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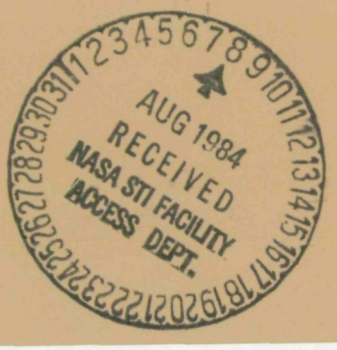
Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011(260)
July 1984



(NASA-SP-7011(260)) AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 260) (National Aeronautics and Space Administration) 75 p
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Aerospace Medicine & Biology

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NASA SP-7011(260)
Aerospace Medicine and Biology
A Continuing Bibliography with Indexes
Pages 239-273
July 1984

ACCESSION NUMBER RANGES

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

STAR (N-10000 Series)	N84-20473 - N84-22526
IAA (A-10000 Series)	A84-26401 - A84-30008

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NASA SP-7011(260)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 260)

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 June 1984 in

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

NASA Scientific and Technical Information Branch 1984
National Aeronautics and Space Administration
Washington, DC

NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.

This supplement is available as NTISUB/123/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of $7.00 domestic; $14.00 foreign.

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* lists 225 reports, articles and other documents announced during June 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.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A84-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies of accessions are available at $8.50 per document. Microfiche[1] of documents announced in *IAA* are available at the rate of $4.00 per microfiche on demand. Standing order microfiche are available at the rate of $1.45 per microfiche for *IAA* source documents.

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Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

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Other availabilities: If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line.

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC: NASA and NASA-sponsored documents and a large number of aerospace publications are available to the public for reference purposes at the library maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

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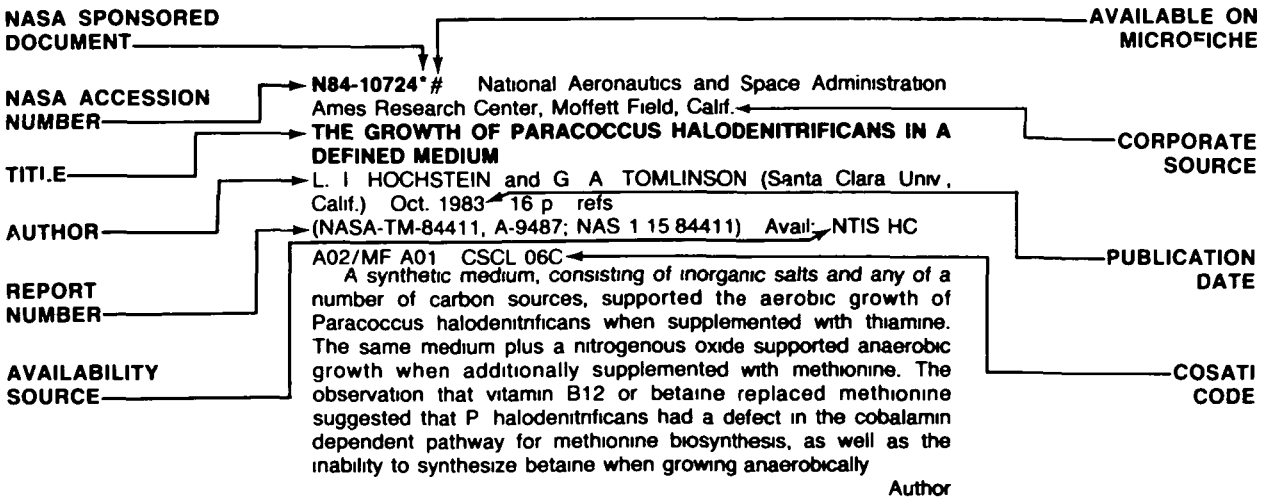

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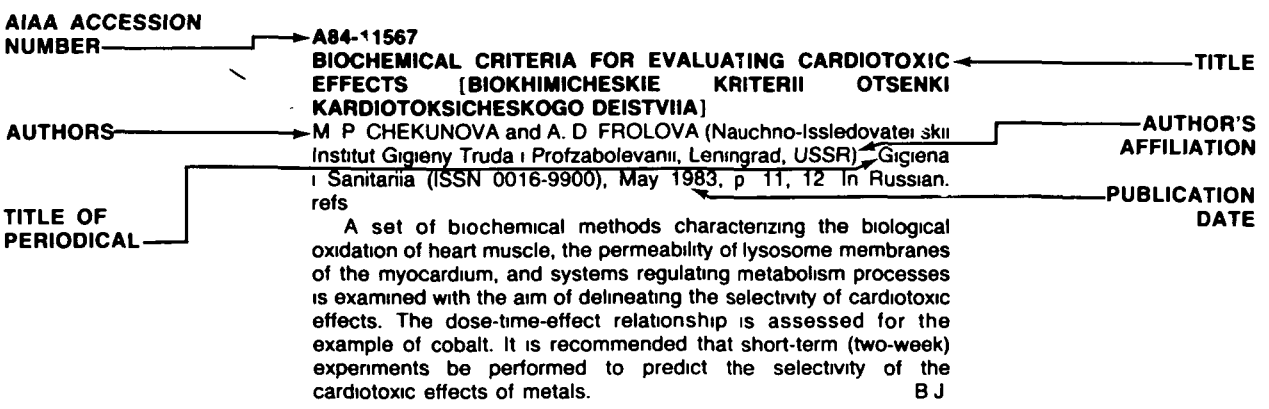

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 260)

JULY 1984

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LIFE SCIENCES (GENERAL)

Includes genetics

A84-27120
EFFECT OF LOW-FREQUENCY MAGNETIC FIELDS ON THE SODIUM CURRENT OF MYOCARDIAL CELLS [VOZDEISTVIE NIZKOCHASTOTNOGO MAGNITNOGO POLIA NA NATRIEVYI TOK MIOKARDIAL'NYKH KLETOK]
L. A. PIRUZIAN, A. V. LAZAREV, T. SH KSHUTASHVILI, I N. ULIANKIN, and A N. KUZNETSOV (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow; Nauchno-Issledovatelskii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, USSR) Akademiia Nauk SSSR, Doklady (ISSN 0002-3264), vol 274, no. 4, 1984, p. 952-955 In Russian refs

To assess the influence of a weak variable magnetic field (B = 0.02 mT, nu ranging from 10 to 70 Hz) on ionic currents, the action potentials and ionic currents in the transmembrane potential difference fixation process were measured in isolated auricular *trabeculae of a Rana ridibidunda frog. In each experiment the* currents were measured three times (1) after a 30-minute monitoring before turning on the field, (2) after 20-minute development of the field effect, and (3) 20 minutes after the field was turned off The results demonstrate that the mgnetic fields induce in the myocardial cells a suppression of the sodium current, which is related to the decrease in the transmembrane sodium ion gradient As there were no observed variations in the conductivity of the sodium canal system, it is proposed that this effect is basically related to the field-induced activity decrease of the ATP-dependent sodium-potassium 'pump' of cytoplasmic myocardial cell membranes. J N.

A84-27642
DRUG AND NEUROTRANSMITTER RECEPTORS IN THE BRAIN
S. H. SNYDER (Johns Hopkins University, Baltimore, MD) Science (ISSN 0036-8075), vol 224, April 6, 1984, p. 22-31. Research supported by the International Life Sciences Institute and McKnight Foundation. refs
(Contract PHS-MH-18501; PHS-DA-00266; PHS-NS-16375)

Progress in the study of drug and neurotransmitter receptors in the brain is reviewed The properties of drugs and neurotransmitters are discussed in terms of the types of receptors they bind to, including opiate receptors, calcium antagonist receptors, adenosine receptors, GABA and benzodiazepine receptors, and biogenic amine receptors Insights into how binding of neurotransmitters to their receptors excites or inhibits neuronal firing or changes cellular metabolism are discussed. C.D.

A84-27876
CORRELATION OF ULTRASLOW ACTIVITY WITH VARIATIONS OF THE FUNCTIONAL STATE OF NEOCORTEX CYTOSTRUCTURES [SOPOSTAVLENIE SVERKHMEDLENNOI AKTIVNOSTI S IZMENENIIAMI FUNKTSIONAL'NOGO SOSTOIANIIA TSITOSTRUKTUR NEOKORTEKSA]
N I. RAZUMOVSKAIA, I A. LAPINA, L. M. BELIAVTSEVA, O. G. KULIKOVA, I. M MATVEEVA, N. A. LOSEV, and IU S. BORODKIN (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Feb 1984, p. 125-129. In Russian. refs

Experiments were conducted on adult male Wistar rats in which ethimizole was administered intraabdominally in concentrations of 3 mg/kg and traced with C-14 The differential centrifugation method was then used for a post mortem removal from the large hemisphere cortex of the nuclei, synaptic membranes, mitochondria, hyaloplasms, and microsomes. Data for the dynamics of the C-14-ethimizole distribution in the cortex cytostructures are presented for 2, 5, 15, 30, and 60 minutes after its introduction. The cellular nuclei and the microsomal membrane surface proteins were the most powerful acceptors of the ethimizole From a graph of the variations of the multiminute wave amplitudes of ultraslow oscillations of the frontal neocortex, a fundamental change in the characteristic of this activity as a result of the ethimizole is seen to be the appearance of a negative multiminute oscillation wave 5 min after the introduction of the preparation, with a maximum negativity at 30 min. J N

A84-27877
DYNAMIC MODEL OF THE REGULATION OF MUSCLE FIBER CONTRACTION [DINAMICHESKAIA MODEL' REGULIATSII SOKRASHCHENIIA MYSHECHNOGO VOLOKNA]
S P ROMANOV (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol 70, Feb 1984, p 141-148. In Russian. refs

A dynamic model of muscle fiber contraction is based on the hypothesis that all variations in the length of muscle, both in relaxation and active contraction, lead to a change in the relationship of elastic and viscous properties of different membrane structures of muscle fiber, changing their electrical excitability. The model parameters are interconnected using differential equations, and the concept of 'absolute muscle length' with points along a scale from 0 to 1 is introduced In this way, different muscle types are differentiated by the position of the physiological work range on the standardized length scale. Each point on this scale has its own relationships of elastic and viscous parameters and its own mechanism for the transformation of stimulation impulse to contraction force development characteristics The present model is used to reproduce the contraction characteristics of various muscle types, including heart muscle fibers. J.N

A84-27878
NATURE OF THE DUAL CAFFEINE-SODIUM BENZOATE EFFECT ON THE TONIC COMPONENT OF POTASSIUM CONTRACTURE IN THE FROG MYOCARDIUM [PRIRODA DVOISTVENNOGO EFFEKTA KOFEINA-BENZOATA NATRIIA NA TONICHESKUIU KOMPONENTU KALIEVOI KONTRAKTURY MIOKARDA LIAGUSHKI]
M. R MUKUMOV, A. B. KHODOROVA, and B I. KHODOROV (Nauchno-Issledovatel'skii Institut po Biologicheskim Ispytaniiam Khimicheskikh Soedinenii, Kupavna, Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Feb. 1984, p. 180-185 In Russian refs

A84-27879
GLUCOCORTICOID HORMONES AND IMMUNE RESPONSE [GLIUKOKORTIKOIDNYE GORMONY I IMMUNNYI OTVET]
E. K. SHKHINEK, E. A. KORNEVA, E. SHTARK, ZS. AZS, K ABAWARY, K SALAI, and I. FIOK (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR; Hungarian Academy of Sciences, Institute of Experimental Medicine, Budapest, Hungary) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Feb. 1984, p. 213-219. In Russian. refs

The level of gluco- and mineral-corticoids in blood is investigated in the dynamics of immune response development. The correlation between the functional activity of the hypothalamo-hypophisial-adrenocortical system and the intensity of antibody production with directed shifts of glucocorticoid activity and immune response was investigated in animals immunized with ram erythrocytes under a variety of conditions Data describing the role of glucocorticoids in immune system reactions to antigens on the cellular and molecular levels are presented. For comparatively short and moderate intensities of hormonal background changes, no essential disturbance of the humoral immune response was observed. However, for the more complex endocrinal shifts brought about by adrenalectomy or acute chronic hypercortism resulting from repeated doses of hydrocortisone, essential changes in the response to antigens were observed on the level of immunocompetent cells and antibody production was sharply reduced. J.N.

A84-27880
SPATIAL-TEMPORAL ORGANIZATION OF FUNCTIONS OF SUBCORTICAL BRAIN STRUCTURES IN THE PROCESS OF IMMUNE RESPONSE DEVELOPMENT [PROSTRANSTVENNO-VREMENNAIA ORGANIZATSIIA FUNKTSII PODKORKOVYKH STRUKTUR MOZGA V PROTSESSE RAZVITIIA IMMUNNYKH REAKTSII]
V A. GRIGOREV and V. M. KLIMENKO (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Feb. 1984, p 221-230. In Russian. refs

A84-27881
ANALYSIS OF INTERACTION BETWEEN DOPAMINERGIC AND SEROTONINERGIC SYSTEMS IN IMMUNOMODULATION [ANALIZ VZAIMODEISTVIIA DOFAMINERGICHESKOI I SEROTONINERGICHESKOI SISTEM V IMMUNOMODULIATSII]
L. V. DEVOINO and E. L. ALPERINA (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR) Fiziologicheskii Zhurnal SSSR (ISSN 0015-329X), vol. 70, Feb. 1984, p. 239-246 In Russian. refs

The use of substances with a sufficiently selective effect on various aspects of the metabolism of the biogenic amines, serotonin and dopamine, establishes that the serotoninergic system controls the inhibiting mechanism of immune response through the adrenals, while the dopaminergic system controls the stimulating mechanism through the thymus. In experiments with male mice immunized with ram erythrocytes, activation of the dopaminergic system through the introduction of Mydantanum leads to stimulation of the immune response. An analysis of data from the bilateral electrolytic destruction of the A9 group of dopaminergic nuclei, localized in the middle brain in direct proximity to the n raphe, shows in the immunized animals a marked decrease in the number of rosula-forming cells due to a suppression of Ig-M synthesis. J.N.

A84-28194
ELECTROPHYSIOLOGICAL INVESTIGATION OF STATIONARY ACTIVITY IN THE BRAIN [ELEKTROFIZIOLOGICHESKOE ISSLEDOVANIE STATSIONARNOI AKTIVNOSTI V GOLOVNOM MOZGE]
M. N LIVANOV, ED. Moscow, Izdatel'stvo Nauka, 1983, 344 p In Russian.

Papers are presented on experimental studies of the dominant type of foci of stationary electrical activity in the brain (i.e., excitation foci produced under the direct effect of electrical current and chemical agents on the brain) Synaptic and nonsynaptic mechanisms in the dynamics of stationary excitation are examined, and EEG studies directed toward an understanding of focal lesions in the brain are considered. No individual items are abstracted in this volume B J.

A84-28369
FREE-RADICAL DISTURBANCE IN MOUSE TISSUES AFTER IN VITRO IRRADIATION WITH GAMMA-RAYS AND NEUTRONS - RADIOCHEMICAL YIELDS [SVOBODNORADIKAL'NYE NARUSHENIIA V TKANIAKH MYSHEI PRI DEISTVII GAMMA-OBLUCHENIIA I NEITRONOV IN VITRO RADIATSIONNO-KHIMICHESKIE VYKHODY]
D. A. SVISTUNENKO, G. T. RIKHIREVA, M. K. PULATOVA, and V. M ERMAKOV (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki and Institut Atomnoi Energii, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol. 24, Jan.-Feb. 1984, p 3-8. In Russian. refs

A84-28370
EFFECT OF IONIZING RADIATION ON THE CONTENT AND TURNOVER OF SUPEROXIDE DISMUTASE IN RAT LIVER [VLIIANIE IONIZIRUIUSHCHEI RADIATSII NA SODERZHANIE I KRUGOOBOROT SUPEROKSIDDISMUTAZY V PECHENI KRYS]
V. P. KOMOV and E. IU. IVANOVA (Leningradskii Khimiko-Farmatsevticheskii Institut, Leningrad, USSR) Radiobiologiia (ISSN 0033-8192), vol. 24, Jan.-Feb. 1984, p. 25-28. In Russian refs

A84-28371
ACTIVITY OF SOME ENZYMES OF THE GLUTAMIC ACID METABOLISM AND THE KREBS CYCLE IN THE BRAIN OF RATS EXPOSED TO LASER RADIATION AND WITH ALTERED FUNCTIONAL CONDITION OF THE ADRENORECEPTORS [AKTIVNOST' NEKOTORYKH FERMENTOV OBMENA GLUTAMINOVOI KISLOTY I TSIKLA KREBSA V GOLOVNOM MOZGE KRYS PRI LAZERNOM OBLUCHENII NA FONE IZMENENNOGO FUNKTSIONAL'NOGO SOSTOIANIA ADRENORETSEPTOROV]
A. T. PIKULEV, N. A. DZHUGURIAN, T. N. ZYRIANOVA, V. M. LAVROVA, V. A. MOSTOVNIKOV, and I. V. KHOKHLOV (Belorusskii Gosudarstvennyi Universitet, Minsk, Belorussian SSR) Radiobiologiia (ISSN 0033-8192), vol 24, Jan.-Feb. 1984, p. 29-34. In Russian. refs

A84-28372
INFLUENCE OF INHIBITION OF PROSTAGLANDIN BIOSYNTHESIS ON THE HEMOPOIESIS OF IRRADIATED MICE [VLIIANIE INGIBIROVANIIA BIOSINTEZA PROSTAGLANDINOV NA SOSTOIANIE GEMOPOEZA OBLUCHENNYKH MYSHEI]
I. E. SKLOBOVSKAIA, L. P. ZHAVORONKOV, and B. V. DUBOVIK (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiia (ISSN 0033-8192), vol. 24, Jan.-Feb. 1984, p. 56-59. In Russian refs

A84-28373
INFLUENCE OF INDOMETHACIN ON THE RECOVERY OF HEMOPOIESIS IN MICE AFTER WHOLE-BODY GAMMA-IRRADIATION [VLIIANIE INDOMETATSINA NA VOSSTANOVLENIE GEMOPOEZA U MYSHEI POSLE OBSHCHEGO GAMMA-OBLUCHENIIA]
I. E. SKLOBOVSKAIA, L. P. ZHAVORONKOV, and B V. DUBOVIK (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiia (ISSN 0033-8192), vol 24, Jan -Feb. 1984, p 101-104. In Russian. refs

For five days after mice had been irradiated with sublethal doses of Co-60 gamma-radiation, indomethacin in doses of 6 mg/kg in a 1 percent starch gel was introduced into their stomachs. To study the effects of indomethacin on the dynamics of the postradiation recovery of bone marrow and truncal hemopoietic cells, the mice were tested from one hour to 15 days after irradiation for bone marrow cellularity and content of colony-forming unit (CFU) cells. The application of indomethacin, while not leading to changes in the rates of repopulation of CFUs, stimulated the process of change from division inhibition to proliferation As a result, the recovery of hemopoiesis is accelerated by three days in comparison with a control group; the appearance of newly formed mature cellular elements in the blood may lead to an easing of the clinical symptoms of acute radiation sickness J.N

A84-28374
INFLUENCE OF HIGHLY DISPERSED IRON POWDER ON THE LIFE SPAN OF IRRADIATED MICE [VLIIANIE VYSOKODISPERSNOGO POROSHKA ZHELEZA NA PRODOLZHITEL'NOST' ZHIZNI OBLUCHENNYKH MYSHEI]
IU. I. FEDOROV, G F. IVANENKO, and E. B. BURLAKOVA (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR) Radiobiologiia (ISSN 0033-8192), vol 24, Jan -Feb 1984, p. 104-107. In Russian refs

A suspension of highly dispersed iron powder in a NaCl solution was hypodermically administered to male mice 20-30 minutes before irradiation in concentrations ranging from 0 2 to 100 mg/kg of body mass The life span of mice irradiated in doses of 5.5 and 6.5 gram roentgen and with introduction of the iron powder in concentrations 1.5-2.0 mg/kg was increased twofold. The maximum tonic effect occurred for a dose of 3.5 gram roentgen, while the maximum radioprotective effect (for both average life span and percent survivability of irradiated mice) occurred for a dose of 6.5 gram roentgen J N

A84-28375
USE OF PHOTONUCLEAR REACTIONS FOR THE INVESTIGATION OF THE BIOLOGICAL ACTION OF SLOW HEAVY IONS [ISPOL'ZOVANIE FOTOIADERNYKH REAKTSII DLIA IZUCHENIIA BIOLOGICHESKOGO DEISTVIIA MEDLENNYKH TIAZHELYKH IONOV]
S P. KAPCHIGASHEV (Akademiia Meditsinskikh Nauk SSSR, Obninsk, USSR) Radiobiologiia (ISSN 0033-8192), vol. 24, Jan -Feb. 1984, p 132-135. In Russian refs

Bremsstrahlung with cut-off energies between 22 and 30 MeV was used in an investigation of the biological action of slow heavy ions. In photonuclear reactions of slow heavy ions with elements of tissue, 3 5 times more heavy ions are formed for each proton than with rapid ions, and about ten times more than with irradiation by intermediate neutrons For example, a thin layer of diploid yeast cells was placed at 0 3, 5, and 10 mm depths of a tissue-equivalent phantom, and were then subject to bremsstrahlung with a cut-off energy of 25 MeV As the depth decreased over the range of distribution, the irradiation biological effect increased threefold. For photoprotons with 5 MeV the irradiation biological effect approached unity J.N

A84-28650
BIOMEDICAL ASPECTS OF THE APPLICATION OF THE ELECTRON PARAMAGNETIC RESONANCE TECHNIQUE [MEDIKO-BIOLOGICHESKIE ASPEKTY PRIMENENIIA METODA ELEKTRONNOGO PARAMAGNITNOGO REZONANSA]
IA I AZHIPA Moscow, Izdatel'stvo Nauka, 1983, 528 p In Russian. refs

The work examines data on the origin, nature, and role of various paramagnetic centers recorded in biological systems by the electron paramagnetic resonance (EPR) technique, data on the presence of these centers in organs, cells, and subcellular structures; and data on the dependence of the paramagnetism level of organs on their functional activity. Attention is given to results of EPR spectroscopy as applied in endocrinology, vitaminology, microbiology, toxicology, radiobiology, oncology, nervous dystrophy studies, hypoxia investigations, dermatology, atherosclerosis studies, and forensic medicine The role of free radicals in the appearance and development of pathological processes is examined it is concluded that the EPR technique is conjunction with the spin marker method can be used for purposes of diagnosis and to study mechanisms of body response to stimuli, and mechanisms of sickness, recovery, and healing on the electronic level B.J.

A84-28669
CHEMICAL AND BIOLOGICAL KINETICS [KHIMICHESKAIA I BIOLOGICHESKAIA KINETIKA]
N. M. EMANUEL, ED., I. V. BEREZIN, ED , and S. D. VARFOLOMEEV, ED. Moscow, Izdatel'stvo Moskovskogo Universiteta, 1983, 296 p. In Russian.

A study of the dynamics of chemical and biochemical processes includes kinetic models of heterogeneous catalytic reactions; the nature of photoprocesses; intermediate compounds in enzymatic catalysis and their investigation by chemical kinetics methods, the macrokinetics of enzymatic systems, and the polyenzymatic system of prostaglandin synthesis. Attention is given to the dependence of quantum efficiencies on photoprocess rate constants, the laws of kinetic thermodynamics in excited molecule reactions, acylenzymes in catalysis by serine proteinase, laccase, and protein conformation variations accompanying enzymatic catalysis. Questions of the spatial organization of complex enzymatic systems are considered The kinetic behavior of the action of polyenzymatic systems in the synthesis of prostaglandins, the conditions of their formation, and the specific features of the synthesis of each enzyme are reviewed No individual items are abstracted in this volume J.N

A84-29012
BIOLOGICAL RHYTHMS AND MEDICINE: CELLULAR, METABOLIC, PHYSIOPATHOLOGIC, AND PHARMACOLOGIC ASPECTS
A. REINBERG, ED (CNRS, Fondation A de Rothschild, Paris, France) and M. H. SMOLENSKY, ED. (Texas, University, Houston, TX) New York and Heidelberg, Springer-Verlag, 1983, 317 p

Chronobiology and the relevance of biological rhythms in the practice of medicine are covered Consideration is given to investigative methodology, cellular morphology, cellular poliferation and the implications for cancer chemotherapy, human chronopathology, clinical chronopharmacology, and nutrition No individual items are abstracted in this volume C.M

A84-29030* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.
AMES RESEARCH CENTER LIFE SCIENCES PAYLOAD PROJECT FOR SPACELAB MISSION 3
P. X. CALLAHAN, J. TREMOR (NASA, Ames Research Center, Moffett Field, CA), G. LUND, and W. L WAGNER (Management and Technical Services Co., Moffett Field, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 12 p. refs (SAE PAPER 831094)

The Research Animal Holding Facility, developed to support rodent and squirrel monkey animal husbandry in the Spacelab

environment, is to be tested during the Spacelab Mission 3 flight. The configuration and function of the payload hardware elements, the assembly and test program, the operational rationale, and the scientific approach of this mission are examined. Topics covered include animal life support systems, the squirrel monkey restraint, the camera-mirror system, the dynamic environment measurement system, the biotelemetry system, and the ground support equipment. Consideration is also given to animal pretests, loading the animals during their 12 hour light cycle, and animal early recovery after landing. This mission will be the first time that relatively large samples of monkeys and rats will be flown in space and also cared for and observed by man. C M

A84-29063* Case Western Reserve Univ., Cleveland, Ohio.
GRAVITATIONAL BIOLOGY ON THE SPACE STATION
J. R. KEEFE (Case Western Reserve University, Cleveland, OH) and A. D. KRIKORIAN (New York, State University, Stony Brook, NY) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 25 p. NASA-supported research. refs
(SAE PAPER 831133)

The current status of gravitational biology is summarized, future areas of required basic research in earth-based and spaceflight projects are presented, and potential applications of gravitational biology on a space station are demonstrated. Topics covered include vertebrate reproduction, prenatal/postnatal development, a review of plant space experiments, the facilities needed for growing plants, gravimorphogenesis, thigmomorphogenesis, centrifuges, maintaining a vivarium, tissue culture, and artificial human organ generation It is proposed that space stations carrying out these types of long-term research be called the National Space Research Facility. C M.

A84-29611
ANALYSIS OF LIPIDS IN PROCHLORON SP. - OCCURRENCE OF MONOGLUCOSYL DIACYLGLYCEROL
N. MURATA and N SATO (Tokyo, University, Tokyo, Japan) Plant and Cell Physiology (ISSN 0032-0781), vol 24, no 1, 1983, p. 133-138 refs

Prochloron contained monogalactosyl diacylglycerol, digalactosyl diacylglycerol, sulfoquinovosyl diacylglycerol, phosphatidylglycerol and, as a minor component, monoglucosyl diacylglycerol, but no phosphatidylcholine. With respect to the lipid and fatty acid compositions, this alga is similar to the blue-green algae rather than the chloroplasts of eukaryotic plants. Author

A84-29612* Dalhousie Univ., Halifax (Nova Scotia).
THE 5S RIBOSOMAL RNAS OF PARACOCCUS DENITRIFICANS AND PROCHLORON
R. M. MACKAY, D. SALGADO, L. BONEN, W. F DOOLITTLE (Dalhousie University, Halifax, Canada), and E. STACKEBRANDT (Muenchen, Technische Universitaet, Munich, West Germany) Nucleic Acids Research (ISSN 0305-1048), vol. 10, no 9, 1982, p. 2963-2970 Research supported by the National Geographic Society University of California, Deutsche Forschungsgemeinschaft, and Natural Sciences and Engineering Research Council and Medical Research Council of Canada. refs
(Contract NSF DEB-76-21405; NAGW-18)

The nucleotide sequences of the 5S rRNAs of Paracoccus denitrificans and Prochloron sp. are presented, along with the demonstrated phylogenetic relationships of P denitrificans with purple nonsulfur bacteria, and of Prochloron with cyanobacteria. Structural findings include the following: (1) helix II in both models is much shorter than in other eubacteria, (2) a base-pair has been deleted from helix IV of P. denitrificans 5S, and (3) Prochloron 5S has the potential to form four base-pairs between residues. Also covered are the differences between pairs of sequences in P. denitrificans, Prochloron, wheat mitochondion, spinach chloroplast, and nine diverse eubacteria. Findings include the observation that Prochloron 5S rRNA is much more similar to the 5S of the cyanobacterium Anacystis nidulans (25 percent difference) than either are to any of the other nine eubacterial 5S rRNAs. C.M.

A84-29613* Hamburg Univ. (West Germany).
FINE-STRUCTURAL CHANGES IN THE MIDGUT OF OLD DROSOPHILA MELANOGASTER
F ANTON-ERXLEBEN (Hamburg, Universitaet, Hamburg, West Germany), J. MIQUEL, and D. E. PHILPOTT (NASA, Ames Research Center, Life Science Dept, Moffett Field, CA) Mechanisms of Ageing and Development (ISSN 0047-6374), vol 23, 1983, p. 265-276 refs

Senescent fine-structural changes in the midgut of Drosophila melanogaster are investigated. A large number of midgut mitochondria in old flies exhibit nodular cristae and a tubular system located perpendicular to the normal cristae orientation Anterior intestinal cells show a senescent accumulation of age pigment, either with a surrounding two-unit membrane or without any membrane. The predominant localization of enlarged mitochondria and pigment in the luminal gut region may be related to the polarized metabolism of the intestinal cells. Findings concur with previous observations of dense-body accumulations and support the theory that mitochondria are involved in the aging of fixed post-mitotic cells. Demonstrated by statistical analyses is that mitochondrial size increase is related to mitochondrial variation increase. C M.

A84-29614* Colorado Univ., Boulder
INTRACELLULAR COAGULATION INHIBITS THE EXTRACTION OF PROTEINS FROM PROCHLORON
R. FALL (Colorado, University, Cooperative Institute for Research in Environmental Sciences, Boulder, CO), R A. LEWIN (California, University, La Jolla, CA), and L R. FALL (Colorado, University, Boulder, CO) Phytochemistry (ISSN 0031-9422), vol. 22, no. 11, 1983, p. 2365-2368. Research supported by the Solar Energy Research Institute refs
(Contract NAGW-181)

Protein extraction from the prokaryotic alga Prochloron LP (isolated from the ascidian host Lissoclinum patella) was complicated by an irreversible loss of cell fragility in the isolated algae. Accompanying this phenomenon, which is termed intracellular coagulation, was a redistribution of thylakoids around the cell periphery, a loss of photosynthetic O2 production, and a drastic decrease in the extractability of cell proteins. Procedures are described for the successful preparation and transport of cell extracts yielding the enzymes glucose-6-phosphate dehydrogenase and 6-phosphogluconate dehydrogenase as well as other soluble proteins. Author

A84-29615* Washington State Univ., Pullman
RIBULOSE 1,5-BISPHOSPHATE CARBOXYLASE AND PHOSPHORIBULOKINASE IN PROCHLORON
M A. BERHOW and B. A MCFADDEN (Washington State University, Pullman, WA) Planta (ISSN 0032-0935), vol. 158, 1983, p. 281-287. refs
(Contract NAGW-181; NIH-GM-19972)

Ribulose 1,5-bisphosphate (RuBP) carboxylase and phosphoribulokinase, enzymes in the reductive pentose-phosphate cycle, were measured in cell-free extracts of Prochloran didemni. The partial purification and characterization of RuBP carboxylase were described Prochloron RuBP carboxylase, when purified by isopycnic centrifugation in reoriented linear 0.2 to 0.8 M sucrose gradients, sedimented to a position which corresponded to that of the 520,000-dalton spinach enzyme. Sodium dodecyl sulfate polyacrylamide gel electrophoresis showed that the Prochloron enzyme was composed of large and small subunits (MW = 57,500 and 18,800). Though results established that the enzymes RuBP carboxylase and phosphoribulokinase were present in levels comparable to other CO2-fixing microorganisms, it was suggested that other enzymes in the Calvin cycle limit growth or that additional enzymic insufficiencies exist. C M.

A84-29619* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.
HYPOTHERMIC AND ANTIPYRETIC EFFECTS OF ACTH (1-24) AND ALPHA-MELANOTROPIN IN GUINEA-PIGS
S. B. KANDASAMY and B. A WILLIAMS (NASA, Ames Research Center, Biosystems Div., Moffett Field, CA) Neuropharmacology (ISSN 0028-3908), vol. 23, no. 1, 1984, p. 49-53. refs

Intracerebroventricular administration of adrenocorticotropin (ACTH 1-24) and alpha-melanotropin (alpha-MSH), peptides which occur naturally in brain induced dose-related hypothermia in guinea-pigs at room temperature (21 C) and also produced greater hypothermia at low (10 C) ambient temperature. However, when the experiments were repeated in a warm (30 C) environment, no effect on body temperature was observed. These results indicate that the peptides did not reduce the central set-point of temperature control The hypothermia induced by ACTH and alpha-MSH was not mediated via histamine H1- or H2-receptors and serotonin since the H1-receptor antagonist, mepyramine, the H2-receptor antagonist, cimetidine, and the serotonin antagonist, methysergide, had no antagonistic effects The peptides were antipyretic since they reduced pyrogen-induced-fever and hyperthermia due to prostaglandin E2, norepinephrine and dibutyryl cAMP, at a dose which did not affect normal body temperature. The powerful central effects of these peptides on normal body temperature, fever and hyperthermia, together with their presence of the brain regions important to temperature control, suggest that they participate in thermoregulation Author

A84-29700* Nebraska Univ., Lincoln.
THE PROCHLORON SYMBIOSIS
R L. PARDY, K LEE (Nebraska, University, Lincoln, NE), and R A. LEWIN (California, University, La Jolla, CA) IN Algal symbiosis A continuum of interaction strategies Cambridge, Cambridge University Press, 1984, p. 91-96. refs
(Contract NAGW-181; NSF PCM-79-04224; NSF DEB-76214)

Colonies of L patella were collected from inshore water adjacent to small islets near Babelthaup Island, Republic of Palau, for the purpose of studying Prochloron symbionts. Examination of the algal symbionts after fixing, dehydrating, and embedment in Epon, showed Prochloron's central body to consist of a granular ground substance with a few electron-dense inclusions and to be enclosed by prominent photosynthetic membranes Also found around the central body were thylakoids in a concentric pattern After comparing the results with those of former studies, it was suggested that Prochloron morphology is host specific. Finally the network of host tissue extensions that entraps the symbionts was noted as possibly being a site for metabolic exchange C M

N84-21038# Materials Research Labs., Melbourne (Australia).
MARINE FOULING AT HMAS STIRLING, WESTERN AUSTRALIA
I DUNSTAN Jan. 1984 25 p refs
(MRL-R-914; AR-003-895) Avail: NTIS HC A02/MF A01

The results of a study of marine fouling at HMAS STIRLING in Careening Bay, Western Australia are presented Marked seasonal variation in the settlement of fouling organisms was noted, with the heaviest settlement of most species coinciding with the high water temperatures of the summer months The fouling community developed in several stages dependent upon temporal variations in settlement and growth of organisms. Established fouling underwent annual changes due to the heavy annual summer settlement of numerous species, the late winter influx of Mytilis edulis and the periodic fall-off of large mature organisms. The dominant marine fouling species at HMAS STRILING were different to those prominent in the fouling at the east Australian Naval establishments. S L.

N84-21039# Materials Research Labs , Melbourne (Australia).
CHECKLIST AND BIBLIOGRAPHY OF BENTHIC MARINE MACROALGAE RECORDED FROM NORTHERN AUSTRALIA. 1: RHODOPHYTA
J A LEWIS Jan. 1984 102 p
(MRL-R-912, AR-003-893) Avail NTIS HC A06/MF A01

Published records of benthic marine red algae (Rhodophyta) from tropical and subtropical Australia are systematically listed with full bibliographic details and collection localities More than four hundred taxa are included and, for each, references to the original description and, where possible, references to an illustration are also given Author

N84-21040*# National Aeronautics and Space Administration. Lyndon B Johnson Space Center, Houston, Tex.
SPACE STATION MEDICAL SCIENCES CONCEPTS
J A. MASON, ed and P. C JOHNSON, JR., ed Feb. 1984 79 p refs
(NASA-TM-58255, NAS 1.15:58255) Avail NTIS HC A05/MF A01 CSCL 06C

Current life sciences concepts relating to Space Station are presented including the following research, extravehicular activity, biobehavioral considerations, medical care, maintenance of dental health, maintaining health through physical conditioning and countermeasures, protection from radiation, atmospheric contamination control, atmospheric composition, noise pollution, food supply and service, clothing and furnishings, and educational program possibilities Information on the current status of Soviet Space Stations is contained Author

N84-21041# Calspan Corp , Buffalo, N Y. Applied Technology Group.
MITIGATION OF BIOFOULING USING COATINGS Final Annual Report
M S FORNALIK, R E. BAIER, A. E MEYER, and R W KING 21 Dec 1983 53 p refs
(Contract DE-AC02-80ER-10766)
(DE84-006112, DOE/ER-10766/12; FAR-3, C-6782-M-12) Avail: NTIS HC A04/MF A01

A 3 year project which summarizes earlier findings in seawater and brackish water systems which presents detailed new data from field tests in fresh cooling water of the Niagara River is reported. The results are similar for all systems tested in showing that deliberate modification of the initial material surface qualities, using thin film coatings in short term, proof of principle trials, can significantly reduce the retention of efficiency degrading biofouling layers and mineral scales while retarding corrosion The best coating evaluated has a critical surface tension of 22 milliNewtons per meter. The serious environmental need to reduce dependence on toxic fouling control techniques such as use of metallic poisons and/or chlorination in industrial heat exchange circuits is recognized. DOE

N84-21042# California Univ , Livermore. Lawrence Livermore Lab Biomedical Sciences Div
STATISTICAL ANALYSIS OF HIGH SCE FREQUENCY CELLS IN HUMAN LYMPHOCYTES
D H MOORE, II and A V CARRANO Dec 1983 24 p refs Presented at the Intern. Symp. on Sister Chromatic Exchange, Upton, N.Y., 4-8 Dec. 1983
(Contract W-7405-ENG-48)
(DE84-005433; UCRL-89891; CONF-831261-1) Avail: NTIS HC A02/MF A01

The existence of a subpopulation of lymphocytes in which genetic damage persists was identified in experiments on rabbits injected with low levels of mitomycin C. This led to the suggestion that an important parameter to quantify after exposure to a possibly harmful agent may be the proportion of cells with high sister chromatid exchange (SCE) frequency, i.e., high frequency cells (HFCs). In the research reported here, the statistical properties of HFCs are described, particularly their utility in detecting low levels of genetic damage which may be undetected by a simple t-test comparing the means of two samples of SCEs. DOE

N84-22141# Washington Univ., Seattle. Bioelectromagnetics Research Lab.
EFFECTS OF LONG-TERM LOW-LEVEL RADIOFREQUENCY RADIATION EXPOSURE ON RATS. VOLUME 4: OPEN-FIELD BEHAVIOR AND CORTICOSTERONE Final Report, 1 Jun. 1980 - 31 Jan. 1983
R. B. JOHNSON, D. SPACKMAN, J. CROWLEY, D. THOMPSON, and C. K. CHOU Dec. 1983 47 p
(Contract F33615-80-C-0612; AF PROJ 7757)
(AD-A137743; USAFSAM-TR-83-42) Avail. NTIS HC A03/MF A01 CSCL 06R

No significant alterations in overall behavioral response or corticosterone content were apparent in rats after 2 years of exposure to pulsed-microwave radiation. A reduction in open-field activity by the exposed animals during the first assessment period correspond with an increase in serum corticosterone. GRA

N84-22142# Charles F. Kettering Research Lab., Yellow Springs, Ohio.
PARTICULATE MODELS OF PHOTOSYNTHESIS
G. R. SEELY Nov. 1983 15 p
(Contract DE-AC02-82ER-12039)
(DE84-003947; DOE/ER-12039/1) Avail: NTIS HC A02/MF A01

The photochemical and photophysical properties of chlorophyll adsorbed together with various surfactants to particles of polyethylene swollen with low molecular weight hydrocarbon diluents were studied. The objectives of the program are to (1) discover and optimize photochemical reactions for separation of oxidized and reduced products into different phases; (2) further characterize association of chlorophyll and other amphiphilic substances on the particle surface; and (3) improve the methods of studying photoprocesses in optically dense scattering media. An analog of photosystem of photosynthesis will be developed, in which quinones will be reduced in the particle phase, and reductants oxidized in the aqueous suspending phase. Diacylindigos will be investigated as all purpose probes for photoprocesses in heterogeneous systems. It is shown that the forms of chlorophyll association are specific to the surfactant, that the chlorophyll species are often strongly fluorescent at room temperature, and that the particular systems are capable of a vigorous and sometimes novel photochemistry. DOE

N84-22143# Department of Energy, Washington, D. C. Div. of Electric Energy Systems.
BIOLOGICAL EFFECTS FROM ELECTRIC FIELDS ASSOCIATED WITH HIGH VOLTAGE TRANSMISSION LINES Abstracts Only
Nov. 1983 46 p Presented at the DOE Contractors Review of Elect Field Effects, Kansas City, Mo , 7 Nov. 1983 Prepared in cooperation with EPRI, Palo Alto, Calif.
(DE84-005498; CONF-831161-ABSTS) Avail: NTIS HC A03/MF A01

The biological effects from electric fields were investigated. Investigations are summarized with objectives, accomplishments of the past year, and some indication of projected studies DOE

N84-22144# Pacific Northwest Lab., Richland, Wash. Biology and Chemistry Dept.
BIOLOGICAL EFFECTS OF ELECTRIC FIELDS: AN OVERVIEW
L. E. ANDERSON and R. D. PHILLIPS Nov. 1983 36 p refs Presented at the Intern. School of Radiation Damage and Protection: Biological Effects and Dosimetry of Non-ionizing Radiation, Erice, Italy, 15-25 Nov. 1983
(Contract DE-AC06-76RL-01830)
(DE84-005888; PNL-SA-11781; CONF-831138-1) Avail: NTIS HC A03/MF A01

A cursory overview of investigations on the biological consequences of exposure to ELF electromagnetic fields is presented Three topics are discussed, including: (1) the general methodology of exposure experiments, including those elements which are critical for definitive studies in biological systems; (2) a discussion of epidemiological and clinical studies conducted to date; and (3) a more extensive examination of animal experiments representing major areas of investigation (behavior, biological rhythms, nervous and endocrine systems, bone growth and repair, cardiovascular system and blood chemistry, immunology, reproduction, growth and development mortality and pathology, cellular and membrane studies, and mutagenesis). Current concepts, possible mechanisms and future directions of research are presented DOE

N84-22145# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES, BIOMEDICAL AND BEHAVIORAL SCIENCES
15 Feb. 1984 74 p Transl. into ENGLISH from Various Russian Repts , May - Jun. 1983 p 1-61
(JPRS-UBB-84-003) Avail: NTIS HC A04

Mixtures of herbicides, growth retardants and fertilizers are used in regulating growth and maturation, however many nutrients are utilized by weeds instead of the target crop. Good results were obtained with barley using chlorocholine chloride-dihydrel mixtures A fertilizer of N120P90K90 was applied and show lodging reduction by a factor of 1.5 to 2.5 with various mixtures was shown and a 4 : 1 mixture of ingredients brought nearly complete elimination of lodging Separate applications of growth regulators had no appreciable effect, while the mixtures had a clear synergistic effect. Overall yield and protein content of the wheat growth was increased with the mixture. Various mixtures of retardants and fertilizers and the study of their manufacture and application are recommended. E.A K

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AEROSPACE MEDICINE

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

A84-27534
ESTIMATES OF THE MAXIMUM PERMISSIBLE EXPOSURES TO ULTRAVIOLET LASER RADIATION
V. A. OVSIANNIKOV (Nauchno-Issledovatel'skii Institut Elektrofizicheskoi Apparatury, Leningrad, USSR) (Kvantovaia Elektronika (Moscow), vol 10, Sept. 1983, p 1940-1942) Soviet Journal of Quantum Electronics (ISSN 0049-1748), vol. 13, Sept 1983, p. 1293, 1294. Translation. refs

It is shown that even low-intensity ultraviolet laser radiation may be a hazard to man because of nonthermal effects. Estimates are obtained of the maximum permissible exposures to such radiation. In the wavelength range of 230-300 nm the maximum permissible daily exposure should be within the range 10 to the -7th to 10 to the -9th J/sq cm. Author

A84-27557* California Univ., Berkeley
EFFECT OF EXTERNAL VISCOUS LOAD ON HEAD MOVEMENT
M.-H. NAM (Kon-Kuk University, Seoul, Republic of Korea), V. LAKSHMINARAYANAN, and L. W. STARK (California, University, Berkeley, CA) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol. BME-31, March 1984, p 303-309. Research supported by the Ministry of Education of the Republic of Korea. refs
(Contract NCC2-86)

Quantitative measurements of horizontal head rotation were obtained from normal human subjects intending to make 'time optimal' trajectories between targets. By mounting large, lightweight vanes on the head, viscous damping B, up to 15 times normal could be added to the usual mechanical load of the head. With the added viscosity, the head trajectory was slowed and of larger duration (as expected) since fixed and maximal (for that amplitude) muscle forces had to accelerate the added viscous load. This decreased acceleration and velocity and longer duration movement

still ensued in spite of adaptive compensation, this provided evidence that quasi-'time optimal' movements do indeed employ maximal muscle forces. The adaptation to this added load was rapid. Then the 'adapted state' subjects produced changed trajectories. The adaptation depended in part on the differing detailed instructions given to the subjects. This differential adaptation provided evidence for the existence of preprogrammed controller signals, sensitive to intended criterion, and neurologically ballistic or open loop rather than modified by feedback from proprioceptors or vision. Author

A84-28032
THE EFFECT OF EXPECTATIONS ON SLOW OCULOMOTOR CONTROL. IV ANTICIPATORY SMOOTH EYE MOVEMENTS DEPEND ON PRIOR TARGET MOTIONS
E. KOWLER (Rutgers University, New Brunswick, NJ), A J MARTINS (Maryland, University, College Park, MD), and M. PAVEL (Stanford University, Stanford, CA) Vision Research (ISSN 0042-6989), vol. 24, no. 3, 1984, p. 197-210 refs
(Contract F49620-81-K-008; AF-AFOSR-00085; NSF BNS-80-13508; NIH-EY-04647)

Anticipatory smooth eye movements (involuntary drifts in the direction of future target motion) were measured in two subjects that fixated a stationary target, expected to move left or right The Markov model was found to provide reasonable predictions for anticipatory smooth eye movement velocity as a function of prior stimuli It was demonstrated that saccadic latency, like manual reaction time, was affected by prior stimuli. It is suggested that saccadic latency and manual reaction time are controlled by very similar processes Finally, it is concluded that accurate predictions concerning smooth eye movement velocity are possible even when target motions are unpredictable, and that a subject's expectations about future target motions affect smooth eye movement velocities. C M

A84-28033* California Univ , Irvine.
IMAGE SAMPLING PROPERTIES OF PHOTORECEPTORS - A REPLY TO MILLER AND BERNARD
J. I YELLOTT, JR. (California, University, Irvine, CA) Vision Research (ISSN 0042-6989), vol. 24, no. 3, 1984, p. 281, 282. refs
(Contract NCA2-OR-345-301)

A84-28176#
THE USE OF SIGNAL ANALYSIS FOR THE DETECTION OF QUANTITATIVE RELATIONS BETWEEN ELECTROCEREBRAL WAKEFULNESS ACTIVITY AND DYNAMIC TASK DEMANDS IN THE CASE OF VISUOMOTORIAL TRACKING [SIGNALANALYTISCHER NACHWEIS QUANTITATIVER BEZIEHUNGEN ZWISCHEN HIRNELEKTRISCHER WACHAKTIVITAET UND DYNAMISCHER AUFGABENANFORDERUNG BEI VISUOMOTORISCHEM TRACKING]
R. KRIEBITZSCH Berlin, Technische Universitaet, Fachbereich Verkehrswesen, Dr.-Ing. Dissertation, 1983, 90 p In German. refs

The present investigation had the objective to determine the relations which exist between the dynamic characteristics of alpha activity, the task demands, and the performance quality. The model for determining these relations involved an experimental arrangement which corresponds to a visuomotorial tracking task. The required investigations were conducted in connection with a pharmacoencephalographic study The study was concerned with the analysis of the effect of a pharmacon on the EEG in a state of rest and during wakefulness, giving particular attention to vigilance dynamics and regulation The obtained results show that a general, systematic employment of the methods of signal analysis for the detection of the relations between EEG and the input and output quantities of the biological subject has the potential to provide new information concerning dynamic aspects of coordination involving environment, cerebral function, and behavior. G.R.

A84-28299
THE EFFECT OF ACOUSTIC-STIMULATION REPETITION RATE ON THE TEMPORAL AND AMPLITUDE CHARACTERISTICS OF THE EVOKED AUDITORY POTENTIAL OF THE HUMAN BRAIN-STEM [VLIIANIE CHASTOTY POVTORENIIA AKUSTICHESKOI STIMULIATSII NA VREMENNYE I AMPLITUDNYE KHARAKTERISTIKI SLUKHOVOGO VYZVANNOGO POTENTSIALA STVOLA MOZGA CHELOVEKA]
G A. TAVARTKILADZE and N G. MARTYNOV (Ministerstvo Zdravookhraneniia RSFSR, Moskovskii Nauchno-Issledovatel'skii Institut Ukha, Gorla i Nosa, Moscow, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Mar.-Apr. 1984, p. 11-17 In Russian refs

A84-28300
CHANGES IN THE NASAL MUCOSA OF WORKERS IN CONDITIONS OF INDUSTRIAL PRODUCTION [IZMENENIIA SLIZISTOI OBOLOCHKI POLOSTI NOSA U RABOCHIKH, NAKHODIASHCHIKHSIA V USLOVIIAKH PROMYSHLENNOGO PROIZVODSTVA]
A. A. SHTIL, I A. ANIKIN, V. S. POLIAKOVA, and O. F. ROSCHISLAV (Orenburgskii Meditsinskii Institut, Orenburg, USSR) Vestnik Otorinolaringologii (ISSN 0042-4668), Mar.-Apr 1984, p. 37-40. In Russian refs

The olfactory, absorptive, motor, and excretory functions of the nasal mucosa, along with the temperature and pH of the discharge, were investigated in 420 workers of the Orenburg gas refinery The workers studied were divided into three groups according to the degree of contact with natural gas (containing 1 5 to 3.5 percent hydrogen-sulfide and hydrocarbon condensate) and the final products (containing gas purified from sulfur compounds, a large fraction of hydrocarbons, and pure sulfur). The basic functions of the mucosa were found to be reduced; the morphological substrate of the mucosa showed a distinct tendency toward chronic subatrophic processes. The severity and incidence of this pathology appeared to be directly related to the degree of contact with the natural gas and final products B.J.

A84-28418
EVALUATION OF THE CONTRACTILE FUNCTION OF THE MYOCARDIUM IN HEART PATIENTS BY THE APEX CARDIOGRAM METHOD [OTSENKA SOKRATITEL'NOI FUNKTSII MIOKARDA U BOL'NYKH S POROKAMI SERDTSA METODOM APEKSKARDIOGRAFII]
K. I KORYTNIKOV, N. V. KORNEEV, and T. G KIREEVA Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Feb 1984, p. 26-29. In Russian.

A84-28419
PREVENTIVE METHODS FOR OVERFATIGUE (REVIEW OF THE LITERATURE) [SPOSOBY PROFILAKTIKI PEREUTOMLENIIA /OBZOR LITERATURY/]
V. N PROTASOV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Feb 1984, p. 36-39. In Russian. refs

Methods for the prevention of overfatigue, which supplement general measures for military work optimization involving motivation, recreation, training, and personnel competency, are reviewed Techniques for combatting overfatigue, which may be considered a prepathological state leading to decreased work productivity, include: exercise, the use of autogenous training to relieve psychic stress (particularly in flight crews and passengers), therapy involving color, light, and simulation of natural landscapes and sounds, and electric sleep Other techniques include oxygen therapy and the use of pharmacological stimulators of the central nervous system, such as the eleutherococcus group J.N.

A84-28420
TRACE ELEMENT METABOLISM AND THE PREVENTION OF ITS DISTURBANCE [OBMEN MIKROELEMENTOV I PREDUPREZHDENIE EGO NARUSHENII]
V. V. NASOLODIN, V IA. RUSIN, and V. A. SUVOROV Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Feb. 1984, p. 39-42. In Russian. refs

Several groups of young healthy male subjects were tested to determine the daily balance of trace elements in their blood The first group was administered iron in the form of phytoferrolactolum three times a day, 2 mg Cu and 10 mg Mn in the form of sulfate salts once a day, and 0 05 g ascorbic acid three times a day. Two other groups were given the same supplements, but with the respective additions of 0.01 g dibazolum once a day and 0 2 g pentoxylum three times a day. In autumn, the level of trace elements, especially iron and copper, were markedly increased. The levels of iron and manganese in the test subjects' diets were not always at the requisite norms The daily balance of iron was negative, that of copper was positive in winter and summer, and that of manganese was negative in summer and positive in winter. The additions to the supplement series of pentoxylum, and especially dibazolum, were accompanied by markedly higher concentrations of trace elements in the blood J.N.

A84-28421
INFORMATION CONTENT OF DIRECT INDICATORS OF PILOT WORK CAPACITY BEFORE FLIGHT [INFORMATIVNOST' PRIAMYKH POKAZATELEI RABOTOSPOSOBNOSTI LETCHIKA PERED POLETOM]
V. I. ZORILE, E S MELIKOV, and V. I. PYSLAR Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Feb. 1984, p. 43-46. In Russian. refs

The quality of pilot control in a two-dimensional compensatory tracking routine with respect to banking and pitch was tested on a TUZO-3 instrument. The motion imparted to a flight stick in response to fixed, partially predicted, and harmonic input signals was analyzed in terms of the duration and integral of various levels of error between input and output signals for 5 minutes of constant activity Electromyograms of the shoulder flexors and extensors were registered, and pulse, arterial pressure, body temperature, and critical flicker fusion frequency were measured Before the second and third flights in one work shift, the duration of control errors increased, respectively, by 12 and 23 percent. The direct indicators of the work capacity changed earlier and to a greater extent than functional indicators The duration of control errors increases significantly before flights in which inadvertent actions or preconditions to the flight procedures were to be permitted. J.N.

A84-28649
RADIATION SAFETY OF FLIGHT CREWS [RADIATSIONNAIA BEZOPASNOST' EKIPAZHEI LETATEL'NYKH APPARATOV]
E. I VOROBEV and E. E. KOVALEV Moscow, Energoatomizdat, 1983, 152 p. In Russian. refs

Principal experimental findings, including those from the Salyut-6 missions, are used to evaluate the conditions for radiation safety of the crews of aircraft, space vehicles, and orbital space stations The ranges of radiation to which contemporary man is exposed are analyzed with respect to such sources as natural and artificial radioactive material in the environment, medical preparations and instrumentation, as well as cosmic radiation that reaches earth. The radiobiological principles of radiation safety are presented, and radiation exposure effects are classified in relation to standard exposure and risk. The question of radiation safety in typical and high-altitude aircraft is considered, and major sources of radiation in near-earth space are studied for calculations of the radiation protection of manned spacecraft. Features of the radiobiological effect of cosmic radiation are reviewed in detail, and a model description of the dependence of the justified-risk dose on the duration of the space mission is given. The concept of acceptable risk is reviewed as a possible foundation for a standardization of the radiation risk in space flight. Data for radiation risk in space flight, including the risk of somatic and somatic-stochastic damage, are presented, and the concept of risk is further used to analyze the reliability of radiation protection. J.N.

A84-28848
FACTORS AFFECTING HUMAN TOLERANCE TO SUSTAINED ACCELERATION
E. HENDLER (Human Factors Applications, Inc., Warminster, PA) and L HREBIEN (U.S Naval Material Command, Naval Air Development Center, Warminster, PA) SAFE Journal, vol. 14, Spring 1984, p 6-10.

Six trained Naval enlisted personnel were exposed to increasing G pulses on a centrifuge for the purpose of studying the servo-controlled anti-G (SCAG) valve outlet pressure in supine and upright body positions. G tolerance and anti-G suit (AGS) comfort were treated as dependent variables, showing that G tolerance increased with a seat back angle of 60 deg In supine and upright positions with an AGS with inflated bladders, G tolerance also increased, linearly with increases in AGS bladder pressure Also demonstrated was that changing the mode of operation of the SCAG valve regulating AGS bladder pressure did not affect G tolerance or AGS comfort. High AGS bladder pressures reduced AGS comfort, though G onset time did not. It is concluded that G protection provided by simultaneously applied anti-G techniques is additive. C M

A84-29062* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ARE THERE LIMITS TO MAN'S LONG-TERM PRESENCE IN SPACE?
H. SANDLER (NASA, Ames Research Center, Biomedical Research Div , Moffett Field, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 10 p. refs
(SAE PAPER 831132)

While manned space flights lasting up to six months have resulted in no physiological changes that have proved detrimental to the health of astronauts, the longer missions envisioned aboard space stations in the future require the further consideration of physiological and psychological well-being for both men and women, and for individuals of more advanced age than astronauts of the past. It is speculated that when permanent manning of spacecraft becomes a reality, the microgravity environment and extensive use of electronics may lead to substantial and permanent physiological, and ultimately evolutionary, changes. Headward shifts of body fluids may, for instance, stimulate greater growth and development of the upper half of the body. O.C.

A84-29064* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEALTH CARE DELIVERY SYSTEM FOR LONG DURATION MANNED SPACE OPERATIONS
J. S. LOGAN, E. L. SHULMAN, and P. C. JOHNSON (NASA, Johnson Space Center, Medical Sciences Div., Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 10 p.
(SAE PAPER 831134)

Specific requirements for medical support of a long-duration manned facility in a low earth orbit derive from inflight medical experience, projected medical scenarios, mission related spacecraft and environmental hazards, health maintenance, and preventive medicine. A sequential buildup of medical capabilities tailored to increasing mission complexity is proposed. The space station health maintenance facility must provide preventive, diagnostic, and therapeutic medical support as immediate rescue capability may not exist. Author

A84-29812
LONG-RANGE AIR CAPABILITY AND THE SOUTH ATLANTIC CAMPAIGN
A N. NICHOLSON (RAF, Institute of Aviation Medicine, Farnborough, Hants., England) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol 55, April 1984, p. 269, 270 refs

Usage of the sleep-inducing drug 1,4-benzodiazepine, which has no long acting metabolite and is rapidly eliminated, by the Royal Air Force during long-range air operations in the South Atlantic Campaign was discussed Crews reported good sleep and were able to fly six hours after ingestion without side or residual effects Extended duties included missions lasting up to 28 hours and involving air-to-air refueling, and the accumulation of 360 flying hours within a three month period The ability to ensure adequate sleep under difficult circumstances was attributed to the knowledge gained around 1970 concerning aircrew capability and long-range missions, and the use of sleep-inducing drugs studied over the past several years C M.

A84-29813
THE SICKLE CELL TRAIT IN RELATION TO THE TRAINING AND ASSIGNMENT OF DUTIES IN THE ARMED FORCES. II - ASEPTIC SPLENIC NECROSIS
L W DIGGS (Tennessee, University, Memphis, TN) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p 271-276 refs

Well-documented information gleaned from the world's literature reveals that in vivo sickling of erythrocytes and vascular occlusive lesions involving the spleen have occurred in individuals with the sickle cell trait (SCT) while flying in unpressurized airplanes or when exposed to hypoxic environments in mountains at intermediate altitudes. The clinical and anatomical manifestations of splenic infarcts are described. Individuals without the trait do not develop splenic infarcts during or following exposure to ambient hypoxia. Author

A84-29814
MOTION SICKNESS SUSCEPTIBILITY IN STUDENT NAVIGATORS
L ROYAL (USAF, Mather AFB, California, University, Davis, CA), B. JESSEN, and M. WILKINS (USAF, Mather AFB, CA) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol 55, April 1984, p. 277-280. refs

Identification of individuals highly susceptible to motion sickness could be of significant benefit in managing flying personnel in training Several studies in the past four decades with this end have been primarily aimed at pilot trainees. The following study is a prospective evaluation of airsickness in Air Force navigation students Motion Sickness Questionnaires and Minnesota Multiphasic Personality Inventories were given to the students at the beginning of navigator training Airsickness was assessed by means of questionnaires and evaluation by a flight surgeon Motion sickness among navigation trainees was found to be quite common. However, prediction of susceptible individuals by methods used was not reliable. Further investigation of airsickness susceptibility in navigation students by means of physiologic techniques is suggested Author

A84-29815
EXPERIMENTAL ASSESSMENT OF SELECTED ANTIMOTION DRUGS
E. I. MATSNEV and D. BODO (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 281-286. refs

Space motion sickness (SMS) has been a perplexing problem in both the Soviet and U S. manned space programs. Both the sensory conflict theory (neuronal signal mismatch) and the cephalad fluid shift concept explain the mechanism. This paper reviews the mechanism of action of various drugs that primarily affect brain blood flow or brain metabolism. In particular, Cavinton (apovincamic acid ethyl ester) has been used successfully in offsetting SMS in experimental test subjects. Author

A84-29816
EFFECT OF DIGOXIN ON SERUM AND URINARY CATION CHANGES ON ACUTE INDUCTION TO HIGH ALTITUDE
V. C. OHRI, J C CHATTERJI, Y. R SACHDEV, B K. DAS, M. AKHTAR, S C. TIWARI, P BHATTACHARJI, A. BEHL, and S. K. DUTTA (Defence Ministry, Armed Forces Medical Services, New Delhi, India) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol 55, April 1984, p 287-290. refs

Forty subjects each were rapidly inducted by road to altitudes of 3200 and 3771 meters (m). Half of subjects at each altitude were maintained on digoxin and the other half received placebos. The digoxin group showed higher serum potassium at both altitudes. Serum sodium remained unaltered. When compared to control groups, urinary volume changes were less marked in the digoxin group Similarly, the alterations in calcium and magnesium in serum and urine at 3771 m were less pronounced However, none of these changes in the digoxin groups were statistically significant when compared with control groups. Author

A84-29817
COAGULATION AND FIBRINOLYTIC RESPONSES TO EXERCISE AND COLD EXPOSURE
M. MANGUM, E M. HAYMES, and H. LIPNER (Florida State University, Tallahassee, FL) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 291-295 refs

The effect of acute cold exposure (5C) on coagulation (PTT) and fibrinolysis (ELT), and the effect of cold treatment on subsequent exercise-induced coagulation and fibrinolytic responses were examined ELT was shortened to 74, 62, and 44 percent while hematocrit increased to 107, 107, and 111 percent of pretest values for cold/rest, neutral/exercise, and cold/exercise, PTT values remained unchanged. Findings demonstrated that cold exposure stimulated fibrinolytic response and substantiated the theory that a threshold level of exercise is necessary to affect clotting times It is concluded that acute cold and exercise effect a rise in ELT activity; a simultaneous rise in coagulation is not inextricably linked to an elevation of fibrinolytic activity, a result that questions the significance of the Hageman factor dependent pathway between coagulation and fibrinolysis. C.M.

A84-29818
BLOOD VOLUME RESPONSES IN PARTIALLY DEHYDRATED SUBJECTS WORKING IN THE COLD
D. V. TAPPAN, M J JACEY, E HEYDER, and P H. GRAY (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, CT) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 296-301. refs

A84-29819
COMPARATIVE ANALYSIS - EFFECTS OF POSITIVE AND NEGATIVE LATERAL ACCELERATION ON ISOMETRIC FATIGUE IN THE FOREARM
R. A. JOHNSON (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, OH) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p 302-307. refs

The possible difference produced by + or - Gy acceleration on forearm fatigue was investigated The Dynamic Environment Simulator at the USAF Aerospace Medical Research Laboratory was used to create a lateral acceleration environment. The experiment was designed to measure the forearm strength, endurance, recovery from fatigue, and surface electrical activity of six subjects during + or - 2 Gy acceleration. The results: isometric performance was degraded during -2 Gy acceleration compared to +2 Gy acceleration. The percentage drop in center frequency of the EMG signal was determined to be unreliable as a fatigue index during lateral acceleration. When head and shoulder restraints were used during lateral maneuvers, they were a factor in pilot performance, with +2 Gy being superior to -2 Gy. A way of analyzing the EMG signals that may permit quantification of

isometric fatigue during lateral acceleration was suggested
Author

A84-29821
HEAD AND NECK INJURIES IN CANADIAN FORCES EJECTIONS
K W. ROWE and C. J. BROOKS (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) (Joint Committee on Aviation Pathology, Scientific Session, 13th, Toronto, Canada, Oct. 1982) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 313-315.

This paper reviews the head and neck injuries experienced by Canadian Forces Aircrew who ejected while wearing the DH 41-2 helmet during the period from 1 Jan. 1972 through 31 July 1982. Pre and post-ejection factors, including a review of helmet performance, are presented
Author

A84-29823
PROGNOSTIC FACTORS RELATED TO SURVIVAL AND COMPLICATION-FREE TIMES IN AIRMEN MEDICALLY CERTIFIED AFTER CORONARY SURGERY
E. T. LEE (Oklahoma, University, Oklahoma City, OK), A W. DAVIS, C F BOOZE, JR. (FAA, Oklahoma City, OK), and I. W. HAMMOND Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 321-331. refs

Aircraft pilots who petitioned for a special issuance of medical certification approximately two years after coronary bypass surgery were studied to determine the prognostic factors associated with complication-free time and survival time. Diastolic blood pressure and coffee history were found to be associated to complication-free time, and diagnosis for surgery and smoking history were found to be related with survival time Among the observations made, airmen with higher diastolic blood pressure were found to have fewer complications but lower complication-free time complications occurred later in this group than in the lower diastolic blood pressure group. Finally, it was demonstrated that those airmen who were approved for special issuance of medical certification exhibited a somewhat better survival than comparable counterparts.
C M

A84-29824
MEDICAL DISQUALIFICATION IN USAF PILOTS AND NAVIGATORS
R. C. WHITTON (USAF, School of Aerospace Medicine, Brooks AFB, TX) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 332-336.

The categories of medical condition which have most often been responsible for permanent disqualification of flying personnel have not been previously well documented. In this study, 304 USAF rated personnel were identified from the USAF Medical Waiver File These pilots and navigators were grounded during 1980 and 1981 and have not been returned to flying duties after 1-2 years of follow-up. The disqualifying conditions were reviewed, listed individually, and grouped by major disease categories. Age factors related to these conditions were examined. Cardiovascular disease, as a category, was found to be the commonest cause (30 percent) of disqualification in this group. Other internal medical and neurological diseases are frequent reasons for permanent disqualification.
Author

N84-21043*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: 1983 CUMULATIVE INDEX
Jan. 1984 310 p
(NASA-SP-7011(254); NAS 1.21:7011(254)) Avail: NTIS HC $12 00 CSCL 06E

This publication is a cumulative index to the abstracts contained in the Supplements 242 through 253 of Aerospace Medicine and Biology· A Continuing Bibliography. It includes six indexes--subject, personal author, corporate source, contract number, report number, and accession number.
Author

N84-21044*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Mar 1984 67 p
(NASA-SP-7011(256); NAS 1 21 7011(256)) Avail: NTIS HC $7 00 CSCL 06E

This bibliography lists 224 reports, articles and other documents introduced into the NASA scientific and technical information system in February 1984.
Author

N84-21045*# Texas Univ. Health Science Center, Houston Dept of Surgery.
SYSTEM FOR THE MANAGEMENT OF TRAUMA AND EMERGENCY SURGERY IN SPACE Final Report
B HOUTCHENS 5 Dec. 1984 124 p refs
(Contract NASW-3744)
(NASA-CR-175439, NAS 1.26:175439) Avail: NTIS HC A06/MF A01 CSCL 06E

The need to develop a systems approach to the management of trauma and other major clinical medical events in space along with appropriate development and evaluation of surgical techniques and required hardware was investigated. A prototype zero gravity surgical module was constructed and tested aboard a KC-135 aircraft during parabolic arc zero G flight To insure parity of quality care to that available on Earth, it was recommended that a clinical medical and bioengineering advisory committee define and help develop the necessary components of the clinical medical care system for the space station and lunar base Key components of the system are aerospace surgical training, medical equipment development, including support hardware and software, rapid access to a network of specialty expertise, and continued research and development.
M.A C.

N84-21046*# Federation of American Societies for Experimental Biology, Bethesda, Md Life Sciences Research Office.
RESEARCH OPPORTUNITIES IN BONE DEMINERALIZATION, PHASE 3 Final Report
S. A. ANDERSON, ed. and S H. COHN, ed. (Brookhaven National Lab.) Dec 1983 71 p refs
(Contract NASW-3728)
Avail. NTIS HC A04/MF A01 CSCL 06P

Bone demineralization, calcium responses to weightlessness, endocrine responses to weightlessness, mechanisms of bone loss, biomedical research, pathogenesis, and endocrine effects are discussed
Author

N84-21047# Army Intelligence and Threat Analysis Center, Arlington, Va.
MILITARY MEDICAL JOURNAL, NO. 5, MAY 1983
Feb. 1984 130 p refs Transl. into ENGLISH of Voyenno-Med. Zh. (Moscow), no. 5, May 1983
(L-2404) Avail: NTIS HC A07/MF A01

Several areas of clinical medicine are addressed including aeronautical and naval medicine, therapeutic and prophylactic questions, education of health workers, hygiene, physiology, and epidemiology

N84-21048# Army Intelligence and Threat Analysis Center, Arlington, Va.
ASPECTS OF MEDICAL EXAMINATIONS OF AIRMEN WITH REGARD TO EYE DISEASES
L. M. ASYYEV *In its* Mil Med. J., No. 5, May 1983 p 68-70 Feb 1984 Transl. into ENGLISH from Voyenno-Med Zh. (USSR), no. 5, May 1983
Avail NTIS HC A07/MF A01

The assessment of fitness for duty of airmen with regard to the condition of their eyes is based on an individual approach. The fitness for duty of each person examined is determined with consideration of the state of his visual functions, his professional experience and qualifications. The resolving power of the eye has special importance in this assessment. During medical examination of airmen, the ophthalmologist should make clear how the subject's

state of health will effect his flight duty, whether or not a basis (eye) or a concomitant (somatic) disease is progressive and what is the prognosis of them. It is very important to establish how this or that deviation in the state of health will affect performance of flight duty and whether this condition could contribute to breakdowns or flight accidents. Author

N84-21049# Army Intelligence and Threat Analysis Center, Arlington, Va.
ANTHROPOMETRIC INDICATORS OF SUBMARINERS
V. V. POLONSKIY and S. V. KORZH *In its* Mil. Med J., No. 5, May 1983 p 71-73 Feb. 1984 Transl. into ENGLISH from Voyenno-Med Zh. (USSR), no 5, May 1983
Avail: NTIS HC A07/MF A01

Anthropmetric indicators are one of the criteria used to determine the ergonomic parameters of control panels, spaces and equipment at the work stations of operator-specialists as well as the surroundings of human habitation These characteristics must be restudied periodically since the conditions and criteria of occupational selection are changing and, the change in these parameters among the population is accelerating Comparison of results of anthropometric studies carried out in the USSR with data from analogous investigations among populations of Western European countries and analysis of factors stimulating acceleration of changes in these indicators in our country show that this process will continue. The anthropometric study of submariners and the comparison of the data obtained with results of data from previous observations and also with data concerning the present-day civilian population show the need for periodic (about once every 10 years) anthropometric studies of servicemen. Author

N84-21050# Army Intelligence and Threat Analysis Center, Arlington, Va
MILITARY MEDICAL JOURNAL, NO. 11, NOVEMBER 1983
Nov. 1983 141 p refs Transl. into ENGLISH of Voyenno-Med Zh. (Moscow), no 11, Nov. 1983
(L-2539) Avail: NTIS HC A07/MF A01

Several areas of clinical medicine are addressed including immunology, workloads (psychophysiology), pilot performance, disease predictions, tomography, sanitation, vascular disease, and microsurgery.

N84-21051# Army Intelligence and Threat Analysis Center, Arlington, Va.
METHODS AND MEANS OF IMPROVING THE WORKING CAPABILITY OF FLIGHT PERSONNEL
V A VODROV *In its* Mil Med. J., No 11, Nov. 1983 p 58-64 Nov. 1983 refs Transl. into ENGLISH from Voyenno-Med Zh (USSR), no. 11, 1983 p 40-44
Avail: NTIS HC A07/MF A01

Working capability is one of the most important categories of activity of flight personnel The successfulness of performing the flight mission, flight safety, and flight longevity are determined by work capability. The necessity to ensure high effectiveness of using aircraft, the complexity and responsibility of flight activity require creating conditions for maintaining the working capability of personnel at the necessary level The nature and conditions of the pilot on the ground and in the air lead in a number of cases to a significant decrease in working capability. The use of scientific development of means and methods ensures high working capability of flight personnel and their practical use during the creation and operation of aviation equipment is an extremely important one. The working capability of the pilot is determined by his professional experience, training, and his personality, by the nature of demands, settings, and motives for activity, and finally, by the functional condition of the body and the value of its reserve potentials Therefore, controlling the functional condition of pilots, mainly its evaluation and correction, is the task of military-aviation physicians Author

N84-21052# Army Intelligence and Threat Analysis Center, Arlington, Va.
SOME IMMUNOLOGICAL MECHANISMS OF ADAPTATION OF SEAMEN TO CONDITIONS OF LOW LATITUDE SAILING
I A. SAPOV *In its* Mil Med J., No 11, Nov. 1983 p 65-67 Nov 1983 refs Transl. into ENGLISH from Voyenno-Med Zh (USSR), no 11, 1983 p 44-45
Avail NTIS HC A07/MF A01

One of the most important homeostatic systems of the body is the immune system. Therefore, a great deal of importance is given to studying the immunologically foundations of vital activity as one of the leading trends in basic theoretical investigations of the problem of adaptation. The functional state of the immune system of sailors during their adaptation to conditions of prolonged sailing in the subtropical climatic zone was studied. The examinations were made before the crew went to sea (73 men), at the end of a long voyage (53 men), and after 35 days of rest (50 men) All of the examined men was healthy men ranging in age from 18 to 24 years Occupational factors inherent to the work performed by sailors have the decisive effect on the immune system during a prolonged voyage in the lower latitudes. This is confirmed by the nearly complete recovery of immunological reaction and the decrease in the morbidity of ship specialists after rest. This took place under exactly the same climatic conditions as the previous period of the voyage. Giving ship crews rest after a long voyage is an important preventive and rehabilitative measure facilitating preservation of the sailors' health. Author

N84-21053*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va.
METHOD FOR THERMAL MONITORING SUBCUTANEOUS TISSUE Patent Application
J. S HEYMAN and G H BRANDENBURG, inventors (to NASA) 22 Feb. 1984 10 p
(NASA-CASE-LAR-13028-1; US-PATENT-APPL-SN-582492)
Avail NTIS HC A02/MF A01 CSCL 06B

A noninvasive accurate method for measuring the temperature of tissue beneath the surface of a living body is described. Ultrasonic signals are directed into beads of a material inserted into the tissue with a syringe. The reflected signals indicate the acoustic impedance or resonance frequency of the beads which in turn indicates the temperature of the tissue A range of temperatures around the melting temperature of the material can be measured by this method NASA

N84-21054# Pacifica-Sierra Research Corp., Los Angeles, Calif
INITIAL HUMAN RESPONSE TO NUCLEAR RADIATION Technical Report
G. H ANNO, H L. BRODE, and R. WASHTON-BROWN 1 Apr. 1982 92 p
(Contract DNA001-81-C-0067, P99-QAXD)
(AD-A137543; AD-E301319; PSR-N-477, DNA-TR-81-237) Avail. NTIS HC A05/MF A01 CSCL 06R

This report documents the results of the first phase of an investigation into the nuclear effects on military troop performance. Both signs and symptoms associated with radiation sickness were examined to develop models of human response to radiation as a function of dose, time and symptom severity. Data on the early symptomatic effects of radiation exposure were gathered from some 150 books, articles and monographs. The analysis of this data focused on human data collected from the victims of nuclear accidents and therapy patients. Data from the survivors of the Japanese atomic bombs were excluded because of data imprecision and questions raised about the accuracy of reported exposure levels. A hypothetical exposed population was divided of reported groups based on the sensitivity of individuals to radiation hyper-, hypo-, and normsensitives The population was also classified by the severity of their symptoms; unaffected and mildly, moderately and severely affected. Using this data, relationships for the onset time and duration of acute symptoms after a given radiation dose were developed. Conceptual models were then derived for (1) individual response as a function of dose, time after exposure, and severity of symptoms, (2) population

response (percentage affected in various degrees), and (3) links between individual and population responses. GRA

N84-21055# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
A STUDY OF LOW LEVEL LASER RETINAL DAMAGE Annual Progress Report, 1 Feb. 1983 - 31 Jan. 1984
B. F HOCHHEIMER 1 Feb. 1984 55 p
(Contract N00024-83-C-5301)
(AD-A137664; AD-E000561) Avail: NTIS HC A04/MF A01 CSCL 06R

The general objective of this program is to document changes in the retina due to very low laser irradiation. We have two primary aims. One is to develop and improve methods that can be used, in vivo, to objectively determine changes that occur in the retina from laser irradiation The second is to determine the mechanisms that cause these retinal changes. During this past year we have: (1) Measured the change in retinal reflectivity during YAG and Argon Ion laser burn periods (2) Determined the fluorescence decay time of fluorescein dye in water, blood and monkey retinas (3) Obtained estimates of the amount of scattered light in the eye in the green and red spectral regions. GRA

N84-21056# Georgia Inst. of Tech , Atlanta. Biomedical Research Div
RADIOFREQUENCY RADIATION EFFECTS ON EXCITABLE TISSUES Final Report, 1 Jun. 1981 - 30 Oct. 1982
R. L SEAMAN and R. L. DEHAAN (Emory Univ., Atlanta, Ga) Nov. 1983 111 p
(Contract F33615-81-K-0618; AF PROJ 2312)
(AD-A137772; GIT/EES-A-2974, USAFSAM-TR-83-36) Avail: NTIS HC A06/MF A01 CSCL 06R

Spheroidal aggregates of cultured chick cardiac cells were used to study effects of 2450-MHz radiofrequency radiation (RFR) on excitable membranes. Membrane voltage noise was recorded simultaneously with two microelectrodes Preparation bulk temperature ws 37 + or - 0.2 C, and temperature at the aggregate was less than 0.9 C above this during RFR exposures of 2- and 3-min durations. Specific absorption rate (SAR) was between 1 and 231 mW/g, and both continuous-wave (CW) and pulse-modulated (PW, 5 microsec at 100 pps) RFR were applied using an open-ended coaxial exposure device. Membrane voltage fluctuations, in the form of noise and microspike event and membrane impedance were observed before, during, and after RFR exposures. No RFR effect was seen on membrane impedance viewed as parallel resistance and capacitance The relation of membrane voltage noise power (0 1-1 0 Hz) to membrane potential was significantly altered during the first half of 3-min exposures to 1-5 and 15-30 mW/g CW RFR. This was found by using two-tailed t-tests to test the difference in slopes between least-squares linear regression fits of data from different RFR conditions with the significance level set at $P<0.05$ Although microspikes seemed to contribute to this RFR effect on noise, there was no significant difference (two-tailed t-test, $P<0.05$) in frequency of occurrence of microspikes greater than 0.2 mV for any RFR exposure condition GRA

N84-21057# California Univ., Santa Barbara. Inst. of Environmental Stress.
PHYSIOLOGICAL ADJUSTMENTS TO HEMORRHAGE, ALTITUDE, AND WORK Final Scientific Report, 1 Dec. 1977 - 31 Aug. 1983
S. M. HORVATH Oct. 1983 16 p
(Contract AF-AFOSR-3534-78; AF PROJ. 2312)
(AD-A137781; AFOSR-84-0019TR) Avail: NTIS HC A02/MF A01 CSCL 06S

This research program has been concerned with evaluating the influence of various stressors, physiological and psychological, on man and subsequently determining the capacity of the individual to successfully adapt to these environmental influences. In the process of these investigations some 42 peer-reviewed manuscripts were published. They have dealt with the responses to exercise, cold and hot environments, hypoxia, toxicological substances, sleep and psychological stresses. The subjects for these studies have included both sexes. In general while some facets of man's adaptability have been resolved, it is clear that numerous problems remain to be investigated. GRA

N84-21058# Texas Univ. Health Science Center, San Antonio. Health Science Center.
THE EFFECTS OF ORGANOPHOSPHORUS ANTICHOLINESTERASE COMPOUNDS ON BRAIN GLUCOSE AND ENERGY METABOLISM Annual Summary Report, 1 Oct. 1981 - 30 Sep. 1982
M A MEDINA and A. L. MILLER Jan. 1983 24 p
(Contract DAMD17-81-C-1240; DA PROJ 3M1-62734-A-875)
(AD-A137819) Avail: NTIS HC A02/MF A01 CSCL 06T

The purpose of these experiments was to determine the effect of an organophosphorus cholinesterase inhibitor, paraoxon, on glucose utilization and the levels of intermediary metabolites in brain The 24 hr. I.V LD(50) of paraoxon in rats was 0 764 + or - 0.032 micromol/kg A dose of 0.8 of the LD(50) did not result in any evidence of hypoxia in rats up to 2 hr post-injection The levels of glucose, pyruvate, glutamate, lactate, ATP, and phosphocreatine were determined in the following brain areas· cortex, midbrain, thalamus-basal ganglia, cerebellum and brain stem at 2, 10, 32 or 128 min. after administration of 0.8 or 0.5 of the LD(50) of paraoxon. The only consistent change observed was an elevation of tissue glucose. Injection of 0.8 of the LD(50) of paraoxon resulted in a significant depression in glucose utilization in the cortex for up to 30 min. However this decrease was not observed at 128 min. when the peripheral cholinergic effects were also absent. The diminished glucose utilization may be the cause of the increase in brain glucose observed. The decrease in glucose utilization may be due to an increase in inhibitory cholinergic neuronal activity. GRA

N84-21059# Boston Univ., Mass. Dept. of Mathematics.
DYNAMIC MODELS OF NEURAL SYSTEMS: PROPAGATED SIGNALS, PHOTORECEPTOR TRANSDUCTION, AND CIRCADIAN RHYTHMS Final Scientific Report
S GROSSBERG Nov. 1983 97 p
(Contract AF-AFOSR-0148-82; AF PROJ 2313)
(AD-A137826; AFOSR-84-0022TR) Avail: NTIS HC A05/MF A01 CSCL 06P

Three concepts are used to illustrate how a small number of simple mechanisms can generate a wide diversity of complex biological phenomena, as well as parametric experimental tests of the models that simulate these phenomena. One is the classifical concept that a membrane equation can model fast electrical responses in cells The second is the concept that mass action processes can be coupled to the membrane equation as conductance terms. The third is the concept that gating processes can be used to model the mass action dynamics of chemical transmitters. GRA

N84-21060# Duke Univ , Durham, N. C. Lab for Environmental Research
DECOMPRESSION MECHANISMS AND DECOMPRESSION SCHEDULE CALCULATIONS Final Report, 1 Nov. 1982 - 31 Oct. 1983
R D VANN 20 Jan. 1984 85 p
(Contract N00014-83-K-0019)
(AD-A137868) Avail: NTIS HC A05/MF A01 CSCL 06S

A theoretical method has been developed to predict space craft and space suit atmospheres The method used to analyze stage decompression procedures which have been tested for the Shuttle. The effect of exercise during compression and bottom time has been studied with rats during an 18 minute air dive at 350 fsw Seventeen resting rats and 27 exercising rats out of 2 groups of 108 rats developed decompression sickness. A method for developing decompression schedules for helium/oxygen and nitrogen/oxygen saturation dives is described. Only one unknown constant is required for each saturation depth and inert gas, and this constant can be estimated from the results of previous saturation dives. Equations are presented for analyzing previous

dives and for calculating decompression schedules, and examples of provisional schedules are given GRA

N84-21061# Army Research Inst. of Environmental Medicine, Natick, Mass. Heat Research Div
EXERCISE IN THE HEAT. EFFECTS OF SALINE OR BICARBONATE INFUSION
R. P. FRANCESCONI and R. W. HUBBARD 1 Dec 1983 30 p (Contract DA PROJ. 3M1-61102-BS-10)
(AD-A137194, USARIEM-M10/84) Avail: NTIS HC A03/MF A01 CSCL 06S

Adult, male rats (N=17/group, 300-320 g, physically untrained) were exercised (9.14 m/min) in the heat (35 C) to hyperthermic exhaustion (Tre = 43 C) after infusion of 2 ml of 7.5% sodium bicarbonate (BIC) or 2 ml of 0.9% sodium chloride (SAL). BIC or SAL administration had no effects on endurance when compared with rats receiving no exogenous fluid (CON) while the rate of heat gain was significantly increased in the BIC-treated group. Following exercise, the BIC group manifested significantly decreased hematocrit and plasma protein levels, but exaggerated increments in plasma osmolality. Lactate levels were significantly increased in all three groups with no notable inter-group differences. While venous (v) blood pH and bicarbonate levels were decreased following exercise in the SAL and CON groups, they were unchanged in the BIC group. While vPCO2 was unaffected by fluid administration in all three groups, vPO2 was significantly increased following exercise in the heat in all groups. We concluded from these experiments that while BIC infusion prevented the acidosis and hypobicarbonatemia induced by exercise in the heat to hyperthermic exhaustion, no beneficial effects on physical performance or thermoregulation ensued. GRA

N84-21062# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).
SUSTAINED INTENSIVE AIR OPERATIONS: PHYSIOLOGICAL AND PERFORMANCE ASPECTS
Loughton, England Nov 1983 220 p refs In ENGLISH and FRENCH Conf. held in Paris, 18-22 Apr 1983
(AGARD-CP-338; ISBN-92-835-0343-0) Avail: NTIS HC A10/MF A01

The symposium addressed the aeromedical and human factors aspects of the capabilities of aircrew and ground crew to perform their duties at high intensities at irregular times of the day and night over many days or weeks under military operational conditions. Laboratory studies on the measurement of aircrew workload, the effects of disturbances of circadian rhythms and deprivation of sleep and the use of hypnotics and stimulants to influence sleep and wakefulness are reported. The effects of protective equipment and procedures on air and ground crew with particular reference to fast jet and helicopter operations are examined. Field studies of fatigue, performance and physiological disturbances in aircrew and ground personnel engaged in sustained air operations are described.

N84-21067# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Flugmedizin
CIRCADIAN RHYTHMS AND SUSTAINED OPERATIONS
H. M. WEGMANN and K. E. KLEIN *In* AGARD Sustained Intensive Air Operations 7p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

Sustained operations necessarily conflict with the circadian system in several ways: changes in the habitual work-rest cycle, shifts in meal- or sleep-timing, intense activity during night hours, sleep deprivation and disruptions of the normal synchrony between body functions and environment. When these rhythm disturbances affect performance, they become operationally significant. Their consequences are discussed and factors are described which influence the range of performance oscillation. Of particular operational relevance are motivation, sleep and physical exercise. Under certain conditions they can help to overcome deficits in performance and periods of diminished efficiency M.G.

N84-21072# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
HYPNOTICS AND AIR OPERATIONS
A. N. NICHOLSON *In* AGARD Sustained Intensive Air Operations 8p Nov 1983 refs
Avail: NTIS HC A10/MF A01

The selection and use of hypnotics for personnel involved in air operations is discussed. Diazepam (5 to 10 mg) is an excellent hypnotic when used occasionally for both night time and day time sleep, but it should not be ingested more than once every 48 hours and more than twice in 7 days. Temazepam and oxadepam are also useful, but oxazepam (15 to 30 mg) is unlikely to shorten sleep onset. Triazolam (0.125 to 0.25 mg) can be used daily - if this is essential - and this is so with the other triazolodiazepine, brotizolam (0.25 to 0.25 mg). Midazolam (10 to 20 mg) with its very short short elimination half-life is a promising hypnotic in the context of shiftwork. If hypnotics are to be used in the mangement of sleep difficulties in those who carry out skilled work a drug with which the individual is familiar must be used. It should be given at the lowest dose, and as infrequently as possible. There should be an interval of 24 h between ingestion and commencement of duty their use is supervised. Under these circumstances the interval may be reduced to 12 hours. M.A.C.

N84-21073# Centre de Recherches du Service de Sante des Armees, Lyons (France).
PSYCHO-ERGONOMIC PROBLEMS PRESENTED BY THE PROLONGED WEARING OF GAS MASKS [PROBLEMES PSYCHO-ERGONOMIQUES POSES PAR LE PORT PROLONGE DE MASQUES A GAZ]
J. FOURCADE and C. RAPHEL *In* AGARD Sustained Intensive Air Operations 13p Nov 1983 refs In FRENCH
Avail: NTIS HC A10/MF A01

The adaptation of man to the gas mask and the constraints that wearing this protective device continuously from 16 to 48 hours imposes on his living and working were investigated in 34 subjects over a two year period without simulating a toxic chemical environment. The relation of the mask wearer with his environment, with other mask wearers, with the mask itself, and with nourishment were investigated. Results discussed cover the effects of the mask on visual tasks, sensorimotor adjustment (writing, walking, driving, use of instruments, etc.), verbal communication, and the making of medical examinations. The opinions of the subjects on their affective and mental states are examined including individual dynamics, sociability, the tendency for isolation, annoyance with the mask during work, manifestations of pain, sleeping conditions, and general comfort. Liquid feeding, caloric intake, and gastric system disturbances are also covered. A.R.H.

N84-21075# School of Aerospace Medicine, Brooks AFB, Tex. Crew Technology Div.
AIRCREW FATIGUE DURING EXTENDED TRANSPORT, TACTICAL, AND COMMAND POST OPERATIONS
W. F. STORM *In* AGARD Sustained Intensive Air Operations 16p Nov. 1983
Avail: NTIS HC A10/MF A01

Self ratings of subjective fatigue and sleep logs provide a simple and useful means of evaluating aircrew during real world operations involving large numbers of participants working irregular schedules. Evaluations of extended USAF operations involving transport, tactical, and airborne command post systems are reviewed. Following outboard crew rest on C-141 transport aircraft flying 8 to 9 hour missions, aircrew performance in simulator missions was significantly deteriorated and accompanied by reports of severe fatigue. Tactical aircrews are being trained and evaluated in unit flying at the fast pace expected in the first crucial days of an armed conflict. Flying 2 to 3 sorties a day for a week or more resulted in reports of only moderate fatigue. Daily fatigue was ameliorated by a night of quality sleep. During a 10 hour airborne command post mission, crew fatigue was moderate and not suggestive of compromises in performance. After mission completion, severe levels of fatigue were reported. Author

N84-21077# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).
SUSTAINED PHYSICAL ACTIVITY IN DIVERSE SITUATIONS: METABOLIC AND HORMONE DATA [L'AVTIVITE PHYSIQUE SOUTENUE DANS DIVERSES SITUATIONS DONNEES METABOLIQUES ET HORMONALES]
P. C. PESQUIES and C. Y GUEZENNEC *In* AGARD Sustained Intensive Air Operations 8p Nov 1983 refs In FRENCH
Avail: NTIS HC A10/MF A01

Physical activity undergone or repeated during more than three hours, at a level corresponding to more than 50% of VO2 maximum, involves a hormonal table characterized by an elevation of cortisol and a lowering of testicular androgens The intimate mechanisms which led to this hormonal table, characterized by an antagonism between the catabolic and anabolic hormones as well as the consequences of the metabolism is demonstrated in studies of white Wistar rats The regulation of metabolism during environmental constraints encountered by military personnel is discussed with emphasis on physical exercises, exposure to cold, and deprivation of food. A R.H

N84-21078# Centre d'Essais en Vol, Bretigny-Air (France). Lab de Medecine Aerospatiale.
THERMAL CONSTRAINTS IN A HELICOPTER DURING LONG DURATION FLIGHTS UNDER EXTREME CLIMATIC CONDITIONS [CONTRAINTES THERMIQUES EN HELICOPTERE AU COURS DES VOLS DE LONGUE DUREE EN AMBIANCES CLIMATIQUES EXTREMES]
C. BOUTELIER, E. MAURICE, C. LEFIEVRE, and G GUERIN *In* AGARD Sustained Intensive Air Operations 7p Nov 1983 refs In FRENCH
Avail NTIS HC A10/MF A01

The physiological and psychophysiological effects of extreme climatic conditions on helicopter crews were observed and analyzed. It is concluded that the operational efficiency of flight crews can be obtained by adopting four measures. (1) preliminary acclimatization of the crews; (2) limitation of hours of flight with a possibility for rest between flights in a climatized environment; (3) improvement of the comfort and ergonomics of the pilot station; and (4) improvement of equipment and a partial or total individual acclimatization A R.H.

N84-21081# Institut fuer Wehrmedizin und Hygiene, Koblenz (West Germany). Physiology and Ergonomics Div.
SUSTAINED MILITARY OPERATIONS WITH PARTICULAR REFERENCE TO PROLONGED EXERCISE
G KLEINHANSS and G. SCHAAD *In* AGARD Sustained Intensive Air Operations 8p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

The effects of sleep deprivation and intense work are studied in the context of military operations Motivation was found to be an important factor in task performance. R.J.F.

N84-21082# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)
NON-INVASIVE METHODS OF CARDIOVASCULAR EXPLORATION IN AEROSPACE MEDICINE
R. CARRE (Centre Principal d'Expertise Medicale du Personnel Navigant de l'Aeronautique), R. AMORETTI, A. COIGNARD, J COLIN, A. DIDIER, J. DRONIOU, J F. GAILLARD, C. HILTENBRAND, H. ILLE, P LANTRADE et al. Loughton, England Dec. 1983 213 p refs
(AGARD-AG-277(E); ISBN-92-835-1464-5) Avail: NTIS HC A10/MF A01

Noninvasive methods of cardiography used in determining flight fitness for flight personnel were examined. These methods include standard electrocardiogram and cardiac radiography analysis of heart abnormalities, continuous electrocardiograph monitoring, study of ventricular pre-excitations syndromes, X ray fluorescence of the cardiovascular system, and information on the exercise electrocardiogram The merits of each technique as it applies to aerospace medicine in general and flight crew fitness in particular is discussed.

N84-21083# Centre Principal d'Expertises Medicales du Personnel Navigant de l'Aeronautique, Paris (France).
MAIN ELECTROCARDIOGRAPHIC ABNORMALITIES IN THE MEDICAL EXAMINATION OF FLYING PERSONNEL
R CARRE, A DIDIER, and H. ILLE *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 1-12 Dec 1983 refs
Avail NTIS HC A10/MF A01

The electrocardiographic tests that qualify flight personnel for duty on very high performance aircraft were examined Tests included electro-cardiographic recordings for certain arrhythmias, right and left bundle blockage or deviation, Wolff-Parkinson-White syndrome, atypical ventricular repolarization, and sequella of myocardial infarctus. The significance of each disorders as it applies to flight personnel was discussed M.A C.

N84-21084# Hopital d'Instruction des Armees, Paris (France)
VENTRICULAR PRE-EXCITATION SYNDROMES
J. DRONIOU *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 13-24 Dec. 1983 refs
Avail. NTIS HC A10/MF A01

Ventricular Pre-Excitation (VPE) syndrome in flight personnel was discussed. Current understanding of the disorder as well as diagnosis, prognosis, classification, and mechanisms of the disease as it applies to flight personnel was presented. Electro cardiographs detailing characteristic tachyarrhythmias of the syndrome were included M A.C.

N84-21085# Hopital d'Instruction des Armees, Versailles (France).
THE EXERCISE ELECTROCARDIOGRAM
G. LEGUAY and A SEIGNEURIC *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 25-63 Dec 1983 refs
Avail: NTIS HC A10/MF A01

The use of the exercise electrocardiogram (EECG) in the determination of physical fitness was thoroughly discussed. Factors effecting the results of the EECG such as maximum oxygen consumption, cardiac output and basic techniques of EECG use were presented A comparison between a normal EECG and that of a graph showing coronary failure was included. The EECG must be interpreted by taking into account the intensity of exertion, nature of the ST shift, HRxBP product, age, sex, and risk factor such as smoking or hypertension. In an asymptomatic population such as military personnel, the EECG cannot be used as a reliable means of mass screening for coronary failure M A C.

N84-21086# Hopital d'Instruction des Armees, Versailles (France)
CONTINUOUS ECG MONITORING BY THE HOLTER METHOD
G. LEGUAY and A. SEIGNEURIC *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 65-81 Dec 1983 refs
Avail: NTIS HC A10/MF A01

The Holter method of continuous electrocardiograph (ECG) recording in the active subject was discussed with primary focus on heart arrhythmias and repolarization disorders. The technical aspects of the recorder, lector, and computer were examined. The method aids in the indication of antiarrhythmic medication efficiency, including the speed and duration of drug action. Continuous ECG recording allows close monitoring of coronary artery disease treatment and patients with heart pace makers. M.A C

N84-21087# Hopital d'Instruction des Armees, Versailles (France).
THE HOLTER METHOD IN AERONAUTICAL MEDICINE
G. LEGUAY and A. SEIGNEURIC *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 83-86 Dec 1983 refs
Avail: NTIS HC A10/MF A01

The Holter method was discussed as a means of monitoring pilot and flight crew cardiac performance during all the operations

of different mission types Emphasis was placed on fighter pilots subject to extreme accelerations and transport aircraft crews effected by circadian rhythm disruption The Holter method could provide information on inflight malaises, cardiac tolerance, and flight adaptation that would contribute to air safety M A.C.

N84-21088# Centre Principal d'Expertises Medicales du Personnel Navigant de l'Aeronautique, Paris (France).
CONTRIBUTION OF STANDARD X-RAY TO CARDIOVASCULAR EXPLORATION DURING THE CLINICAL EXAMINATION OF FLYING PERSONNEL
M. PUECH and P. J METGES (Hopital d'Instruction des Armees, Saint Mande, France) *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 87-92 Dec. 1983 refs
Avail NTIS HC A10/MF A01

The use of teleradiography and televised fluoroscopy in the cardiovascular examinations of flight personnel was discussed. Heart fluoroscopy allows analysis of the shape and dynamic features of the heart cavities, aorta, and the pulmonary arteries Normal heart anatomy and physiology was described and compared with minor abnormalities found in flight crews Four position teleroentgenography and televised fluoroscopy remain the usual methods for the analysis and kinetic investigation of the cardiovascular silhouette and pulmonary vascularisation and are now also part of the battery of tests used to assess flight fitness M A C

N84-21089# Centre Principal d'Expertises Medicales du Personnel Navigant de l'Aeronautique, Paris (France)
CONTRIBUTION OF CARDIAC MECHANOGRAMS IN THE EXPERT EXAMINATION OF FLYING PERSONNEL
R. CARRE, R. AMORETTI, A. DIDIER, and H. ILLE *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med p 93-112 Dec 1983 refs
Avail NTIS HC A10/MF A01

Non-invasive cardiac mechanograms are easily reproducible at each examination and provide recordings which can be added to the pilot's medical record and compared from one examination to another. Cardiac mechanograms provide three types of information (1) analysis of cardiac murmurs, determining the type of heart disease on the basis of phonocardiography, (2) study of arterial distension from the carotid pulse cardiogram, and (3) chronocardiographic determinations based on the systolic time intervals which give some idea of the contraction of the myocardial muscle. Techniques for the analysis of various murmurs, aortic stenosis, mitral defect, pulmonary stenosis, and aortic coarctation are described M.G.

N84-21090# Hopital d'Instruction des Armees, Paris (France)
ECHOCARDIOGRAPHY IN THE EXPERT EXAMINATION OF FLYING PERSONNEL
J. DRONIOU and A COIGNARD *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med p 113-142 Dec. 1983
Avail: NTIS HC A10/MF A01

The technical principles of echocardiography are reviewed and the various types and imaging capabilities are described. The use of echocardiography in the detection and analysis of pathological heart conditions is discussed. Finally, the practical modalities of the application of echocardiography to the expert examination of flying personnel are considered. M.G.

N84-21091# Centre Principal d'Expertises Medicales du Personnel Navigant de l'Aeronautique, Paris (France).
EXPLORATION OF ARTERIAL FUNCTION USING DOPPLER FLOW DETERMINATION. APPLICATION TO AERONAUTICAL AND SPACE MEDICINE
A. DIDIER, H. ILLE, C. RIBADEAU-DUMAS, P. LANTRADE, and C HILTENBRAND *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med p 143-156 Dec. 1983 refs Prepared in cooperation with Hopital d'Instruction des Armees, Paris
Avail: NTIS HC A10/MF A01

The instrumentation and capabilities of continuous and pulse emission arterial dopplerography are discussed. The Doppler ultrasonic determination of the blood flow rate makes use of the Doppler-Fizeau principle by determining the change of frequency of an ultrasonic beam directed onto the vessel under study. The beam is reflected by solid elements within the blood, the flow rate of which is the same as that of the bloodstream as a whole. The change of frequency is a function of the blood flow but also of the angle (theta) of incidence at which the ultrasonic beam strikes the vessel. The data obtained is in the form of a velocity and its exact determination depends on knowing the angle theta Calculation of the blood flow rate depends on determination of the cross-section of the vessel The accuracy of the data obtained and the total lack of risk of the method suggests that it should have a place in aeronautical and space medicine, in the medical examination of flying personnel and the investigation of physiological changes of arterial flow in the body during aeronautical and space pressures. M.G.

N84-21092# Hopital d'Instruction des Armees, Paris (France).
THE CONTRIBUTION OF NUCLEAR MEDICINE TO CARDIOLOGY
J. F. GAILLARD *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med p 157-164 Dec 1983 refs
Avail NTIS HC A10/MF A01

Isotopic methods of exploration have developed greatly over the last twenty years and now constitute important complementary cardiological examinations. In 1948 PRINZMETAL introduced the radiocardiogram by external detection recording of the dilution curve of a radioactive indicator in the cardiac cavities. In 1964 CARR introduced static scintigraphy, followed by a link-up of the gamma camera to a computer which from the 1970's made possible the development of rapid dynamic investigations and computer-processing of the image obtained Recently gamma or positron emission tomography has provided results in detailed studies of the vascularization and metabolism of the myocardium Isotopic methods provide information which was generally not available previously except by means of invasive radiological explorations using contrast media and recently by ultra-sound. The non-invasive functional investigation of an organ is the main contribution of nuclear medicine. The possibility of quantifying organ function, of describing it by means of graphs, diagrams and image remains unrivalled. The contribution of nuclear medicine to the examining expert is important because of the non-invasive nature of most of the methods. Author

N84-21093# Rome Univ (Italy) School of Aerospace Medicine.
HALLISTOCARDIOGRAPHY: A NON-INVASIVE METHOD ADVANCING TOWARDS CLINICAL APPLICATION
A. SCANO *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med p 165-170 Dec. 1983 refs
Avail NTIS HC A10/MF A01

The evolution of ballistocardiographic (BCG) methods is reviewed Ballistocardiography can be defined as a non-invasive method of recording and studying periodic accelerations of the body mass due to the inertia reaction it presents at every ventricular systole. The typical sequence of waves which constitutes the BCG tracing differs quantitatively according to the bodily axis (the ones recorded along the longitudinal axis are generally more ample), according to the state of rest or physical exercise, the age and

pathological conditions of the heart and/or the large arterial vessels. Specific applications are discussed. M.G

N84-21094# Centre de Recherches du Service de Sante des Armees, Clamart (France).
USE OF CHANGES IN ELECTRICAL IMPEDANCE IN CARDIOLOGY
J. COLIN *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 171-179 Dec. 1983 refs
Avail NTIS HC A10/MF A01

The investigation of variations of electrical impedance is of particular value amongst the non-invasive methods used in physiological and clinical study of heart function because of the absence of risk, ease of the procedure and the possibility of repeating determinations or carrying out continuous determinations over long periods. The physical bases of the method of determining electrical impedance are reviewed along with the required instrumentation. The analytic capabilities of thoracic, aortic, and cardiac plethysmography are discussed. M G

N84-21095# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Paris (France).
VALUE OF THE TILT TABLE IN THE EXPLORATION OF CIRCULATORY FUNCTION
J. TIMBAL *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med p 183-187 Dec. 1983 refs
Avail: NTIS HC A10/MF A01

Any change of position from the inclined to the upright position or vice versa results in important hemodynamic changes which result mainly from the rapid transfer of part of the total blood from one territory to another The value of this type of maneuver in exploring circulatory system functions is discussed The tilt table makes it possible to standardize observation conditions and to eliminate any muscular effect. If properly carried out, the method provides a passive orthostatic or antiorthostatic test. In practice, it is the orthostatic tests which are most commonly used in both functional exploration during the selection or medical check up of aeronautical teams and for more fundamental research. Antiorthostatic tests have been used particularly in the Soviet Union for the selection of cosmonauts. The short term effects of passage from the horizontal to the vertical position are considered. M.G.

N84-21096# Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge (France).
VALUE OF THE LOWER BODY NEGATIVE PRESSURE TEST IN AEROSPACE MEDICINE
B VETTES and H. VIELLEFOND *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 189-192 Dec 1983 refs
Avail: NTIS HC A10/MF A01

The lower body negative pressure (LBNP) test is of two-fold interest in aerospace medicine. First, it provides an excellent method for investigation of the cardiovascular and respiratory changes associated with weightlessness and secondly it provides a method of preventing these problems during flight. The daily use of the LBNP during a period of one month of total bedrest is very effective in preventing the loss of plasma, reducing the increase in heart rate and maintaining the cardiac index at a more satisfactory level during the LBNP. It is therefore not surprising that use of the LBNP has been extended to the training of astronauts and to the prevention of the severe orthostatic syndromes which occur after a return from a mission. However, aeronautical medicine can also benefit from the lower body negative pressure test not only as a clinical orthostatic test but especially as a means of investigating cardiovascular adaptation capacity to the positive longitudinal accelerations known as + Gz The physiopathological disturbance produced by + Gz accelerations are of vascular origin and the mechanism by which they occur is fairly similar to that underlying LBNP. M.G.

N84-21097# Laboratoire de Medecine Aerospatiale, Bretigny-sur-Orge (France).
METHODS AND MAJOR FINDINGS OF CARDIOVASCULAR EXPLORATION INVOLVING THE HUMAN CENTRIFUGE
B. VETTES and H VIEILLEFOND *In* AGARD Non-Invasive Methods of Cardiovascular Exploration in Aerospace Med. p 193-201 Dec 1983 refs
Avail: NTIS HC A10/MF A01

The cardiovascular effects of accelerations as produced by human centrifuge experiments are discussed. Particular attention is given the evasive and non-evasive techniques used to monitor heart rate, arterial pressure, venous pressure, cardiac output, and local blood flow. The use of visual field criteria as a way of assessing hemodynamic tolerance is also addressed M.G.

N84-22146* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 257
Apr. 1984 96 p
(NASA-SP-7011(257); NAS 1 21 7011(257)) Avail: NTIS HC $7 00 CSCL 06E

This bibliography lists 331 reports, articles and other documents introduced into the NASA scientific and technical information system in March 1984. Author

N84-22147# Royal Observatory, Edinburgh (Scotland).
WORK AT HIGH ALTITUDE: A CLINICAL AND PHYSIOLOGICAL STUDY AT THE UNITED KINGDOM INFRARED TELESCOPE, MAUNA KEA, HAWAII
P. J. G FORSTER 1983 99 p refs
(REPT-11; ISSN-0309-099X) Avail: Issuing Activity

The 3 8m United Kingdom Infrared Telescope (UKIRT) is sited at the summit of Mauna Kea (4,200). Staff manning the telescope reside at sea level. While living on the mountain, staff eat and sleep at the midlevel facility of Hale Pohaku (3,000 m, 9,270 ft). Telescope personnel represent a unique population exposed to the stress of hypoxia. From previous studies of sea-level residents ascending to high altitudes, the staff should be acutely susceptible to altitude-related illness. In addition to the effects of hypoxia, astronomers may be subject to physiological disturbances due to a reversal of diurnal rhythms. Results of the medical examinations are presented B.G.

N84-22148 Ohio State Univ., Columbus
CARDIAC SWIMMING AND A TRADITIONAL REHABILITATION PROGRAM OF BIKE-WALK-JOG; A COMPARISON OF MAXIMAL OXYGEN CONSUMPTION AND STRENGTH Ph.D. Thesis
K. T. KEAR 1983 133 p
Avail: Univ. Microfilms Order No DA8400232

In an attempt to determine the changes in maximal oxygen consumption and strength proceeding a three month training program using the mode of swimming, two groups of cardiovascular disease high risk patients were studied. Group B consisted of post myocardial infraction (MI), post coronary artery bypass graft (CABG) or high risk patients at least three months after the event. Their mode of exercise was a walk-jog program in The Ohio State University's Phase 2 Cardiac Rehabilitation Program. Group A consisted of patients who first went through at least one week of the walk-jog program and then volunteered for the swimming program. Both groups underwent a maximal oxygen consumption graded exercise test on a treadmill using the Balke (Special) Protocol Exercise prescriptions were based on 60-75% of maximal oxygen consumption at corresponding heart rates. For strength testing the Cybex II was used to measure muscle strength, measured in peak torque at 90 degrees per second. The joints tested were the right and left knee, shoulder, and elbow.
Dissert. Abstr.

N84-22149# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 18, NO. 1, JANUARY - FEBRUARY 1984
4 Apr. 1984 18 p refs Transl into ENGLISH of Kosmich. Biol. i Aviakosmich. Med (Moscow), v. 18, no 1, Jan. - Feb. 1984
(JPRS-USB-84-002) Avail NTIS HC A02

The tonus of antigravity muscles of subjects in different age groups under simulated weightlessness is discussed Highlights of papers presented at the 13th annual Gagarin Conference on Aviation and Cosmonautics are included with emphasis on the effects of long term space flight on man

N84-22150# Joint Publications Research Service, Arlington, Va
MUSCLE TONE CHANGES IN INDIVIDUALS OF DIFFERENT AGE GROUPS SUBMITTED TO SIMULATED WEIGHTLESSNESS
V G. KOZLOVA and Y A ILINA *In its* USSR Rept: Space Biol. and Aerospace Med., V. 18, No 1, Jan. - Feb 1984 (JPRS-USB-84-002) p 3-6 4 Apr. 1984 refs Transl. into ENGLISH from Kosmich. Biol i Aviakosmich Med. (Moscow), v 18, no 1, Jan - Feb 1984 p 90-92
Avail NTIS HC A02

Water immersion with dry submersion was used to simulate weightlessness in tests conducted on 24 men between 30 and 49 years of age. Immersion lasted 7 days Muscle tone was tested on the basis of evaluating the firmness of muscle tissues before and during water immersion hypokinesia on the 1st, 3rd, and 7th days Tonometry of crural muscles and thigh was performed under standard conditions at rest. A tonomyometer was used that is based on consideration of the correlation between resilient deformation which occurs upon measured depression of the skin at the point of projection of the tested muscle and the tension of this muscle Student's variational statistical method was applied. Results are shown in tables and indicate changes in the same direction in muscle tone in subjects of different age groups. The factor of repeated immersion is of decisive significance. A R.H.

N84-22151# Joint Publications Research Service, Arlington, Va.
THIRTEENTH GAGARIN CONFERENCE
A A. GYURDZHIAN, S M LEDOVSKOY, and V I SAVCHENKO *In its* USSR Rept. Space Biol. and Aerospace Med , V 18, No. 1, Jan. - Feb 1984 (JPRS-USB-84-002) p 7-13 4 Apr. 1984 Transl. into ENGLISH from Kosmich Biol. i Aviakosmich. Med. (Moscow), v. 18, no. 1, Jan - Feb 1984 p 92-95 Conf. held in Moscow, 4-8 Apr. 1983
Avail: NTIS HC A02

Cosmonaut experience in training and participating in the 211 day Salyut-7 mission; space monitoring of anthropogenic factors and related effects; and medical findings from the longest manned space flight to date are discussed Papers delivered at the biomedical sessions of the 13th Gagarin Congerence are summarized. Topics cover (1) psychophysiology of operator performance; (2) effect of flight factors on the body; (3) symptomatology, expertise, and nutrition, and (4) gravity biology. Problems in studying plant life in weightlessness; a model of a man-Chlorella-mineralization system for studying biological and abiotic relations; and a device for transmitting via a single channel the indicators of pulse and respiration rate, dynamics of cardiac output, and coronary blood flow are described The protection of passengers and crew from sonic booms and from low humidity in civil aviation aircraft is also explored. A.R H

N84-22152# Federal Aviation Administration, Washington, D C
A HAZARD IN AEROBATICS: EFFECTS OF G-FORCES ON PILOTS
28 Feb. 1984 12 p
(FAA-AC-91-61) Avail NTIS HC A02/MF A01

Background information on gravitational effects (G's), their effect on the human body, and their role in safe flying are discussed. Suggestions are offered for avoiding problems caused by accelerations encountered in aerobatic maneuvers These include familiarization with aerobatic maneuvers, easing off of the controls when reaching tolerance limits, consultation with a knowledgeable flight surgeon, maintaining good physical fitness, and knowledge of methods that reduce the effects of acceleration. M.A.C.

N84-22153# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
PHYSIOLOGICAL DATA ACQUISITION SYSTEM AND MOTION SICKNESS PREVENTION TRAINER M.S. Thesis
O A. EARL and C. N PETERSON Dec. 1983 140 p Original contains color illustrations
(AD-A138361; AFIT/GE/EE/83D-19) Avail: NTIS HC A07/MF A01 CSCL 06S

A physiological data acquisition system and rotating chair were erected to allow future studies on the prevention of motion sickness induced by coriolis stimulation Physiological monitoring equipment to measure pulse-to-pulse heart rate, gastric motility, respiration rate, and skin pallor were designed and built This physiological monitoring equipment and commercially available equipment which measures skin surface temperature, galvanic skin reflex (GSR), and electomyogram (EMG) of superficial muscles were integrated into a programmable digital data acquisition system. The programmable digital data acquisition system provides equivalent digital values for the analog outputs of the monitoring equipment at time intervals which can be chosen by an experimenter These digital values are transmitted from the chair, through sliprings, to an output port where the signal processing and data recording equipment can be attached. GRA

N84-22154# Environmental Health Lab., Wiesbaden, APO New York 09220.
INDUSTRIAL HYGIENE DATA FOR F-16 AIRCRAFT REFUELING INSIDE CLOSED AIRCRAFT SHELTERS. SUPPLEMENTARY Final Technical Report, May - Jul. 1983
J. A. MARTONE and D. J HAWKINS Jul. 1983 11 p Previously announced as N82-28994
(AD-A138364, EHL(W)-TR-83-13) Avail: NTIS HC A02/MF A01 CSCL 01C

This report supplements EHL(W) TR 83-08, An Industrial Hygiene Evaluation of F-16 Aircraft Refueling Inside Closed Aircraft Shelters. This study considers F-16 refueling inside third generation shelters using JP-8 was well as JP-4 fuel The position of the fuel truck differed from previous work Workplace concentrations of fuel vapors, carbon monoxide, and benzene were measured. The conclusion is that F-16 refueling in third generation shelters need not be limited because of industrial hygiene considerations GRA

N84-22155# Naval Biodynamics Lab., New Orleans, La
CURRENT RESEARCH AT THE U.S. NAVAL BIODYNAMICS LABORATORY ON HUMAN WHOLE-BODY MOTION AND VIBRATION
J. C. GUIGNARD, A C. BITTNER, JR., and M. M. HARBESON Jul. 1983 24 p Presented at the Meeting of the United Kingdom Informal Group, Human Response to Vibration in London, Sep. 1982
(Contract M00-96-PN, F58-524)
(AD-A138367; NBDL-83R008) Avail: NTIS HC A02/MF A01 CSCL 06S

This report provides an overview of recent, ongoing, and planned whole-body motion and vibration research at the Naval Biodynamics Laboratory. Three interrelated efforts are reviewed: (1) Performance Evaluation Tests for Environmental Research; (2) the development of experimental paradigms and statistical methodologies, and (3) identification of vibration effects on performance. Three studies in which performance tasks were administered under various levels of vibration are summarized. A program to assess human whole-body vibration effects is under way at the Naval Biodynamics Laboratory (NBDL). This program, together with affiliated ship-motion and impact-acceleration programs, is directed at establishing correlations between psychological, physiological, and biodynamic (inertial) responses of human volunteer subjects. Mechanical input forces of interest across programs ar the kind experienced in ship and aircraft crewstations Recent research has been directed at the

developement of experimental paradigms, statistical methodologies, and strategic plans for systematic explorations of pertinent parameters of the motion environment. Results of th vibration program suggest: using repeated measures methodologies; (2) experimental focus on mechanical interference with input (e g., visual) and output (e.g., motor) processes; and (3) study of the nature of performance changes during repeated and longer-term exposures. Ongoing and future research efforts are aimed at these recommendations. Author (GRA)

N84-22156# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE APPLICATION OF A SUPERCONDUCTING QUANTUM INTERFERENCE DEVICE SECOND-ORDER GRADIOMETER TO MEASURE VISUAL EVOKED RESPONSES M.S. Thesis
R. D MURRAY Dec. 1983 171 p
(AD-A138407; AFIT/GE/EE/83D-50) Avail: NTIS HC A08/MF A01 CSCL 06P

The acquisition of a Superconducting Quantum Interference Device (SQUID) gradiometer, along with the previous research which led to the first cortical implant of a multiplexed multi-electrode semiconductor brain electrode, motivated the use of the SQUID second-order gradiometer to measure visual evoked responses (VER) from humans, and from the canine which had previously had the AFIT brain electrode implanted and removed Some discussion of the current dipole model for the fields measured from the brain is presented. The human visual evoked responses picked up by gradiometer were compared to previous human electroencephalograph visual evoked responses, and were found to have similar latencies. The canine visual evoked responses which were measured by the gradiometer had similar initial waveform and latencies, but then dampen out more rapidly than the waveforms measured by the AFIT brain chip. Conclusions about the use of a SQUID gradiometer in measuring visual evoked responses, along with comparisons between the EEG and AFIT brain chip data versus the SQUID data is discussed. GRA

N84-22157# Environmental Health Lab., Wiesbaden, APO New York 09220
AN INDUSTRIAL HYGIENE EVALUATION OF F-16 AIRCRAFT REFUELING INSIDE CLOSED AIRCRAFT SHELTERS Final Report, Mar. - Jun. 1983
J A. MARTONE Jul 1983 24 p
(AD-A138501, EHL(W)-TR-83-08) Avail: NTIS HC A02/MF A01 CSCL 01C

This study is an industrial hygiene evaluation of F-16 aircraft refueling in closed first generation hardened aircraft shelters; it supplements BEES(W) Technical Reports 81-03 and 81-42. The primary concern is with breathing zone concentrations of fuel vapors displaced from the aircraft fuel tanks during refueling In-shelter F-16 integrated combat turns are also assessed. The major conclusion is that in-shelter F-16 refueling can be performed without limitation For the case of integrated combat turns, short term exposure limits to carbon monoxide, nitrogen dioxide, and nitric oxide are not exceeded but full workday average carbon monoxide exposure is a potential limitation that requires further study. GRA

N84-22158# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd Audiologie.
MOTION SICKNESS [BEWEGINGSZIEKTZ]
W. BLESS Oct. 1983 43 p refs In DUTCH; ENGLISH summary
(IZF-1983-21; TDCK-78679) Avail: NTIS HC A03/MF A01

The functions of the vestibular, visual, and somatosensory systems in gathering information on spatial orientation and on the effects of sensory interactions are discussed. It is concluded that incongruent sensory information may lead to motion sickness. The concept of an intersensory mismatch is applied to several manifestations of motion sickness such as sea sickness, air sickness, and car sickness. Individual susceptibility to, prevention of, and adaptation to motion sickness, as well as theoretical applications are considered. Author (ESA)

N84-22159# Medical Biological Lab RVO-TNO, Rijswijk (Netherlands).
TOXICOLOGY OF TETRACHLOROETHYLENE
D. M. W ELSKAMP Jan. 1983 38 p refs In DUTCH; ENGLISH summary
(MBL-1983-3; TDCK-77771) Avail: NTIS HC A03/MF A01

Literature on the toxic characteristics of tetrachloroethylene was reviewed. Technical data, environmental and biological monitoring, toxicokinetics, and data of acute and chronic toxicity for laboratory animals and humans are given The effects on reproduction, and mutagenic and carcinogenic effects are discussed. Author (ESA)

N84-22160# Medical Biological Lab RVO-TNO, Rijswijk (Netherlands)
TOXICOLOGY OF STYRENE
D. M. W. ELSKAMP Apr. 1983 50 p refs In DUTCH, ENGLISH summary
(MBL-1983-11; TDCK-77816) Avail NTIS HC A03/MF A01

Literature on the toxic characteristics of styrene was reviewed. Technical data, environmental and biological monitoring, toxicokinetics, and data of acute and chronic toxicity for laboratory animals and humans are given The effects on reproduction, and mutagenic and carcinogenic effects are discussed. Author (ESA)

N84-22161# PEDCo-Environmental, Inc., Durham, N C
A STUDY OF PERSONAL EXPOSURE TO CARBON MONOXIDE IN DENVER, COLORADO
T JOHNSON Jan 1984 290 p
(Contract EPA-68-02-3755)
(PB84-146125, EPA-600/4-84-014) Avail: NTIS HC A13/MF A01 CSCL 06T

Noninstitutionalized, nonsmoking residents of the urbanized portion of the metropolitan area who were between 18 and 70 years were studied for exposure to carbon monoxide. Each participant carried a personal exposure monitor (PEM) and an activity diary for two consecutive 24 hour sampling periods and provided a breath sample at the end of each sampling period. Approximately 900 person days of PEM and activity diary data were analyzed and it was found that personal CO exposures were higher in microenvironments associated with motor vehicles such as parking garages and automobiles GRA

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BEHAVIORAL SCIENCES

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

A84-27456#
ON VISUAL ILLUSION OF HEIGHT DURING VISUAL APPROACHES TO AIRCRAFT LANDING BY MEANS OF ANALYSIS OF VISUAL CIRCLE - AN ATTEMPT TO ELUCIDATE 'UNDERLANDING' PHENOMENON
T YAMANOI, T YAMAZAKI, S KAJIKAWA, and M. KAWAGUCHI Hokkaido University, Faculty of Engineering, Bulletin (ISSN 0385-602X), vol 59, Feb 1984, p. 7-13 In Japanese, with abstract in English. refs

By identifying the situation of night visual approaches to landing with Visual Circle experiments, a geometrical model which indicates the visual illusion of height is developed. The model is applied to Visual Circle data and results of simulation experiments with approach lights. The tendency toward height overestimation is obtained for specific observation distances. The results confirm that the 'underlanding' phenomenon inevitably appears during aircraft landings at night Some remarks on a dynamic approach to the psychology of aircraft landing are made. C D

A84-28252
WORKLOAD EVALUATION ON CIVIL TRANSPORT AIRCRAFT
W. A WAINWRIGHT (British Aerospace PLC, Hatfield/Chester Div., Hatfield, Herts., England) International Journal of Aviation Safety (ISSN 0264-6803), vol 1, March 1984, p 415-421

The present discussion compares the pilot workload assessment method employed during certification of the BAe 146 four-engine aircraft for two-crew member operation with the workload evaluation methods applied by the respective manufacturers of the DC9, 737, 757, 767, and Airbus two-engine airliners, which also possess two-crew member cockpits. The flying evaluation performed by Boeing for its 757/767 program, following a time-line analysis of crew actions during flight simulator exercises to provide quantitative dynamic evaluation data, took the form of a 'mini-airline' exercise and set the standard for all subsequent programs. The BAe 146's workload evaluation program accordingly employed a dynamic in-flight simulation O.C

A84-28257
HUMAN FACTORS - ERRORS IN JUDGEMENT
L. H. MOUDEN (Flight Safety Foundation, Inc , Arlington, VA) International Journal of Aviation Safety (ISSN 0264-6803), vol 1, March 1984, p. 471-474.

Errors in judgment are the result of inadequate or incorrect information transfer, and may be found over the entire spectrum of aviation industry and airline operation occupations (design engineer, manufacturer, pilot, maintenance technician, etc.) An appropriately wide-ranging discussion is presently conducted on the decision-making capabilities and shortcomings which distinguish personnel concerned with aircraft and their operation from the institutions and information-processing systems that are, respectively, the contexts and the tools of their actions. O.C

A84-28261
EMOTIONAL STRESS AND PILOTS - A REVIEW
B. NIMICK, C. L. COOPER, and S SLOAN (University of Manchester Institute of Science and Technology, Manchester, England) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, March 1984, p. 493-497. refs

As stress increases, human efficiency reaches a peak value and then begins to decline at an accelerating rate. All individuals exhibit a 'yield point' beyond which a major behavioral breakdown occurs. Attention is presently given to emotional stress leading to such a breakdown in flight personnel. This phenomenon is addressed by Selye's (1983) 'general adaptation syndrome theory', which describes the three states undergone by individuals in stressful situations as: (1) an alarm reaction, in which an initial shock phase's lowered resistance is followed by a countershock through which the individual's defense mechanism becomes active, (2) resistance, or a stage of maximum adaptation and perhaps of successful return to equilibrium; and (in the event that stress continues and defense is ineffectual) (3) exhaustion, with the collapse of adaptive mechanisms. Attention is given to the predisposition of certain pilot personality types to stress, and the correlation of life changes over the two years before stressful activity with degradation of pilot performance O.C

A84-29480
PILOT MONITORING OF AIRPLANE ACCELERATION ON TAKEOFF
J. W. DANAHER (National Transportation Safety Board, Washington, DC) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p 27-33 refs
(SAE PAPER 831415)

Timely detection of subnormal acceleration and appropriate pilot reaction either to continue the takeoff or to reject it and stop on the remaining runway is vital to the safe operation of today's transport category airplanes. But ironically, pilots have no direct, accurate means to assess actual airplane acceleration during takeoff Despite a history of infrequent but sometimes catastrophic accidents in which takeoff performance was a factor, little progress has been made to remedy this situation Occasionally used techniques and two developmental systems to monitor acceleration are described A novel and promising approach which uses the onboard inertial navigation system also is described and is advocated as a means to enhance pilot judgment and decision-making during the takeoff roll This scheme offers potential for significant improvement of air transport safety with a minimum of development effort and equipment cost Author

A84-29481
WORKLOAD ASSESSMENT METRICS - WHAT HAPPENS WHEN THEY DISSOCIATE?
T M. MCCLOY, W L DERRICK (U.S Air Force Academy, Colorado Springs, CO), and C. D WICKENS (Illinois, University, Champaign, IL) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc , 1983, p 37-42. refs
(SAE PAPER 831416)

A theory-based interpretation as to why dissociation occurs is suggested The definition of workload and the determination of valid relationships between measurement techniques as they relate to the workload concept are discussed. Several examples of dissociation between performance and subjective evaluations of flight task workload are given in which the system designer compares two modifications to a system and assesses the subjective difficulty of each With sufficient knowledge of their limitations, a designer may use subjective measures as an inexpensive and easy means of augmenting knowledge of the system performance. J N.

A84-29482
DEVELOPMENT AND APPLICATION OF A CRITERION TASK SET FOR WORKLOAD METRIC EVALUATION
C. A. SHINGLEDECKER (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, OH), W H ACTON, and M S CRABTREE (Systems Research Laboratories, Inc , Dayton, OH) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc , 1983, p. 43-49. refs
(SAE PAPER 831419)

In order to optimize the design and operation of modern military aircraft systems, methods are needed to measure the mental workload of the human operator While numerous candidate metrics are now available for this purpose, little prescriptive information exists to guide their selection and application This paper describes the development of a standardized methodology for the evaluation of workload measures against several theoretical and practical criteria. The central feature of this methodology is a set of representative loading tasks selected to place demands on primary information processing resources of the operator Results are reported from an initial evaluation study in which a subset of these standardized tasks were employed to assess the characteristics of a behavioral workload measure. Author

A84-29486* Systems Technology, Inc , Hawthorne, Calif.
PRACTICAL GUIDANCE FOR THE DESIGN OF CONTROLS AND DISPLAYS FOR SINGLE PILOT IFR
R H. HOH (Systems Technology, Inc , Hawthorne, CA), H. BERGERON, and D HINTON (NASA, Langley Research Center, Hampton, VA) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 79-90. refs
(SAE PAPER 831423)

This paper represents a first step in developing the criteria for pilot interaction with advanced controls and displays in a single pilot IFR (SPIFR) environment. The research program presented is comprised of an analytical phase and an experimental phase. The analytical phase consisted of a review of fundamental considerations for pilot workload taking into account existing data, and using that data to develop a SPIFR pilot workload model

The rationale behind developing such a model was based on the concept that it is necessary to identify and quantify the most important components of pilot workload to guide the experimental phase of the research which consisted of an abbreviated flight test program The purpose of the flight tests was to evaluate the workload associated with certain combinations of controls and displays in a flight environment. This was accommplished as a first step in building a data base for single pilot IFR controls and displays. Author

A84-29487* National Aeronautics and Space Administration Langley Research Center, Hampton, Va.
SUMMARY OF NASA LANGLEY'S PILOT SCAN BEHAVIOR RESEARCH
A. A. SPADY, JR. and R L. HARRIS, SR. (NASA, Langley Research Center, Hampton, VA) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p 91-99 *refs*
(SAE PAPER 831424)

The present investigation is concerned with the information acquired in a series of basic studies designed to obtain an understanding of the pilot's scanning behavior. In the studies, use was made of an oculometer system which operates by shining a beam of collimated infrared light at the subject's eyes A number of oculometer software modifications have been made to make the oculometer user-friendly and versatile. Scanning is found to be a subconscious conditioned activity. The conditioned activity of scanning is different for each pilot. There are also slight variations between test runs for the same conditions for the same pilot. This indicates that scanning is situation dependent. Attention is given to the rate of information transfer, the possibility that scanning can be disrupted, the visual approach look-point, and workload sensitive measures. G.R.

A84-29507
TRAINING PILOTS IN THE AREA OF JUDGMENT, DECISION MAKING AND COCKPIT MANAGEMENT
R. E. NORMAN, JR. (Air Line Pilots Association, Washington, DC) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automobile Engineers, Inc., 1983, p. 311-313
(SAE PAPER 831498)

Training pilot judgment skills is stressed to improve management of emergency situations, and a training program that takes social psychological factors into consideration is proposed. Goal and group orientation as desirable crew characteristics and total situation awareness are among the topics covered. The training program suggested involves testing under full mission simulated conditions how personality types influence group performance in various situations. It is also recommended that a system feedback loop through accident and incident investigation be provided to ensure realistic training and to demonstrate system deficiencies. C M.

A84-29508
PILOT JUDGMENT - AN OPERATIONAL VIEWPOINT
R. B. STONE, G. L. BABCOCK, and W. W. EDMUNDS, JR. (Air Line Pilots Association, Washington, DC) IN· Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 315-318.
(SAE PAPER 831499)

Pilot judgement was examined in the context of understanding the elements of the decision making process for the purpose of improving pilot training and developing operational procedures. The 1973 Iberia DC-10 accident in Boston and the 1977 Southern Airways DC-9 accident at New Hope, Georgia, were discussed, and a sample of 70 reports from NASA's Aviation Safety Reporting System (ASRS) were studied Topics covered include mechanical malfunctions, situations requiring instantaneous decisions, decisions made on incomplete information, and instances involving outside agencies In some of the incidents, personal or shared previous experience was a strong determinant of the action taken It is concluded that pilot training systems and procedures must be upgraded to provide an optimum decision-making environment C M

A84-29509
A PHILOSOPHY OF AUTOMATION
W. W MELVIN (Air Line Pilots Association, Washington, DC) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 319-325. refs
(SAE PAPER 831501)

Proper and improper uses of automatic piloting systems are examined, and flight-critical functions controlled only by automatic systems are questioned. Beneficial automatic systems include the ground proximity warning system, and the C(3)I principles that enhance pilots' performance. It is recommended that an automatic monitor not have the ability to shut down a system itself. Consideration is also given to takeoff decisions, takeoff with problem error, instrument approaches, automatic systems for military aircraft, stability augmentation, flight-critical systems, and redundancy. It is concluded that whatever automatic systems are implemented, safety never be compromised. C.M.

A84-29510
EFFECTIVE USE OF SIMULATORS FOR PILOT PERFORMANCE EVALUATIONS IN FEDERAL AVIATION ADMINISTRATION AIRMAN CERTIFICATION
D. C. GILLIOM and H. J. DEMUTH (FAA, Washington, DC) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 329-333. refs
(SAE PAPER 831504)

A84-29517
MAN/MACHINE; MAN/MAN, OR MURPHY'S LAW REVISITED
J. F LEDERER (Flight Safety Foundation, Inc , New York, NY) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings Warrendale, PA, Society of Automotive Engineers, Inc , 1983, p. 379-387.
(SAE PAPER 831526)

An assessment is made of the implications for man/machine systems design of a series of case histories taken from aviation incident and accident investigations in the U.S The predictability of the unexpected, or 'Murphy's Law', is stressed in characterizations of the factors ultimately responsible for mishaps in which hardware solutions to technical problems failed to anticipate the irrepressibly intrusive nature of human carelessness. Recommendations are made concerning the general applicability of human factors-related solutions for seemingly unique problems, as well as the precautions that may be taken at an institutional level to check human problems that can aggravate man/machine interface problems, such as drug abuse Author

A84-29518
THE LIFE STYLE KEYS TO FLIGHT DECK PERFORMANCE OF THE NAVAL AVIATOR - ANOTHER WINDOW
F. E. DULLY, JR. (U.S Navy, Aerospace Medical Institute, Pensacola, FL) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 389-395.
(SAE PAPER 831529)

This paper presents the views of a Naval Flight Surgeon on the coping mechanisms that the Naval Aviator brings to his occupation It develops the theme that four life style characteristics necessarily receive inordinate polishing, and that the aviator's continued safety is dependent on his ability to fully exploit all four of these in concert. When one of the four is flawed, he is in

jeopardy. Also identified in the paper are five built-in defects present in the healthy aviator that require that he be protected from these, both by his own recurring awareness and by concerted institutional measures Author

A84-29523* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
POTENTIAL INTERACTIONS OF COLLISION AVOIDANCE ADVISORIES AND COCKPIT DISPLAYS OF TRAFFIC INFORMATION
E. PALMER and S. R. ELLIS (NASA, Ames Research Center, Moffett Field, CA) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 433-443. refs
(SAE PAPER 831544)

Future aircraft cockpits may be equipped with both collision avoidance systems and cockpit traffic situation displays. This paper summarizes a series of experiments investigating a pilot's ability to make a variety of traffic related decisions with a traffic display. Some of the key findings were Pilots were not able to accurately judge the future position of an aircraft unless the display contained predictor symbols Pilots' subjective judgements of threat were inversely proportional to time to closest approach but generally were not sensitive to small changes of other parameters of the encounter. When pilots were asked to make avoidance maneuvers based solely on the traffic display, they began their maneuvers well before a CAS advisory would have been triggered. Provided sufficient time was available, pilots preferred horizontal avoidance maneuvers Author

A84-29525* Miami Univ , Coral Gables, Fla.
COMPUTERS IN THE COCKPIT - BUT WHAT ABOUT THE PILOTS?
E. L WIENER (Miami, University, Coral Gables, FL) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 453-458 refs
(Contract NCC2-152)
(SAE PAPER 831546)

The advent of the microprocessor has made it possible to design and implement small special purpose digital computers for the flightdeck of an aircraft. However, by the end of the 1970s, many in aviation and government were concerned about certain safety implications of developments related to automation which had occurred. As a result of these concerns, NASA was directed to examine the human factors of automation A field investigation concerning the arising questions was conducted, taking into account the introduction of the Dash 80 airliner in 1980. Attention is given to the design philosophy of the aircraft, the study methodology, and preliminary results of the study, which are based on analysis of the first wave of questionnaire data and interviews Almost all pilots, and check captains as well, expressed the view that the first 50 to 100 hours in the -80 were difficult The reasons for these difficulties were related to cockpit automation and, in addition, to the fact that the new aircraft was more powerful than the older models to which they were accustomed. G.R

A84-29820
COMPARATIVE ANALYSIS OF SOCIAL, DEMOGRAPHIC, AND FLIGHT-RELATED ATTRIBUTES BETWEEN ACCIDENT AND NONACCIDENT GENERAL AVIATION PILOTS
R. F. URBAN (Metropolitan State College, Denver, CO) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 308-312. refs

Possible relationships between a variety of sociological concerns and the incidence of general aviation accidents were studied in 46 nonfatal accident-involved Colorado-resident nonairline pilots. In general, those pilots more likely to be accident-involved had a high level of education, a liberal political orientation, were among the oldest siblings in their families, flew professionally, reported more activity in nonflying events, participated in more aviation-related nonconformist behavior, and had not been involved in aviation for very long Age, occupational rank, involvement in social networks, recent life changes, and amount of recent flying time were not significant factors Finally, a mathematical function was produced which correctly distributed 78 5 percent of the cases into their appropriate groups, thereby effecting a 56.5 percent proportionate reduction in error over a random effects model. C.M.

A84-29822
FEAR OF FLYING - AN ISRAELI AIR FORCE SHORT CASE REPORT
S RABINOWITZ (Israel Air Force, Institute of Aviation Medicine; Negev, University, Beersheba, Israel) and A HESS (Israel Air Force, Institute of Aviation Medicine, Beersheba, Israel) Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol. 55, April 1984, p. 316-318. refs

This paper outlines the brief psychological treatment of an Israel Air Force pilot presenting with the fear of flying disorder. An in-depth case report is described and a variety of issues are discussed, including presentation of symptoms and psychotherapeutic techniques utilized, as well as the complicated role of the Mental Health Officer treating the problem within the military system. Author

A84-29825
AFTER THE FIRE-BALL
J R. POPPLOW Aviation, Space, and Environmental Medicine (ISSN 0095-0562), vol 55, April 1984, p 337, 338

A hypothetical aircraft accident scenario is described in which the pilot survives but some of the passengers are fatally injured. Information is provided on the acute situational anxiety that may occur in aircrew after any aviation accident, especially one in which lives are lost. A course of action is discussed which encourages early recognition and treatment of the potentially debilitating phenomenon termed 'post-accident anxiety syndrome' Author

A84-29944
PRINCIPLES OF ESTIMATION OF OPERATOR PERFORMANCE IN DYNAMIC OPERATIONS OF CONTROL OF FLYING VEHICLES
S. IU ARTIUKHIN, IU. P. ARTIUKHIN, and S V. CHERNIKOV Automation and Remote Control (ISSN 0005-1179), vol. 44, no. 9, Feb 10, 1984, pt. 1, p. 1121-1125 Translation.

The operating principles of an on-board computer system that permits on-line evaluation of the pilot's activities are considered The evaluation establishes a functional relationship between performance and safety indicators pertinent to the execution of a given dynamic operation. A criterion is examined for selecting optimal control and for estimating pilot performance. C D

N84-21063# Aerospace Medical Research Labs , Wright-Patterson AFB, Ohio.
CONCEPTUAL FRAMEWORK FOR THE DEVELOPMENT OF WORKLOAD METRICS IN SUSTAINED OPERATIONS
R D. ODONNELL (Wright State Univ) and F. T. EGGEMEIER (Systems Research Labs., Inc.) *In* AGARD Sustained Intensive Air Operations 10p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

In sustained operations, the cumulative effect of workload may lead to unpredicted, catastrophic human failure. Workload assessment, however, has suffered from the lack of an overall, standardized framework which would permit development of sensitive, predictive metrics. Such a general framework is developed based on the view that workload is a multiply-determined hypothetical construct conveniently summarizing the interactions which limit task performance. Major task, operator, and response factors are presented, and related to metrics available or being developed for assessing these factors. The framework is then utilized to suggest the broad outlines of a research program leading to standardizatin of workload assessment in sustained operations environments. M.G

N84-21064# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio Workload and Ergonomics Branch.
THE U.S. AIR FORCE NEUROPHYSIOLOGICAL WORKLOAD TEST BATTERY: CONCEPT AND VALIDATION
R. D ODONNELL *In* AGARD Sustained Intensive Air Operations 10p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

In order to provide measures of specific human capabilities and resources, the U S Air Force Aerospace Medical Research Laboratory is developing workload metrics spanning the entire spectrum, from task analysis through subjective and behavioral measures. In addition, neurophysiological measures have been investigated for a number of years with respect to their sensitivity in assessing workload As a result of these studies, a test battery consisting of six different electrophysiological measures in eleven different forms was constructed The tests selected were based on extensive laboratory data which indicated some probability that each measured an aspect of workload and might be appropriate and practical in applied settings This test battery is currently undergoing validation studies in simulator environments and successfully validated tests will be incorporated into a second generation neurophysiological test battery to be used in field workload assessment. The overall rationale of the tests selected, as well as some of the experimental evidence supporting their use as workload assessment devices are detailed. Validation studies and plans for future test modifications are also presented. M G

N84-21065# Aerospace Medical Research Labs, Wright-Patterson AFB, Ohio Workload and Ergonomics Branch
BEHAVIORAL AND SUBJECTIVE WORKLOAD METRICS FOR OPERATIONAL ENVIRONMENTS
C. A. SHINGLEDECKER *In* AGARD Sustained Intensive Air Operations 10p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

The assessment of crew performance capability under conditions of sustained intensive air operations requires the use of specialized measures of operator workload which are matched to the nature of the investigation and to the environment in which the workload evaluation must be conducted. In many cases, the effects of severe combined stressors and of aircrew performance requirements on mental workload cannot be studied in the laboratory, and must be addressed in high fidelity simulation or during operational test exercises The advantages and limitations of traditional subjective report and behavioral measures of workload for application in operational environments are examined In addition, efforts at the U.S. Air Force Aerospace Medical Research Laboratory to develop improved field-usable subjective and behavioral secondary task metrics are described. M.G.

N84-21068# Centre de Recherches du Service de Sante des Armees, Lyons (France).
VARIATIONS IN STATES OF ALERTNESS DURING CONTINUOUS OPERATIONS AT THE CONTROL POST LEVEL [VARIATIONS DES ETATS DE VIGILANCE AU COURS D'OPERATIONS CONTINUES AU NIVEAU D'UN POSTE DE COMMANDEMENT]
J. FOURCADE, A BUGUET (Niamey Univ.), R. BUGAT (Centre d'Etudes et de Recherches Biophysiologiques Appliques a la Marine), and C RAPHEL *In* AGARD Sustained Intensive Air Operations 16p Nov. 1983 refs In FRENCH
Avail NTIS HC A10/MF A01

The evolution of certain mental and decision making capacities of control post personnel was observed and two officers were chosen as representative of the group for neurophysiological studies of sleep and wakefulness as well as psychological and psychoergonomic evaluation. Urinalyses were also performed. Hypnograms from the neurophysiology of sleep tests show a difference in sleep deprivation for the two subjects because of the hours worked and the degree of comfort during sleep Occipital and temporal deprivation obtained by EEG is plotted and results of the urinalysis are discussed. It is concluded that persons responsible for cognitive and decision making tasks at a control post must have a nearly normal amount of sleep. Transl by A R.H.

N84-21069# Defence and Civil Inst. of Environmental Medicine, Downsview (Ontario).
THE EFFECTS OF SLEEP LOSS AND SUSTAINED MENTAL WORK: IMPLICATIONS FOR COMMAND AND CONTROL PERFORMANCE
R G. ANGUS and R J. HESLEGRAVE *In* AGARD Sustained Intensive Air Operations 21p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

During sustained military operations was investigated Subjects were required to perform continuous cognitive work in an environment modelled after a command post during sustained battle. They assumed the role of operations duty officers and were required to handle message traffic during a 54-hour period of wakefulness Performance was evaluated by monitoring the subjects' message-processing ability and by other objective tests embedded in and interspersed around the messages. Data are presented to show that sleep loss and sustained mental work can have dramatic effects on cognitive functions, even during the first night to sleep loss. The data also revealed that under this continuous cognitive workload, performance systematically declined. After 18 hours, performance declined substantially and remained at this lower lever for approximately another 24 hours. Performance then declined again to a level that would generally be viewed as unacceptable. Author

N84-21070# Royal Air Force Inst. of Aviation Medicine, Farnborough (England)
ADAPTATION TO IRREGULARITY OF REST AND ACTIVITY
A N NICHOLSON, B. M STONE, R G BORLAND, and M B. SPENCER *In* AGARD Sustained Intensive Air Operations 6p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

The adaptation to conventional shiftwork is discussed in reference to circadian rhythmicity, quality of sleep, and general effectiveness of the individual during air operations. Observations of sleep parameters, physiochemical tests, and performance results provided evidence that during a lengthy period of irregular sleep and work, efficiency impairment increases Circadian rhythmicity, the length of time on a task and cumulative sleep loss contributed to the impaired ability of the individuals. The most adverse effects were minimized by avoiding prolonged periods of work extending to the latter part of the night and by avoiding sleep loss. M.A C.

N84-21071# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
SOME ISSUES IN RESEARCH ON EFFECTS OF SUSTAINED WORK AND SLEEP LOSS ON PERFORMANCE
A. F SANDERS *In* AGARD Sustained Intensive Air Operations 8p Nov 1983 refs
Avail. NTIS HC A10/MF A01

The effects of sustained operations, sleep loss and diurnal rhythms in relation to human performance demands was examined. Performance impairment, sleep loss, alertness, motivation, reaction time, and task duration were used to establish performance guidelines. Short term tests suggested that directly interpreting input and handling output was impaired after sleep loss The effects on performance of actual time-at-work are minor as compared to those of sleep loss and disturbance of diurnal rhythms. M A.C

N84-21074# Army Aeromedical Research Lab., Fort Rucker, Ala. Biomedical Applications Research Lab
SELECTED FACTORS AFFECTING AIRCREW PERFORMANCE DURING SUSTAINED OPERATIONS
K A KIMBALL *In* AGARD Sustained Intensive Air Operations 17p Nov. 1983 refs
Avail NTIS HC A10/MF A01

Six graduates of initial rotary wing training flew a UH-1H helicopter for up to 4 hours while wearing each of clothing ensembles. Each aviator wore the standard flight suit, the US chemical defense (CD) ensemble, and the United Kingdom (UK)

CD ensemble in hot weather (mean WBCT 29 C). Skin temperatures (chest, thigh, upper arm, and calf), rectal temperature, heart rate, and preflight and postflight body weights were recorded Cognitive testing was conducted preflight, postflight, and on nonflight days Aviator performance measures were also obtained during flight. Well acclimatized aviators were able to fly at least 2 hours without serious physiological impairment. Three of the six aviators terminated flight for medical reasons (heart rates 40 bpm or nausea) while wearing the US ensemble. The susceptible subjects tended to be older and heavier. Heart rate was judged to be the most sensitive indicator of heart stress. Cognitive testing and flight performance data obtained during this exercise did not demonstrate changes as a function of the type of flight ensemble worn during the test, nor did flight performance serve as a predictor of heart stress Author

N84-21076# Bergen Univ. (Norway).
ATTENTION, PERFORMANCE, AND SUSTAINED ACTIVATION IN MILITARY AIR TRAFFIC CONTROLLERS
H. URSIN, S GRAHNSTEDT, I HANSEN, K MYHRE, P. K. OPSTAD, B. WALTHER, and H. ANDERSEN (Inst of Aviation Medicine) *In* AGARD Sustained Intensive Air Operations 10p Nov 1983 refs Prepared in cooperation with the Norwegian Defense Research Establishment, Kjeller (Norway)
Avail. NTIS HC A10/MF A01

Trained military air traffic controllers report increased anxiety following, and demonstrate increased heart rate and urinary levels of epinephrine during a session of ground control interception This type of activation has no detrimental effects on health, and is probably necessary for efficient performance even in well trained and coping personnel. There was also some rise in plasma levels of cortisol, but no other endocrine signs of any general activation. However, if the coping potential of the men is threatened, in a real life situation, the activation picture is expected to be totally different, with a general activation which is far more taxing both on the information treating capacity and on the brain biochemistry. Psychological defense mechanisms will then be activated, which also impede performance. These psychological and physiological mechanisms are difficult to mimic, and occur only when the individual feels a real danger and threat to his or her coping potential. Author

N84-21098# Human Resources Research Organization, Alexandria, Va.
MEMORY ORGANIZATION-BASED METHODS OF INSTRUCTION: A COMPARISON WITH PERFORMANCE-ORIENTED TRAINING Final Report, Feb. - Oct. 1983
R. G. HOFFMAN, E. H. DRUCKER, J. E MORRISON, and S L GOLDBERG Jan 1984 54 p
(Contract MDA903-80-C-0223, DA PROJ 2Q2-63743-A-794)
(AD-A137640; HUMRRO-FR-TRD(KY)-83-6, ARI-RN-84-26)
Avail: NTIS HC A04/MF A01 CSCL 05J

Based on an overview of principles of cognitive, information processing psychology concerning the structuring of information in memory, training was designed to give students task organizing information to aid their recall of four armor crewman tasks. Two alternative strategies for presenting the structure were developed: one in which the task structure information guided the presentation from the beginning of training, and one in which students were first allowed to have hands-on exposure to the task before being given the structure information. Under the constraint that these alternative training programs should not cost extra training time, they did not improve learning over the Army's standard performance oriented training strategy. Discussion concerned the role of practice and student ability in the acquisition of memory organization during learning. GRA

N84-21099# Georgia Inst of Tech , Atlanta.
BINARY CLASSIFICATION AND THE SUBTRACTIVE APPROACH
G M CORSO, S KELLY (AF Aerospace Medical Research Lab., Wright-Patterson AFB, Ohio), and D E. BRIDGES (AF Aerospace Medical Research Lab , Wright-Patterson AFB, Ohio) Sep. 1983 32 p
(Contract F49620-82-C-0035; AF PROJ. 7184)
(AD-A137716, AFAMRL-TR-83-050) Avail. NTIS HC A03/MF A01 CSCL 05J

Two experiments were performed using a modification of the subtractive approach to the partitioning of human reaction time This investigation provided information concerning the effects of display size, classification rules, and interference stimuli on input and output latencies The major findings from this investigation showed that input and output latencies were affected by different independent variables and provided information regarding the cognitive processes within a binary classification task not observed with previous methods Suggestions for further research are presented GRA

N84-21100# Illinois Univ., Champaign Cognitive Psychophysiology Lab
THE EVENT RELATED BRAIN POTENTIAL AS AN INDEX OF INFORMATION PROCESSING, COGNITIVE ACTIVITY, AND SKILL ACQUISITION: A PROGRAM OF BASIC RESEARCH Final Progress Report, 1 Sep. 1979 - 31 Aug. 1983
E DONCHIN, C WICKENS, and M. G H. COLES Oct 1983 189 p
(Contract F49620-79-C-0233; AF PROJ 2313)
(AD-A137779; CPL83-4; AFOSR-84-0051TR) Avail: NTIS HC A09/MF A01 CSCL 05J

The materials assembled in this report represent work conducted with AFOSR support at the Cognitive Psychophysiology Laboratory during the reporting period Appendix A of the report contains abstracts and papers that have been presented at various scientific meetings. In the text we present a brief review of these studies For studies not included in Appendix A, a longer review is given Appendix B gives a list of items that are either final versions of materials that were presented in previous progress reports or review chapters GRA

N84-21101# Human Resources Research Organization, Alexandria, Va.
MEMORY ORGANIZATION-BASED METHODS OF INSTRUCTION: RATIONALE AND DEVELOPMENT Interim Report, Feb. - Aug. 1983
R. G. HOFFMAN and J E MORRISON Jan. 1984 230 p
(Contract MDA903-80-C-0223; DA PROJ. 2Q2-63743-A-794)
(AD-A137504; ARI-RN-84-25) Avail: NTIS HC A11/MF A01 CSCL 05J

An effort was made to improve training techniques in order to increase retention of procedural tasks common to armor crewmen. Based on an overview of principles of cognitive, information processing psychology concerning the structuring of information in memory and on research using various memory organization mnemonics, a general training strategy was described The strategy began with a systematic structure analysis of tasks to be trained. Training was then designed to give students the organizing structure to aid their recall of the task. Two alternative strategies for presenting the structure were developed: one in which the structure guided the presentation from the beginning of training, and one in which students were first allowed to have hands-on exposure to the task before being given the structure information. Training programs using these two training strategies, along with programs using the Army's standard performance-oriented training strategy were developed for four tasks performed by M1 (Abrams) tank crew members GRA

N84-22162*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va.
A USER-ORIENTED AND COMPUTERIZED MODEL FOR ESTIMATING VEHICLE RIDE QUALITY
J D. LEATHERWOOD and L. M. BARKER (System Development Corp., Hampton, Va) Apr. 1984 45 p refs
(NASA-TP-2299; L-15745; NAS 1 60:2299) Avail: NTIS HC A03/MF A01 CSCL 05H

A simplified empirical model and computer program for estimating passenger ride comfort within air and surface transportation systems are described. The model is based on subjective ratings from more than 3000 persons who were exposed to controlled combinations of noise and vibration in the passenger ride quality apparatus. This model has the capability of transforming individual elements of a vehicle's noise and vibration environment into subjective discomfort units and then combining the subjective units to produce a single discomfort index typifying passenger acceptance of the environment. The computational procedures required to obtain discomfort estimates are discussed, and a user oriented ride comfort computer program is described. Examples illustrating application of the simplified model to helicopter and automobile ride environments are presented. E.A.K.

N84-22163# Oklahoma Univ., Norman Decision Processes Lab
RESEARCH AND THEORY ON PREDECISION PROCESSES Final Report, 15 Aug. 1980 - 30 Sep. 1983
C F. GETTYS 30 Nov. 1983 100 p
(Contract N00014-80-C-0639, NR PROJ. 197-066)
(AD-A137962; TR-11-30-83) Avail: NTIS HC A05/MF A01 CSCL 05J

This monograph discusses six years of research and theory building at the Decision Processes Laboratory concerned with predecision processes, the cognitive processes that occur prior to making the actual decision These processes include problem detection, the process by which the decision maker decides that a problem exists; act generation, the process of creating candidate acts that might solve the problem, hypothesis generation where various states of the world are identified that might affect the outcomes of various actions; and outcome generation, a process where the possible results or outcomes of actions are generated There are nine substantive chapters in the monograph. The first five chapters are concerned with modeling the various predecision processes and describe the empirical research that addresses these models. Chapter 6 is devoted to research on various topics such as schemata, causal explanation, small group research, individual differences, and expertise in various predecision processes Chapter 7 discusses recommendations for improving predecision performance, including specific attempts to aid the decision maker, and Chapter 8 presents, in summary form, the major conclusions of this program of research. In Chapter 9, general suggestions are made for further research in the area. GRA

N84-22164# Michigan State Univ , East Lansing. Dept. of Psychology.
OPERATIONALIZING HALO: PROBLEMS WITH THE COMPUTATION OF A STANDARD DEVIATION ACROSS DIMENSIONS WITHIN RATES Interim Technical Report
E. D. PULAKOS and N. SCHMITT Jan. 1984 20 p
(Contract N00014-83-K-0756)
(AD-A138393; TR-84-1; REPT-2003) Avail NTIS HC A02/MF A01 CSCL 05J

The use of a standard deviation across rating dimensions for each rate as a measure of halo is criticized for those cases in which the average of the ratings on each dimension is not equal. Standardizing the data within each dimension prior to computing the standard deviation across dimensions corrects this problem. Further, an example is presented in which this standardized standard deviation is shown to be correlated nearly 1 00 with the average intercorrelation among rating dimensions and the average difference between the true and observed dimension intercorrelations Correlations between the commonly used unstandardized standard deviation and the other operationalizations of halo were approximately 80. GRA

N84-22165# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Traffic Behavior Group
TIME TO LINE CROSSING (TLC): A NEW METHOD TO DESCRIBE DRIVING PERFORMANCE
J. GODTHELP, P MILGRAM, and G J. BLAAUW Jul. 1983 22 p refs
(IZF-1983-10; TDCK-78190) Avail· NTIS HC A02/MF A01

The time to line crossing (TLC) concept (which represents the time before an automobile reaches either edge of the driving lane, assuming a fixed steering strategy) was used to describe driving as a task in which closed loop strategies can be alternated with open loop periods Subjects drove a straight roadway at different speed levels and under conditions of temporary, self chosen occlusion periods. The results show that lateral position control and looking strategy can very well be explained in terms of the TLC data It is also shown how a combination of the driver's self chosen occlusion times and TLC may lead to a better understanding of the driver's strategy. Author (ESA)

N84-22166# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Experimental Psychology Group
SOCIETAL VERSUS INDIVIDUAL DECISION MAKING: HOW THEY MIGHT DIFFER
S. LICHTENSTEIN and W. A. WAGENAAR Oct. 1983 43 p refs
(IZF-1983-20; TDCK-78678) Avail: NTIS HC A03/MF A01

The situation in which a societal decision maker (SDM) is responsible for making decisions whose effects fall primarily or exclusively on other people is discussed The causes of differences between the decisions made by the SDMs and the preferences of the affected individuals and ways to resolve such discrepancies are considered. Discrepancies are traced to different perspectives on the problem, different values, or differences in the customary methods that people use when making decisions. For resolving decision discrepancies, the SDM should first make the decision and then, before implementing it, make a meta-analysis of that decision and its potential for generating disagreements. Once the possible source or sources of disagreements are found, resolution can be sought Author (ESA)

N84-22167# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Traffic Behavior Group.
OPEN AND CLOSED LOOP STEERING IN A LANE CHANGE MANEUVER
J. GODTHELP, A. R. A. VANDERHORST, S. BURRIJ, and C. VANDELAGEMAAT Nov. 1983 36 p refs
(IZF-1983-22; TDCK-78680) Avail NTIS HC A03/MF A01

Car steering during a lane change was analyzed as a precognitive control task, with and without occlusion to test the hypothesis that the dependency on instantaneous visual feedback is low during precognitive steering. Results show that variability in steering wheel movement amplitude increases linearly with movement amplitude, and is equal with and without occlusion. A tendency to overshoot the steering wheel movement amplitudes without visual feedback is only confirmed for maneuvers with small steering wheel movement amplitudes. A tendency to reproduce steering wheel movements too slowly under conditions without visual feedback is not confirmed. Rather than affecting the variability in steering wheel amplitude and timing separately, the withdrawal of visual feedback deteriorates the mutual tuning of these quantities. Author (ESA)

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

A84-26786
THE FUTURE FLYING OFFICE
R. L WASSON (Sperry Corp., Blue Bell, PA) IN Digital Avionics Systems Conference, 5th, Seattle, WA, October 31-November 3, 1983, Proceedings New York, Institute of Electrical and Electronics Engineers, 1983, p 19 1.1-19 1 5.

The convergence between flight station design requirements and the design requirements of the automated office are examined, with digital technology being the common denominator. The commonalities of flight station and automated office are discussed with respect to displays, data entry devices, and computer hardware and software, and attention is given to how Lockheed-Georgia's advanced concepts flight station is exemplary of an office-like design It is concluded that functional equivalence and its concomitant effects on system design requirements should serve as the impetus for designers to share ideas and strategies. B.J.

A84-26789*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif
IMPACT OF DIGITAL SYSTEMS TECHNOLOGY ON MAN-VEHICLE SYSTEMS RESEARCH
R. N. BRETOI (NASA, Ames Research Center, Man-Vehicle Systems Research Div , Moffett Field, CA) IN Digital Avionics Systems Conference, 5th, Seattle, WA, October 31-November 3, 1983, Proceedings New York, Institute of Electrical and Electronics Engineers, 1983, p 19.6 1-19.6.8 refs

The present study, based on a NASA technology assessment, examines the effect of new technologies on trends in crew-systems design and their implications from the vantage point of man-vehicle systems research. Those technologies that are most relevant to future trends in crew-systems design are considered along with problems associated with the introduction of rapidly changing technologies and systems concepts from a human-factors point of view The technologies discussed include information processing, displays and controls, flight and propulsion control, flight and systems management, air traffic control, training and simulation, and flight and resource management. The historical evolution of cockpit systems design is used to illustrate past and possible future trends in man-vehicle systems research B.J.

A84-27296
BIOSTEREOMETRICS '82; PROCEEDINGS OF THE MEETING, SAN DIEGO, CA, AUGUST 24-27, 1982
R. E HERRON, ED. (Illinois, University, Urbana, IL) Meeting sponsored by SPIE - The International Society for Optical Engineering. Bellingham, WA, SPIE - The International Society for Optical Engineering (SPIE Proceedings. Volume 361), 1983, 365 p

Subjects related to stereometric data acquisition are discussed, taking into account the study of craniofacial anomalies with a portable stereo camera, a family of calibrated stereometric cameras for direct intraoral use, an automated system for stereometric analysis of the human face, semireal time monitoring of the functional movements of the mandible, rapid three-dimensional measurements in clinical dentistry, close-range photogrammetry in predicting animal weight, and applications of hybrid image processing for the determination of the optical properties of cellular membranes Other topics explored are concerned with stereometric data acquisition and moireinterferometry, stereometric analysis and display, stereometric radiography, biomechanics, and the eye and the brain. Attention is given to X-ray photogrammetry for endocavitary radiation therapy, a television scanning technique for topographic body measurements, applications of biostereometry to geriatric neurology, concepts of biostereometrics applied to robotics, and the analysis and display of human wrist motion G R.

A84-27297
INTERACTIVE STRUCTURE (EUCLID) FOR STATIC AND DYNAMIC REPRESENTATION OF HUMAN BODY
CH RENAUD and R. STECK (Paris V, Universite, Paris, France) IN Biostereometrics '82, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 . Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p 146-151. refs

It is pointed out that recent developments in the means of biostereometric measurements make it possible to describe man in static and dynamic position, in reference to three-dimensional space. The integration of the three-dimensional data in representation of the human body will make it feasible to create static or dynamic models of different complexities in accordance with problems considered in biodynamics, ergonomics, and anatomy The present investigation is concerned with the development of an interactive structure capable of creating different models in various degrees of complexity The considered system is connected to a data bank with the objective of employing two-dimensional and three-dimensional basic data in anthropometry and biomechanics EUCLID software of three-dimensional data processing as well as the International Data Bank of Human Biometry and Ergonomy are integrated on a host computer of great capacity. G.R.

A84-27298
BIOSTEREOMETRIC STUDY OF A SAMPLE OF 50 YOUNG ADULTS BY PHOTOGRAMMETRY
R MOLLARD, M. SAUVIGNON, and J C. PINEAU (Paris V, Universite, Paris, France) IN· Biostereometrics '82, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 . Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p. 234-240. refs

The biostereometric study of the human body has important applications related to human biology, anthropology, physiology, equipment design, and medicine A three-dimensional photogrammetric measurement procedure was used in a study involving 50 young French male adults. The subjects were photographed in positions of normal standing and erect sitting The obtained pictures were processed on an analytic stereo-plotter which was connected with a computer The investigation had the objective to establish from the experimental data the relationship between anthropometric dimensions and partial and overall surfaces and volumes A Biostereometric Acquisition Unit was designed and built. This unit makes it possible to collect three-dimensional information about anthropomorphic measurements and body form on all the subjects at the same time G.R.

A84-27299* Northrop Services, Inc., Houston, Tex.
MEASUREMENT OF REACH ENVELOPES WITH A FOUR-CAMERA SELECTIVE SPOT RECOGNITION (SELSPOT) SYSTEM
J. H STRAMLER, JR. (Northrop Services, Inc., Houston, TX) and B J WOOLFORD (NASA, Johnson Space Center, Houston, TX) IN: Biostereometrics '82, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p. 241-245. refs

The basic Selective Spot Recognition (SELSPOT) system is essentially a system which uses infrared LEDs and a 'camera' with an infrared-sensitive photodetector, a focusing lens, and some A/D electronics to produce a digital output representing an X and Y coordinate for each LED for each camera. When the data are synthesized across all cameras with appropriate calibrations, an XYZ set of coordinates is obtained for each LED at a given point in time Attention is given to the operating modes, a system checkout, and reach envelopes and software. The Video Recording Adapter (VRA) represents the main addition to the basic SELSPOT system The VRA contains a microprocessor and other electronics

which permit user selection of several options and some interaction with the system G.R

A84-27558
THE POLYACRYLAMIDE AS A PHANTOM MATERIAL FOR ELECTROMAGNETIC HYPERTHERMIA STUDIES
M. G BINI, A IGNESTI, L MILLANTA, R. OLMI, N. RUBINO, and R VANNI (CNR, Istituto di Ricerca sulle Onde Elettromagnetiche, Florence, Italy) IEEE Transactions on Biomedical Engineering (ISSN 0018-9294), vol BME-31, March 1984, p 317-322 refs

The Polyacrylamide gel is suggested as a new and convenient material for simulating the electrical behavior of biological tissues in experimental studies of heat deposition by electromagnetic means. The advantages of Polyacrylamide are: (1) excellent optical transparency, (2) solid elastic, (3) easily shaped into complex forms, and (4) readily prepared with a complete range of highly reproducible values of electrical parameters, which can also be combined to simulate various different tissues in complex structures The material is also low-cost and readily available The preparation of the material is explained and all the relevant data for obtaining the electrical properties of interest are given The thermal behavior is also important and is investigated. Attention is concentrated onto the short-wave frequency range, where phantom studies are essential, but the possibility of using the same material at microwave frequencies is also pointed out Author

A84-28255
INVESTIGATING THE HUMAN ERROR IN AIRCRAFT ACCIDENTS
A ADERET and Y. TAL (Israel Air Force, Tel Aviv, Israel) International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, March 1984, p 458-462. refs

Human error is a dominant causal factor in aviation accident statistics, and aircrew errors currently represent the largest single cause of aircraft accidents. In order to systematically analyze the conduct of key personnel in a typical human factors-related aircraft accident, the Behavioral Sequence Model has been developed. It identifies both the indicators of the given emergency and the responses of the air crew (usually, the pilot), as is presently illustrated for the case of an aircraft spin accident. It is suggested that the investigation and analysis of accidents according to this model will lead to the discovery of those situations in which pilot response is most critical, thereby allowing training to be focused on those situations and the most appropriate responses to them. O.C.

A84-28259
THE MAINTENANCE AND TESTING OF SURVIVAL SUITS - PROBLEMS AND OPTIONS
F. PIDCOCK International Journal of Aviation Safety (ISSN 0264-6803), vol. 1, March 1984, p. 482-484.

The materials, fabrication, servicing and cleaning requirements of 'survival suits' employed by helicopter crews and passengers engaged in North Sea oil industry-related operations are discussed. A Survival Suit Service Center has been established at Aberdeen Airport in order to furnish expert inspection, repair, and cleaning services for such apparel The stimulus for the establishment of such a service came as a result of the experiences of oil company personnel with the survival suit designs and the maintenance practices which were available at the outset of North Sea operations, in 1977. O C

A84-28422
STANDARDIZATION OF DIMENSIONS OF SHIP LIVING SPACES IN LIMITED-AREA CONDITIONS [NORMIROVANIE RAZMEROV KORABEL'NYKH ZHILYKH POMESHCHENII V USLOVIIAKH DEFITSITA PLOSHCHADI]
V. V POLONSKII Voenno-Meditsinskii Zhurnal (ISSN 0026-9050), Feb 1984, p. 47. In Russian.

A84-28523* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va
NASA RESEARCH IN TELEOPERATION AND ROBOTICS
A J MEINTEL, JR (NASA, Langley Research Center, Automation Technology Branch, Hampton, VA) and R. L. LARSEN (NASA, Computer Science and Electronics Office, Washington, DC) IN: Robotics and industrial inspection, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 . Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p. 22-30 refs

Increased automation is necessary in future NASA missions Drivers for automation include constrained funding and physical resources as well as mission capabilities not achievable through conventional means. The application of emerging technology in manipulators and machine intelligence will enable the development of robotic devices remotely commanded by human operators to increase man's productivity in space. The Office of Aeronautics and Space Technology (OAST) has established a program for research in teleoperation and robotics. The program's near-term focus is a Remote Orbital Servicing System (ROSS) The longer range goals include: (1) basic research in autonomous operations, (2) human factors research on the man-machine interface to remote systems, and (3) system integration and analysis of advanced concepts. This paper reviews the current NASA research and technology and considers future work needed to meet the OAST goals. Author

A84-28524
DARPA PROGRAM - INTELLIGENT TASK AUTOMATION
E C LEVINTHAL (U S. Defense Advanced Research Projects Agency, Defense Science Office, Arlington, VA) IN: Robotics and industrial inspection, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 . Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p. 32-38. refs

Industrial robots for many future applications will have to be much more sophisticated than current robots employed for assembling automobiles. The use of military robots with adequate capability for a number of envisaged applications is also being considered. The Defense Advanced Research Project Agency (DARPA) has a primary responsibility to support research leading to the development of robots with the required abilities It is thought that robots will provide a tool for manufacturing in an affordable way the most technologically advanced systems. Other applications of robots are related to the detection and the elimination of mines. Intelligent Task Automation (ITA) is to provide the base for future developments The developments needed are discussed, taking into account the manipulator function and control, end sensing, micro-miniature motors, and intelligent sensory data integration. G.R.

A84-28525
APPLICATIONS OF ARTIFICIAL INTELLIGENCE/ROBOTICS
D. R. BROWN, D. V. FOWLER, W. T. PARK, and A. E. ROBINSON (SRI International, Menlo Park, CA) IN Robotics and industrial inspection, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p 50-57 refs
(Contract DAAK70-81-C-0250)

A plan for research and development in the area of artificial intelligence is considered, taking into account applications in Army combat and combat support. In order to perform human tasks, an intelligent robot should be able to think, sense, and effect (move and manipulate). Thinking, involving the implementation of the 'brain' function by means of a computer, is the domain of artificial intelligence. Attention is given to aspects of sensing and effecting, the need for some knowledge about the environment, the processes by which an intelligent system decides to influence its environment by direct actions, mobility, manipulation, the generation of information, and reasoning. Application categories include human/equipment interface aids, planning and monitoring aids, expert advisors, data assimilation and access aids, support systems, situation assessment systems, system controllers, weapons, and information collectors G.R.

A84-28526
OVERVIEW OF NAVY ROBOTICS
S. Y. HARMON and G R MCDEVITT (U S. Naval Ocean Systems Center, San Diego, CA) IN Robotics and industrial inspection, Proceedings of the Meeting, San Diego, CA, August 24-27, 1982 Bellingham, WA, SPIE - The International Society for Optical Engineering, 1983, p. 58-66.

Robotics technology can be applied to numerous areas of naval operations Three general areas of applications are discussed in this paper: (1) production, (2) support and (3) operations Production applications involve manufacturing naval material. Shipbuilding robots are the primary production applications currently of interest to the Navy. Support activities ensure the availability of both expendable and permanent equipment resources at the field units The most near term support applications of robots are maintenance and repair applications. Operations applications use robots as active parts of the battle process. Robots for naval battlefield operations which could perform such tasks as surveillance, intelligence collection, communications and C3 countermeasures are well within the capabilities of existing technology This area of Navy applications requires the most advanced technology of all the other areas. The Navy robots which will find the quickest and widest implementations will be those for which there is substantial industrial experience and commercial availability Author

A84-28672
ENGINEERING PSYCHOLOGY IN MILITARY PRACTICE [INZHENERNAIA PSIKHOLOGIIA V VOENNOM DELE]
B. F. LOMOV, ED. Moscow, Voenizdat, 1983, 224 p. In Russian

The principal problems of contemporary military engineering psychology are reviewed, including the psychological structure of military technician activity, the perception, retention, and processing of information, the motor activity and abstract thought processes of the military technician; occupational selection and orientation, and the psychology of military duty. Attention is given to the reliability of military technical systems and the impact of engineering psychology, the influence of emotional state on operator activity, the ergonomic support of the functional quality of military technical systems, and education and psychological preparation of military technicians. A brief analysis of the physiological and psychological elements involved in fighter pilot missions is also presented No individual items are abstracted in this volume J.N.

A84-28849
THE DEVELOPMENT OF A DYNAMIC RESPONSE SENSING AND RECORDING SYSTEM FOR INCORPORATION INTO A STATE-OF-THE-ART MANIKIN
G D FRISCH (U.S. Naval Material Command, Naval Air Development Center, Warminster, PA) and P H. FRISCH (Applied Physics, Inc., Nanuet, NY) SAFE Journal, vol. 14, Spring 1984, p. 13-20. refs

The technical need for improved manikin utilization and the historical manikin development are discussed as an introduction to a program designed to modify the Hybrid III dummy with six degrees of freedom for use in ejection seat and restraint evaluation testing Additional goals of the program include developing an instrumentation package that permits three dimensional tracking of dummy based coordinate systems within the seat, and incorporating a microprocessor controlled data acquisition and storage system into the manikin The system presently developed is comprised of signal conditioning, A/D conversion, and storage Using 1 MBYTES of RAM storage, the system can support 50 channels for 6 6 seconds, and it is expandable to 16 MBYTES of available memory From work underway, it is concluded that the structural integrity of Hybrid III will be established and its level of biofidelity ascertained. Applications include standardization of data acquisition and analysis techniques, and conforming to Military Specifications and Standards. C.M.

A84-29026* Lockheed Missiles and Space Co , Sunnyvale, Calif
THE DEVELOPMENT OF A SPACE SHUTTLE GENERAL PURPOSE WORK STATION (GPWS)
P. A WAGNER (Lockheed Missiles and Space Co , Inc., Sunnyvale, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 9 p.
(Contract NAS2-10198)
(SAE PAPER 831090)

The GPWS being developed for the Life Sciences Laboratory to be flown on the fourth Spacelab mission in late 1985 is characterized, and results from Phase I and Phase II tests are reported. The GPWS is designed to provide biological protection for both experiment and operator, a clean-room environment, control of liquids at zero gravity, protection against Spacelab-cabin contamination by chemical vapors, and work space with lights and other accommodations for one or two users in the zero-gravity neutral-body position The flight hardware subsystems are examined and illustrated, the approach taken to evaluate human factors, performance, contaminant control, and user accommodation is explained; the design-verification unit for ground testing is described, and the improvements introduced in constructing the flight version are indicated. T K

A84-29028*
THE LSLE ECHOCARDIOGRAPH - COMMERCIAL HARDWARE ABOARD SPACELAB
R. SCHWARZ AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 7 p.
(Contract NAS9-15850)
(SAE PAPER 831092)

The Life Sciences Laboratory Equipment Echocardiograph, a commercial 77020AC Ultrasound Imaging System modified to meet NASA's spacecraft standards, is described. The assembly consists of four models display and control, scanner, scan converter, and physioamplifiers. Four separate processors communicate over an IEE-488 bus, and the system has more than 6000 individual components on 35 printed circuit cards Three levels of self test are provided a short test during power up, a basic test initiated by a front panel switch, and interactive tests for specific routines Default mode operation further enhances reliability Modifications of the original system include the replacement of ac power supplies with dc to dc converters, a slide-out keyboard (to prevent accidental operation), Teflon insulated wire, and additional shielding for the ultrasound transducer cable. C M

A84-29029
THE LAYOUT OF A LABORATORY FOR LIFE SCIENCES EXPERIMENTS IN SPACE
D. J. GROUNDS (General Electric Co , Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 7 p
(SAE PAPER 831093)

The planned layout for NASA's life science Spacelab 4 (SL-4) mission payload was reviewed. Physical characteristics and functional capabilities of the Spacelab module were discussed and illustrated The SL-4 payload which holds 25 plant, animal, and human studies (e.g., four cardiovascular/cardiopulmonary and five metabolic/immunology experiments) was described Also covered were the layout of the animal facilities and the human experiment equipment (e.g , an Ergometer, a Body Mass Measurement Device, and a Body Restriction Device) Racks were described, with their starboard and portside layouts presented In conclusion, it was stated that the payload layout was still in a state of flux and that the cost tradeoffs of modifications were always being taken into consideration. C M.

A84-29031
PRIMATE METABOLIC SYSTEM FOR SHUTTLE
N. PACE (California, University, Berkeley, CA) and T. SECORD (McDonnell Douglas Astronautics Co., Huntington Beach, CA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 11 p refs
(SAE PAPER 831096)

An appraisal of the scientific need for metabolic research is presented, and a Primate Metabolic System (PMS) for the Shuttle is proposed. Discussed are experiments designed to measure the metabolic cost of earth gravity in Macaca nemestrina and to examine some of the physiological consequences of the predicted weightlessness-induced decrease in total metabolic energy expenditure rate The monkey pod, designed to measure continuously metabolic and cardiovascular changes while retraining macaque monkeys comfortably under space conditions, is described the monkey is installed in a fiberglass couch and nylon-net jacket assembly, introduced into a hermetically sealed fiberglass envelope or pod Additional topics covered include habitat and supporting equipment, the data management and control system; food, water, and waste management; and a representative PMS flight test and research program. C.M.

A84-29043* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ENVIRONMENTAL CONTROL AND LIFE SUPPORT FOR AN EVOLUTIONARY SPACE STATION
P. D QUATTRONE (NASA, Ames Research Center, Moffett Field, CA) and R. A WYNVEEN (Life Systems, Inc., Cleveland, OH) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 18 p. refs
(SAE PAPER 831108)

The requirements for the Space Station are being defined The Environmental Control/Life Support System (ECLSS) is one of its 13 systems. The ECLSS is further divided into five functional categories. Major ones are the Air Revitalization and Water Reclamation Systems. The paper presents ECLSS performance requirements, average design loads and fluids interfaces The major cost savings of regenerable ECLSS techniques versus the open loop approach are quantified Issues impacting ECLSS design are cited Priority regenerable ECLSS developments are reviewed including the Electrochemical CO2 Concentrator, Static Feed Electrolyzer and Automated Control/Monitor Instrumentation. Baseline and alternative approaches are cited. The ECLSS planning issues are reviewed including functional boundaries, planning schedule, technology maturity definition and technology gaps. The paper concludes with a review of water electrolysis as a Space Station utility impacting ECLSS design Author

A84-29044* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SYSTEMS ENGINEERING ASPECTS OF A PRELIMINARY CONCEPTUAL DESIGN OF THE SPACE STATION ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM
C H. LIN and M. S. MEYER (NASA, Johnson Space Center, Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 19 p.
(SAE PAPER 831109)

The systems engineering aspects of developing a conceptual design of the Space Station Environmental Control and Life Support System (ECLSS) are discussed Topics covered include defining system requirements and groundrules for approach, formulating possible cycle closure options, and establishing a system-level mass balance on the essential materials processed in oxygen and water cycles. Consideration is also given to the performance of a system trade-off study to determine the best degree of cycle closure for the ECLSS, and the construction of a conceptual design of the ECLSS with subsystem performance specifications and candidate concepts. For the optimum balance between development costs, technological risks, and resupply penalties, a partially closed cycle ECLSS option is suggested C M.

A84-29045* National Aeronautics and Space Administration. Lyndon B Johnson Space Center, Houston, Tex.
INTEGRATED ATMOSPHERE REVITALIZATION SYSTEM DESCRIPTION AND TEST RESULTS
R. B. MARTIN, N LANCE, R. J. CUSICK (NASA, Johnson Space Center, Houston, TX), and A. T LINTON (Boeing Aerospace Co., Seattle, WA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 14 p refs
(SAE PAPER 831110)

The design and operation of several air revitalization subsystems are described, along with the testing of these subsystems separately and integrated in an air revitalization system for use in space stations. The subsystems are: one that generates O2 by water electrolysis, one that removes and concentrates CO2 using an electrochemical technique, and one that reduces concentrated CO2 by the Sabatier process Results of the integrated testing include the observations that liquid cooling should be baselined for recovery of the CO2 reduction subsystem product water, continuous CO2 injection into the air supply unit is preferable, small changes in the current CO2 removal subsystem inlet PCO2 are detectable as changes in the CO2 reduction subsystem reactor temperatures, and hardwired shutdown of critical parameters is vital if computer-based controllers are not redundant Several block diagrams are provided. C.M.

A84-29046* National Aeronautics and Space Administration. Lyndon B Johnson Space Center, Houston, Tex.
INTEGRATED WATER MANAGEMENT SYSTEM - DESCRIPTION AND TEST RESULTS
N C ELDEN, H E WINKLER, D. F. PRICE (NASA, Johnson Space Center, Houston, TX), and R P REYSA (Boeing Aerospace Co , Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 13 p. refs
(SAE PAPER 831111)

Water recovery subsystems are being tested at the NASA Lyndon B. Johnson Space Center for Space Station use to process waste water generated from urine and wash water collection facilities. These subsystems are being integrated into a water management system that will incorporate wash water and urine processing through the use of hyperfiltration and vapor compression distillation subsystems. Other hardware in the water management system includes a whole body shower, a clothes washing facility, a urine collection and pretreatment unit, a recovered water post-treatment system, and a water quality monitor This paper describes the integrated test configuration, pertinent performance data, and feasibility and design compatibility conclusions of the integrated water management system. Author

A84-29047* Boeing Aerospace Co., Houston, Tex.
HYPERFILTRATION WASH WATER RECOVERY SUBSYSTEM - DESIGN AND TEST RESULTS
R. P. REYSA (Boeing Aerospace Co., Houston, TX), D. F PRICE (NASA, Johnson Space Center, Houston, TX), T OLCOTT (Lockheed Missiles and Space Corp., Palo Alto, CA), and J. L. GADDIS (Clemson University, Clemson, SC) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 12 p refs
(SAE PAPER 831112)

The Hyperfiltration Wash Water Recovery (HWWR) subsystem, designed to offer low-power high-volume wash water purification for extended mission spacecraft, is discussed in terms of preprototype design and configuration. Heated wash water collected from the shower, hand wash, and laundry flows into a temperature-controlled (374 K) waste storage tank Two parallel 25 micron absolute filters at the tank outlet remove large particles from the feed stream. A positive displacement feed pump delivers wash water to the hyperfiltration module at a constant flow rate of 0.20 lpm with discharge pressure variations from 4181-7239

Kpa The hyperfiltration membrane module is a single-pass design including 36 porous stainless steel tubes, and is designed to provide an approximate water recovery rate of 90 percent. Permeate and brine water flows are monitored by flow meters, and removal of urea and ammonia is achieved by adding 15 percent NaOCl solution to the permeate fluid stream An alternate module design using two diameters of tubing (allowing a smaller pressure drop and a larger membrane area) gave a superior predicted performance over the first module with larger tubing throughout J N.

A84-29048* National Aeronautics and Space Administration. Lyndon B Johnson Space Center, Houston, Tex.
URINE PRETREATMENT FOR WASTE WATER PROCESSING SYSTEMS
H. E. WINKLER, C. E. VEROSTKO (NASA, Johnson Space Center, Houston, TX), and G. F. DEHNER (United Technologies Corp , Hamilton Standard Div , Windsor Locks, CT) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 8 p. refs
(SAE PAPER 831113)

Recovery of high quality water from urine is an essential part of life support on a Space Station to avoid costly launch and resupply penalties. Water can be effectively recovered from urine by distillation following pretreatment by a chemical agent to inhibit microorganism contamination and fix volatile ammonia constituents. This paper presents the results of laboratory investigations of several pretreatment chemicals which were tested at several concentration levels in combination with sulfuric acid in urine. The optimum pretreatment formulation was then evaluated with urine in the Hamilton Standard Thermoelectric Integrated Membrane Evaporation Subsystem (TIMES) Over 2600 hours of test time was accumulated Results of these laboratory and system tests are presented in this paper Author

A84-29054
ELECTROCHEMICAL AND STEAM-DESORBED AMINE CO2 CONCENTRATION SUBSYSTEM COMPARISON
D. B HEPPNER and F H. SCHUBERT (Life Systems, Inc , Cleveland, OH) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 11 p. refs
(SAE PAPER 831120)

A comparative study has been conducted for the continuous Electrochemical Depolarized CO2 Concentration (EDC) and amine resin bed cyclic absorption/desorption systems which may furnish CO2 removal for a regenerative space station environmental control and life support system, with attention to the sizing of their respective subsystems. The analysis includes identification of subsystem boundaries, which are defined as the hardware required for the replacement of the nonregenerable substances otherwise employed in the space station system It is found that the EDC concept has a far lower equivalent weight than the alternative O C.

A84-29056
PHASE CHANGE WATER RECOVERY TECHNIQUES - VAPOR COMPRESSION DISTILLATION AND THERMOELECTRIC/MEMBRANE CONCEPTS
F. H. SCHUBERT (Life Systems, Inc , Cleveland, OH) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 17 p refs
(SAE PAPER 831122)

The Vapor Compression Distillation (VCD) and thermoelectric/membrane evaporation concepts, both of which involve phase change recovery processes and attempt to minimize the energy input/unit mass of water recovered by using heat released by condensation as energy for further evaporation, are being considered for the recovery of water from urine and other waste waters in a space station regenerative life support system Comparisons between these alternatives are conducted in light of configurational and subsystem schematics, component sizing considerations, and projected operational characteristics The thermoelectric concept is found to be 26 percent heavier, with 56 percent higher total equivalent weight and more than twice the energy/unit mass of water recovered by the alternative VCD process. O C

A84-29075* Boeing Aerospace Co., Seattle, Wash
A NEAR-TERM MISSION FOR CELSS
E A. GUSTAN, T. J. VINOPAL, and R L. OLSON (Boeing Aerospace Co , Seattle, WA) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983 14 p. refs
(Contract NAS2-11148)
(SAE PAPER 831149)

A study has been conducted on the mission types that may benefit from Controlled Ecological Life Support System (CELSS) technology, with emphasis on manned missions projected by NASA for the next 50 years and cost evaluations in which transportation system characteristics are factored The CELSS analyses considered water, air revitalization, waste management, and food production. The six mission locations considered included four in the earth-moon system, together with asteroid belt and Mars surface missions. In the various locations, the radiation, solar flux and available materials scenario can be very different. It is concluded on the basis of these considerations that the short duration Mars sortie mission analyzed will not benefit from CELLS technology, while large manned bases beyond the earth-moon system will not only benefit, but positively require it. O C

A84-29076* United Technologies Corp , Windsor Locks, Conn.
REGENERABLE NON-VENTING THERMAL CONTROL SUBSYSTEM FOR EXTRAVEHICULAR ACTIVITY
G J. ROEBELEN, JR., K. J DRESSER, E W HODGSON, JR. (United Technologies Corp , Hamilton, Standard Div , Windsor Locks, CT), and C. LIN (NASA, Johnson Space Center, Houston, TX) AIAA, SAE, ASME, AIChE, and ASMA, Intersociety Conference on Environmental Systems, 13th, San Francisco, CA, July 11-13, 1983. 15 p.
(Contract NAS9-16609)
(SAE PAPER 831151)

Extravehicular Mobility Unit heat rejection requirements have been formulated for both Space Shuttle Orbiter and space station regenerable nonventing thermal sink (RNTS) applications, where the former involve nonventing extravehicular activity (EVA) missions and the latter both nonventing and regenerable EVA. The present conceptual study notes that while the exclusive use of thermal storage is suitable for the Space Shuttle mission, space station requirements are best satisfied by a hybrid system which combines thermal storage with radiator and heat pump. The Space Shuttle RNTS thermal control subsystem's thermal storage unit uses water as a phase change medium. It is noted that the same heat storage unit can satisfy the Space Shuttle and space station requirements. O.C.

A84-29476
AEROSPACE BEHAVIORAL ENGINEERING TECHNOLOGY CONFERENCE, 2ND, LONG BEACH, CA, OCTOBER 3-6, 1983, PROCEEDINGS
Conference sponsored by the Society of Automotive Engineers. Warrendale, PA, Society of Automotive Engineers, Inc. (SAE P-132), 1983, 503 p

The man/machine interaction and its functional relationship to present and future operational environments are addressed with regard to the critical automation workload technology issues facing the aerospace industry. Topics discussed include the role of aircraft recorders in human performance investigations, the dissociation of workload assessment metrics; operational aspects of the integrated vertical flight path and speed control system; man's role in a remote orbital servicing system; and information processing using helmet-mounted displays and voice interactive systems Attention is also given to improving the operator interface through use of a touch interactive display, information interpretation through pictorial format; and the F-15 dual role fighter cockpit integration Other areas of study include the airline pilot's perspective of the

operating environment; the impact of technology on rotorcraft mission management, advanced flight deck information and display concepts for commercial transport; and behavioral aspects of interaction with high technology systems. J.N.

A84-29485* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MAN'S ROLE IN A REMOTE ORBITAL SERVICING SYSTEM
J. E. PENNINGTON and W. W. HANKINS, III (NASA, Langley Research Center, Hampton, VA) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 75-78. refs
(SAE PAPER 831422)

The Remote Orbital Servicing System (ROSS), a focal point for NASA research in automation and robotics, is discussed in terms of the role of man in such a system. In the supervisory control mode, the ROSS operator inputs high-level goals to a strategic (nonreal-time) planner which then passes the plan or series of actions to a tactical (real-time) planner which executes the plan. Using directed control, man makes more specific commands to perform strategic planning with or without the use of the automated strategic planner. Shared computer/manual control will require a multifunction interactive display. At the teleoperator control level, a hand controller is used to command the ROSS manipulator and end effectors. J N

A84-29495
WARNINGS AND CAUTIONS - ARE WE ON THE RIGHT TRACK?
R. J. OHANLON (U.S. Navy, Naval Air Test Center, Patuxent River, MD) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 199-202.
(SAE PAPER 831458)

With each new generation of tactical jet aircraft, the number of alerts is increasing. Since cockpit space is at a premium, a system of displaying alerts to the aircrew must be designed and integrated into the airframe. A cost effective method of accomplishing this task includes appointing a panel of pilots to advise the manufacturers about the cockpit from a user's point of view. In order to reduce distractions to the aircrew during critical combat phases of flight, a scheme of inhibiting alerts should be adopted The decision concerning which alerts should be inhibited during which phases of flight should be made by the panel of pilots convened by the manufacturer. The final product will be an aircraft that will inform the pilot only of the most severe system failures during combat which will allow the mission to be accomplished without unnecessary distractions, thus reducing the crew's workload Author

A84-29496
IMPROVING THE OPERATOR INTERFACE THROUGH USE OF A TOUCH INTERACTIVE DISPLAY
T. M. MCKANNON and C. A. BOHN (U.S Navy, Naval Air Test Center, Patuxent River, MD) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p 203-207.
(SAE PAPER 831459)

In investigations related to the optimization of the performance of weapons systems, it must be realized that the key element in the performance of many modern weapon systems is the interface between the operator and the machine. A good operator interface can often be obtained on the basis of the utilization of the new display and control technologies. The present study is concerned with the replacement of conventional controls by a plasma panel with a transparent, microdepression touch overlay. The two components form an integral whole referred to as the ICP The display makes use of a large number of small neon lights, each of which can be turned on or off independently. The display's 60 dots per linear inch resolution is high for commercial, discrete technologies ICP applications in a fixed wing, multiengine aircraft used primarily for antisubmarine and maritime patrol missions are discussed. G.R.

A84-29501
INFORMATION INTERPRETATION THROUGH PICTORIAL FORMAT
J S. HAWKINS, J M. REISING (USAF, Wright-Patterson AFB, OH), and J. D GILMOUR (Boeing Military Airplane Co , Seattle, WA) IN· Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc , 1983, p. 243-248
(SAE PAPER 831468)

Three key display formats needed for maximization of the benefits of tactical flight management algorithms to fighter aircraft pilots are discussed heads-up display, vertical situation display, and horizontal situation display. The monochrome and color versions of each format were analyzed using a model configuration consisting of simulation host computing and bus communication equipment, a digital graphics system, a crew station with displays, and supporting elements including data recording units. The front seat of a multimission two-man tandem crew station was modified to include five color CRT monitors. Results of simulated 4-D flight path control, automatic and manual terrain following, and threat avoidance indicate faster and more accurate pilot response when the displays are in color; 21.2 percent fewer switch hit errors were recorded with color than monochrome displays Also, when only threat-related display elements were considered, pilot ratings of the systems were consistently higher J.N.

A84-29515
INTEGRATED VOICE CONTROLS AND SPEECH DISPLAYS FOR ROTORCRAFT MISSION MANAGEMENT
C. A. SIMPSON (Psycho-Linguistic Research Associates, Menlo Park, CA) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p 359-368 refs
(SAE PAPER 831523)

After assessing the development status of computer voice generation and speech recognition technology in the context of potential rotorcraft cabin applications, suggestions are made toward the integrated development and design of such systems for missions typical of rotorcraft. Attention is also given to the most pertinent set of human factors issues that must influence such design efforts. Currently commercially available voice recognition systems physically suitable for incorporation by aircraft are speaker-dependent, recognize only isolated words, and respond to a fixed, though user-alterable, vocabulary. O.C.

A84-29519
COMMUNICATIONS - MAJOR HUMAN FACTOR IN COCKPIT DESIGN
J. J. SPEYER and A. P FORT (Airbus Industrie, Blagnac, Haute-Garonne, France) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p 399-407. refs
(SAE PAPER 831530)

Communications and human factors in relation to aspects of the design of the cockpit for an aircraft are considered. It is pointed out that the design of the best possible man-machine interface implies a dedicated human factor orientation towards optimizing man-machine comunication. A European Aircraft manufacturer decided, therefore, that in order to derive maximum benefit from the capabilities of latest technology, it had to tailor its cockpit design to the needs of proper man-machine communications. Attention is given to cockpit design criteria, questions of cockpit resource management, relations between communications and new technology, communications and cockpit esthetics, and communications and future technology It is expected that electronics will ultimately also integrate the various aerodynamic,

structural, economical, and systems-related constraints into flight management Crucial for the new era will be the reliability of electronic equipment. G R.

A84-29520
THE TOUCH-SENSITIVE CONTROL/DISPLAY UNIT - A PROMISING COMPUTER INTERFACE
M. A. BIFERNO and D. L. STANLEY (Douglas Aircraft Co , Long Beach, CA) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings Warrendale, PA, Society of Automotive Engineers, Inc., 1983, p. 409-413.
(SAE PAPER 831532)

Installation of a touch-sensitive control/display unit (touch-CDU) could improve the operational reliability of future aircraft cockpits, providing that basic human factors issues are addressed early in the development phase of this device. The touch-CDU could be implemented with electronic displays to help: (1) reduce peak workload levels, (2) improve situational awareness, (3) improve the mental set of command and control over the process of flight, (4) reduce the number of controls outside of the optimum eye-hand envelope, (5) reduce crew error due to data-entry, (6) encourage cockpit designers to employ a systems approach Although the technology exists to implement touch-CDUs in aircraft, several problem areas need to be studied (1) the effects of turbulence, (2) glare and reflections, (3) cockpit location and orientation to the operator, (4) electronic display formats compatible with touch-entry activities It is concluded that touch-CDUs offer a promising man/machine interface for aircraft cockpits, provided that adequate developmental testing is performed Author

A84-29522
INTEGRATED MODELLING APPROACHES IN ADVANCED COCKPIT AUTOMATION
A. MADNI (Perceptronics, Encino, CA) IN Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings . Warrendale, PA, Society of Automotive Engineers, Inc , 1983, p. 427-432
(SAE PAPER 831543)

A unified approach is outlined for introducing automation in the cockpit of a tactical platform It is suggested that no one model is ideally suited for the variety of onboard tactical functions. For this reason, a multi-model-based approach embedded within an overall framework of artificial intelligence (AI) is proposed This approach makes use of the capabilities of each model as necessary while also preserving the overall flexibility of the AI-based framework. It is further suggested that within this framework, automation of higher level planning and situation assessment functions is possible The man-machine interface associated with the automation of these functions is seen as undergoing significant changes, especially in the level of abstraction at which information is exchanged and the degree to which information is symbolically encoded. C R.

A84-29524* Army Research and Technology Labs., Moffett Field, Calif
VOICE INTERACTIVE ELECTRONIC WARNING SYSTEMS (VIEWS) - AN APPLIED APPROACH TO VOICE TECHNOLOGY IN THE HELICOPTER COCKPIT
J W VOORHEES (U.S. Army, Aeromechanics Laboratory, Moffett Field, CA) and N. M. BUCHER (NASA, Ames Research Center, Moffett Field, CA) IN: Aerospace Behavioral Engineering Technology Conference, 2nd, Long Beach, CA, October 3-6, 1983, Proceedings Warrendale, PA, Society of Automotive Engineers, Inc , 1983, p. 445-452.
(SAE PAPER 831545)

The cockpit has been one of the most rapidly changing areas of new aircraft design over the past thirty years. In connection with these developments, a pilot can now be considered a decision maker/system manager as well as a vehicle controller. There is, however, a trend towards an information overload in the cockpit, and information processing problems begin to occur for the rotorcraft pilot. One approach to overcome the arising difficulties is based on the utilization of voice technology to improve the information transfer rate in the cockpit with respect to both input and output. Attention is given to the background of speech technology, the application of speech technology within the cockpit, voice interactive electronic warning system (VIEWS) simulation, and methodology. Information subsystems are considered along with a dynamic simulation study, and data collection. G.R

A84-29581#
MAPPING AN ASTRONAUT AND HIS REACH
B FRISCH Aerospace America (ISSN 0740-722X), vol 22, April 1984, p 44-46.

In astronauts subjected to zero g, a number of changes occur with respect to the dimensions of their bodies, their attitude, and their ability to make movements For these reasons, it appears desirable to NASA to map the reach and other movements of astronauts to see if they can work controls and do repair jobs properly An eventual simulation of individual astronauts in three dimensions is considered, taking into account movements inside and around space work sites The tools developed for conducting these studies should also serve for aircraft pilots, car and truck drivers, robots, machinery operators, and plant monitors at control consoles. At the beginning, a simple goniometer, or angle-measuring system was devised. Adding a second camera turned the goniometer into a three-dimensional anthropometric measurement system G.R

A84-29853* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex
HABITABILITY DESIGN ELEMENTS FOR A SPACE STATION
M C DALTON (NASA, Johnson Space Center, Houston, TX) IN: Space manufacturing 1983; Proceedings of the Sixth Conference, Princeton, NJ, May 9-12, 1983 San Diego, CA, Univelt, Inc., 1983, p 9-26.
(AAS PAPER 83-200)

Habitability in space refers to the components, characteristics, conditions, and design parameters that go beyond but include the basic life sustaining requirements. Elements of habitability covered include internal environment, architecture, mobility and restraint, food, clothing, personal hygiene, housekeeping, communications, and crew activities All elements are interrelated and need to be treated as an overall discipline Designing for a space station is similar to designing on earth but with 'space rules' instead of ground rules It is concluded that some habitability problems require behavioral science solutions C M.

N84-20719# L'Air Liquide, Sassenage (France) Food and Pharmaceutical Industries Dept
FOOD PRESERVATION WITH GAS
M COULON *In* South African Inst. of Refrigeration and Air Conditioning Frigair 1983 Papers 12 p 1983
Avail. NTIS HC A14/MF A01

Some examples of the applications of cryogenic fluids and gases with regard to the food preservation were developed. Four main subjects are covered: (1) gas packaging of foodstuffs illustrated by meat and bread packaging, (2) cryogenic refrigeration during transportation; (3) cook-chill and cook-freezing with cryogenic fluids; and (4) immersion freezing. E.A.K

N84-21066# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio Human Engineering Div
LABORATORY STUDIES OF AIRCREW CHEMICAL PROTECTIVE ENSEMBLE: EFFECTS ON PILOTS' PERFORMANCE
G. R. MCMILLAN, W. J. CODY (McDonnell-Douglas Astronautics Co), and R G MILLS *In* AGARD Sustained Intensive Air Operations 18p Nov. 1983 refs
Avail: NTIS HC A10/MF A01

The results of a U.S. Air Force program designed to quantify the effects of current and near-term chemical protective gear on pilot performance are described The first phase of the program consisted of a sensitivity analysis to determine which aspects of pilot performance should be evaluated, the anticipated performance

decrements, the stress mechanisms presumed to be operating, and the flight simulations required to quantify the effects of the protective ensemble. To date, two full-mission laboratory experiments have been completed These experiments evaluated the currently fielded USAF aircrew ensemble and a proposed Integrated Chemical Defense System Reductions in pilot performance were observed with both systems under simulated hot environmental conditions. However, the pilots strongly preferred the Integrated Chemical Defense System's eye-respiratory protective gear The data suggest that thermal stress, produced by the multiple layer body protective gear, caused the performance reductions. M G.

N84-21079# Royal Air Force Inst of Aviation Medicine, Farnborough (England).
WORKLOAD OF PERSONNEL ENGAGED IN AIR DEFENCE
R. G BORLAND and A. S. ROGERS *In* AGARD Sustained Intensive Air Operations 6p Nov. 1983 refs
Avail. NTIS HC A10/MF A01

Workload is defined in many ways and the methods employed to quantify workload are a legion. Jahns (1972) suggested the subject should be divided into the three broad areas of input load, operator effort and work result, while Hartman (1961) has defined input load as the sum of all requirements imposed on an operator at any instant by the system. In the past it was common practice to limit the system to the local environment or crew station and to consider the engineerings, physiological and psychological factors affecting the operator, and little attention was given to studying the workload imposed by the daily pattern of work and rest, for as Selye (1974) points out, stress is a reasonably normal component in every day life and can be adaptive, but cumulative stress becomes maladaptive and ultimately then stress becomes distress The three studies reported were designed to establish the normal pattern of work and rest of selected personnel from operational units engaged in air defense and to identify possible areas of high workload or stress R.J.F.

N84-21080# Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
HUMAN FACTORS OF AIR OPERATIONS IN THE SOUTH ATLANTIC CAMPAIGN
J. A. BAIRD (Royal Air Force Strike Command) and A. N. NICHOLSON *In* AGARD Sustained Intensive Air Operations 4p Nov 1983 refs
Avail NTIS HC A10/MF A01

The role of human factors engineering in the management of the invasion of the Falkland Islands by the United Kingdom in April 1982 is discussed. Sorties of very long duration and intensive rates of work were two particular problems that were studied. During the South Atlantic Campaign advice on human factors proved of great significance in determining the frequency of sorties and the number of sorties flown by each crew. Flight Supervisors were given clear directives about crew scheduling and flight medical officers monitored all aircrew The aircrew on Ascension Island were given priority for accommodation to ensure good rest facilities and their feeding was closely supervised. Hypnotics were extensively used for the first time with very beneficial results A total of some 1,000 RAF aircrew were involved in Operation Corporate and morale and motivation remained at a very high level throughout the campaign. R.J F.

N84-21102 Texas A&M Univ., College Station.
MODELING AND ROBUST CONTROL OF A COMPLIANT ROBOTIC MANIPULATOR VIA THE FINITE ELEMENT METHOD Ph.D. Thesis
L. J. EVERETT 1983 200 p
Avail Univ Microfilms Order No. DA8329919

Robotic manipulators are often used in a production environment to help increase productivity, and product quality. It is therefore desirable to operate the manipulator accurately and at high speed. Unfortunately, structural compliance (when ignored in the control system) limits the speed at which the manipulator can be given. It has been shown elsewhere, that this speed limitation is removed when the compliance is accommodated in the control design It has also been shown, however, that these compliant manipulator control systems (when based upon pole placement algorithms) are sensitive to slight variations in payload and manipulator configuration. The sensitivity is so severe that, even under idealized assumptions, the system often loses stability This research attacks the problem of designing an insensitive control system for a compliant manipulator. The servo control utilized is a simple extension of the well known Linear Quadratic Regulator which is known to possess excellent sensitivity properties Dissert. Abstr

N84-21103# Hughes Aircraft Co , El Segundo, Calif. Display Systems Lab.
EVALUATION OF ARMY REMOTELY PILOTED VEHICLE MISSION PAYLOAD OPERATOR PERFORMANCE IN SIMULATED ARTILLERY MISSIONS Final Technical Report, Apr. 1981 - Sep. 1983
M L. HERSHBERGER, S A MURRAY, P FITZHENRY, and A J FARNOCHI Nov. 1983 67 p
(Contract DAAK20-81-C-0133)
(AD-A137602, HAC-P30759; HAC-E9224; DELCS-TR-81-0133-F)
Avail: NTIS HC A04/MF A01 CSCL 05H

A real-time operator-in-the-loop simulation of the Army Remotely Piloted Vehicle mission payload operations was developed and conducted This report describes the RPV system and its mission, the operation of the mission payload system, the implementation of the simulation, and the results and their implications to design and operation of the mission payload system. Author (GRA)

N84-21104# Human Engineering Labs., Aberdeen Proving Ground, Md.
HUMAN ENGINEERING GUIDELINES FOR MANAGEMENT INFORMATION SYSTEMS. CHANGE 1
D. E. HENDRICKS, P. W. KILDUFF, P. BROOKS, R MARSHAK, and B. DOYLE 9 Jun 1983 164 p
(AD-A137808; AD-E900298) Avail NTIS HC A08/MF A01 CSCL 05E

These guidelines are intended to be an aid for the inclusion of human factors considerations in the design of Management Information Systems (MIS). The US Army Material Development and Readiness Command (DARCOM) is faced with a problem of continuing growth in workload combined with constrained or decreasing numbers of personnel. Like many other corporate entities, DARCOM has decided to accelerate the growth of computer utilization in order to increase the productivity of the workforce. In addition to increased computer utilization, there is emphasis toward distributive processing Distributive processing places computer power in the hands of the functional used which allows the user to interact with (manipulate) the data. Unfortunately, empirical evidence indicates that expenditures on computers are not accompanied, necessarily, by the expected rises in productivity The paper resulting from this research from this research presented selected personnel data relevant to the design of computer systems and problems of human-computer interaction divided into eight areas the system design process, system downtime, training, input, data manipulation or retrieval, output, the work station, and communication (Hendricks, D.E , Man/Computer Interaction in DARCOM A paper presented at the 1980 AMEDD Psychology Symposium at Walter Reed Army Medical Center, Washington, DC, October, 1980.) Appendix A contains a list of three problems With an overview of systems and user characteristics, the research team combined that information with the results of an extensive literature search to develop these guidelines for inclusion of human factors considerations during system development or system improvement. GRA

N84-22168*# Rochester General Hospital, N Y. Dept of Surgery.
DEVELOPMENT AND MARKETING OF A PROSTHETIC URINARY CONTROL VALVE SYSTEM Final Report, Jan. 1978 - Dec. 1983
J. B. TENNEY, R. RABINOWITZ, D W ROGERS, and H. N HARRISON Dec. 1983 237 p refs
(Contract NAS8-32815)
(NASA-CR-170994; NAS 1.26.170994) Avail NTIS HC A11/MF A01 CSCL 05H

An implantable prosthetic for the control of urinary incontinence was developed and marketed Three phases are presented bench development studies, animal trials, and human clinical trials This work was performed under the direction of a Research Team at Rochester General Hospital (RGH). Bench trials were completed on prototype hardware and provided early verification of the device's ability to withstand repeated cyclic testing Configurational variants were evaluated and a preferred design concept was established Silicone rubber (medical grade) was selected as the preferred material for the prosthesis. Author

N84-22169*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va
DOSE IN CRITICAL BODY ORGANS IN LOW EARTH ORBIT
J W. WILSON and F CUCINOTTA (Old Dominion Univ) Apr. 1984 35 p refs
(NASA-TM-85778, NAS 1.15 85778) Avail: NTIS HC A03/MF A01 CSCL 06R

Human exposure to trapped radiations in low Earth orbit (LEO) are evaluated on the basis of a simple approximation of the human geometry for spherical shell shields of varying thickness. A data base is presented that may be used to make preliminary assessment of the impact of radiation exposure constraints on human performance. A sample impact assessment is discussed. Author

N84-22170# Army Aeromedical Research Lab , Fort Rucker, Ala. Biodynamics Research Div.
UH-60 SHOULDER HARNESS LEAD-IN STRAP FAILURE ANALYSIS
T A HUNDLEY Oct. 1983 23 p
(Contract DA PROJ 3E1-62777-A-878)
(AD-A138014; USAARL-84-1) Avail NTIS HC A02/MF A01 CSCL 01C

Shoulder harness lead-in strap failures have occurred in several UH-60 Blackhawk helicopter accidents with crewmembers being injured as a result. An investigation into possible failure causes was conducted. The two most likely causes found were incorrect installation of the seat insert guide and an increase in stress in the lead-in strap caused by the radius of bend at the point where the strap passes through the seat back. Test showed that incorrect installation of the seat insert guide caused a significant reduction in the failure load of the webbing. Tests also showed that a reduction in failure load occurred when the webbing was pulled over a radiused corner. The first problem was solved by removing and reinstalling the seat insert guides The second problem can be dealt with by using a higher-strength lead-in strap GRA

N84-22171# Army Aeromedical Research Lab., Fort Rucker, Ala
COMPARISON OF REAL-EAR ATTENUATION CHARACTERISTICS OF THE STANDARD SPH-4 EARCUP AND A PROTOTYPE CRUSHABLE EARCUP
B. T MOZO and W. R. NELSON Dec 1983 24 p
(Contract DA PROJ 3E1-62777-A-878)
(AD-A138042; USAARL-84-2) Avail: NTIS HC A02/MF A01 CSCL 06Q

The use of the SPH-4 aviator's helmet in the Army is to provide hearing protection, voice communications, and head protection against impact Efforts have been made recently to improve protection in the region of the earcup. In 1977, USAARL contracted with Simula Incorporated to develop an earcup which would provide greater energy absorption on impact and still provide sound attenuation equivalent to the current standard earcup. A prototype has been submitted for evaluation of noise attenuation and comparison to the current standard earcup. The crushable earcup was found to provide greater hearing protection at most test frequencies GRA

N84-22172# Air Force Inst of Tech., Wright-Patterson AFB, Ohio School of Engineering
PSC, A PROGRAMMABLE SOFTWARE CONTROLLER FOR A MULTIPLE BLADDER, SEQUENTIALLY INFLATABLE G-SUIT M.S. Thesis
J L MARCU Dec. 1983 180 p
(AD-A138069, AFIT/GE/EE/83D-41) Avail: NTIS HC A09/MF A01 CSCL 06K

A bang-bang closed loop digital programmable controller was developed for a multiplebladder sequentially inflatable g-suit Programmable parameters included the number of bladders, sequence of inflation, PSI/G relationship, and a g-suit refresh cycle The software was developed in BASIC-80 Two bladders were analyzed and their transfer functions approximated (assuming linearity) for both inflation and deflation. A theoretical versus actual time response comparison revealed the degree of linearity of bladder inflation and deflation GRA

N84-22173# Army Aeromedical Research Lab , Fort Rucker, Ala
EFFECTS OF EXTENDED USE OF AN/PVS-5 NIGHT VISION GOGGLES ON HELICOPTER PILOTS' PERFORMANCE
L W. STONE and C E. DUNCAN Jan 1984 51 p
(Contract DA PROJ. 3E1-62777-A-879; DA PROJ. 3E1-62773-A-819)
(AD-A138126, AD-E440224, USAARL-84-3) Avail NTIS HC A04/MF A01 CSCL 05E

The effects of extended use of AN/PVS-5 night vision goggles (NVG) were investigated by observing 10 NVG helicopter instructor pilots during two 6-hour missions. Each mission consisted of three 2-hour flights during which pilot control inputs and aircraft status variables were recorded in flight. Questionnaires were completed before the first mission and after the NVG mission In order to examine for a carryover effect, subjects were flown in a crossover design in which half of the aviators flew NVG on the first mission, the other half on the second Only the out-of-ground-effect hover showed a statistically significant carryover effect; that is, subjects who flew naked eye before NVG demonstrated a greater absolute difference in hover flight performance variability than those who flew naked eye after NVG flight In the traffic pattern (final approach segment), there was a statistically significant difference between the visual conditions only The postflight questionnaire responses revealed a concern over what was described as a lack of concentration and a decline of mental alertness. Some physiological stress reactions were reported None of the three maneuvers analyzed revealed a significant effect on performance across flights GRA

N84-22174# Aerospace Medical Research Labs , Wright-Patterson AFB, Ohio
HUMAN STRENGTH CAPABILITIES FOR THE OPERATION OF PARACHUTE RIPCORDS AND RISER RELEASES Technical Report, Oct. 1981 - Dec. 1982
N. M. AUME, J. W. MCDANIEL, and T GARVER Oct. 1983 60 p
(Contract AF PROJ. 7184)
(AD-A138328, AFAMRL-TR-83-081) Avail NTIS HC A04/MF A01 CSCL 05E

Military Specification MIL-P-6645H permits a maximum pull of 27 pounds to activate a parachute ripcord A test was conducted to evaluate this force Two hundred eleven physically fit male and female subjects made maximum voluntary exertions on five different parachute ripcord handles with the left hand, the right hand, and with both hands. The applied isometric forces were recorded. Considerable differences in the recorded forces were found to be attributable to sex and to one versus two hand pulls; lesser differences were caused by variations in ripcord handle types and

locations. When both hands were used, almost all male subjects could exceed the permitted 27-pound pull. Significant numbers of female subjects using either one or both hands, and male subjects using only one hand could not exceed 27 pounds of pull. As a result, the authors recommend that the currently specified 27 pound limit not be increased as has been proposed, and that teaching the two hand pull be continued. The same subjects also performed maximum voluntary exertions on two types of riser releases with the left and right hands. The type of riser release caused a significant difference in the force exerted. GRA

N84-22175# Canyon Research Group, Inc., Westlake Village, Calif.
PART-TASK TRAINING OF TRACKING IN MANUAL CONTROL Final Report, 1 Sep. 1981 - 31 Aug. 1984
D. C. WIGHTMAN and G. LINTERN. Sep. 1983. 43 p.
(Contract N61339-81-C-0105)
(AD-A138346; NAVTRAEQUIPC-81-C-0105-2) Avail: NTIS HC A03/MF A01. CSCL 05I

Part-task trainers offer potential cost savings in flight training programs, in that relatively inexpensive devices might be used to train critical subskills prior to more comprehensive training in a simulator or in the criterion vehicle. Part-task methods are currently employed in many training programs with apparent success. However, there is no comprehensive statement of principles to guide users towards the best procedures or to help the maximize the effectiveness of procedures already being used. A review of the part-task training literature was undertaken to integrate the existing empirical data. The review was intended to identify the more promising principles and procedures for part-task training, and to provide a coherent guide to future research. Part-task training was defined as practice on some set of components of the whole task as a prelude to performance of the whole task. Part-task procedures are intended to improve learning efficiency and to reduce costs. Our review focused on the instruction of tracking skills for manual control. Transfer of training was emphasized and crucial features of the methodology and of means of assessing transfer were discussed. The part-task procedures of segmentation, fractionation and simplification were explained, and procedures for reintegrating parts into the whole task were summarized. GRA

N84-22176# Oak Ridge National Lab., Tenn. Instrumentation and Controls Div.
HUMAN FACTORS IN REMOTE CONTROL ENGINEERING DEVELOPMENT ACTIVITIES
M. M. CLARKE (Oak Ridge Associated Univs., Inc.), W. R. HAMEL, and J. V. DRAPER (Oak Ridge Associated Univs., Inc.). 1983. 19 p. refs. Presented at the ANS Ann. Meeting, Detroit, 14-18 Jun. 1983
(Contract W-7405-ENG-26)
(DE84-003201; CONF-830609-64) Avail: NTIS HC A02/MF A01

Human factors engineering, which is an integral part of the advanced remote control development activities is described. It was shown that operators can perform a wide variety of tasks, some of which were not specifically designed for remote systems, with a dextrous electronic force reflecting servomanipulator and good television remote viewing capabilities. The data collected during mock up remote maintenance experiments at the RSDF were analyzed to provide guidelines for the design of human interfaces with an integrated advanced remote maintenance system which is under development. Guidelines are provided for task allocation between operators, remote viewing systems, and operator controls. DOE

N84-22177# Institute for Perception RVO-TNO, Soesterberg (Netherlands). Afd. Technische Menskunde
INVESTIGATION OF THE EFFECT OF THE VIEWING TARGET HEIGHT ON THE EYE HEIGHT OF SITTING VISUAL DISPLAY UNIT (VDU) OPERATORS
J. LOMBAERS. Jul. 1983. 20 p. refs. In DUTCH, ENGLISH summary
(IZF-1983-9; TDCK-78189) Avail: NTIS HC A02/MF A01

The effect of the viewing target height on the eye height of sitting VDU operators was investigated. Twelve subjects performed a tracking task for 45 min. The viewing target was presented on a VDU placed at three different heights. The eye height was monitored by video cameras, and the recordings were analyzed with a video system. An increased viewing target height results in an increased mean eye height and a decreased standard deviation of the eye height. An influence of the viewing target height on the performance of the tracking task is not found. Author (ESA)

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PLANETARY BIOLOGY

Includes exobiology, and extraterrestrial life

A84-28113
MANGANESE OXIDES AS HIGH-P-EPSILON REDOX BUFFERS ON MARS
T. R. BLACKBURN (St. Andrews Presbyterian College, Laurinburg, NC). Icarus (ISSN 0019-1035), vol. 57, Feb. 1984, p. 307-312. refs

The X-ray photoelectron spectrum of Mn(VI) is closely similar to that of UV-irradiated MnO_2, previously reported to simulate the Viking gas exchange reaction. Beta-MnO_2 is the thermodynamically stable form of manganese on the surface of Mars, and MnO_2 abundances estimated from shergottite, nakhlite, and chassignite iron/manganese ratios are sufficient to account for the oxidant buffer capacity observed by Viking. Author

A84-29602* San Jose State Univ., Calif.
ROOM-TEMPERATURE LUMINESCENCE FROM KAOLIN INDUCED BY ORGANIC AMINES
L. M. COYNE, R. KLOEPPING (San Jose State University, San Jose, CA), and G. POLLACK (NASA, Ames Research Center, Moffett Field, CA). Clays and Clay Minerals (ISSN 0009-8604), vol. 32, no. 1, 1984, p. 58-66. Research supported by the U.S. National Research Council. refs

Several new, room-temperature luminescent phenomena, resulting from the interaction of kaolin and various amino compounds, have been observed. The emission of light from kaolin pastes (treated with quinoline, pyridine, hydrazine, monoethanolamine, n-butylamine, and piperidine) was shown to decay monotonically over a period of hours to days. More light was released by a given amino compound after it was dried and purified. Hydrazine, in addition to the monotonically decaying photon release, produces delayed pulses of light with peak emission wavelength of 365 nm which last between several hours and several days. These photon bursts are acutely sensitive to the initial dryness of the hydrazine, both in the number of bursts and the integrated photon output. The amount of light and the capacity of the kaolin to produce the delayed burst appeared to be strongly dependent on preliminary heating and on gamma-irradiation, analogous to the dehydration-induced light pulse previously reported from the Ames Research Center. A small, delayed burst of photons occurred when piperidine and n-butylamine were removed by evaporation into an H_2SO_4 reservoir. Author

N84-22178*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif.

SETI SCIENCE WORKING GROUP REPORT

F DRAKE (Cornell Univ), J H. WOLFE (San Francisco Univ.), and C L. SEEGER (San Francisco Univ) Jan. 1984 119 p refs

(NASA-TP-2244; A-9326, NAS 1.60:2244) Avail: NTIS HC A07/MF A01 CSCL 05K

This report covers the initial activities and deliberations of a continuing working group asked to assist the SETI Program Office at NASA. Seven chapters present the group's consensus on objectives, strategies, and plans for instrumental R&D and for a microwave search for extraterrestrial intelligence (SETI) projected for the end of this decade Thirteen appendixes reflect the views of their individual authors Included are discussions of the 8-million-channel spectrum analyzer architecture and the proof-of-concept device under development, signal detection, recognition, and identification on-line in the presence of noise and radio interference, the 1-10 GHz sky survey and the 1-3 GHz targeted search envisaged, and the mutual interests of SETI and radio astronomy. The report ends with a selective, annotated SETI reading list of pro and contra SETI publications Author

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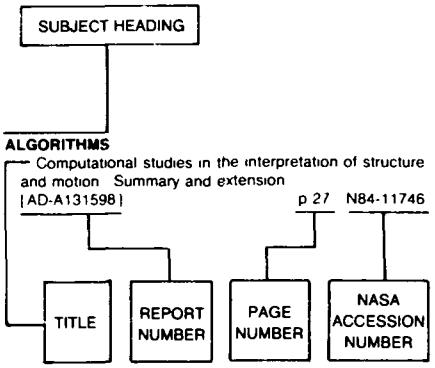

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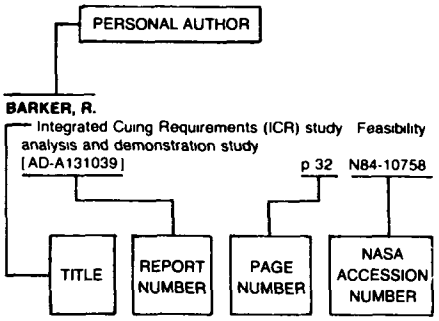

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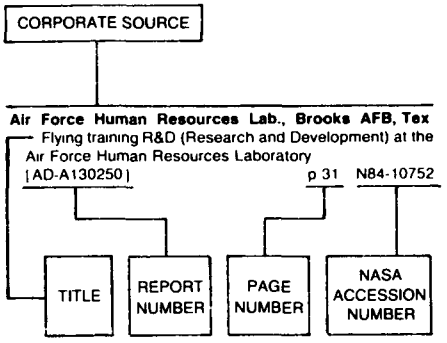

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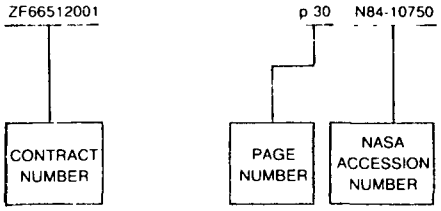

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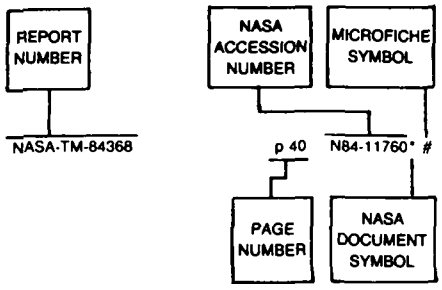

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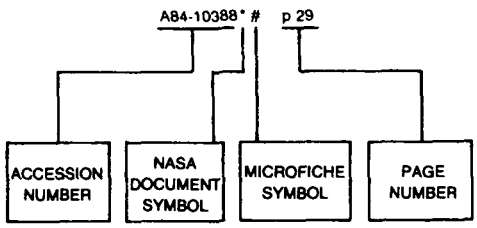

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