nucleus of the hypothalamus and the dorsal hippocampus during long-term adaptation to hypoxia p 133 A84-22943
- ORLOVA, G. S.**
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
- OVCHARENKO, L. N.**
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
- OVERWEEL, C. H.**
Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035
- OWEN, T.**
Life as a planetary phenomenon p 166 A84-19911
- P**
- PAKHEVANIIAN, V. G.**
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
- PANDOLF, K. B.**
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
- PANOV, A. A.**
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
- PARMENOV-TRIFILOV, B. I.**
Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787
Investigation of the microcirculation of the conjunctiva in airmen with the initial symptoms of cerebral atherosclerosis p 148 N84-17818
- PARSHIN, L. B.**
Effect of syndocarb on hemodynamics and redistribution of blood during functional tests following six-hour antihypostatic hypokinesia p 145 N84-16777
- PASTUKHOV, V. A.**
The influence of central and peripheral serotonergic structures on the cardiovascular system and respiration p 130 A84-22779
- PASTUKHOV, V. V.**
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813
- PAVLOV, A. D.**
Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
- PAVLOV, N. A.**
Comparative-physiological aspects of the functional stability of the brain-circulation system p 132 A84-22935
- PECHATNIKOV, V. A.**
The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910
- PELLIEUX, L.**
Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
- PENKNOVICH, A. A.**
Clinical problems of medical services for automobile drivers in automobile transport p 139 A84-20886
- PENNOCK, G. R.**
Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 N84-17851
- PERRAUD, R. C.**
Hemorrhoid symptomatology and fighter pilots p 144 A84-22569
- PERRONE, J. A.**
Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 N84-16795
- PESCE, V. H. D.**
Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
- PETERSIK, J. T.**
Failure to find an absolute retinal limit of a putative short-range process in apparent motion p 152 A84-20023
- PETROV, R. V.**
T-lymphocyte dependence of the proliferation and differentiation of hemopoietic trunk cells p 131 A84-22926
- PEW, R. W.**
Perspective on human performance modelling p 160 A84-21641
- PIEBER, M.**
Code dependent conservation of the physico-chemical properties in amino acid substitutions p 167 A84-22848
- FIGAREVA, Z. D.**
Age-related changes in monoamine oxidase activity in visual-analyzer structures in the case of light stimuli p 124 A84-20877
- PILIPENKO, N. V.**
Mathematic modeling of heat transfer processes in the human body p 158 A84-20924
- PIMENTAL, N. A.**
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
Physiological responses to prolonged upper body exercise [AD-A134811] p 149 N84-17826
- PIRON, J. P.**
Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
- PIRON, J.-P.**
High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286
- PIRUZIAN, L. A.**
The effect of unvarying and low-frequency magnetic fields on biological systems p 128 A84-21726
- PISSARD, R.**
Hemorrhoid symptomatology and fighter pilots p 144 A84-22569
- PITTMAN, J. C., JR.**
Standardization of units and symbols - Revised p 142 A84-21735
- PLAHOV, N. N.**
Effect of the microclimate on the night sleep and physical fitness of seamen during a cruise in the low latitudes p 147 N84-17813
- PLETNEV, V. V.**
The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910
- PLOKHOVA, V. G.**
G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
- PLOTNIKOV, N. IU.**
The role of catecholamines and various subtypes of beta adrenoreceptors in ensuring the resistance of mice to intense cooling p 125 A84-20883
- POGASH, R.**
Effects of load, cognitive complexity and type A on satisfaction [AD-A134415] p 156 N84-17846
- POKROVSKII, B. V.**
The preservation of the 2-S retinol receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
- POLLARD, T. J.**
The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882
- POPOV, I. G.**
Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781
- POPOV, V. V.**
Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786
- POTURALSKI, R. J.**
Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 N84-16799
- POWERS, D. A.**
Biochemical indicators of thermal stress: Selected genetic and physiological parameters [PB84-100122] p 137 N84-17808
- POWERS, G. D.**
Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831
- PREOBRAZHENSKII, N. A.**
Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936
- PRIMAKOFF, H.**
Statistical fluctuation versus specific mechanism and the origin of the left-handed asymmetry of proteins p 131 A84-22846
- PRIVALOV, A. P.**
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392
- PROKOPENKO, L. G.**
The effect of vibration on the immune response induced by thymus-dependent and thymus-independent antigens p 125 A84-20888
Serum immunoregulatory factors in toxic affection of the liver p 132 A84-22930
- PSHENNIKOVA, M. G.**
Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939
- PUECH, M.**
Medical evaluation and thoracic radiophotography in flight personnel during 1983 p 143 A84-22568
- PUF AHL, R.**
Failure to find an absolute retinal limit of a putative short-range process in apparent motion p 152 A84-20023
- PUKACH, L. P.**
Assessment of the functional state of the heart muscle in aircrew members by means of bicycle ergometry p 148 N84-17815
- Q**
- QUANDIEU, P.**
Vibratory behavior of the sacrolumbar spine after removal of the nucleus pulposus p 127 A84-21019
- R**
- RABKIN, I. KH.**
Computer tomography in the diagnosis of neoplasms in the accessory nasal sinuses p 144 A84-22936

- RADFORD, D. D.**
Temperature effect on the human dive response in relation to cold water near-drowning p 142 A84-21035
- RAJAMURTHY, M. S.**
Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649
- RAOL, J. R.**
Contributions of congruent pitch motion cue to human activity in manual control p 153 A84-21649
- RAUP, D. M.**
Multiple origins of life p 166 A84-21025
- RAVEN, P. B.**
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
- READING, T. E.**
Helicopter pilot back pain - A preliminary study p 143 A84-21738
- REDETZKI, H. M.**
Side effects of antimotion sickness drugs p 143 A84-21737
- REED, L. D.**
Patterns of skin temperature and surface heat flow in man during and after cold water immersion p 138 A84-20289
- REEVES, J. T.**
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036
- REGAN, D.**
Texture changes versus size changes as stimuli for motion in depth p 137 A84-20018
- REILLY, J. P.**
Human reactions to transient electric currents, volume 8 [PB84-112895] p 151 N84-17834
- REKHACHEVA, I. P.**
Specific characteristics of the choice of operating wavelengths in the study of somatic muscle fibers using the two-wave photometry technique p 126 A84-20894
- REPIAKH, V. S.**
Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392
- RIAZANTSEVA, I. N.**
The use of carbon monoxide by bacteria of the genus *Desulfovibrio* p 128 A84-21730
- RIJNSDORP, J. E.**
Human system interface concerns in support system design p 159 A84-21637
- RINALDUCCI, E. J.**
Low-level flight simulation: Vertical cues [AD-A133612] p 155 N84-16802
Visual cues in the simulation of low-level flight [AD-A135461] p 155 N84-17839
- RIZVANOV, F. F.**
The permeability of sarcoplasmic reticulum membranes to monovalent cations p 127 A84-20910
- RODIONOV, A. A.**
Transfer of 3H-aldosterone from cytosol receptors of tubule cells of rat kidneys to nuclear receptors in the case of reflex and denervation dystrophy of this organ p 126 A84-20896
- RODRIGUEZ, J.**
Aircrew restraint improvement program p 161 A84-22399
- ROGOZHIN, V. A.**
Prospects for the use of computer-controlled tomography in otolaryngology p 140 A84-20898
- ROHM-YOUNG, D.**
Physical fitness and cardiovascular response to lower body negative pressure p 141 A84-21031
- ROLL, J. P.**
Visuo-manual tracking performance of man submitted to vibration p 157 A84-19640
- ROLL, J.-P.**
High-frequency vestibulo-ocular reflex activation through forced head rotation in man p 138 A84-20286
Spinal reflex alterations as a function of intensity and frequency of vibration applied to the feet of seated subjects p 138 A84-20287
- ROMANOVA, I. A.**
Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781
- ROTENBERG, V. S.**
Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933
- ROUSE, W. B.**
Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638
- RUDNYI, N. M.**
The concept of working capacity of the flight crew p 155 N84-17837
- RUFFT, D. J.**
Electrical-shock prevention. Volume 2: Ground-fault interrupting devices [PB84-102953] p 165 N84-17866
- RYMAN, D. H.**
Extending human effectiveness during sustained operations through sleep management [AD-A134782] p 149 N84-17825
- RYSMENDJIEV, A. ZH.**
Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

S

- SADCHIKOVA, M. N.**
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
- SADIKOV, G. N.**
Industrial gymnastics in conditions of a hot climate p 140 A84-20917
- SAGE, A. P.**
Human system interface concerns in support system design p 159 A84-21637
- SALDIVAR, J. T.**
The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers [AD-A134912] p 150 N84-17830
- SAMAJA, M.**
Red cell function at extreme altitude on Mount Everest p 141 A84-21030
- SAMOYLENKO, I. I.**
Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 N84-16765
- SAMPSON, J. B.**
Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036
- SAMSONOV, G. V.**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
- SARKISOVA, G. M.**
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
- SAVIN, B. M.**
New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
- SAVINA, V. P.**
Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779
- SAWKA, M. N.**
Hydration and vascular fluid shifts during exercise in the heat p 141 A84-21028
Physiological responses to prolonged upper body exercise [AD-A134811] p 149 N84-17826
- SCAGLIONE, P. H.**
Autonomic influences on peripheral circulatory and thermal responses to cold [AD-A134444] p 150 N84-17831
- SCHMIDT, R. E.**
Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741
- SCHUBERT, F. H.**
Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855
Static feed water electrolysis subsystem testing and component development [NASA-CR-166539] p 164 N84-17856
Electrochemical carbon dioxide concentrator subsystem development [NASA-CR-166538] p 164 N84-17857
- SEIGNEURIC, A.**
Rhythm anomalies observed in the course of 24-hour EKGs in healthy young males - Report of 100 cases p 140 A84-21014
- SEKULER, R.**
Coherent global motion percepts from stochastic local motions p 153 A84-20625
- SEMENOV, B. K.**
Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787
- SERGEEV, V. P.**
A simple technique of multiple central static perimetry and the first results of its application p 161 A84-22942
- SEVERINGHAUS, J. W.**
Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
- SEVIER, J. A.**
The effect of computational time-delays on pilot performance in real-time flight simulation [AIAA PAPER 84-0553] p 160 A84-21882
- SHABANOVA, M. E.**
The preservation of the 2-S retinal receptor in the rat retina in injuries induced by the visible light p 125 A84-20881
- SHAIMARDANOV, R. M.**
Thermostatic setup for a polythermal calorimetric probe p 158 A84-20900
- SHAKHLAMOV, V. A.**
The response of cells to hypoxia p 125 A84-20889
- SHANAHAN, D. F.**
Spinal injury in a U.S. Army light observation helicopter p 139 A84-20291
Helicopter pilot back pain - A preliminary study p 143 A84-21738
Impact response of an energy absorbing earcup [AD-A134828] p 164 N84-17860
- SHANSKOV, M. A.**
A device for estimating the composition of alveolar air p 158 A84-20918
- SHARRATT, M. T.**
Alterations in blood volume following short-term supramaximal exercise p 142 A84-21032
- SHASHKOV, V. S.**
Effect of syndromic on hemodynamics and redistribution of blood during functional tests following six-hour antihypertensive hypokinesia p 145 N84-16777
- SHASHKOVL, V. S.**
Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771
- SHAW, J. H. F.**
Isotopic determination of amino acid-urea interactions in exercise in humans p 142 A84-21037
- SHAYDOROV, Y. I.**
Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786
- SHCHEPELENKO, I. V.**
Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725
- SHEPELEV, Y. Y.**
Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786
- SHERIDAN, T. B.**
Measuring, modeling, and gauging reliability of man-machine systems p 160 A84-21639
Automation, supervisory control and workload in flight management [NASA-CR-166474] p 155 N84-17838
- SHESTOPALOV, A. M.**
Determination of the characteristics of information reception by an operator in man-machine systems p 158 A84-20553
- SHIDLOVSKAIA, T. V.**
Indices of the temporal characteristics of the acoustic reflex in workers with normal and impaired hearing exposed to high levels of noise p 140 A84-20899
- SHIN, S.-B.**
Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274
- SHISHKINA, S. K.**
Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
- SHOWELL, M. S.**
In vitro chlorophyll photosynthetic reaction [PB84-104892] p 137 N84-17810
- SHULIAK, B. A.**
Possible mechanism of a thalamic pacemaker of alpha rhythm and fusiform activity p 127 A84-20913
- SHULZHENKO, Y. B.**
G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
- SHUMAI, E. P.**
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
- SHVAYKO, I. I.**
Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766
- SIDORENKO, L. I.**
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- SIDORENKOVA, E. S.**
The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804

- SIEGFRIED, J. B.**
ERG (Electroretinogram) implicit time: An exploration of high frequency wavelets recorded in the human visual system
[AD-A134575] p 150 N84-17832
- SIGALOV, A. V.**
Mathematic modeling of heat transfer processes in the human body p 158 A84-20924
- SIMEONOVA, R. A.**
A study of the interaction of glycine and its oligohomopeptides with formaldehyde and acetaldehyde under possible primitive earth conditions p 130 A84-22844
- SIMONOV, L. G.**
Biocollocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788
- SINGH, G.**
Use of microwaves to improve nutritional value of soybeans for future space inhabitants
[NASA-CR-175336] p 162 N84-16805
- SIVOLOB, A. V.**
Model of the packing of DNA and histone octamer in the nucleosome p 126 A84-20901
- SKLANSKY, J.**
Scan-along polygonal approximation for data compression of electrocardiograms p 161 A84-22274
- SMIRNOV, K. M.**
Work stress p 143 A84-22449
- SMITH, S. D.**
Studies of electrically stimulated rat limb and peripheral nerve regeneration
[AD-A134358] p 136 N84-17806
- SOKOLOVA, M. M.**
The activity of potassium in the extracellular fluid of rats under conditions of a potassium imbalance p 130 A84-22782
- SOLOSHENKO, N. V.**
Study of vibration resonance frequencies in rats p 135 N84-16784
- SOMMER, T. M.**
An optical proximity sensor for measuring surface position and orientation for robot manipulation
[AD-A134899] p 164 N84-17861
- SOROKOVOI, V. I.**
The response of cells to hypoxia p 125 A84-20889
- SOTSKII, O. P.**
Neutral glycolipids in the blood of normal individuals and individuals suffering from hypertension p 139 A84-20878
- SPENCER, M. B.**
Adaptation to irregularity of rest and activity p 142 A84-21736
- SPINWEBER, C. L.**
Benzodiazepine effects on arousal threshold during sleep
[AD-A133151] p 147 N84-16792
- STAESSEN, J.**
Hemodynamic and humoral effects of prostaglandin inhibition in exercising humans p 141 A84-21026
- STAFFORD, M. J.**
Ventrolateral medullary surface blood flow determined by hydrogen clearance p 128 A84-21033
- STATLER, I. C.**
Army pilot ergonomics p 157 A84-19647
- STEIN, W.**
Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645
- STEPANENKO, O. A.**
Indices of the temporal characteristics of the acoustic reflex in workers with normal and impaired hearing exposed to high levels of noise p 140 A84-20899
- STEPANOV, V. S.**
Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 N84-16764
- STEVENS, S. C.**
Army pilot ergonomics p 157 A84-19647
- STOFFEL, F.**
Standardization of units and symbols - Revised p 142 A84-21735
- STOKES, B. T.**
A qualitative discussion of mechanisms of feedback and feedforward in the control of locomotion p 161 A84-22272
- STONE, B. M.**
Circadian rhythms and disturbed sleep - Its relevance to transport operations p 138 A84-20080
Adaptation to irregularity of rest and activity p 142 A84-21736
- STRAGOVICH, A. M.**
Oxygen supply of the body in the case of an increase in the affinity of hemoglobin to oxygen and a change in blood viscosity p 123 A84-20187
- STRELKOVA, N. I.**
Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768
- STRELTSOVA, Y. N.**
Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768
- STREUFERT, S.**
Cognition and arousal as predictors of risk taking: Effects of load and cognitive style
[AD-A134324] p 156 N84-17843
Effects of load, cognitive complexity and type A on satisfaction
[AD-A134415] p 156 N84-17846
- STREUFERT, S. C.**
Task differences, stylistic characteristics and physiological arousal
[AD-A134335] p 156 N84-17844
Effects of load, cognitive complexity and type A on satisfaction
[AD-A134415] p 156 N84-17846
- STUPFEL, M.**
Temperature variations in groups of mice of both sexes exposed to normobaric hypoxia at 10-35 C p 127 A84-21018
Sex-related factors in acute hypoxia survival in one strain of mice p 129 A84-21742
- SUDOMA, A. S.**
Prospects for the use of computer-controlled tomography in otolaryngology p 140 A84-20898
- SURKINA, I. D.**
An attempt to carry out immunocorrection in the case of secondary immunodeficit in athletes (preliminary report) p 140 A84-20915
- SUTHERLAND, I. E.**
Walking machine control programming
[AD-A134435] p 163 N84-16809
- SWENSON, R. S.**
Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521
- SWINDLE, M.**
Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843

T

U

- TRUSH, V. D.**
Possible mechanism of a thalamic pacemaker of alpha rhythm and fusiform activity p 127 A84-20913
- TRUTT, F. C.**
Electrical-shock prevention. Volume 1: Protection of maintenance personnel p 165 N84-17865
Electrical-shock prevention. Volume 2: Ground-fault interrupting devices
[PB84-102953] p 165 N84-17866
Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment
[PB84-102961] p 165 N84-17867
Electrical-shock prevention. Volume 4: Overhead-line contact fatalities
[PB84-102979] p 166 N84-17868
- TSETLIN, M. G.**
Clinical-physiological analysis of sleep disorders in patients with neurotic states p 144 A84-22933
- TUCKER, D. M.**
Plasma substrate response in men and women during marathon running p 143 A84-21740
- TUMANYAN, M. A.**
Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 N84-16765

V

- UNDERWOOD GROUND, K. E.**
Prevalence of fatty liver in healthy male adults accidentally killed p 139 A84-20293
- UNWIN, N.**
The structure of proteins in biological membranes p 123 A84-20249
- USHAKOV, I. B.**
Study of vibration resonance frequencies in rats p 135 N84-16784
- USTINOVA, E. E.**
Prevention of stress-induced and hypoxic heart-damage by the beta-blocker inderal p 132 A84-22940
- UTESHEV, B. S.**
Investigation of the cytokinetics of the lymphoid organs of immune and nonimmune mice p 131 A84-22929
- VAISMAN, A. I.**
Prospects in the development of medical services in automobile transport p 158 A84-20885
- VALENTINE, J. W.**
Multiple origins of life p 166 A84-21025
- VAN DER STEEN, J.**
A comparison of oculomotor pursuit of a target in circular real, beta or sigma motion p 151 A84-20022
- VANWILLIGEN, H.**
Investigation of the structure of photosynthetic reaction centers
[DE84-002886] p 134 N84-16760
- VARFOLOMEEV, V. N.**
Paramagnetic metal complexes of iron in regenerative processes of the liver p 126 A84-20905
- VASILYEV, P. V.**
Practical applications of advances in aviation medicine p 144 N84-16770
- VEES, C.**
Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane
[NASA-TM-77359] p 162 N84-16806
- VEKOVIVUS, W. A.**
Side effects of antimotion sickness drugs p 143 A84-21737
- VIDAL, G.**
The oldest eukaryotic cells p 123 A84-20247
- VIELLEFOND, H.**
An altimetric-dilution law applicable to high-altitude clothing p 159 A84-21016
Problems posed by the use of onboard oxygen generators p 161 A84-22567
- VINNIKOV, IA. A.**
SEM investigation of the labyrinth of Macaca mulatta under hypokinetic conditions p 132 A84-22934
- VINOGRADOVA, O. S.**
Current ideas on the general properties of and plastic phenomena in hippocampal neurons p 129 A84-22448
- VINTER, R. I.**
The structure of the palisade nerve fibers of the sinus hairs after the section of the infraorbital nerve p 125 A84-20890
- VOLKOV, A. M.**
Industrial gymnastics in conditions of a hot climate p 140 A84-20917

VOLKOV, V. V.

A simple technique of multiple central static perimetry and the first results of its application p 161 A84-22942

VOLKOVA, M. I.

Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778

VOROBEVA, T. M.

Adrenergic reactivity of coronary vessels and the myocardium in old dogs p 123 A84-19725

VOROBYEV, Y. I.

Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771

VORONTSOVA, E. IA.

Prevention of stress disorders of the contractile function of the myocardium using membrane protectors p 132 A84-22939

W

WARD, S. L.

Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 N84-16799

WATSON, J. W.

Oscillatory mechanics of the respiratory system in ozone-exposed rats p 128 A84-21034

WEIGEL, P. H.

Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833

WEIKERT, C.

Preliminary field tests for detecting flying targets in front of a land background [FOA-C-56033-H2] p 157 N84-17847

Detection of flying targets in front of a land background: Laboratory tests

[FOA-C-56034-H2] p 157 N84-17848

Detection of flying targets in front of a land background: Field tests

[FOA-C-56035-H2] p 157 N84-17849

WEIL, J. V.

Variable inhibition by falling CO₂ of hypoxic ventilatory response in humans p 142 A84-21036

WELLS, M. J.

Benefits of helmet-mounted display image stabilisation under whole-body vibration p 158 A84-20288

WEST, J. B.

Red cell function at extreme altitude on Mount Everest p 141 A84-21030

WETZEL, P. A.

Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828

WEWERINKE, P. H.

Model of the human observer and decision maker - Theory and validation p 160 A84-21642

Human display monitoring and failure detection - Control theoretic models and experiments p 160 A84-21645

WHINNERY, J. E.

Significance of the headrest geometry in +Gz protective seats p 160 A84-21739

WHITNEY, J. R. A.

Training the helicopter test pilot p 151 A84-19608

WILLIAMS, D. W.

Coherent global motion percepts from stochastic local motions p 153 A84-20625

WILLIAMS, P.

Insulin and cortisol improve heat tolerance in isolated perfused rat liver [AD-A133382] p 133 N84-16758

WILSON, A. F.

Behavioral change of blood lactate metabolism [PB84-100171] p 157 N84-17850

WINSLOW, R. M.

Red cell function at extreme altitude on Mount Everest p 141 A84-21030

WINTER, W. G.

Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 N84-17806

WOLFE, M. H.

Isopot determination of amino acid-urea interactions in exercise in humans p 142 A84-21037

WOLFE, R. R.

Isopot determination of amino acid-urea interactions in exercise in humans p 142 A84-21037

WOOD, C. D.

Side effects of antimotion sickness drugs p 143 A84-21737

WOOD, M. D.

Side effects of antimotion sickness drugs p 143 A84-21737

WUWONGSE, V.

An interactive system for supporting multiobjective decision making p 160 A84-21643

Y

YAROV, A. S.

G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775

YAVIN, Y.

Strategies using an observer for steering a random motion of a point in a multitarget environment [CSIR-TWISK-285] p 153 N84-16794

YEFIMOV, V. I.

Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771

YEH, I.

Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521

YOKEL, R. A.

Rabbit neurobehavioral toxicity from aluminum [PB84-103266] p 137 N84-17809

YOUNG, D. R.

Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521

YOUNG, L. R.

Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828

Z

ZABETAKIS, P. M.

Plasma osmolality, volume, and renin activity at the 'anaerobic threshold' p 141 A84-21027

ZAETS, T. L.

Lipid peroxidation in subcellular liver organelles in thermal burns p 125 A84-20882

ZEEVI, Y. Y.

Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828

ZHELTOV, G. I.

Thermochemical model for the calculation of the maximum permissible exposure of the retina in the near infrared range p 124 A84-20392

ZHEVLAKOVA, L. A.

Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787

ZHIDKOV, V. V.

Effect of synocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777

ZHURAVLEV, V. V.

Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780

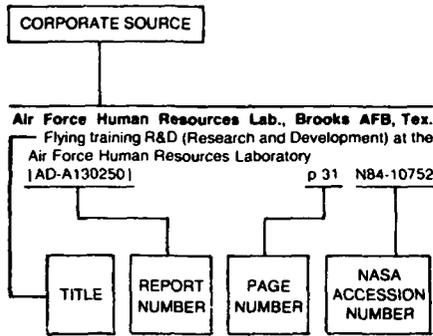
ZUCLICH, J. A.

Effect of non-mode-locked ultraviolet laser radiation (334 nm) on the retina p 128 A84-21741

ZVIAGILSKAIA, R. A.

Investigation of the iron-sulfur center N-2 from NASH-dehydrogenase in the case of direct and reverse electron transport in the mitochondria of rat liver and *Endomyces magnusii* yeasts p 128 A84-20904

Typical Corporate Source Index Listing



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

A

Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
 Bone mineral analysis of rat vertebrae following space flight: COSMOS 1129 [AD-A133178] p 133 N84-16757
 Maze-solving as a performance measurement tool for human operations under time-stress [AD-A133394] p 154 N84-16799
 A test of Fitts' law in two dimensions with hand and head movements [AD-A133347] p 163 N84-16810

Air Force Human Resources Lab., Brooks AFB, Tex.
 Low-level flight simulation: Vertical cues [AD-A133612] p 155 N84-16802
 Human factors products: A one-act play with epilogue [AD-A133354] p 163 N84-16811

Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
 Analysis of tutored videotape instructional delivery system [AD-A133441] p 154 N84-16800
 Analysis of the pilot conversion process for the Air Force T-46A jet trainer aircraft [AD-A134404] p 156 N84-17845

Air Force Occupational and Environmental Health Lab., Brooks AFB, Tex.
 Rationale for a Threshold Limit Value (TLV)R for JP-4/Jet B wide cut aviation turbine fuel [AD-A134814] p 150 N84-17827

Alabama Univ., Birmingham.
 Complexes of polyadenylic acid and the methyl esters of amino acids p 167 A84-22843

Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
 Human reactions to transient electric currents, volume 8 [PB84-112895] p 151 N84-17834

Argonne National Lab., Ill.
 Comparison of organisms and cell types using two-dimensional electrophoresis [DE84-003574] p 136 N84-17807

B

Behavioral Inst. for Technology and Science, Inc., West Lafayette, Ind.
 A theoretical approach to measuring pilot workload [NASA-CR-173297] p 164 N84-17859

Bendix Corp., Kansas City, Mo.
 Measurement of robot accuracy using the Latin Square Three-Dimensional Ball Plate [DE84-004920] p 165 N84-17862

Boston Univ., Mass.
 Investigation of the structure of photosynthetic reaction centers [DE84-002886] p 134 N84-16760

C

California Univ., Berkeley.
 The spatial distribution of fixed mutations within genes coding for proteins p 129 A84-21800

California Univ., Davis.
 Kinematics and dynamics of multi-rigid-body open-chain systems: Application to robot manipulators p 163 N84-17851

California Univ., Irvine.
 Behavioral change of blood lactate metabolism [PB84-100171] p 157 N84-17850

California Univ., Santa Barbara.
 Multiple origins of life p 166 A84-21025

Carnegie-Mellon Univ., Pittsburgh, Pa.
 Grippers for an unmanned forging cell [AD-A134237] p 163 N84-16808

An optical proximity sensor for measuring surface position and orientation for robot manipulation [AD-A134899] p 164 N84-17861

Chicago Univ., Ill.
 Multiple origins of life p 166 A84-21025
 A theory of diagnostic inference: Judging causality [AD-A133172] p 153 N84-16796

Colorado Univ., Boulder.
 Task conditions versus stable individual differences as determinants of experts' judgement policies [AD-A134797] p 156 N84-17841

F

Federal Aviation Administration, Washington, D.C.
 Age, altitude, and workload effects on complex performance [AD-A133594] p 147 N84-16793
 Radar training facility initial validation [AD-A133220] p 154 N84-16797
 The objective evaluation of aircrew protective breathing equipment. 5: Mask/goggles combinations for female crewmembers [AD-A134912] p 150 N84-17830

G

Georgia Inst. of Tech., Atlanta.
 Models of human problem solving - Detection, diagnosis, and compensation for system failures p 159 A84-21638
 Visual cues in the simulation of low-level flight [AD-A135461] p 155 N84-17839
 Inorganic analysis in a controlled ecological life support system [NASA-CR-173299] p 163 N84-17852
 Techniques for the inorganic analysis in a controlled ecological life support system p 137 N84-17853
 Standard research materials: Feces and urine p 137 N84-17854

H

Hershey (Milton S.) Medical Center, Hershey, Pa.
 Cognition and arousal as predictors of risk taking: Effects of load and cognitive style [AD-A134324] p 156 N84-17843
 Task differences, stylistic characteristics and physiological arousal [AD-A134335] p 156 N84-17844
 Effects of load, cognitive complexity and type A on satisfaction [AD-A134415] p 156 N84-17846

I

Illinois Univ., Urbana.
 Identifying different item response curves [AD-A133259] p 154 N84-16798

Illinois Univ., Urbana-Champaign.
 Multilevel semantic analysis and problem-solving in the flight-domain [NASA-CR-173177] p 162 N84-16804

Information Ventures, Inc., Philadelphia, Pa.
 Biological Effects of Nonionizing Electromagnetic Radiation, volume 7, number 2-4, July - December 1982 [AD-A134674] p 136 N84-17805

J

Jet Propulsion Lab., California Inst. of Tech., Pasadena.
 Radiation protection for manned space activities [NASA-CR-173202] p 147 N84-16791

Johns Hopkins Univ., Baltimore, Md.
 Biochemical indicators of thermal stress: Selected genetic and physiological parameters [PB84-100122] p 137 N84-17808

SOURCE

Joint Publications Research Service, Arlington, Va.

USSR report: Life sciences. Effects of nonionizing electromagnetic radiation, no. 13 [JPRS-84991] p 134 N84-16762
 Permeability of sodium sulfacyl through membrane structures differing in degree of organization with exposure to low-frequency magnetic field p 134 N84-16763
 Change in immunobiological reactivity under the effect of combined exposure to microwaves, infrasound and gamma radiation p 134 N84-16764
 Influence of variable magnetic field on bactericidal effect of ionizing radiation p 134 N84-16765
 Animal sensitivity to super-high frequency electromagnetic fields in correlation to age p 135 N84-16766

New trends in standardization of electromagnetic microwave radiation p 135 N84-16767
 Use of electromagnetic field in patients following a disruption of cerebral circulation p 135 N84-16768
 USSR report: Space Biology and Aerospace Medicine, Vol. 17, No. 6, November - December 1983 94 p [JPRS-USB-84-001] p 135 N84-16769
 Practical applications of advances in aviation medicine p 144 N84-16770
 Shielding part of bone marrow as a method of local protection against cosmic radiation p 144 N84-16771
 Fluid intake at high altitudes p 145 N84-16772
 Mental status and work capacity of Salyut-6 station crew members p 145 N84-16773
 Changes in some rheological parameters of blood in experiments simulating weightlessness p 145 N84-16774

G suit of bladderless type as a means of improving orthostatic stability after water immersion hypokinesia and exposure to accelerations p 162 N84-16775
 Study of metabolic sequelae of using positive intrapulmonary pressure during exposure to accelerations p 145 N84-16776
 Effect of synocarb on hemodynamics and redistribution of blood during functional tests following six-hour antiorthostatic hypokinesia p 145 N84-16777
 Respiratory tract closing volume and structure of total lung capacity during seven-day hypokinesia in head-down position p 145 N84-16778
 Evaluation of human blood morphological composition during exercise in sealed chamber with different concentrations of ammonia p 146 N84-16779
 Metabolic disturbances in man in an environment with low ammonia level and their correction by graded physical exercise p 146 N84-16780
 Metabolism and nutritional status in emergency situations without food supply or on a low-calorie diet p 146 N84-16781

Effect of periodic accelerations of 5 G on kinetics of erythrocyte hemolysis in white rats p 135 N84-16782
 Neuronal-vascular relations in lateral geniculate body and superior colliculi of cats after exposure to accelerations p 135 N84-16783
 Study of vibration resonance frequencies in rats p 135 N84-16784
 Comparative characteristics of erythron reactions to hypoxic hypoxia, immobilization and high-intensity stationary magnetic field p 135 N84-16785
 Plant waste processing on a solid substrate for a biological life-support system for man p 162 N84-16786
 Detection of latent atherosclerotic stenosing lesions to great vessels of the head in flight personnel p 146 N84-16787
 Biocholocation method for investigation of parameters of intracranial circulation of blood and fluid in man p 146 N84-16788
 Experimentally produced biped monkeys as a model for multipurpose research in gravity biology and physiology p 136 N84-16789

K

Kentucky Univ., Lexington.
 Studies of electrically stimulated rat limb and peripheral nerve regeneration [AD-A134358] p 136 N84-17806
 Rabbit neurobehavioral toxicity from aluminum [PB84-103266] p 137 N84-17809

L

Life Systems, Inc., Cleveland, Ohio.
 Advanced air revitalization system testing [NASA-CR-166540] p 164 N84-17855
 Static feed water electrolysis subsystem testing and component development [NASA-CR-166539] p 164 N84-17856

Electrochemical carbon dioxide concentrator subsystem development [NASA-CR-166538] p 164 N84-17857
 Louisiana State Univ., Baton Rouge.
 physico-chemical investigation of some areas of fundamental significance to biophysics [DE83-017404] p 134 N84-16761
 Louisiana State Univ., Shreveport.
 Side effects of antimotom sickness drugs p 143 A84-21737

M

Management and Technical Services Co., Houston, Tex.
 Energy balance and the composition of weight loss during prolonged space flight [NASA-CR-171745] p 148 N84-17820
 Water immersion and its computer simulation as analogs of weightlessness [NASA-CR-171746] p 149 N84-17821
 Maryland Univ., Princess Anne.
 Use of microwaves to improve nutritional value of soybeans for future space inhabitants [NASA-CR-175336] p 162 N84-16805
 Massachusetts Inst. of Tech., Cambridge.
 Temporal aspects of eye movement when viewing multiple targets [AD-A134853] p 150 N84-17828
 Automation, supervisory control and workload in flight management [NASA-CR-166474] p 155 N84-17838
 Materials Research Labs., Melbourne (Australia).
 The response of rats to cutaneous dosing with trichothecene mycotoxins [MRL-R-902] p 136 N84-17803
 Missouri Univ., Rolla.
 Effect of radiofrequency radiation on DNA duplex stability and replication [AD-A133526] p 134 N84-16759

N

National Aeronautics and Space Administration, Washington, D. C.
 Studies of proteinograms in dermatophytes by disc electrophoresis. 1. Protein bands in relation to growth phase [NASA-TM-77095] p 133 N84-16755
 Birth of space plant growing [NASA-TM-77244] p 133 N84-16756
 Aerospace Medicine and Biology: A continuing bibliography with indexes (supplement 253) [NASA-SP-7011(253)] p 146 N84-16790
 Development of a systems theoretical procedure for evaluation of the work organization of the cockpit crew of a civil transport airplane [NASA-TM-77359] p 162 N84-16806
 The effect of various carbon sources on the growth of single-celled cyanophyta [NASA-TM-77090] p 136 N84-17804
 National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
 Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521
 Visual slant misperception and the Black-Hole landing situation [NASA-TM-85866] p 153 N84-16795
 National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.
 Method and apparatus for simulating gravitational forces on a living organism [NASA-CASE-MSC-20202-1] p 162 N84-16803
 National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
 Strategies using an observer for steering a random motion of a point in a multitarget environment [CSIR-TWISK-285] p 153 N84-16794

Naval Academy, Annapolis, Md.
 Stability enhancement of a flexible robot manipulator [AD-A134185] p 162 N84-16807
 Naval Air Development Center, Warminster, Pa.
 Blood flow measurements under high-G conditions: Early prediction of Gz tolerance [AD-A134653] p 149 N84-17823
 Naval Health Research Center, San Diego, Calif.
 Benzodiazepine effects on arousal threshold during sleep [AD-A133151] p 147 N84-16792
 Extending human effectiveness during sustained operations through sleep management [AD-A134782] p 149 N84-17825

Naval Personnel Research and Development Center, San Diego, Calif.
 Productivity improvement in a purchase division: Evaluation of a Performance Contingent Reward System (PCRS) [AD-A133589] p 155 N84-16801

P

Pennsylvania Coll. of Optometry, Philadelphia.
 ERG (Electroretinogram) implicit time: An exploration of high frequency wavelets recorded in the human visual system [AD-A134575] p 150 N84-17832
 Pennsylvania State Univ., University Park.
 Electrical-shock prevention. Volume 1: Protection of maintenance personnel [PB84-102946] p 165 N84-17865
 Electrical-shock prevention. Volume 2: Ground-fault interrupting devices [PB84-102953] p 165 N84-17866
 Electrical-shock prevention. Volume 3: Fault protection for motion-drive equipment [PB84-102961] p 165 N84-17867
 Electrical-shock prevention. Volume 4: Overhead-line contact fatalities [PB84-102979] p 166 N84-17868
 Pittsburgh Univ., Pa.
 Problem solving abilities [AD-A134717] p 155 N84-17840
 Purdue Univ., Lafayette, Ind.
 In vitro chlorophyll photosynthetic reaction [PB84-104892] p 137 N84-17810
 Objective measure of pilot workload [NASA-CR-173296] p 164 N84-17858

R

Research Inst. of National Defence, Stockholm (Sweden).
 Preliminary field tests for detecting flying targets in front of a land background [FOA-C-56033-H2] p 157 N84-17847
 Detection of flying targets in front of a land background: Laboratory tests [FOA-C-56034-H2] p 157 N84-17848
 Detection of flying targets in front of a land background: Field tests [FOA-C-56035-H2] p 157 N84-17849
 Man and machine. The role of human factors in system development [FOA-A-56005-H2] p 165 N84-17863
 Protection against heat radiation in the steel industry [FOA-C-20500-E4] p 165 N84-17864

S

Sutherland Sproull and Associates, Inc., Pittsburgh, Pa.
 Walking machine control programming [AD-A134435] p 163 N84-16809
 Systems Applications, Inc., San Rafael, Calif.
 Human exposure to atmospheric concentrations to selected chemicals, volume 1 [PB84-102540] p 151 N84-17835

T

Texas Univ., Austin.
 Mathematical simulation of the cardiopulmonary system [AD-A135460] p 149 N84-17822
 Texas Univ., Galveston.
 Formation and remodeling of the early wound matrix [AD-A134576] p 151 N84-17833

U

University of Southern California, Los Angeles.
 Motivation and performance appraisal behavior [AD-A134311] p 156 N84-17842

V

Veterans Administration Hospital, Palo Alto, Calif.
 Metabolic alkalosis during immobilization in monkeys (M. nemestrina) p 124 A84-20521

W

Wayne State Univ., Detroit, Mich.

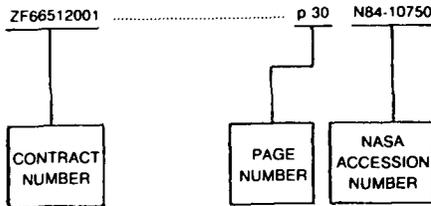
The spatial distribution of fixed mutations within genes
coding for proteins p 129 A84-21800

West Virginia Univ., Morgantown.

Analysis of electrical accident prevention
countermeasures p 166 N84-17869
[PB84-102987]

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing

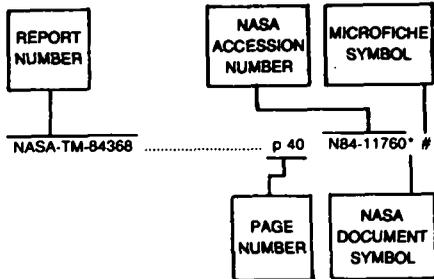


Listings in this index are arranged alphanumerically by contract number. Under each contract number, the accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order with the AIAA accession numbers appearing first. The accession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

ZF66512001	p 30	N84-10750	NAS9-14523	p 148	N84-17820
			NAS9-15487	p 148	N84-17820
			NAS9-16328	p 148	N84-17820
				p 149	N84-17821
			NAS9-16801	p 143	A84-21737
			NCC2-228	p 164	N84-17859
			NCC2-235	p 164	N84-17858
			NGR-01-010-001	p 167	A84-22843
			NGR-05-003-460	p 129	A84-21800
			NIH-AG-01450	p 141	A84-21031
			NIH-CA-32487	p 161	A84-22274
			NIH-EY-02688	p 137	A84-20019
			NIH-EY-02890	p 152	A84-20622
			NIH-GM-00455-05	p 142	A84-21037
			NIH-GM-21700-08	p 142	A84-21037
			NIH-HL-006281	p 128	A84-21034
			NIH-HL-06285	p 128	A84-21033
			NIH-HL-14985	p 142	A84-21036
			NIH-HL-17407	p 141	A84-21029
			NIH-HL-26606	p 128	A84-21034
			NIH-NS-15760	p 144	A84-22866
			NIH-NS-15766	p 144	A84-22866
			NIH-RR-07008	p 161	A84-22274
			NIH-1-R01-EY-03884	p 152	A84-20622
			NIH-1-R01-EY-03976	p 152	A84-20622
			NIH-5-P30-EY-01186	p 152	A84-20622
			NOAA-ES-02304	p 161	A84-22273
			NSERC-A-0323	p 137	A84-20018
			NSF DEB-78-10717	p 129	A84-21800
			NSF ECS-81-21259	p 138	A84-20021
			NSF ECS-82-01240	p 161	A84-22272
			NSF PCM-76-08627	p 129	A84-21800
			NSG-2118	p 155	N84-17838
			NSG-7470	p 162	N84-16805
			NSG-9026	p 141	A84-21031
			N00014-79-C-0215	p 155	N84-17840
			N00014-79-C-0332	p 136	N84-17806
			N00014-80-C-0581	p 156	N84-17843
				p 156	N84-17844
				p 156	N84-17846
			N00014-81-C-0591	p 156	N84-17841
			N00014-81-K-0048	p 156	N84-17842
			N00014-81-K-0314	p 153	N84-16796
			N00014-81-K-0391	p 158	A84-20290
			N00014-81-K-0503	p 164	N84-17861
			N00014-82-K-0279	p 151	N84-17833
			N00014-83-C-0004	p 136	N84-17805
			PHS-MH-29791	p 157	N84-17850
			PHS-MH-34188	p 137	N84-17809
			PHS-OH-00836	p 141	A84-21029
			SERC-GR/A/73817	p 153	A84-20624
			W-31-109-ENG-38	p 136	N84-17807
			199-20-74-03	p 147	N84-16791
			505-35-31	p 153	N84-16795
			506-64-31	p 164	N84-17855
				p 164	N84-17856
				p 164	N84-17857
AF PROJ. 1123	p 155	N84-16802			
AF PROJ. 1710	p 163	N84-16811			
AF PROJ. 2312	p 149	N84-17822			
AF PROJ. 2313	p 154	N84-16798			
	p 155	N84-17839			
AF PROJ. 3E1-63777-A-879	p 149	N84-17826			
AF PROJ. 3M1-61102-BS-10	p 164	N84-17860			
AF PROJ. 6893	p 163	N84-16810			
AF PROJ. 7184	p 154	N84-16799			
AF PROJ. 7231	p 133	N84-16757			
AF PROJ. 7757	p 134	N84-16759			
AF-AFOSR-0123-79	p 149	N84-17822			
AF-AFOSR-0144-82	p 155	N84-17839			
AF-AFOSR-78-3711	p 137	A84-20018			
AF-AFOSR-82-0345	p 152	A84-20622			
DA PROJ. 3E1-62777-A-879	p 149	N84-17824			
DA PROJ. 3M1-61192-BS-10	p 133	N84-16758			
DAAG29-79-C-0103	p 150	N84-17832			
DAMD-81-C-1057	p 142	A84-21036			
DARPA ORDER 4456	p 163	N84-16809			
DE-AC02-81ER-10911	p 134	N84-16760			
DE-AC04-76DP-00613	p 165	N84-17862			
DE-AS05-76EV-03018	p 134	N84-16761			
DE-BM-J0-113009	p 165	N84-17865			
DI-BM-J0-113009	p 165	N84-17866			
	p 165	N84-17867			
	p 166	N84-17868			
EPA-68-02-3066	p 151	N84-17835			
F33615-79-C-0503	p 163	N84-16810			
F33615-80-C-0613	p 134	N84-16759			
F33615-81-K-0011	p 150	N84-17828			
F41689-81-C-0012	p 154	N84-16798			
F58-528	p 149	N84-17825			
MDA903-79-C-0421	p 159	A84-21638			
MDA903-80-C-0154	p 153	A84-20625			
MDA903-82-C-0102	p 163	N84-16809			
MRO4101	p 147	N84-16792			
NAG1-288	p 162	N84-16804			
NAG2-100	p 144	A84-22866			
NAG2-123	p 159	A84-21638			
NAG2-170	p 163	N84-17852			
NASW-3541	p 133	N84-16755			
	p 133	N84-16756			
	p 162	N84-16806			
	p 136	N84-17804			
NAS2-10961	p 164	N84-17855			
NAS2-11087	p 164	N84-17856			
NAS2-11129	p 164	N84-17857			
NAS2-73	p 166	A84-21025			
NAS7-918	p 147	N84-16791			
NAS9-12932	p 148	N84-17820			

REPORT NUMBER INDEX

Typical Report Number Index Listing



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

A-9573	p 153	N84-16795	*	#
AD-A133151	p 147	N84-16792		#
AD-A133172	p 153	N84-16796		#
AD-A133178	p 133	N84-16757		#
AD-A133220	p 154	N84-16797		#
AD-A133259	p 154	N84-16798		#
AD-A133347	p 163	N84-16810		#
AD-A133354	p 163	N84-16811		#
AD-A133382	p 133	N84-16758		#
AD-A133394	p 154	N84-16799		#
AD-A133441	p 154	N84-16800		#
AD-A133526	p 134	N84-16759		#
AD-A133589	p 155	N84-16801		#
AD-A133594	p 147	N84-16793		#
AD-A133612	p 155	N84-16802		#
AD-A134185	p 162	N84-16807		#
AD-A134237	p 163	N84-16808		#
AD-A134311	p 156	N84-17842		#
AD-A134324	p 156	N84-17843		#
AD-A134335	p 156	N84-17844		#
AD-A134358	p 136	N84-17806		#
AD-A134404	p 156	N84-17845		#
AD-A134415	p 156	N84-17846		#
AD-A134435	p 163	N84-16809		#
AD-A134444	p 150	N84-17831		#
AD-A134575	p 150	N84-17832		#
AD-A134576	p 151	N84-17833		#
AD-A134653	p 149	N84-17823		#
AD-A134672	p 149	N84-17824		#
AD-A134674	p 136	N84-17805		#
AD-A134717	p 155	N84-17840		#
AD-A134782	p 149	N84-17825		#
AD-A134797	p 156	N84-17841		#
AD-A134811	p 149	N84-17826		#
AD-A134814	p 150	N84-17827		#
AD-A134828	p 164	N84-17860		#
AD-A134853	p 150	N84-17828		#
AD-A134892	p 150	N84-17829		#
AD-A134899	p 164	N84-17861		#
AD-A134912	p 150	N84-17830		#
AD-A135460	p 149	N84-17822		#
AD-A135461	p 155	N84-17839		#
AD-E301247	p 155	N84-17840		#
AD-E750844	p 154	N84-16800		#
AD-E950446	p 154	N84-16799		#
AD-F630168	p 156	N84-17841		#
AFAMRL-TR-83-052	p 154	N84-16799		#
AFAMRL-TR-83-054	p 163	N84-16810		#
AFAMRL-TR-83-055	p 133	N84-16757		#
AFHRL-TP-83-33	p 154	N84-16798		#
AFHRL-TP-83-34	p 163	N84-16811		#
AFHRL-TP-83-6	p 150	N84-17828		#
AFHRL-TR-83-17	p 155	N84-16802		#
AFIT-LSSR-51-83	p 156	N84-17845		#
AFOSR-83-0999TR	p 149	N84-17822		#
AFOSR-83-1016TR	p 155	N84-17839		#
AIAA PAPER 84-0553	p 160	A84-21882		#
APR-2	p 164	N84-17858	*	#
APR-2	p 164	N84-17859	*	#
AR-003-798	p 136	N84-17803		#
ARO-16272.2-LS	p 150	N84-17832		#
AU-AFIT-ED-TR-83-1	p 154	N84-16800		#
BDX-613-2992	p 165	N84-17862		#
BM-OFR-177(1)-83	p 165	N84-17865		#
BM-OFR-177(2)-83	p 165	N84-17866		#
BM-OFR-177(3)-83	p 165	N84-17867		#
BM-OFR-177(4)-83	p 166	N84-17868		#
BM-OFR-179-83	p 166	N84-17869		#
CMU-RI-TR-83-15	p 164	N84-17861		#
CMU-RI-TR-83-3	p 163	N84-16808		#
CONF-8310221-1	p 136	N84-17807		#
CRJP-249	p 156	N84-17841		#
CSIR-TWISK-285	p 153	N84-16794		#
DE83-017404	p 134	N84-16761		#
DE84-002886	p 134	N84-16760		#
DE84-003574	p 136	N84-17807		#
DE84-004920	p 165	N84-17862		#
DOE/ER-10911/5	p 134	N84-16760		#
DOE/EV-03018/247	p 134	N84-16761		#
FAA-AM-83-14-5	p 150	N84-17830		#
FAA-AM-83-15	p 147	N84-16793		#
FAA-AM-83-9	p 154	N84-16797		#
FOA-A-56005-H2	p 165	N84-17863		#
FOA-C-20500-E4	p 165	N84-17864		#
FOA-C-56033-H2	p 157	N84-17847		#
FOA-C-56034-H2	p 157	N84-17848		#
FOA-C-56035-H2	p 157	N84-17849		#
G-81-12(19)	p 156	N84-17842		#
GRI-81/0124	p 137	N84-17810		#
ISSN-0281-0239	p 165	N84-17863		#
ISSN-0347-3694	p 165	N84-17864		#
JHU/APL/CPE-8305-VOL-8	p 151	N84-17834		#
JPL-PUB-83-26	p 147	N84-16791	*	#
JPRS-USB-84-001	p 135	N84-16769		#
JPRS-84991	p 134	N84-16762		#
L-2341	p 148	N84-17814		#
L-2399	p 148	N84-17817		#
L-2403	p 155	N84-17836		#
L-2456	p 147	N84-17811		#
LSI-TR-406-4	p 164	N84-17855	*	#
LSI-TR-481-4	p 164	N84-17856	*	#
LSI-TR-482-4	p 164	N84-17857	*	#
MRL-R-902	p 136	N84-17803		#
NADC-83115-60	p 149	N84-17823		#
NAS 1.15:77090	p 136	N84-17804	*	#
NAS 1.15:77095	p 133	N84-16755	*	#
NAS 1.15:77244	p 133	N84-16756	*	#
NAS 1.15:77359	p 162	N84-16806	*	#
NAS 1.15:85866	p 153	N84-16795	*	#
NAS 1.21:7011(253)	p 146	N84-16790	*	#
NAS 1.26:166474	p 155	N84-17838	*	#
NAS 1.26:166538	p 164	N84-17857	*	#
NAS 1.26:166539	p 164	N84-17856	*	#
NAS 1.26:166540	p 164	N84-17855	*	#
NAS 1.26:171745	p 148	N84-17820	*	#
NAS 1.26:171746	p 149	N84-17821	*	#
NAS 1.26:173177	p 162	N84-16804	*	#
NAS 1.26:173202	p 147	N84-16791	*	#
NAS 1.26:173296	p 164	N84-17858	*	#
NAS 1.26:173297	p 164	N84-17859	*	#
NAS 1.26:173299	p 163	N84-17852	*	#
NAS 1.26:175336	p 162	N84-16805	*	#
NASA-CASE-MSC-20202-1	p 162	N84-16803	*	#
NASA-CR-166474	p 155	N84-17838	*	#
NASA-CR-166538	p 164	N84-17857	*	#
NASA-CR-166539	p 164	N84-17856	*	#
NASA-CR-166540	p 164	N84-17855	*	#
NASA-CR-171745	p 148	N84-17820	*	#
NASA-CR-171746	p 149	N84-17821	*	#
NASA-CR-173177	p 162	N84-16804	*	#
NASA-CR-173202	p 147	N84-16791	*	#
NASA-CR-173296	p 164	N84-17858	*	#
NASA-CR-173297	p 164	N84-17859	*	#
NASA-CR-173299	p 163	N84-17852	*	#
NASA-CR-175336	p 162	N84-16805	*	#
NASA-SP-7011(253)	p 146	N84-16790	*	#
NASA-TM-77090	p 136	N84-17804	*	#
NASA-TM-77095	p 133	N84-16755	*	#
NASA-TM-77244	p 133	N84-16756	*	#
NASA-TM-77359	p 162	N84-16806	*	#
NASA-TM-85866	p 153	N84-16795	*	#
NAVLTHRSCHC-83-13	p 149	N84-17825		#
NAVLTHRSCHC-83-17	p 147	N84-16792		#
NIMH-83-333	p 157	N84-17850		#
NIMH-83-335	p 137	N84-17809		#
NPROC-TR-83-34	p 155	N84-16801		#
OEHL-83-128EH11DGA	p 150	N84-17827		#
PB84-100122	p 137	N84-17808		#
PB84-100171	p 157	N84-17850		#
PB84-102540	p 151	N84-17835		#
PB84-102946	p 165	N84-17865		#
PB84-102953	p 165	N84-17866		#
PB84-102961	p 165	N84-17867		#
PB84-102979	p 166	N84-17868		#
PB84-102987	p 166	N84-17869		#
PB84-103266	p 137	N84-17809		#
PB84-104892	p 137	N84-17810		#
PB84-112895	p 151	N84-17834		#
PPSP/PPRP-75	p 137	N84-17808		#
REPT-14	p 156	N84-17842		#
REPT-6	p 136	N84-17806		#
SAI-58-EF81-156R2	p 151	N84-17835		#
SSA-2054	p 163	N84-16809		#
T-135	p 162	N84-16804	*	#
TIR-2114-MED-2005	p 149	N84-17821	*	#
TIR-2114-MED-2012	p 148	N84-17820	*	#
TOP-1-1-003	p 150	N84-17829		#
TR-ONR-13	p 156	N84-17846		#

TR-14-ONR

REPORT NUMBER INDEX

TR-14-ONR p 156 N84-17844 #
TR-15-ONR p 156 N84-17843 #

UPITT/LRDC/ONR/KBC-8 p 155 N84-17840 #

US-PATENT-APPL-SN-414106 p 162 N84-16803 * #

US-PATENT-CLASS-128-1A p 162 N84-16803 * #
US-PATENT-CLASS-128-15R p 162 N84-16803 * #
US-PATENT-CLASS-128-38 p 162 N84-16803 * #

US-PATENT-4,421,109 p 162 N84-16803 * #

USAARL-83-14 p 164 N84-17860 #

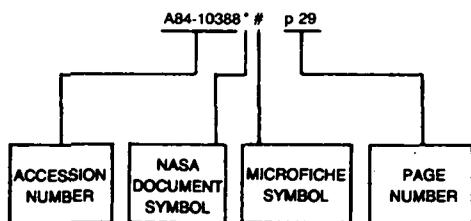
USAFSAM-TR-83-20 p 134 N84-16759 #

USARIEM-M-4/84 p 150 N84-17831 #
USARIEM-M-46/83 p 133 N84-16758 #
USARIEM-M-5/84 p 149 N84-17826 #
USARIEM-M-9/83 p 149 N84-17824 #

USNA-TSPR-126 p 162 N84-16807 #

ACCESSION NUMBER INDEX

Typical Accession Number Index Listing



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

A84-19599 #	p 123	A84-20890 #	p 125	A84-21638 * #	p 159	N84-16763 #	p 134	N84-17837 #	p 155
A84-19600 #	p 151	A84-20891 #	p 125	A84-21639 #	p 160	N84-16764 #	p 134	N84-17838 * #	p 155
A84-19608 #	p 151	A84-20892 #	p 125	A84-21641 #	p 160	N84-16765 #	p 134	N84-17839 #	p 155
A84-19640 #	p 157	A84-20893 #	p 126	A84-21642 #	p 160	N84-16766 #	p 135	N84-17840 #	p 155
A84-19647 #	p 157	A84-20894 #	p 126	A84-21643 #	p 160	N84-16767 #	p 135	N84-17841 #	p 156
A84-19724 #	p 123	A84-20896 #	p 126	A84-21645 #	p 160	N84-16768 #	p 135	N84-17842 #	p 156
A84-19725 #	p 123	A84-20897 #	p 126	A84-21648 #	p 153	N84-16769 #	p 135	N84-17843 #	p 156
A84-19848 #	p 158	A84-20898 #	p 140	A84-21649 #	p 153	N84-16770 #	p 144	N84-17844 #	p 156
A84-19911 #	p 166	A84-20899 #	p 140	A84-21675 #	p 142	N84-16771 #	p 144	N84-17845 #	p 156
A84-20017 #	p 166	A84-20900 #	p 158	A84-21726 #	p 128	N84-16772 #	p 145	N84-17846 #	p 156
A84-20018 #	p 137	A84-20901 #	p 126	A84-21727 #	p 128	N84-16773 #	p 145	N84-17847 #	p 157
A84-20019 #	p 137	A84-20902 #	p 126	A84-21728 #	p 128	N84-16774 #	p 145	N84-17848 #	p 157
A84-20020 #	p 151	A84-20903 #	p 126	A84-21729 #	p 166	N84-16775 #	p 145	N84-17849 #	p 157
A84-20021 #	p 138	A84-20904 #	p 126	A84-21730 #	p 128	N84-16776 #	p 145	N84-17850 #	p 157
A84-20022 #	p 151	A84-20905 #	p 126	A84-21735 #	p 142	N84-16777 #	p 145	N84-17851 #	p 163
A84-20023 #	p 152	A84-20906 #	p 126	A84-21736 #	p 142	N84-16778 #	p 145	N84-17852 * #	p 163
A84-20078 #	p 152	A84-20907 #	p 126	A84-21737 * #	p 143	N84-16779 #	p 146	N84-17853 * #	p 137
A84-20080 #	p 138	A84-20908 #	p 127	A84-21738 #	p 143	N84-16780 #	p 146	N84-17854 * #	p 137
A84-20082 #	p 138	A84-20909 #	p 127	A84-21739 #	p 160	N84-16781 #	p 146	N84-17855 * #	p 164
A84-20084 #	p 152	A84-20910 #	p 127	A84-21740 #	p 143	N84-16782 #	p 135	N84-17856 * #	p 164
A84-20086 #	p 138	A84-20911 #	p 127	A84-21741 #	p 128	N84-16783 #	p 135	N84-17857 * #	p 164
A84-20187 #	p 123	A84-20912 #	p 127	A84-21742 #	p 129	N84-16784 #	p 135	N84-17858 * #	p 164
A84-20247 #	p 123	A84-20913 #	p 127	A84-21743 #	p 143	N84-16785 #	p 135	N84-17859 * #	p 164
A84-20249 #	p 123	A84-20914 #	p 140	A84-21744 #	p 143	N84-16786 #	p 162	N84-17860 #	p 164
A84-20275 #	p 124	A84-20915 #	p 140	A84-21745 #	p 143	N84-16787 #	p 146	N84-17861 #	p 164
A84-20286 #	p 138	A84-20916 #	p 140	A84-21800 * #	p 129	N84-16788 #	p 146	N84-17862 #	p 165
A84-20287 #	p 138	A84-20917 #	p 140	A84-21882 * #	p 160	N84-16789 #	p 136	N84-17863 #	p 165
A84-20288 #	p 158	A84-20918 #	p 158	A84-22272 #	p 161	N84-16790 * #	p 146	N84-17864 #	p 165
A84-20289 #	p 138	A84-20924 #	p 158	A84-22273 #	p 161	N84-16791 * #	p 147	N84-17865 #	p 165
A84-20290 #	p 158	A84-21013 #	p 140	A84-22274 #	p 161	N84-16792 #	p 147	N84-17866 #	p 165
A84-20291 #	p 139	A84-21014 #	p 140	A84-22399 #	p 161	N84-16793 #	p 147	N84-17867 #	p 165
A84-20293 #	p 139	A84-21015 #	p 140	A84-22447 #	p 129	N84-16794 #	p 153	N84-17868 #	p 166
A84-20294 #	p 139	A84-21016 #	p 159	A84-22448 #	p 129	N84-16795 * #	p 153	N84-17869 #	p 166
A84-20392 #	p 124	A84-21017 #	p 159	A84-22449 #	p 143	N84-16796 #	p 153		
A84-20521 #	p 124	A84-21018 #	p 127	A84-22450 #	p 129	N84-16797 #	p 154		
A84-20553 #	p 158	A84-21019 #	p 127	A84-22567 #	p 161	N84-16798 #	p 154		
A84-20621 #	p 152	A84-21020 #	p 159	A84-22568 #	p 143	N84-16799 #	p 154		
A84-20622 #	p 152	A84-21022 #	p 141	A84-22569 #	p 144	N84-16800 #	p 154		
A84-20623 #	p 152	A84-21025 * #	p 166	A84-22776 #	p 129	N84-16801 #	p 155		
A84-20624 #	p 153	A84-21026 #	p 141	A84-22777 #	p 130	N84-16802 #	p 155		
A84-20625 #	p 153	A84-21027 #	p 141	A84-22778 #	p 130	N84-16803 * #	p 162		
A84-20876 #	p 124	A84-21028 #	p 141	A84-22779 #	p 130	N84-16804 * #	p 162		
A84-20877 #	p 124	A84-21029 #	p 141	A84-22780 #	p 130	N84-16805 * #	p 162		
A84-20878 #	p 139	A84-21030 #	p 141	A84-22781 #	p 130	N84-16806 * #	p 162		
A84-20879 #	p 124	A84-21031 * #	p 141	A84-22782 #	p 130	N84-16807 #	p 162		
A84-20880 #	p 124	A84-21032 #	p 142	A84-22843 * #	p 167	N84-16808 #	p 163		
A84-20881 #	p 125	A84-21033 #	p 128	A84-22844 #	p 130	N84-16809 #	p 163		
A84-20882 #	p 125	A84-21034 #	p 128	A84-22845 #	p 131	N84-16810 #	p 163		
A84-20883 #	p 125	A84-21035 #	p 142	A84-22846 #	p 131	N84-16811 #	p 163		
A84-20884 #	p 139	A84-21036 #	p 142	A84-22847 #	p 131	N84-17803 #	p 136		
A84-20885 #	p 158	A84-21037 #	p 142	A84-22848 #	p 167	N84-17804 * #	p 136		
A84-20886 #	p 139	A84-21056 #	p 159	A84-22849 #	p 167	N84-17805 #	p 136		
A84-20887 #	p 139	A84-21246 #	p 159	A84-22850 #	p 131	N84-17806 #	p 136		
A84-20888 #	p 125	A84-21600 #	p 128	A84-22866 * #	p 144	N84-17807 #	p 136		
A84-20889 #	p 125	A84-21637 #	p 159	A84-22926 #	p 131	N84-17808 #	p 137		
				A84-22927 #	p 131	N84-17809 #	p 137		
				A84-22928 #	p 131	N84-17810 #	p 137		
				A84-22929 #	p 131	N84-17811 #	p 147		
				A84-22930 #	p 132	N84-17812 #	p 147		
				A84-22931 #	p 132	N84-17813 #	p 147		
				A84-22932 #	p 144	N84-17814 #	p 148		
				A84-22933 #	p 144	N84-17815 #	p 148		
				A84-22934 #	p 132	N84-17816 #	p 148		
				A84-22935 #	p 132	N84-17817 #	p 148		
				A84-22936 #	p 144	N84-17818 #	p 148		
				A84-22937 #	p 144	N84-17819 #	p 148		
				A84-22938 #	p 144	N84-17820 * #	p 148		
				A84-22939 #	p 132	N84-17821 #	p 149		
				A84-22940 #	p 132	N84-17822 #	p 149		
				A84-22941 #	p 132	N84-17823 #	p 149		
				A84-22942 #	p 161	N84-17824 #	p 149		
				A84-22943 #	p 133	N84-17825 #	p 149		
				A84-22944 #	p 133	N84-17826 #	p 149		
				A84-22945 #	p 133	N84-17827 #	p 150		
						N84-17828 #	p 150		
						N84-17829 #	p 150		
						N84-17830 #	p 150		
						N84-17831 #	p 150		
						N84-17832 #	p 150		
						N84-17833 #	p 151		
						N84-17834 #	p 151		
						N84-17835 #	p 151		
						N84-17836 #	p 155		
						N84-16755 * #	p 133		
						N84-16756 * #	p 133		
						N84-16757 #	p 133		
						N84-16758 #	p 133		
						N84-16759 #	p 134		
						N84-16760 #	p 134		
						N84-16761 #	p 134		
						N84-16762 #	p 134		

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