NASA SP-7011 (21)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (21)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during January , 1966

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. FEBRUARY 1966

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

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 on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N66-10000 series),
b. AIAA entries identified by their *IAA* accession numbers (A66-10000 series); and
c. LC entries identified by a number in the A66-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

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(continued)

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For further details please consult the *Introductions* to *STAR* and *IAA*, respectively.

LC Entries

Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

AVAILABILITY OF THIS BIBLIOGRAPHY

Copies of *Aerospace Medicine and Biology* (SP-7011) and its supplements can be obtained from NASA (Code USS-A), without charge, by NASA offices and contractors, U.S. Government agencies and their contractors, and organizations that are working in direct support of NASA programs.

Other organizations can purchase copies of the bibliography from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

TABLE OF CONTENTS

	Page
STAR Entries (N66-10000)	1
IAA Entries (A66-10000)	21
LC Entries (A66-80000)	35
Subject Index	I-1
Corporate Source Index	I-35
Personal Author Index	I-39

AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography FEBRUARY 1966

STAR ENTRIES

N66-10052 Battelle Memorial Inst., Columbus, Ohio. Engineering Physics Dept.
ANALYSIS OF HOSTILE-ENVIRONMENT METHODOLOGIES
John W. Clark *In* AEC Remotely Operated Special Equipment [1964] p 4-26 (See N66-10051 01-15) CFSTI: $4.00

Special tools and equipment for performing manual work in hostile, dangerous, or hazardous environments and in areas inaccessible by man are discussed. A methodological classification scheme based upon the way in which the operator is protected from the hostile environment is proposed for the large number of tools, methods, and equipment used in hostile environment operations. Examples of each methodology are included and the functions which must be accomplished by a "remote control" system are defined. M.R.W.

N66-10055 Philco Corp., Blue Bell, Pa.
A STUDY TO INVESTIGATE THE FEASIBILITY OF UTILIZING ELECTRICAL POTENTIALS ON THE SURFACE OF THE SKIN FOR CONTROL FUNCTIONS
Lee Harrison *In* AEC Remotely Operated Special Equipment [1964] p 100-157 (See N66-10051 01-15) CFSTI: $4.00

The development of myographic signal-handling equipment, and the application of computer programming techniques to myographic signal data is investigated to study the feasibility of using electromyographic signals to generate control inputs to actuators and devices. Myographic data was analyzed to discern, and thus to be able to process, the significant parameters of typical myo-signals. A non-deterministic pattern-classification, computer technique was used to study the myographic patterns which were analyzed for power spectrum, zero and threshold crossings, and RMS values. The RMS value of the waveform appears to be the most acceptable parameter of the signal since it was found to be relatively linear with force. This was verified in the literature. An electronic device called a myocoder was designed to prepare biological signals for computer processing by amplifying the raw electromyographic waveform, extracting the parameter of RMS value, and quantizing this value for subsequent processing. Sketches and block diagrams are included. M.R.W.

N66-10056 Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
DESIGN AND TEST OF A FULL-SCALE WEARABLE EXOSKELETAL STRUCTURE
Neil J. Mizen *In* AEC Remotely Operated Special Equipment [1964] p 158-197 refs (See N66-10051 01-15) CFSTI: $4.00

The development of a wearable exoskeletal device, employing powered joints, to be worn by man to amplify his muscular strength and to increase his endurance in the performance of tasks requiring considerable physical exertion is investigated. The concept is termed the Man Amplifier and consists of a structural exoskeleton with appropriate articulate joints, compatible with those of man. The servomotors powering the joints respond to the output of sensors linking man and machine and cause the appropriate mechanism to follow the natural motion of it's human counterpart. A portable, self-contained power pack is attached to the back of the exoskeleton to provide the necessary power. Tests were conducted to determine: the minimum number of joints necessary to enable the wearer to perform useful work tasks; mean and maximum velocities at each joint; and motion ranges and dynamic responses. An arm-aid designed as a research device for basic studies in man-machine communications and control in orthotics and prosthetics is also considered. M.R.W.

N66-10057 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.
HUMAN FACTORS IN REMOTE HANDLING: A REVIEW OF PAST AND CURRENT RESEARCH AT THE 6570th AEROSPACE MEDICAL RESEARCH LABORATORIES
William N. Kama *In* AEC Remotely Operated Special Equipment [1964] p 198-209 refs (See N66-10051 01-15) CFSTI: $4.00

Human factor problems relating to the design and use of remote handling systems and manipulators in support of nuclear powered systems and extravehicular space operations is investigated. Factors considered and discussed are task variables, equipment design, operator performance, sensory/perceptual problems, and controls. M.R.W.

N66-10058 Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.
A SERVO-RESTRAINT SYSTEM FOR ANTI-G PROTECTION
Warren L. Loudon *In* AEC Remotely Operated Special Equipment [1964] p 210-223 (See N66-10051 01-15) CFSTI: $4.00

Servo-restraint devices to prevent movement of the body and extremities under steady and varying G forces are described and discussed. It is envisioned that the servo-restraint concept will be applied to aerospace vehicles to make control of these vehicles possible under severe and varying G levels by allowing only voluntary movements of the operator and permitting reliable operation of controls through maintenance of kinesthetic reliability. Escape will be made easier and more successful by overcoming the difficulty of the operator in positioning himself and operating the escape mechanism. Photographs of these devices are included. M.R.W.

N66-10059 Philco Corp., Philadelphia, Pa.
CONTROL: THE UNIVERSAL PROCESS
Roy Wirta and Richard Sprince (General Electric Co., Scranton, Pa.) *In* AEC Remotely Operated Special Equipment [1964] p 224–232 (See N66-10051 01-15) CFSTI: $4.00

Requirements for the development of controls which will match human and machine characteristics are discussed. Factors considered in the control process are the human operator; the command data unit; the task to be performed by the machine; and the sensory feedback unit. Several servo-manipulators, remote-handling devices, and man/machine integration systems are examined in terms of the design and function of their controls. M.R.W.

N66-10060 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. Behavioral Sciences Lab.
AN EVALUATION OF PROPOSED APPLICATIONS OF REMOTE HANDLING IN SPACE
Gerald P. Chubb *In* AEC Remotely Operated Special Equipment [1964] p 233-247 refs (See N66-10051 01-15) CFSTI: $4.00

The feasibility of applying remote-handling devices to assembly and maintenance tasks in space is investigated. The telechiric and encapsulation approaches are two of the methods considered and a design evaluation is made based on the human factors aspect of the configuration. The use of myoelectric control is mentioned. M.R.W.

N66-10066 Atomic Energy Commission, Washington, D. C. Div. of Technical Information.
RECOMMENDATIONS AND DISCUSSION BY PARTICIPANTS REGARDING FUTURE RESEARCH AND DEVELOPMENT WORK
In AEC Remotely Operated Special Equipment [1964] p 364–379 (See N66-10051 01-15) CFSTI: $4.00

A discussion by individuals who are specialists in the design and manufacture of remote handling devices, manipulator systems, prosthetic equipment, and remotely controlled tools is presented concerning improvements and research that should be made in order to advance the present state-of-the-art in these areas. Further research is needed to incorporate computer program decision-making into the remote handling field. Methods for improving communications between organization and groups which manufacture and conduct research in this field are suggested. M.R.W.

N66-10067 Veterans Administration, New York.
MANIPULATORS AND UPPER-EXTREMITY PROSTHETICS
Eugene F. Murphy *In* AEC Remotely Operated Special Equipment [1964] p 380–390 refs (See N66-10051 01-15) CFSTI: $4.00

Various motions, gripping, and control requirements for the design of artificial limbs and hands for unilateral and bilateral amputees are investigated. Prehension patterns of human hands are studied to devise a more versatile and functional prosthetic device. A number of remote handling devices, manipulators, and mechanical hooks and tongs are examined and discussed. M.R.W.

N66-10129# Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION ANNUAL PROGRESS REPORT FOR PERIOD ENDING JULY 31, 1965
F. L. Parker et al Oct. 1965 274 p refs
(Contract W-7405-ENG-26
(ORNL-3849)

Continued research in the following areas is reported: radioactive waste disposal, radiation ecology, radiation physics, internal dosimetry, radiation dosimetry, and health physics technology. Cited are studies of: disposal by hydraulic fracturing, the movement of nuclides in terrestrial environments, radiation effects and radioactive waste areas, theoretical and systems ecology, the interaction of radiation with solids, the physics of tissue damage, dosimetry applications, stable element metabolism, aerosol physics, and applied internal dosimetry. S.C.W.

N66-10160# Chicago Univ., Ill. Radiation Lab.
[RESEARCH ON CERTAIN BIOLOGICAL AND MEDICAL ASPECTS OF ATOMIC ENERGY] Quarterly Progress Report
15 Apr. 1965 105 p refs
(Contract AF 41(609)-1693)
(QPR-55; AD-615174)

CONTENTS:

1. THE EFFECTS OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES. I: STUDIES ON THE TOXICITY AND MECHANISM OF ACTION OF 2-MERCAPTOETHYLAMINE (MEA) K.-M. Yam and K. P. Du Bois p 1–16 refs (See N66-10161 01-04)

2. THE EFFECTS OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES. II: FURTHER STUDIES ON THE INHIBITORY EFFECT OF X-RADIATION ON THE DEVELOPMENT OF MICROSOMAL ENZYMES OF THE LIVER F. Kinoshita and K. P. Du Bois p 17–28 refs (See N66-10162 01-04)

3. THE EFFECTS OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES. III: FURTHER STUDIES ON THE ADENOSINE TRIPHOSPHATASE ACTIVITY OF THE HEMATOPOIETIC TISSUES OF RATS EXPOSED TO COBALT-60 GAMMA RADIATION R. Tardiff and K. P. Du Bois p 29–36 refs (See N66-10163 01-04)

4. PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS. I: DOSE-MORTALITY RELATIONSHIPS FOR SEVERAL RADIOPROTECTIVE AGENTS V. Plzak and J. Doull p 37–70 refs (See N66-10164 01-04)

5. PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS. II: MICROSCOPIC FINDINGS IN THE SPLEENS OF MICE GIVEN DIMETHYL SULFOXIDE OR OTHER CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO LETHAL WHOLE-BODY X-RAY EXPOSURE D. Vesselinovitch, E. L. Simmons, F. Fitch, and J. Doull p 71–81 refs (See N66-10165 01-04)

6. PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS. III: RELATIONSHIP BETWEEN SPLEEN OXYGEN TENSION AND RADIOPROTECTION WITH p-AMINOPROPIOPHENONE (PAPP) IN MICE A. T. Hasegawa and H. D. Landahl p 82–87 refs (See N66-10166 01-04)

7. THE INFLUENCE OF EXPOSURE TO LOW LEVELS OF GAMMA AND FAST NEUTRON IRRADIATION ON THE LIFE SPAN OF ANIMALS. I: HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS J. Doull, E. L. Simmons, E. L. Marks, and V. J. Plzak p 88–102 refs (See N66-10167 01-04)

N66-10161 Chicago Univ., Ill. Radiation Lab.
THE EFFECTS OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES. I: STUDIES ON THE TOXICITY AND MECHANISM OF ACTION OF 2-MERCAPTOETHYLAMINE (MEA)
Kei-ming Yam and Kenneth P. Du Bois *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 1–16 refs (See N66-10160 01-04)

Continued efforts were made to reduce the acute toxicity of MEA to adult female rats by using various chemical compounds. In the experiments described, none of the agents tested was capable of completely abolishing the central nervous system excitation produced by MEA. Signs of central nervous system excitation persisted, and they ranged from jerking movements of the extremities, erection of the tail, and mild convulsive movements to tonic-clonic convulsions. It is pointed out that agents effective in counteracting the acute lethal effect of MEA, like pentobarbital, chlorpromazine, reserpine, and magnesium sulfate are compounds having central nervous system depressant and peripheral neuromuscular relaxation effects; and this suggests that counteracting the asphyxiant effect of the convulsions produced by MEA is the most effective measure in the control of the acute toxicity of MEA. R.R.D.

N66-10162 Chicago Univ., Ill. Radiation Lab.
THE EFFECTS OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES. II: FURTHER STUDIES ON THE INHIBITORY EFFECT OF X-RADIATION ON THE DEVELOPMENT OF MICROSOMAL ENZYMES OF THE LIVER

Florence Kinoshita and Kenneth P. Du Bois *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 17–28 refs (See N66-10160 01-04)

Experiments were continued to elucidate the mechanism by which irradiation inhibits enzyme synthesis. Specifically, the effect of radiation on O-demethylase activity was examined and it was found that this system is not affected by radiation. Although this enzyme is developed to the adult level by 23 days of age, there is no sex difference in its activity; however, those enzymes whose development is inhibited by radiation reach the adult level around 35 to 50 days of age and exhibit a sex difference in activity. It is therefore concluded that radiation inhibits the system responsible for the synthesis of increased activity of some enzymes in the livers of male rats. Since castration of male rats prevents development of the same enzymes and certain androgens stimulate enzyme synthesis, it is further shown that the point of action of radiation is on the androgen-stimulated enzyme synthesis process. R.R.D.

N66-10163 Chicago Univ., Ill. Radiation Lab.
THE EFFECT OF IONIZING RADIATIONS ON THE BIOCHEMISTRY OF MAMMALIAN TISSUES. III: FURTHER STUDIES ON THE ADENOSINE TRIPHOSPHATASE ACTIVITY OF THE HEMATOPOIETIC TISSUES OF RATS EXPOSED TO COBALT-60 GAMMA RADIATION

Robert Tardiff and Kenneth Du Bois *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 29–36 refs (See N66-10160 01-04)

Adult, female Sprague-Dawley rats were exposed to 21.2 R and 51 R per day of cobalt 60 gamma irradiation over a 10-hour period for various lengths of time. After various total doses of radiation, the animals were sacrificed for adenosine triphosphatase measurements on the spleens and thymus glands. In adult animals, the adenosine triphosphatase activity of the thymus glands showed no appreciable increase after repeated exposure to gamma radiation; however, the enzyme activity of the thymus glands of weanling rats increased after repeated doses of gamma radiation. R.R.D.

N66-10164 Chicago Univ., Ill. Radiation Lab.
PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS. I: DOSE-MORTALITY RELATIONSHIPS FOR SEVERAL RADIOPROTECTIVE AGENTS

V. Plzak and J. Doull *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 37–70 refs (See N66-10160 01-04)

Dose reduction factors (DRF) for eight radioprotective agents and six salts of aminoethylisothiourea were determined in male mice, using a computer programed maximum likelihood estimate procedure based on the 30-day mortality data following whole-body X-ray exposures in the range of 400 R through 900 R. A listing of the DRF values for 50 of the most effective radioprotective agents tested in the radiation screening program is presented in tabular form. R.R.D.

N66-10165 Chicago Univ., Ill. Radiation Lab.
PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS. III: MICROSCOPIC FINDINGS IN THE SPLEENS OF MICE GIVEN DIMETHYL SULFOXIDE OR OTHER CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO LETHAL WHOLE-BODY X-RAY EXPOSURE

D. Vesselinovitch, E. L. Simmons, F. Fitch, and J. Doull *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 71–81 refs (See N66-10160 01-04)

The effect of dimethylsulfoxide (DMSO) on the gross and microscopic changes produced in the spleen of female mice by whole-body X-ray exposure (800 R) were compared with those produced by aminoethylisothiouronium (AET) and p-aminopropiophenone (PAPP). Although DMSO exhibited radioprotective activity in the hematopoietic system in terms of recovery of the spleen weight and colony formation, these effects were less marked than those produced by the administration of either AET or PAPP. Regeneration of the hematopoietic elements in the radiation damaged spleen was qualitatively similar following the administration of DMSO, AET, and PAPP except for a more pronounced recovery of the myelopoietic series in the PAPP-treated mice. R.R.D.

N66-10166 Chicago Univ., Ill. Radiation Lab.
PHARMACOLOGICAL AND TOXICOLOGICAL COMPOUNDS AS PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN EXPERIMENTAL ANIMALS. III: RELATIONSHIP BETWEEN SPLEEN OXYGEN TENSION AND RADIOPROTECTION WITH p-AMINOPROPIOPHENONE (PAPP) IN MICE

A. T. Hasegawa and H. D. Landahl *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 82–87 refs (See N66-10160 01-04)

Measurements were made of oxygen tension in the spleen and protection against radiation lethality following the administration of p-aminopropiophenone (PAPP) in mice. Experiments showed that the relative oxygen tension in the spleen of mice was 0.74, 0.35, and 0.49 of normal at 4, 15, and 60 minutes after PAPP injection. In propylene glycol treated mice, the oxygen tension values were 0.96, 1.02, and 1.78 at the corresponding times. R.R.D.

N66-10167 Chicago Univ., Ill. Radiation Lab.
THE INFLUENCE OF EXPOSURE TO LOW LEVELS OF GAMMA AND FAST NEUTRON IRRADIATION ON THE LIFE SPAN OF ANIMALS. I: HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS

J. Doull, E. L. Simmons, E. L. Marks, and V. J. Plzak *In its* [Res. on Certain Biol. and Med. Aspects of Atomic Energy] 15 Apr. 1965 p 88-102 refs (See N66-10160 01-04)

The ability of mice, rats, and rabbits to withstand chronic hyperbaric oxygen exposure was investigated by using various cycling schedules of alternate oxygen and air exposure. It was found that the chronic exposure of male and female mice to hyperbaric oxygen in a cycle consisting of 1 hour of oxygen at 15 psig followed by 15 minutes of air at 0 psig (repeated 19 times daily) produced a mortality of between 80% and 100% during a 30-day exposure period. Reducing the oxygen pressure to 10 psig permitted male and female mice, Sprague-Dawley rats, and a rabbit to survive an exposure period of 30 days. New-born and weanling mice appeared to be less susceptible to the effects of chronic hyperbaric oxygen exposure than adult animals of the same strain. Hyperoxia in the range of 20% through 84% oxygen during whole-body X-ray exposure did not markedly alter the lethal effects of X-ray doses of 40 R, 500 R, or 600 R. Subjecting mice to increased air pressure (15, 30, or 45 psig) during whole-body X-ray exposure also failed to markedly influence the mortality response of similar X-ray doses. R.R.D.

N66-10190# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

HEALTH PHYSICS AND MEDICAL DIVISION PROGRESS REPORT, JANUARY-DECEMBER, 1964

London, HMSO, Mar. 1965 39 p refs

(AERE-PR/HPM-7(U)) HMSO: 8s

In response to the operational requirements of the Atomic Energy Authority, research is continuing in radiation dosimetry, aerosol physics, radiation spectrometry, bioassay, body radioactivity measurement, and biomedical problems. Among the reports included are findings on inhalation studies with human volunteers using radioactive vapors and labelled submicron aerosols; methods of producing nonleaching monodisperse aerosols; experiments with volunteers to investigate the uptake, transport, and distribution of radioactive methyl iodide; whole-body neutron activation analysis of the natural sodium, chlorine, and calcium contents of two volunteer subjects; behavior and control of radioiodine released in a water-cooled reactor accident; personnel dosimetry development; and computer analysis of gamma ray spectra. M.G.J.

N66-10192# United Kingdom Atomic Energy Authority, Harwell (England). Electronics Div.

NEW METHODS OF MEASURING NEUTRON DOSE EQUIVALENT RATE AROUND PULSED NEUTRON GENERATORS

J. W. Leake London, HMSO, Jun. 1965 21 p refs

(AERE-R-4883) HMSO: 3s

Two methods of measuring neutron dose equivalent (DE) around pulsed machines are described. Both methods employ the moderator system of the neutron counter assembly with either the standard boron trifluoride pulse counter or a BF_3 ion chamber mounted at the center. The limitations of the neutron counter assembly with the pulse-type counter and the advantages of the ion chamber version are discussed. It is shown that under favorable conditions the neutron counter assembly with a pulse-type counter is able to measure pulsed radiation, with less than 2% count loss, up to a mean DE rate of 1 rem/hr. The response of both systems is proportional to DE rate (as recommended by the I.C.R.P. 1963) within ±50% for neutrons of all energies from thermal to 12 MeV. Author

N66-10199# Joint Publications Research Service, Washington, D. C.

STUDIES ON AIR POLLUTION AND INDUSTRIAL POISONING IN THE USSR

26 Oct. 1965 26 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), no. 5, 1965 p 15-20, 110-112, 114-115

(JPRS-32565; TT-65-33044) CFSTI: $2.00

CONTENTS:

1. EFFECT OF SMALL CONCENTRATIONS OF HEXAMETHYLENEDIAMINE ON EXPERIMENTAL ANIMALS UNDER CONDITIONS OF CHRONIC INHALATION p 1-12 refs
2. TWO CONFERENCES ON THE SANITARY PROTECTION OF THE ATMOSPHERIC AIR D. H. Kalyuzhnyy p 13-18
3. CONFERENCE OF YOUNG SCIENTIFIC WORKERS IN THE INSTITUTE OF INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES OF THE ACADEMY OF MEDICAL SCIENCES OF THE USSR V. I. Mogilyantseva p 19-24

N66-10201# Joint Publications Research Service, Washington, D. C.

SOME NEW TECHNIQUES IN PHYSIOLOGY

V. V. Parin 27 Oct. 1965 4 p Transl. into ENGLISH from Krasnaya Zvezda (Moscow), 9 Sep. 1965 p 6

(JPRS-32585; TT-65-33064) CFSTI: $1.00

Electronic methods have permitted physiologists to increase the sensitivity of their devices and to study slow and rapid bioelectric phenomena. Data were obtained when a subject was in motion, without the use of wires. A low-power miniature transmitting device was mounted in his helmet, pocket, or special knapsack while he was engaged in athletic exercise. A study of higher nervous activity was transmitted to the surface of the skin without wire connections. This permitted an investigation of the activity of an animal at any time during ordinary conditions of life. Experiments were also performed by recording some physiological processes of animals kept in a pasture. R.W.H.

N66-10203# Joint Publications Research Service, Washington, D. C.

BIOLOGIC MEMORY AND NUCLEIC ACIDS

V. L. Ryzhkov 5 Oct. 1965 15 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, Jul.-Aug. 1965 p 533-541

(JPRS-32266; TT-65-32756) CFSTI: $1.00

Memory theories were considered in which a memorization process was changed in the sequence of the nucleotide composition of RNA, reducing it to a process similar to mutations. The basis of memorization in the spiralization of individual secretions of the DNA filament resulted in the inactivation of these secretions. It was stated that spiralization caused a shift in the ratio between the potassium and sodium ions under the influence of nervous stimulation. A hypothesis was proposed based on the indirect experimental data of giant chromosomes, which reduced memory to simple and general processes (spiralization of the chromosomes observed in the cycles of development of the cell and microorganisms). R.W.H.

N66-10316*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography With Indexes, Sep. 1965

Oct. 1965 132 p

(NASA-SP-7011(16)) CFSTI: HC $1.00/MF $1.00 CSCL 06S

An annotated bibliography of aerospace medicine and biology is presented, along with subject, corporate source, and personal author indices. Subject coverage concentrates on the biological, physiological, 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 on biological organisms

of lower order are also included. Related topics such as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, and exobiology are also given attention. L.S.

N66-10319*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
INTERFACE TEST FOR EVALUATING ABILITY OF PRESSURE-SUITED SUBJECTS TO PERFORM LUNAR SCIENTIFIC TASKS
Earl V. La Fevers and Curtis C. Mason Washington, NASA, Nov. 1965 30 p
(NASA-TM-X-1170) CFSTI: HC $2.00/MF $0.50 CSCL 05E

Mobility studies were conducted with subjects wearing an Apollo developmental space suit pressurized to 3.7 psig. Activities were performed to determine time and ability for climbing and traversing, and for performing scientific experiments. Velocity for climbing and traversing varied from 0.06 mile per hour for climbing a 30° extremely rough-surfaced slope to 2.84 miles per hour for walking on an ideal surface. Subjects were able to perform the entire range of scientific tasks as long as the task did not require delicate manipulation on a surface at the level of the subject's feet. Only the simpler tasks could be performed at this level. Further improvement in both exploration techniques and suit design is required so that all scientific tasks in the tests can be performed. L.S.

N66-10369# Société Bertin et Cie, La Garenne-Colombes (France).
MECHANICAL CHARACTERISTICS OF A PURE FLUID RESPIRATOR WITH CURVED WALLS, PAPER F3
Cyrille Davlin and Marcel Kadosch [1965] 11 p Presented at the 1st Intern. Conf. on Fluid Logic and Amplification, Brit. Hydromech. Res. Assoc. and Coll. of Aeron. Cranfield, England, 8-9 Sep. 1965 CFSTI: HC $1.00/MF $0.50

A prototype of an artificial respirator without moving parts has been developed, applying the principles of fluid switching. The combination of a normal exit and another exit with a curved convex wall displays interesting characteristics which lead to a high efficiency of power jet. The device is now tested in hospitals in view of homologation for clinical applications. Author

N66-10370# Joint Publications Research Service, Washington, D. C.
PROBLEMS IN BIONICS
P. Gulyayev 21 Oct. 1965 6 p Transl. into ENGLISH from Med. Gazeta (Moscow), 24 Aug. 1965 p 3
(JPRS-32502; TT-65-32981) CFSTI: $1.00

Bionic models were constructed on the functional basis of the living organism itself as equivalence of relationships with respect to form. The models reproduce the relationships of life processes, predict the trend of the processes, their change with time, magnitude, and other variables. Either growth laws, or random processes, can be used by bionic computers for optic or auditory methods of diagnosis in a number of physiological processes. Self-organizing bionic machines constructed after neuron models were able to read printed text, distinguish vocal sounds, and obey spoken commands. G.G.

N66-10438# Technische Hogeschool, Eindhoven (Netherlands).
RECEPTIVE SYSTEMS. MEDIATING CERTAIN LIGHT REACTIONS OF THE PUPIL OF THE HUMAN EYE
Herman Bouma (Ph.D. Thesis) 19 Jan. 1965 185 p refs CFSTI: HC $5.00/MF $1.25

An analysis is made of the receptive systems for both steady state and flash reactions of the pupil with regard to receptor properties and the organization of the receptive field. A general description of the pupillary system is presented and includes anatomical and physiological data, pupillary reactions and their consequences, passive mechanical properties of iris tissue, and the innervation of iris muscle. Steady-state reactions, transient reactions, and fluctuations of the pupil in response to retinal illumination are discussed. Various methods for measuring steady-state diameters and contractions of the pupil in response to flashes are discussed. R.N.A.

N66-10441# Societa Ricerche Impianti Nucleari, Saluggia (Italy).
ELECTROCHEMICAL LABELLING OF PROTEINS [MARCATURA DI PROTEINE PER VIA ELETTROCHIMICA]
U. Rosa, F. Pennisi, A. Massaglia, G. Scassellati, L. Donato (Pisa Univ.) et al Aug. 1965 50 p refs In ITALIAN
(Contract EURATOM-053-63-10-RISI)
(EUR-2476.i) CFSTI: HC $2.00/MF $0.50

This report is part of a research program on the iodination of proteins for use as tracers in studies on protein metabolism. With the aid of an electrolytic labelling method, studies were conducted on the preparation of radioiodide labelled human serum, albumin, and insulin. Data are given on the apparatus used and the techniques employed for the preparation and control of the end product. The effects of iodination on the protein molecule were studied on the basis of the physicochemical and biological properties. A preliminary study was made to determine the chemical effects as a function of the degree of iodination. The —SH groups in albumin and S–S groups in insulin were titrated amperometrically. The distribution of the iodine in the residual tyrosine was studied by means of MIT and DIT in the hydrolysate. The first batch of results obtained from the project are described and discussed. R.N.A.

N66-10477# Chicago Univ., Ill.
STUDY OF MONKEY, APE, AND HUMAN MORPHOLOGY AND PHYSIOLOGY RELATING TO STRENGTH AND ENDURANCE. PHASE VII: THE MUSCULOSKELETAL ANATOMY OF THE ANTEBRACHIUM OF A SQUIRREL MONKEY (*SAIMIRI*)
William E. Edwards and Erika Fogg-Amed Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Jul. 1965 46 p refs
(Contract AF 29(600)-3466)
(ARL-TR-65-9; AD-468248)

The antebrachial musculature of a female squirrel monkey (Saimiri) is quantitatively described in detail and illustrated by the photo-etching process. Comparisons with data from the literature on other platyrrhines and non-playtyrrhine primates indicate marked taxonomic distinctiveness and primitivity in many features. Author (TAB)

N66-10478# Chicago Univ., Ill.
STUDY OF MONKEY, APE, AND HUMAN MORPHOLOGY AND PHYSIOLOGY RELATING TO STRENGTH AND ENDURANCE. PHASE VIII: FACTORS IN THE SUPERIORITY OF CHIMPANZEE OVER HUMAN STRENGTH
William E. Edwards Holloman AFB, N. Mex., 6571st Aeromed. Res. Lab., Jul. 1965 46 p refs
(Contract AF 29(600)-3466)
(ARL-TR-65-10; AD-468249)

Detailed consideration and testing of hypotheses against available data indicate that the marked two-to-one superiority of chimpanzee over human upper extremity strength per unit

of body-weight is apparently due to a combination in the chimpanzee of relatively larger upper extremities, higher proportions of contractile material, smaller average body-size, muscle origins and insertions farther from joints, obliquity of muscle fibers, greater capillary density and glycogen storage in muscles, and greater frequency and ease of innervating a higher percentage of motor end-plates, but not so different physico-chemical processes of muscular contraction and not, among the subjects tested, significantly to difference in exercise, although somewhat differential response to equivalent exercise is likely. Author (TAB)

N66-10496# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
COMPARATIVE REVIEW OF THE PRINCIPAL NON-STATUTORY UNITED KINGDOM CODES OF PRACTICE FOR PROTECTION AGAINST IONISING RADIATIONS AND RADIOACTIVE MATERIALS
E. J. Bennellick Jul. 1965 29 p refs
(AHSB-(RP)-M-35)

A comparison is made of the main provisions of five Codes of Practice comprising two issued by the United Kingdom Atomic Energy Authority and one each by the Medical Research Council, the Ministry of Health and the Ministry of Labour. Author

N66-10499# Joint Publications Research Service, Washington, D. C.
THE EFFECT OF COSMIC-FLIGHT FACTORS ON SEEDS OF THE SPINDLE-TREE (*EUONYMUS EUROPAEA* L.)
N. I. Nuzhoin, R. L. Dozortseva, N. A. Pastushenko-Strelets, and N. S. Samokhvalova 5 Oct. 1965 10 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), no. 4, Jul.–Aug. 1965 p 576–580
(JPRS-32265; TT-65-32755) CFSTI: $1.00

Previously irradiated air-dry seeds of the European spindletree, *Euonymus europaea*, and unirradiated control seeds were flown on Vostok V spacecraft during a cosmic flight. Also, control seeds of the same plant were kept in Moscow and flown to the cosmodrome. The frequency of the cells with chromosome aberrations was studied. In a series without previous irradiation of the seeds with gamma radiation the frequency of the cells with abnormal mitoses differed from both controls in a statistical manner. In a series in which the seeds were irradiated before cosmic flight with Co^{60} the differences were statistically reliable only as between the experiment and the control retained in Moscow. Previous irradiation of the seeds with Co^{60} gamma radiation and the subsequent action of cosmic flight have an additive effect in the formation of cells with abnormal mitoses. E.E.B.

N66-10517# Joint Publications Research Service, Washington, D. C.
ACCLIMATIZATION AND TRAINING OF ATHLETES IN A MOUNTAINOUS AREA
A. D. Bernshteyn, ed et al Oct. 1965 182 p Transl. into ENGLISH of the book "Akklimatizatsiya i Trenirovka Sportsmenov v Gornoy Mestnosti" USSR, ALMA-ATA, 1965 143 p
(JPRS-32290; TT-65-32780) CFSTI: $5.00

Among the data presented are a series of articles on: some physiological indices of visiting sportsmen under conditions of a foothill area; the vegetative mechanisms of high mountain adaptation and their role in increasing the hypoxia resistance of the body; the effect of the middle mountain area of Tien Shan on the higher nervous activity of athletes; problems of acclimatization to altitude; change of the osmotic resistance of erythrocytes in people and animals during the period of acclimatization to a high mountain area; training for hypoxia as a means of increasing working ability; aspects of the reaction of physiological functions in people performing physical labor during a period of acclimatization to the high mountain area of Tien Shan; phagocyte and enzyme activity, ribonucleic acid content, and certain indices of the hormonal system upon physical loading under conditions of hypoxia; and changes of certain indices of external respiration during the initial period of acclimatization to a high mountainous area in people depending on the age and degree of training. R.W.H.

N66-10518# Joint Publications Research Service, Washington, D. C.
ULTRASOUND IN MOLECULAR BIOLOGY
I. Ye. El'piner 25 Oct. 1965 17 p Transl. into ENGLISH from Priroda (Moscow), no. 8, 1965 p 20–27
(JPRS-32532; TT-65-33011) CFSTI: $1.00

The investigation of physical phenomena originating upon the propagation of ultrasound vibrations of high intensity within a fluid is considered. The propagation of ultrasound waves was realized via periodic compression and rarefaction of the medium. Cavitation took place at the borderline of the fluid-solid body or on the surface of poorly moistened hard particles which were suspended on a medium. It was shown that a certain admixture (initiators), in case of their dissociation within the cavitation bubble with the formation of atoms or radicals, may ensure the origin of chain reactions under the effect of the ultrasound waves. It was stated that by using ultrasound waves the synthesis of biologically active substances was possible; it was possible to induce controlled chemical transformations of these substances and to form a number of molecules with modified biological activity. The controlled physicochemical changes were also detected as a result of the effect of ultrasound waves on biomacromolecules, proteins, and nucleic acids. R.W.H.

N66-10559# Joint Publications Research Service, Washington, D. C.
LIFE IN THE LIGHT OF MODERN ACHIEVEMENTS OF BIOLOGICAL SCIENCES
A. I. Korotyayev 19 Oct. 1965 16 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 8, 1965, p 116–125
(JPRS-32457; TT-65-32936) CFSTI: $1.00

A philosophical discussion is presented on the concept of life, its essence, and origin. The following questions are briefly analyzed: (1) What is the essence of life in the light of the modern data of the biological sciences? (2) What is the basic difference between non-living and living matter? (3) What does modern biology offer that is new on the question of the origin of life on Earth? Various writings on this subject are reviewed. E.E.B.

N66-10564# School of Aerospace Medicine, Brooks AFB, Tex.
SOME STRUCTURAL REQUIREMENTS OF NITROGENEOUS SUBSTANCES WHICH HAVE PROTECTIVE EFFECTS AGAINST ACUTE HYDRAZINE TOXICITY IN MICE Technical Report, Jul.–Nov. 1964
Eugene Roberts, Daisy G. Simonsen, and Ethel Roberts May 1965 11 p refs
(SAM-TR-65-10; AD-469678)

A continuation of previous studies on the protective effects of various substances against acute hydrazine toxicity in mice has revealed several interesting structural features. These are consistent with the provisional interpretation that the protective substances may compete with hydrazine for a site or sites on

cell membranes (neuronal, hepatic, or both). At present, it appears likely that the protective actions of L-arginine and L-ornithine can be attributable only in part to their roles in ammonia detoxication via urea biosynthesis in liver. It also appears that the protection against lethality which they afford also may have a physical basis in terms of membrane interactions.
Author (TAB)

N66-10565# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF IONIZING RADIATION ON ENOLASE. INACTIVATION AND CHEMICAL PROTECTION Technical Report, 1 Sep.–31 Dec. 1964
Jack A. Winstead, Arthur E. Gass, Jr., and John P. Higdon Jul. 1965 9 p refs
(SAM-TR-65-20; AD-470850)

Rabbit-muscle enolase in aqueous solutions was inhibited by gamma irradiation. An exponential inactivation was observed. The G values increased with increasing protein concentration with a value of 0.21 for a 2.5×10 to the -5 M enolase solution. Both sulfhydryl and nonsulfhydryl compounds were shown to be effective in protecting enolase against gamma radiation. Imidazole and analogs were found to be a very effective group of protective agents. It was postulated that the protective effects observed on this enzyme system were due to the mechanism of radical scavenging. Author (TAB)

N66-10566# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF OBSERVER ELEVATION ON THE MOON ILLUSION Technical Report 1 Jun. 1963–1 Jun. 1964
James E. Hamilton Jun. 1965 15 p refs
(SAM-TR-65-46; AD-470897)

A study was made to determine if an increase in elevation of an observer above terrain causes a change in the magnitude of the moon illusion and estimation of distance upon the terrain. A comparison was made to determine a relationship between the magnitude of the illusion at different observer elevations and the correponding estimation of distance. It was found that a general decrease in the magnitude of the moon illusion coincides with a general increase in estimated distance when an observer ascends from a point above a terrain. Evidence is lacking to support the apparent-distance theory when an observer ascents above a terrain. Author (TAB)

N66-10567# School of Aerospace Medicine, Brooks AFB, Tex.
ENDOCRINE AND METABOLIC CHANGES DURING A 12-HOUR SIMULATED FLIGHT
Henry B. Hale, James P. Ellis, Jr., and Edgar W. Williams Jun. 1965 10 p refs
(SAM-TR-65-35; AD-469685)

Forty-eight young men were studied by means of serial urinary determinations while working in flight simulators for 12 hours. The flights began at 0700 hours and ended at 1900 hours. Postflight values obtained at 2100 hours were compared with control values obtained at 2100 hours on the day before the test. Creatinine excretion did not show statistically significant variation with time. All other urinary constituents were expressed as ratios with creatinine. Simulated flight induced statistically significant elevations in urine volume, urea, uric acid, phosphorus, sodium, the Na/K ratio, 17-hydroxycorticosteroids, epinephrine, and norepinephrine. The NE/E ratio fell significantly. Author (TAB)

N66-10568# School of Aerospace Medicine, Brooks AFB, Tex.
EXPERIMENTAL DECOMPRESSION SICKNESS FROM HYPERBARIC NITROUS OXIDE ANESTHESIA
Robert G. Mc Iver, William P. Fife, and Kenneth G. Ikels Jun. 1965 16 p 18 p refs
(SAM-TR-65-47; AD-470657)

Nitrous oxide-oxygen mixtures were administered to dogs at 3, 4, and 5 atmospheres absolute pressure for 30 minutes. Animals which breathed mixtures containing 1,824 mm. Hg, or more, partial pressure of N_2O showed respiratory depression to the point of apnea in some instances. The animals in this group which did not expire from respiratory arrest developed fatal nitrous oxide decompression sickness upon decompression. Author (TAB)

N66-10569# School of Aerospace Medicine, Brooks AFB, Tex.
SOME NOTES ON THE THRESHOLD OF THE VESTIBULAR CORIOLIS EFFECT AND ITS SIGNIFICANCE TO AIRCREW Technical Report, 1 Oct. 1964–1 Feb. 1965
Kent K. Gillingham Aug. 1965 8 p refs
(SAM-TR-65-55; AD-472167)

By employing self-induced Coriolis stimulation, subjects are able to perceive otherwise undetectable constant angular velocity in the yaw plane. How accurately this can be done is studied by determining the psychophysical functions for the discrimination of direction of rotation of different yaw velocities The results indicate that perceivable Coriolis effects can be generated by constant angular velocities of less than 1 degree/sec. This means that: (1) spatial disorientation due to the Coriolis effect can occur at very slow turn rates in instrument flying, and (2) that pilots' head-shaking maneuvers may be an appropriate means of countering some forms of spatial disorientation.
Author (TAB)

N66-10579# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
FACTORS INFLUENCING THE RENAL REGULATION OF CALCIUM—IMPLICATIONS OF PROLONGED WEIGHTLESSNESS
William C. Nungesser May 1965 29 p refs *Its* Rev. 2-65

The metabolism of calcium is reviewed with special emphasis on methods of laboratory determination, general metabolism, and calcium regulation. The renal handling of calcium is emphasized. There is a discussion of the factors leading to the precipitation of kidney stones. The author takes the view that it is unlikely that kidney stones will be a problem in prolonged space flight. However, he makes several recommendations for the keeping of these problems to the irreducible minimum. The review is accompanied by a table showing the physical-chemical factors of input-output as they relate to the physical solubility of calcium salts in kidney stones. The author concludes that the whole area of calcium and magnesium balance under loading conditions, the relationship of parathyroid and calcitonin, and the factors affecting gastrointestinal absorption. The review is intended to study in depth the factors influencing the handling of calcium by the kidneys, including any implications of prolonged weightlessness. Author (TAB)

N66-10586# Joint Publications Research Service, Washington, D. C.
RECENT STUDIES ON INDUSTRIAL TOXICOLOGY IN THE USSR
B. Yu. Kalimin, E. H. Komorova, and B. A. Kurlyandskii 19 Oct. 1965 13 p refs Transl. into ENGLISH from Gigiena i Sanit. (Moscow), v. 30, no. 6, 1965 p 65–67, 73–76
(JPRS-32451; TT-65-32930) CFSTI: $1.00

CONTENTS:

1. APPARATUS FOR THE STUDY OF TOXIC PROPERTIES OF VOLATILE PRODUCTS FROM PLASTICS B. Yu. Kalimin and E. H. Komorova p 1-5 ref

2. ORGANIZATION AND WORK OF THE TOXICOLOGICAL LABORATORY AT THE MOSCOW SANITARY-EDIMIOLOGICAL STATION B. A. Kurlyandskii p 6-11

N66-10594# Turin Univ. (Italy). Medical Clinic.

BEHAVIOUR OF DNA SYNTHESIS IN DIFFERENT PHASES OF THE S-PERIOD IN CHROMOSOMES OF HUMAN ACUTE LEUKAEMIA

F. Gavosto, L. Pegoraro, A. Pileri, and R. Bernardelli Brussels, EURATOM, Aug. 1965 10 p refs Presented at the 10th Congr. of the Intern. Soc. of Haematol., Stockholm, 30 Aug.-4 4 Sep. 1964

(Contract EURATOM-016-62-1 BIOI)

(EUR-2451.e) CFSTI: HC $1.00/MF $0.50

A previously reported in vivo technique was improved in order to investigate the behavior of DNA synthesis at chromosome level in different stages of the S-period in human acute leukemia cells. After intravenous injection of tritiated thymidine, bone marrow samples were withdrawn at different intervals. The incorporation of thymidine was determined within the chromosomes and their segments of c-mitoses of cells which at the moment of labelling were in the early, intermediate and final stage of the S-period. Comparative analysis of the incorporation values in the single chromosomes and in the different stages of the synthetic period was performed. Asynchronism of DNA synthesis was evaluated through the whole S-period, and it was shown to be more evident in the terminal stage as compared to the early phase. Author

N66-10608*# Westinghouse Electric Corp., Baltimore, Md. Defense and Space Center.

NASA INDUSTRIAL APPLICATIONS STUDY. INDUSTRIAL REVIEW FOR IMPROVED ELECTRODE FOR BIOPOTENTIAL MEASUREMENT AT THE SKIN

Herman Schneid 8 Dec. 1964 12 p refs

(Contract NASw-952)

(NASA-CR-67798) CFSTI: HC $1.00/MF $0.50 CSCL 05B

A biopotential electrode developed for the Mercury project is discussed in terms of its potential civilian applications in medicine. These applications include monitoring of cardiac patients, long term study of heart diseases, electroencephalography, fetal electrocardiography, electrohysterectomy, impedance pneumography, muscle biopotentials, and animal husbandry. The electrode has the desirable features of low resistance, resistance to motion artifact, and low irritation. Methods for reducing its cost for civilian use are discussed. R.N.A.

N66-10736# Royal Canadian Air Force, Toronto (Ontario). Inst. of Aviation Medicine.

THE EFFECT OF ACCELERATION ON THE DISTRIBUTION OF PULMONARY BLOOD FLOW

A. C. Bryan and W. D. Mac Namara Nov. 1964 14 p refs

(Rept.-64-RD-8; AD-467516)

The distribution of pulmonary blood flow has been measured during increased positive (+Gz) acceleration. Macroaggregatad albumin labelled with Iodine^{131} was injected intravenously during centrifugal acceleration. The particles embolize the pulmonary vascular bed in proportion to flow and can be subsequently detected by scintillation scanning of the lung. Studies were done supine, seated and at +2, +3 and +4Gz. The results show a progressively smaller reduction in upper zone perfusion with increasing acceleration agreeing with hydrostatic principles. Flow increases in the base up to +2Gz but thereafter becomes fixed, suggesting that the vessels are then maximally dilated. The gas exchange consequences of these changes of perfusion are discussed indicating that there must also be ventilatory changes. Author (TAB)

N66-10758*# Kansas Univ., Lawrence. Engineering Science Div.

PERFORMANCE OF HUMAN OPERATORS UNDER VARIOUS SYSTEM PARAMETERS

Hajime Akashi and Saad Mahmood Jun. 1965 37 p refs *Its* Studies in Eng. Mech. Rept.-22

(Grant NsG-298)

(NASA-CR-67625) CFSTI: HC $2.00/MF $0.50 CSCL 05H

The performance of human operators was investigated for varied system parameters. A practical performance index was defined, and the relation between the parameters and the performance index was found for a range of values of the parameters. Several operators with different control experience were tested, and it was found that human control capability can be represented by a hyperbolic curve in the parameter plane of gain and time constant. The result may be used in the design of man-machine systems that anticipate some unusually difficult situations which the operator may be required to deal with. Author

N66-10773*# Oregon State Univ., Corvallis.

MICROORGANISM STUDY Progress Report

W. B. Bollen Pasadena, Calif., JPL, 20 Aug. 1965 53 p Prepared for JPL

(Contracts NAS7-100; JPL-950783)

(NASA-CR-67686) CFSTI: HC $3.00/MF $0.50 CSCL 06M

Descriptive charts for 12 more isolants are presented. All 12 are soil diphtheroids. The only available genus for these is *Corynebacterium* into which they fall readily with respect to morphology and general physiology. However, many of their biochemical reactions and cultural characters, especially pigmentation, are different. They undoubtedly constitute a part of Winogradsky's unclassified autochthonous microflora and a new genus should be established for them. Cultural characteristics of these bacterial colonies and photomicrographs are included. R.N.A.

N66-10782# Naval School of Aviation Medicine, Pensacola, Fla.

PILOT ATTITUDES ON DARK ADAPTATION AND RELATED SUBJECTS

Robert S. Kennedy and Thomas E. Berghage Jun. 1965 10 p refs *Its* Special Rept. 65-4

(AD-620016)

The night accident rate for carrier landings is five times the day rate. This raises the possibility that visual errors caused by lack of dark adaptation may be involved. Completed questionnaires regarding the importance of being adapted to darkness prior to and during night time aircraft carrier operations were received from 71 experienced naval aviators. Analysis of their responses showed that, generally, their opinion of the usefulness of dark adaptation is an individual matter; if the aviator had never experienced its need, he was less likely to be concerned. The greatest value to an aviator of being adapted to the dark was said to be during pre-flight operations, i.e., on deck, when moving to and around the aircraft, taxiing, and during launch. After being airborne, however, the aviator's major visual problem lies in reflection of the instrument lights which reduces visibility and can affect dark adaptation. Poor knee-board lighting and difference in instrument light intensity were mentioned as other irritating problems. Author (TAB)

N66-10788# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE CLOTHING OF SUBJUGATORS OF OUTER SPACE
V. Krichagin 18 Jun. 1965 9 p Transl. into ENGLISH from Med. Gazeta (USSR), 25 Mar. 1965
(FTD-TT-65-604/1+4; AD-620099)

A synopsis on the function and advantages of using space clothing in outer space exploration is presented. Reviewed are methods for eliminating or modifying the effects of bio-physiological responses induced by high altitudes, atmospheric pressure, solar radiation, and the pressure within the space suit. Emphasized is the importance of research in high-altitude physiology and engineering design to the development of more reliable clothing for exploration of airless outer space. S.C.W.

N66-10820# Syracuse Univ., N. Y.
VERBAL CONDITIONING BY A SIMULATED EXPERIMENTER
Richard Videbeck and Henry Bates (Missouri Univ.) Apr. 1965 15 p refs Prepared in cooperation with Missouri Univ.
(Contract Nonr-2296(02))
(TR-16; AD-620160)

The present study sought to control for absolute consistency in experimenter behavior and reaction to the subject's verbal emissions. To attain this end, a computer was programmed to stimulate the functions of the experimenter. Not only were the instructions to the subject and the experimental stimuli presented in a standardized manner, but invariance in the reinforcing operations was attained. The computer was programmed to recognize the preselected response class and reinforce it with the typed message 'very good.' The result is a highly replicable and consistent presentation of stimuli and reinforcement. TAB

N66-10831# Rome Air Development Center, Griffiss AFB, N. Y. Display Techniques Branch.
COLOR SPECIFICATION FOR ADDITIVE COLOR GROUP DISPLAYS
Edward F. Rizy Aug. 1965 33 p refs
(RADC-TR-65-278; AD-621068)

Nine pairs of dichroic filters were used in a xenon-source additive color projector to determine their effects upon observer performance in a search-and-discrimination task with seven color codes. The objective was to define performance parameters preliminary to setting filter specifications. Results indicated that a blue filter reflecting wavelengths well into the green region facilitated performance in the majority of color codes. A red filter close to the infrared in reflectance reduced performance in most codes. The most efficient color code, regardless of filter, was red. Green, blue and cyan were least efficient. Recommendations were made suggesting a blue filter of approximately 516 mμ cutoff and a red filter with a cutoff between 581 and 595 mμ for optimum observer performance in the context of a seven-color code. Performance criteria were compared and an alternate filter option was described.
Author (TAB)

N66-10848# School of Aerospace Medicine, Brooks AFB, Tex.
THE EFFECT OF EXPOSING STANNOUS FLUORIDE-TREATED ENAMEL SURFACES TO WHOLE SALIVA
Ira L. Shannon Jul. 1965 11 p refs
(SAM-TR-65-28; AD-469637)

Three experiments were carried out in which the effect of whole saliva on the ability of stannous fluoride to protect enamel surfaces was studied. When stannous fluoride-treated enamel was exposed to whole saliva for 24 hours, the protective efficacy of the stannous fluoride treatment dropped from 72.4% to 27.0%. No further drop was seen over an additional 72 hours. Dipping stannous fluoride-treated teeth into whole saliva for only a few seconds significantly decreased the protection afforded the enamel by the treatment. This rapid loss in effectiveness was believed to be caused by chemical reactions between the hydrated stannous oxide layer on the tooth surface and the ions of saliva. Two-thirds of the protection provided enamel surfaces by the topical application of stannous fluoride proved temporary in nature. This emphasized the importance of very frequent reinforcement by daily applications of a compatible stannous fluoride preparation. Thus, the premise was strengthened that there is promise in a properly managed, caries-prevention program that utilizes a low-concentration stannous fluoride mouthwash. Author (TAB)

N66-10849# School of Aerospace Medicine, Brooks AFB, Tex.
WATER AND SOLUTE SHIFTS BETWEEN THE BLOOD AND INTRAPERITONEAL GLUCOSE INFUSATE
Albert E. New and Alfonso Zermeno May 1965 18 p refs
(SAM-TR-65-5; AD-469627)

An isosmotic glucose solution was injected into the peritoneal cavity of 21 anesthetized dogs and the exchanges of solutes and water were determined for plasma and peritoneal fluid. Little change in the peritoneal fluid volume occurred during the first 45 minutes. Glucose rapidly diffused out of the cavity and an influx of sodium, chloride, potassium, and urea resulted. After this period, water diffused into the cavity, glucose continued to leave, and the influx of plasma ions and urea persisted. Reabsorption began after 3 hours when an equilibrium was reached. The packed cell volume of all animals increased. There was evidence that little or no urine was produced during the course of the experiments. A method for calculating quantitative solute fluxes, by employing a compartmental model system based on a simple analytic procedure, is illustrated. From this model, flow-rate constants were obtained which describe fixed characteristics of the peritoneal membrane.
Author (TAB)

N66-10905# Stanford Research Inst., Menlo Park, Calif.
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS IN TRAINABLE PATTERN-CLASSIFYING SYSTEMS
Final Report, Jun. 1964–Jun. 1965
Nils J. Nilsson Griffiss AFB, N. Y., RADC, Sep. 1965 111 p refs
(Contract AF 30(602)-3448)
(RADC-TR-65-257; AD-471810)

Motivation is given for the use of various trainable pattern-classifying structures called *linear* and *piecewise linear (PWL)* machines. The results of various experiments in training these machines are presented. Two different types of training methods were investigated: mode-seeking and error-correction methods. These methods are illustrated by experiments using two-dimensional patterns so that the results of training can be easily visualized. More thorough experiments with 10-dimensional and 100-dimensional patterns are also described. It is concluded that certain of these training methods can be expected to give good performance in complex pattern classifying tasks involving multi-modal pattern distributions. The report contains an appendix presenting a new theorem on training a linear machine. Author

N66-10910# Naval Personnel Research Activity, San Diego, Calif.
PREPARATION FOR PROBLEM SOLVING: STRUCTURAL VS. STRATEGY PRETRAINING

Edward A. Rundquist, John D. Ford, Jr., David J. Chesler, William D. Rohwer, Jr., and Harriet M. Braunstein Jul. 1965 62 p refs
(STB-66-1; AD-619705)

In an attempt to answer questions regarding performance improvement in complex applied problems, an experiment was designed to examine the effects of pretraining on the efficiency of concept attainment. Two principal varieties of pretraining were provided to groups of college students whose subsequent performance on five criterion tasks was compared with that of Ss who received no pretraining. The Ss were taught either to analyze problem materials into their structural components or to apply a strategy for the solution of concept attainment problems. In either case, the training was relatively extensive, consuming ten one-hour sessions for each S. The criterion battery comprised three typical laboratory concept attainment tasks of more than twenty problems each, one concept identification task and a fifth task that required the attainment of sequential or temporal concepts. The dependent measures of principal interest revealed slight, reliable, but insubstantial increments in the performance of Ss given strategy pretraining but not for those given structure pretraining. The most powerful effect of strategy training was to increase dramatically the tendency of Ss to withhold hypotheses until sufficient information had been acquired to insure accuracy. The discrepancy between these results and those reported previously is considered and the utility of laboratory concept attainment tasks for applied research is questioned. Author (TAB)

N66-10918# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
LIFE SUPPORT SYSTEMS EVALUATOR CONSTRUCTION TECHNIQUES
William F. Mickelson May 1963 29 p
(AMRL-TDR-63-43; AD-412649)

The construction, plumbing, capability, and operation of the Life Support Systems Evaluator are described. The evaluator is a research tool for determining technical feasibility of techniques and principles involved in operation and design of life support equipment by integrated evaluation studies. The evaluator is operational and has provided very good results. Author

N66-10938*# Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
MARS LANDING AND RECONNAISSANCE MISSION ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM STUDY. VOLUME 2: SUBSYSTEM STUDIES Final Report, 15 Jul. 1963–15 Mar. 1964
[1964] 408 p refs
(Contract NAS9-1701)
(NASA-CR-67935; SLS-414-2) CFSTI: HC $7.00/MF $2.00 CSCL 06K

Results of subsystem studies used as supporting data for the final system analysis are presented in a parametric form to permit application of the data to the requirements of future Mars missions. The subsystems analyzed include CO_2 removal, transfer, and reduction; water electrolysis; atmospheric storage; water reclamation; waste management; contaminant control; personal hygiene; radiators, heat exchangers and water separators, and fans. General conclusions are presented on each approach considered to demonstrate the preliminary assessment on the subsystem level. To allow full flexibility of use, the data illustrate the fixed weight, power, and expendable requirements in all possible cases. S.C.W.

N66-10939*# Martin Co., Baltimore, Md. Research Inst. for Advanced Studies.
A STUDY OF THE FEASIBILITY OF DETECTING EXTRATERRESTRIAL LIFE BASED ON THE EXCHANGE BETWEEN WATER AND OXYANIONS AND A STUDY OF ENERGY EXCHANGE IN AUTOTROPHIC LIFE Final Report
B. Kok Aug. 1965 73 p refs
(Contract NASw-1054)
(NASA-CR-67924) CFSTI: HC $3.00/MF $0.75 CSCL 06

An extraterrestrial life detection system is proposed based on the detection of enzymes by means of their ability to catalyze the exchange of O^{18} between a labeled oxyanion and water. Experimental data are included to show that with such preparations as whole cells, cell-free extracts, whole insects, plant extract, and random soil samples, the rate of exchange of O^{18} from PO_4 and NO_3 is appreciable and measurable. The theoretical basis of the method is detailed, and underlying assumptions applicable to all forms of earth life are listed. Possible procedures to be followed aboard the Martian probe are discussed, and details on sample analysis, the inlet, and the mass spectrometer are included. An extensive literature survey was conducted to compile existing data, and the findings are reported. Studies were also undertaken to investigate the biochemistry of the energy metabolism of the chemosynthetic bacteria, because of the possible similarities of the extraterrestrial life forms to the terrestrial chemosynthetic microorganisms; the results are summarized. M.G.J.

N66-10956*# Mississippi State Univ., State College.
SOME OF THE EFFECTS OF THREE AMINO ACIDS ON THE GROWTH OF *HYDROGENOMONAS EUTROPHA*
Eve Elliott Blake (M.S. Thesis) Jan. 1966 112 p refs
(Grant NsG-650)
(NASA-CR-67927) CFSTI: HC $4.00/MF $0.75 CSCL 06A

Investigations were conducted to determine if the presence of L-tyrosine, L-alanine, and L-glutamic acid in a medium would impair the growth and physiology of *Hydrogenomonas eutropha*. These compounds were found in the basic medium following growth under autotrophic conditions. Preliminary studies indicated that these amino acids were not toxic. In a series of growth studies using cells grown under autotrophic conditions, *Hydrogenomonas eutropha* was used to inoculate Repaske's medium and Repaske's medium containing the amino acids. Growth under an atmosphere of hydrogen, oxygen, and carbon dioxide in a ratio of 6-2-1 was compared with growth under air. Under an atmosphere of the gas mixture all three of the amino acids caused a marked increase in growth as indicated by turbidity measurements. The increase in cell mass was several fold that in Repaske's medium. The least increase over that of control medium was obtained when 0.1% glutamic acid was in the culture medium and was 2.06. The greatest increase occurred when 1% tyrosine was in the culture medium and was 4.12. R.W.H.

N66-10963# Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex.
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
Clayton S. White, I. Gerald Bowen, and Donald R. Richmond Washington, AEC, 18 Oct. 1965 258 p refs
(CEX-65.4) CFSTI: $2.75

Experience with animals exposed in a variety of above and below ground structures during full-scale field operations were reviewed. The data were assembled and summarized to illustrate the nature of the blast-induced problems of significance in protective shelters, open as well as closed. Potential hazards were related to the following: various patterns of variation in environmental pressure; translational events associated with transient, high-velocity winds, ground shock and gravity involving the impact of energized inanimate objects on the one hand

the consequences of whole-body displacement on the other; non-line-of-sight thermal phenomena including hot objects and rapidly moving hot, dust-laden air, and debris; and dust, in the respirable size range, sufficiently high in concentration even in closed shelters as to warrant design measures to minimize or eliminate the occurrence of small particulates whether arising from wall spalling or otherwise. Author

N66-11058# Sylvania Electric Products, Inc., Waltham, Mass. Sylvania Electronic Systems Div.
INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES Final Technical Report, 16 Mar. 1964–15 Jul. 1965
Donald B. Devoe Bedford, Mass., AFSC, Electron. Systems Div., Oct. 1965 65 p refs
(Contract AF 19(628)-4073)
(ESD-TR-65-461; AD-621278)

Two experiments were performed involving the concurrent presentation to human subjects of two messages, one auditory and one visual, followed by a question requiring information from both messages. The results indicated that bimodally-presented information can be integrated for decision making. However, there was no evidence of an advantage to bimodal presentation as a means of unburdening an overloaded sense. The implications of the results for displays and communications in complex control centers are discussed and directions for future research are suggested. Author (TAB)

N66-11059# Franklin Inst., Philadelphia, Pa. Research Labs.
DEVELOPMENT OF CRITERIA FOR EVALUATION OF LARGE-SCREEN DISPLAYS Final Report
Carl A. Silver, Daniel Landis, and James M. Jones Griffiss AFB, N. Y., RADC, Aug. 1965 77p refs
(Contract AF 30(602)-3302)
(TR-1-052; RADC-TR-65-198; AD-621231)

This research was directed toward developing a metric of display quality for evaluation of large-screen displays and toward developing a criterion to validate the metric. Two approaches were used. In the first, multidimensional analysis (MDA) was used to test the hypothesis that, other things being equal, display quality was related to the number of perceived dimensions of information content; the results of the test failed to support the hypothesis. In the second approach, a game situation was used in which the monetary value of the subjects' decisions could be calculated. Several display parameters, including format, information density, and color, were manipulated. The monetary value of the decisions, or "decision value", was found to be a reliable and valid measure of display quality. It is recommended that MDA and decision quality be combined to formulate a predictive model of display quality. Research to this end should be conducted using a wide range of stimuli and subject proficiency levels. Author

N66-11148# United Kingdom Atomic Energy Authority, Annan (Scotland). Production Group.
METABOLISM OF RADIOACTIVE STRONTIUM IN RAT
T. H. Bates, B. Dymond, I. V. Chapman, and H. Smith 1965 30 p refs
(PG-662(CC)) HMSO: 8s

CONTENTS:

1. THE WHOLE-BODY RETENTION AND TISSUE DISTRIBUTION CHARACTERISTICS OF Sr-85 T. H. Bates, B. Dymond, I. V. Chapman, and H. Smith p 1–9 refs (See N66-11149 02-04)

2. ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL AND OTHER PROCEDURES H. Smith and T. H. Bates p 10–25 refs (See N66-11150 02-04)

N66-11149 United Kingdom Atomic Energy Authority, Annan (Scotland). Production Group.
THE WHOLE-BODY RETENTION AND TISSUE DISTRIBUTION CHARACTERISTICS OF Sr-85
T. H. Bates, B. Dymond, I. V. Chapman, and H. Smith *In its* Metab. of Radioact. Strontium in Rat. 1965 p 1–9 refs (See N66-11148 02-04)

A satisfactory method of whole-body counting of Sr-85 in small experimental animals has been devised along with methods for analysis of excreta and tissues. Use of rats of bodyweight between 150 and 200 g is convenient and ensures reproducible body retention characteristics. Analysis of tissues from animals sacrificed at intervals following administration of Sr-85 shows a rapid clearance from soft tissues and uptake into bone tissue in a matter of hours. This underlines the need for early therapy if attempts at removal are to be simple and effective. Any alternative approach will necessarily involve modification of basic physiological parameters affecting bone metabolism. Distribution in tissues over a 48 hour period was analyzed. There is evidence that skin should be regarded as a separate compartment. Movement of Sr-85 along the gastrointestinal tract has been studied and it transpires that little absorption occurs in caecum or colon. Author

N66-11150 Production Group, United Kingdom Atomic Energy Authority, Annan (Scotland).
ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL AND OTHER PROCEDURES
H. Smith and T. H. Bates *In its* Metab. of Radioact. Strontium in Rat 1965 p 10–25 refs (See N66-11148 02-04)

Sr-85 was injected into rats and the effects of test procedures followed by whole-body counting and analysis of excreta. Inhibitors of calcification and stimulators of decalcification were used to study the effect of modifying bone metabolism. Procedures producing increase in membrane permeability, substances which affect renal selective tubular resorption and several known and potential chelating agents were also tested. Pre-medication with oral fluoride (150 ppm) interferes with skeletal uptake. Sodium citrate and sodium carballylate bring about reductions in body burden at 21 days by 50% and 12% respectively. Isotopic dilution with carrier strontium was beneficial but dilution with calcium was not. Sodium salicylate accelerates excretion for considerable periods following the first 24 hours after administration of the isotope. A combined therapy of early citrate and carrier strontium with daily salicylate is the most successful to date. Author

N66-11249*# General Electric Co., Philadelphia, Pa. Missile and Space Div.
THERMAL INTEGRATION OF ELECTRICAL POWER AND LIFE SUPPORT SYSTEMS FOR MANNED SPACE STATIONS
K. L. Hanson Washington, NASA, Nov. 1965 314 p refs
(Contract NAS3-2799)
(NASA-CR-316) CFSTI: HC $7.00/MF $1.75 CSCL 06K

To obtain maximum utilization of the waste energy available from the power generating system, an evaluation was made of the effect of thermal integration of the life support and electrical power systems of a six-man space station. Power requirements for both non-integrated and thermally integrated systems are tabulated, and total electrical power for the non-integrated system is found to be insufficient for a six-man station since life support requirements do not leave sufficient power for

operation of the station itself. By thermal integration there is a net reduction of 2.97 KW in life support requirements which makes it possible to reduce the size of the power system and leave power for other functions. Integrated systems considered are Solar Stirling, Isotope Stirling, Solar Brayton, Isotope Brayton, Solar Mercury Rankine, and Photovoltaic. Although no single system is found to be clearly superior, Isotope Stirling is considered the best non-integrated system. The selected thermal integrated system, Isotope Brayton, is considered superior for the mission under investigation. M.W.R.

N66-11268# Edinburgh Univ. (Scotland). Physiology Dept.
SMOOTH MUSCLE RESPONSES AS ALTERED BY HUMORAL BACKGROUND Final Scientific Report
L. M. Pickford 31 Dec. 1964 21 p refs
(Grant AF-EOAR-62-79)
(AFOSR-65-0664; AD-614478)

In man, monkey, rat and dog oxytocin normally has a vasodilator effect. Following surgical or chemical sympathetic denervation oxytocin becomes a vasoconstrictor. The dilator effect can be restored by infusing adrenaline or stimulating the sympathetic nerves. Oxytocin also becomes a vasoconstrictor when the circulating concentration of oestrogens is raised either naturally in the presence of cestrogens (as in rats in oestrus) or experimentally. In dogs the dilator response to oxytocin can be restored by giving atropine, and then either infusing adrenaline or stimulating the sympathetic nervous system. Author

N66-11286* Naval School of Aviation Medicine, Pensacola, Fla.
PROLONGED EXPOSURE OF HUMAN SUBJECTS TO MAGNETIC FIELDS OF LESS THAN 100 GAMMA
D. E. Beischer *In* JPL Proc. of the Magnetic Workshop 15 Sep. 1965 p 189-196 (See N66-11276 02-39) CFSTI: HC $7.00/MF $2.00

Two groups of four, respectively two men, were continuously exposed for a period of ten days to a magnetic field with a gradient of about 8 gamma/ft and underwent a number of physiological and psychological tests. Exposure to a 3 by 4 ft flickering area with a flicker frequency from 5 to about 40 cps changed the flicker fusion threshold in five test subjects. Flicker values at the rim of their retina dropped down to 20 or 25% of the original value during change to a low magnetic field; values took about 12 hrs to return to normal after restitution of the normal environmental magnetic field. All the other test results were negative. G.G.

N66-11336# California Univ., Davis.
THE INFLUENCE OF CHRONIC ACCELERATION ON THE EFFECTS OF WHOLE-BODY IRRADIATION ON RATS
Harold Wilton Casey (Ph.D. Thesis) [1965] 78 p refs
(Contract AF 33(608)-1045)
(AD-620403)

The following conclusions are drawn from the results of the studies combining acute whole-body irradiation and acceleration. Rats survive and physiologically adapt to 3.0 G chronic acceleration. A reduced body mass and depletion of body fat deposits are the only detectable changes from normal rats. Acceleration following exposures to acute whole-body irradiation, with doses in the mid-lethal range, increases radiation mortality. The mortality increases progressively with accelerative forces of 2.0 and 3.0 G. Prior adaptation to acceleration does not influence the increased radiation mortality. The detrimental effects of acceleration are operative only during the first week following irradiation. Pathological lesions in rats dying or sacrificed following acceleration and irradiation are typical of those produced by irradiation and are not modified by acceleration. Deceleration to normal gravity followed by irradiation does not influence the effects produced by radiation. Author (TAB)

N66-11341# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROCEDURE FOR SIMULTANEOUS INVESTIGATION OF THE NICTITATING CONDITIONED REFLEXES AND THE FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM IN MAN
F. M. Lebedev and M. G. Kheyfets 28 May 1965 10 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 14, no. 2, 1964 p 364-368
(FTD-TT-65-60/1+2; AD-620784)

Research was undertaken to study simultaneously the state of the central nervous system and the system of blood circulation in man under clinical conditions. An investigation of the nictitating conditioned reflexes and the functional state of the cardiovascular system in man was made. The equipment included: (a) a six-channel electrocardiograph with a set of standard pickups; (b) a protecting screen for isolating the sick person and including stimuli; (c) a special system for recording the inclusion of the stimuli and registering the position of the eyelid. TAB

N66-11356# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THRESHOLDS OF CALORIC NYSTAGMUS DURING ROTATION AT CONSTANT SPEED
I. V. Orlov 9 Jun. 1965 10 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 156, no. 4, 1964 p 972-975
(FTD-TT-65-216/1+2; AD-620949)

The purpose of the work was to get the quantitative characteristics of the excitation of the vestibular apparatus at the time of quite lengthy rotation at constant speed. To this end there was developed a procedure for determining the thresholds of excitability in accordance with the calorific (temperature) test. The index proved to be cervical nystagmus. TAB

N66-11419# California Univ., Berkeley. Lawrence Radiation Lab.
CRITERIA FOR RADIATION SAFETY OF SPACE FLIGHTS OF LONG DURATION
Yu. G. Grigorev, E. E. Kovalev, A. V. Lebendinskii, Yu. G. Nefedov, V. G. Vysotskii et al Jun. 1965 16 p refs Transl. into ENGLISH of Preprint 19, 2d Intern. Symp. on Basic Environ. Probl. of Man in Space, Paris, 14-18 Jun. 1965
(UCRL-TRANS-1225)

Available data on radiation protection during long-duration space flights are reviewed. It is suggested that radiation protection should include general protection of the compartments, radiation shelter, local protection, radiation dosimetry aboard the ship, individual monitoring, chemical protecting against radiation injuries, methods of therapy in the event of radiation injury, and ground service for radiation protection. It is pointed out that the biological effect of each type of ionizing radiation depends on the amount of ionization losses and on the dose and length of exposure to radiation. The basic sources of radiation in cosmic space include galactic cosmic radiation, the inner and outer radiation belts of the earth, the artificial radiation belt of the earth, and solar corpuscular radiation during chromospheric flares of the sun. The biological effects of radiation from each source are discussed. It is concluded that

galactic cosmic radiation, consisting basically of protons, α particles, and light nuclei, will present serious danger to cosmonauts during flights of long duration. Corpuscular radiation of solar flares consists basically of protons and α particles with the proton spectrum containing particles with energies of from several MeV to tens of BeV. During periods of maximum solar activity about 5 to 13 flares of low intensity occur in a year and a period of solar activity is expected in 1969 and 1970. Shielding problems are considered briefly. Data on the relative biological effects of protons with energies of 126 to 510 MeV in dogs, mice, and rats after single or multiple exposures are discussed. Criteria are included for radiation safety during a 15-day flight to the moon and back to Earth based on existing knowledge of the biological effects of ionizing radiation and allowing for a certain acceptable risk factor. NSA

N66-11420# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.

DOSE AND RELATIVE BIOLOGICAL EFFECTIVENESS OF IONIZING RAYS

H. H. Eisenlohr and R. G. Jaeger [1965] 11 p refs Transl. into ENGLISH from Atompraxis (Germany), v. 11, no. 2, 1965 p 80–84

(AEC-TR-6593)

The Roentgen, rad, and the RBE as units for the measurement of dose and relative biological effectiveness are considered. Also, the concept of dose equivalent (DE) expressed by the unit rem which represents the product of the absorbed dose D in rads and the quality factor (QF) is discussed and a new dose quantity is defined which contains the physically determined variation of dose. Of major concern is the use of physical units for the measurement of biological effects. E.E.B.

N66-11479# Iowa State Univ. of Science and Technology, Ames. Inst. for Atomic Research and Coll. of Veterinary Medicine.

EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE-EARTH METALS

Richard B. Talbot, Fred C. Davison, John W. Green, William O. Reece, and Gary Van Gelder May 1965 14 p

(Contract AT(11-1)-1170)

(COO-1170-1)

Subcutaneous implantation of yttrium, cerium, praseodymium, gadolinium, dysprosium, and ytterbium pellets in C57BL mice produced a granulomatous tissue reaction in a majority of the mice examined and malignant neoplasms in three mice. The coagulation time of dysprosium, gadolinium, praseodymium, and ytterbium implanted mice was significantly longer than in control mice 6 months after implantation. Twelve months after implantation only the dysprosium and ytterbium implanted mice had elevated clotting times and at 18 months post-implantation only the dysprosium implanted mice had values longer than control values. A depression of leukocyte numbers occurred in all implanted mice at 6 months post-implantation but returned to control values at 18 months. There were not significant differences in differential leukocyte counts of treated versus control mice. There were no significant treatment differences in life spans of mice. Forty-two neoplasms were diagnosed. Three of these were positively diagnosed as injection site neoplasms produced by three different rare-earth metals. Author

N66-11483 National Research Council of Canada, Ottawa (Ontario). Control Systems Lab.

COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION

T. Kasvand *In its* Quart. Bull. of the Div. of Mech. Eng. and the Natl. Aeron. Establ., 1 Apr.–30 Jun. 1965 [1965] p 21–38 refs (See N66-11481 02-34) CFSTI: HC $5.00/MF $1.00

A two-dimensional monochromatic visual field containing a multiplicity of arbitrary objects in random locations was investigated. The regions in the visual field where objects were expected to be found were specified by the extremum values of suitable functionals. An object was represented as a function in a multidimensional space, from which weighted criteria for recognition were computed. It was concluded that visual objects can be represented in terms of a sufficiently flexible code and that the objects may be recognized as belonging to certain sets and subsets of objects. These sets may be rearranged as the circumstances warrant by varying the weight structures and the desired degree of accuracy of recognition. R.W.H.

N66-11503# Texas A&M Univ., College Station. Graduate Coll.

ABSORPTION OF INTRADERMALLY INJECTED HORSE GAMMA GLOBULIN, A FOREIGN PROTEIN, IN RABBITS FOLLOWING WHOLE BODY GAMMA IRRADIATION

William Harold Pryor, Jr. (M.S. Thesis) Aug. 1965 43 p refs

(Contract AF 33(608)-1120)

(AD-620438)

Groups of rabbits were exposed to whole body gamma radiation. Twenty-four hours later a foreign protein, horse gamma globulin, was injected intradermally. Blood samples were taken at 2, 4, 6, 8, 16, and 24 hours postinjection and analyzed for presence of the foreign protein by antigen-antibody double diffusion in agar techniques. An increased quantity of horse gamma globulin would indicate reduced protein localization in situ. One group of animals (200 R) at one sample time (24 hours) showed a statistically significant increase over the control group. It is logically assumed that many radiation effects have a bearing on the amount of horse gamma globulin in the circulating blood, such as peripheral blood flow, hemoconcentration, and the status of various proteolytic enzymes. Therefore, the amount of foreign protein in the blood sample is not a direct measurement of localization capacity, unless these other effects are slight, as at low levels (200 R) and do not overshadow the localization phenomenon. The results of this study indicated that the hypothesis of a direct relationship between whole body gamma irradiation and localizing capacity of rabbits appears to be correct for a total dose level of 200 R when a 24-hour blood sample is considered. At other dose levels and sampling times, other radiation effects apparently obscure the localizing phenomenon. Author (TAB)

N66-11520# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MAN IN A STATE OF WEIGHTLESSNESS

A. Kitayev-smyk 1 Jun. 1965 19 p Transl. into ENGLISH from Nauk i Zhizn' (Moscow), no. 9, 1964 p 16–21

(FTD-TT-65-146/1+2; AD-620947)

Contents (discourse presumably on experiences of man during weightlessness): Where does weightlessness exist. How did we investigate weightlessness. What sensual organs perceive weightlessness. What do people feel in state of weightlessness. About sea sickness. Vision in weightlessness. How are various colors visible in weightlessness. Vision and movements: Is it easy to work in weightlessness. TAB

N66-11523# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MAN AT GREAT ALTITUDES
A. Nikolayev 4 Aug. 1965 5 p Transl. into ENGLISH from Sov. Aviatsiya (USSR), 4 Nov. 1958
(FTD-TT-65-603/1+4; AD-619488)

A brief discussion is given of phenomena occurring in the human organism at altitudes above 20 km. A situation is considered in which there is an abrupt drop in aircraft cabin pressure, and the pilot is without protective clothing. Such factors as reduced partial oxygen pressure and blood boiling are cited. C.T.C.

N66-11613*# National Aeronautics and Space Administration, Washington, D. C.
CHEMISM OF ACUTE WEIGHT LOSSES. RELATION BETWEEN WATER AND SALTS IN THE ORGANISM [ZUR KENNTNIS DES CHEMISMUS AKUTER GEWICHTSSTURZE. BEZIEHUNGEN SWISCHEN WASSER UND SALZEN IM ORGANISMUS]
L. Tobler Nov. 1965 50 p refs Transl. into ENGLISH from Arch. Exp. Pathol. Pharmakol. (Berlin), v. 62, 1910 p 431-463
(NASA-TT-F-9740) CFSTI: HC $2.00/MF $0.50 CSCL 06A

The material, available from the literature, on weight losses as a function of environmental or test conditions is discussed, especially with respect to weight losses in infants. To study the physiological and chemical processes in weight losses, experiments were performed to determine the amount of water in weight losses and to investigate the chemical composition of the material lost. For this purpose, diarrhea was generated in test animals (dogs) by administering large doses of magnesium sulfate into the stomach. The resulting losses of water and weight were so large that the animals finally died. The pathological conditions observed were somewhat similar to those which occur in severe nutritional disturbances of infants. Author

N66-11614*# National Aeronautics and Space Administration, Washington, D. C.
COMPARATIVE ARTERIAL OSCILLOGRAPHIC INVESTIGATIONS OF THE FOREARM AND LEG IN YOUNGER AND OLDER PERSONS [VERGLEICHENDE ARTERIELL-OSZILLOGRAPHISCHE UNTERSUCHUNGEN DES UNTERARMS UND UNTERSCHENKELS BEI JUNGEREN AND ALTEREN MENSCHEN]
W. Wärbanov Nov. 1965 7 p refs Transl. into ENGLISH from Compt. Rend. Acad. Bulgare Sci. (Sofia), v. 16, no. 2, 1963 p 201-204
(NASA-TT-F-9759) CFSTI: HC $1.00/MF $0.50 CSCL 06P

Various tests were conducted to diminish and evaluate the vascular muscle tone with oscillometric methods: heating, loading, ischemia of limbs, effect of nitroglycerine, and acetylcholine. The tests gave weaker results in sclerotic arteries because of the rigidity of the vessel wall. The investigations were conducted at room temperature with completely horizontal position of the body and limbs with the Gesenius-Keller apparatus, which permits simultaneous oscillography at two places. The examination began with the subjects lying down for 10 minutes. Oscillography was done simultaneously on the right forearm and right leg. After half a minute the flow of blood through the limb was cut off by pumping up the cuff to 30 to 40 mm Hg above the systolic blood pressure of the brachial artery for 2-1/2 or 5 minutes. Before reestablishing the blood flow, the blood pressure in the brachial artery of the nonischemic arm was measured again. During the 15 seconds after reestablishment of the blood flow, another arterial oscillogram was taken at the same place. Results show that the arteries of the lower limbs become increasingly rigid with time, and lose their adaptive capacities by the affects of hydrostatic pressure. R.W.H.

N66-11615*# National Aeronautics and Space Administration, Washington, D. C.
CHANGES IN PULSE RATE SPEED IN LIMBS DUE TO AGE AND OCCUPATION [ALTERS- UND BERUFSBEDINGTE VERANDERUNGEN DER PULSWELLEN-GESCHWINDIGKEIT IN DEN GLIEDMASSEN]
W. Wärbanov Nov. 1965 7 p refs Transl. into ENGLISH from Compt. Rend. Acad. Bulgare Sci. (Sofia), v. 16, no. 3, 1963 p 321-324
(NASA-TT-F-9760) CFSTI: HC $1.00/MF $0.50 CSCL 06P

A functional evaluation of age and occupationally induced pulse rate changes in the upper and lower limbs is reported. Studied were 54 to 61 year old barbers with over 30 years experience; 53 to 62 year old shoemakers with over 30 years experience; and 16 to 38 year old persons having various trades. The time of propagation of the pulse wave to the periphery was found to be shorter in older persons, and this age conditioned increase in the rate of the pulse wave is greater in the legs than in the arms. The decrease in time of the pulse wave propagation in the legs is more noticeable in persons whose occupation necessitates standing for long periods. It is concluded that the module of elasticity of the arteries in the legs increases with increasing age (because of hardening of the arterial wall) to a greater extent than in the upper limbs, and this phenomenon appears more clearly in trades and occupations requiring standing, upright working conditions. S.C.W.

N66-11618*# National Aeronautics and Space Administration, Washington, D. C.
DEVELOPMENT AND CORRECTION OF HYPERNATREMIA DURING A TWO HOUR HIKE AT THE HIGHEST TEMPERATURE IN THE SODOM REGION (A PRELIMINARY REPORT)
M. Toor, E. Wertheimer, S. Massry, and J. B. Rosenfeld Nov. 1965 15 p Transl. into ENGLISH from Harefuah (Tel Aviv), v. 57, 1959 p 244-248
(NASA-TT-F-9716) CFSTI: HC $1.00/MF $0.50 CSCL 06S

Investigations have shown that subjects who are accustomed to the arid conditions of an area can develop an excess of sodium in the blood after a two hour hike without water at a speed of six kilometers per hour and at a temperature of 42° C. It was demonstrated that in spite of the exertion of walking, adequate drinking could not only prevent the excess of sodium in the blood, but was also capable of correcting such symptoms. This indicated that the major cause of hypernatremia was not the loss of salt but the loss of water. The subjects revealed no substantial changes in the hematocrit and their blood pressure remained invariably steady. It was noted that there were changes in the blood volume and also changes in the sodium content of the blood especially among the subjects without water. R.W.H.

N66-11655# Comitato Nazionale per l'Energia Nucleare, La Spezia (Italy).
STUDIES ON THE RADIOACTIVE CONTAMINATION OF THE SEA Annual Report, 1964
M. Bernhard 1965 36 p refs
(Contract EURATOM-024-63-2BIAI)
(RT/CIO (65)18; EUR-2543.e) CFSTI: HC $2.00/MF $0.50

The program of this contract requires studying the factors which influence the uptake, accumulation and loss of radioisotopes by marine organisms. The program is divided into

two parts: (a) a survey of the elements and factors in a sampling area, and (b) experiments on the influence of environmental factors on the uptake, accumulation and loss of radioisotopes by marine organisms in relation to the data obtained in the survey. Author

N66-11656# California Univ., Berkeley. Lawrence Radiation Lab.

RESULTS OF COMPUTATIONS OF DEPTH DOSE IN TISSUE IRRADIATED BY PROTONS

Palmer G. Steward 25 May 1965 119 p refs
(Contract W-7405-ENG-48)
(UCRL-16154)

A computer code was developed for the depth-dose relation due to primary protons and to cascade, evaporation, and hydrogen-proton collision (recoil) secondary protons in spheres of tissue. Recoil protons are assumed to be emitted in the forward direction, as also, on the basis of Metropolis' calculations, are cascade protons. Evaporation protons are assumed to deposit their dose locally. The results show that the depth-dose pattern varies widely with proton energy and sphere size. For certain intermediate proton energies, the primary protons cause a peak dose rate at a predictable depth in the sphere. The secondary proton dose rate increases with increasing incident-proton energy, sphere size, and depth. At the center of a sphere of 2.5-cm radius, 730-MeV protons cause a secondary proton dose which is 14% of the total dose, 35% for a 10-cm radius, and 48% for a 25-cm radius. Author

N66-11657# Joint Publications Research Service, Washington, D. C.

ELECTROENCEPHALOGRAPHIC CHANGES IN THE ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER THE EFFECT OF TRANQUILIZERS

Yu. V. Burov 10 Nov. 1965 8 p refs Transl. into ENGLISH from Farmakol. i Toksikol. (Moscow), v. 28, no. 4, 1965 p 389–393
(JPRS-32810; TT-65-33388) CFSTI: $1.00

The effects of etaperazine (periphenazine), amizyl (benactizine), and meprotan (meprobamate) on the desynchronization of EEG reactions, which accompanied orientation and conditioned defense reflexes, were investigated. In experiments with 18 rabbits, electrodes were implanted in the frontal, motor, sensory, optic, and auditory zones of the cortex, and the orientation reflex was induced by a sound signal. The conditioned defense reflex was developed in 25 rats, with electrodes implanted in the parietal and occipital areas of the cerebral cortex; an electrode floor served as a conditioned signal, and a 20 to 40 V current as an unconditioned signal. The preparations were injected intravenously or intraperitoneally prior to each test. Results indicate that etaperazine and meprotan did not interfere with the origin of the orientation reflex and its accompanying desynchronization on the EEG, and did not block the structure responsible for the origin of this reflex. Amizyl blocks the reaction of desynchronization which accompanies the orientation reflex. It was noted that the desynchronization reaction on the EEG is not uniform in origin, and depends on various cerebral systems which show unequal sensitivity to amizyl. M.G.J.

N66-11658# Joint Publications Research Service, Washington, D. C.

EFFECT OF EXPERIMENTAL HYPOXIC HYPOXIA ON THE BLOOD CLEARING FACTOR

V. I. Uspenskiy 9 Nov. 1965 5 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 9, no. 4, Jul.–Aug. 1965 p 88–89
(JPRS-32781; TT-65-33359) CFSTI: $1.00

The effect of hypoxia on the activity of the post-heparin lipoprotein lipase of the blood was investigated, and experiments were conducted on methods of influencing this lipase by oxygen therapy. The effect of heparin on lipolysis in the fatty tissue under normal and hypoxic conditions was also studied. Data obtained from tests on experimental and control animals indicate: (1) Administration of oxygen is effective only when an oxygen insufficiency exists. (2) When hypoxic hypoxia is present, lipolysis in the fatty tissue increases with increasing nonesterified fatty acids (NEFA) content of the serum. (3) Heparin does not affect lipolysis in the fatty tissue and the NEFA content of serum, whether hypoxia is present or not. (4) The increased NEFA content of the blood during hypoxia is caused by lipolysis in the fatty tissue, rather than by an intensification in intravascular lipolysis. M.G.J.

N66-11696# Jefferson Medical Coll., Philadelphia, Pa. Dept. of Microbiology.

REDUCTION OF POST-IRRADIATION INFECTIONS BY REPLACEMENT OF THE NORMAL ENTERIC FLORA AND BY SPECIFIC IMMUNIZATION Final Report, 1 Aug. 1960–30 Sep. 1964

Rolf Freter [1965] 9 p refs
(Contract AT(30-1)-2628)
(NYO-2628-1)

Ways to reduce post-irradiation infections were investigated in mice. It was shown very definitely that certain bacteria (such as Pseudomonas) may be eliminated from the intestinal tract by means of the antagonism exerted by certain strains of *F. coli* which could be established in the intestinal tract of the irradiated animal. Removal of certain species was complete to the point where these bacteria did not cause post-irradiation infection. A continuation of this study concerning the effect of intestinal anaerobes and the antagonism they exert upon other intestinal bacteria indicated that, with the proper combination of antagonistic strains, all invaders of the intestinal tract could be eliminated before they become a problem in post-irradiation infections. While establishment of a strongly antagonistic intestinal flora may eliminate those bacteria which are highly virulent for the irradiated mammalian host (such as Pseudomonas), there is the definite possibility that the antagonistic flora itself may eventually invade the host. This could, of course, be minimized by establishing antagonistic strains of very low invasiveness. In addition to this, immunologic protection of the host was considered. While there was no apparent gain in resistance to systemic challenge infections of lethally irradiated animals after active or passive immunization, there was a significant degree of protection against oral challenge infections after active immunization. The effect of bone marrow transplants and of homologous disease on the susceptibility to infections was also studied. The results showed a surprisingly quick (within 6 days) recovery of resistance to infection, which is only slightly lowered during the presence of homologous disease. (NSA)

N66-11753*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston.

PROCEEDINGS OF A RESEARCH CONTRACTORS CONFERENCE

[1964] 156 p refs Conf. held at Manned Spacecraft Center, 3–4 Dec. 1964
(NASA-CR-67948) CFSTI: HC $5.00/MF $1.00 CSCL 06S

A group of articles is presented which deal with biomedical problems of interest to space activities. Among the subjects covered are bedrest, cardiovascular-renal studies, exercise, hemodynamic response to acute heat stress, and effects of proton irradiation on metabolism. Plasma volume and fluid-electrolyte changes following water immersion is considered as is the effect of cuff-tourniquets on tilt table intolerance

after immersion. The effects of drugs on post-recumbency orthostatic intolerance is reported and a mathematical expression is given for the arterial pressure pulse contour in man. M.W.R.

N66-11758# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (West Germany).
PAPERS PRESENTED BY THE AEROMEDICAL INSTITUTE OF THE DVL AT THE 2ND WORKING SESSION ON DECOMPRESSION DISEASES [VORTRAGE AUS DEM INSTITUT FUR FLUGMEDIZIN DER DVL ZUR 2. ARBEITSTAGUNG UBER DRUCKFALLKRANKHEITEN]
O. Wünsche Aug. 1965 102 p refs In GERMAN; ENGLISH summary Conf. held at Bad Godesberg, West Germany, 23-24 Oct. 1964 Sponsored by Med. Res. Office on Caisson Work and by Sci. Assoc. for Aeron. and Space Res.
(DLR-FB-65-35) CFSTI: HC $4.00/MF $0.75

This report presents papers on decompression diseases. The subjects include theory and therapy of decompression diseases, and special problems of underground engineering, occupational medicine, and working hygiene. Author

N66-11759*# Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
MARS LANDING AND RECONNAISSANCE MISSION, ENVIRONMENTAL CONTROL, AND LIFE SUPPORT SYSTEM STUDY. VOLUME I: STUDY SUMMARY AND CONCLUSIONS
[1964] 105 p
(Contract NAS9-1701)
(NASA-CR-68000; SLS-414-1) CFSTI: HC $4.00/MF $0.75 CSCL 06K

Detailed requirements were determined for the Environmental Control and Life Support System (ECLSS) necessary to support a crew on landing and reconnaissance mission to the planet Mars. Requirements were used to evaluate presently known methods, and an integrated ECLS system was selected for a 420 day mission for six men. Three modules are envisioned for the spacecraft which has a tentative launch date of 1973. Earth to earth orbit will be in a ferry vehicle, possibly a modified Apollo, or the Earth reentry module; a mission module will be used from Earth orbit to Mars orbit; three of the crew will spend 40 days on the Mars surface in the Mars Excursion Module. The method to perform ECLS system functions is tabulated for each of the three modules; major functions considered are air circulation, humidity control, contaminant control, carbon dioxide removal and reduction, atmospheric storage, water reclamation, waste management, and thermal control. Subsystems and system integration requirements and characteristics are summarized. M.W.R.

N66-11768*# Naval School of Aviation Medicine, Pensacola, Fla.
CLINICAL PATHOLOGICAL CORRELATIONS IN SQUIRREL MONKEYS AFTER SUPPRESSION OF SEMICIRCULAR CANAL FUNCTION BY STREPTOMYCIN SULFATE
Makoto Igarashi, Michael E. Mc Leod, and Ashton Graybiel 14 Jul. 1965 37 p refs Joint report with NASA
(NASA Order R-93)
(NASA-CR-68007; NSAM-940) CFSTI: HC $2.00/MF $0.50 CSCL 06S

Streptomycin sulfate was injected to eight selected squirrel monkeys in sufficient dosage to cause suppression of canal function as indicated by the threshold caloric test, emesis in the Slow Rotation Room, and ataxia. The animals were sacrificed six months after the suppression and slides for light-microscopic investigation were prepared following the standard temporal bone preparation procedure. Pathological findings were confined largely to the cristae and organ of Corti, which were both involved in almost every case. Only very slight changes were observed in the maculae in a few instances; therefore, this drug has a place in vestibular studies requiring selective suppression of canal function. The clinical tests used were not reliable indicators of the pathophysiological state of the cristae but were fairly reliable indicators of normal function of these organs. With regard to emesis in the SRR and ataxia, the essentiality of normal function of the semicircular canals has been demonstrated. No such essentiality was demonstrated for the otolith organs in the present investigation. Author

N66-11770*# Chicago Univ., Ill. Dept. of Biophysics.
MACROMOLECULAR ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS AS REVEALED BY ELECTRON MICROSCOPY
H. Fernández-Morán, E. F. J. van Bruggen, and M. Ohtsuki [1964] 62 p refs
(Grant NsG-441-63; Contract AT (11-1)-1344; Grants NIH NB-04267; NIH GM-13243)
(NASA-CR-67942) CFSTI: HC $3.00/MF $0.75 CSCL 06A

Comparative high resolution electron microscopic studies of the structural organization of representative hemocyanins and apohemocyanins from Mollusca and Arthropoda are described. Mollusca hemocyanins are cylindrical molecules (diameter about 340 Å, height ranging from 140 Å to 680 Å) built up from 3 to 12 rows of subunits. Arthropoda hemocyanins are built from a cubic monomer (105 Å) in various stages of organization which is species dependent. Mollusca hemocyanins are distinctly different from Arthropoda hemocyanins, although they seem to be built from analogous subunits. New structural details observed close to the quaternary levels are discussed in relation to available biochemical and biophysical data on these highly organized macromolecular complexes. Author

N66-11774*# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
THE EVOKED VOCAL RESPONSE OF THE BULLFROG: A STUDY OF COMMUNICATION BY SOUND
Robert R. Capranica 1965 115 p refs *Its* Res. Monograph No. 33
(Grants NsG-496; NSF GP-2495; NIH G-MH-04737-04; Contract DA-36-039-AMC-03200(E))
(NASA-CR-67962) CFSTI: HC $4.00/MF $0.75 CSCL 06C

Vocal behavior was evoked from the males of laboratory colonies of bullfrogs (*Rana catesbeiana*) in response to a restricted class of natural and synthetic sounds. The evoked vocal responses, having the signal characteristics of the bullfrog's mating call, were highly selective. To playbacks of the mating calls of 34 different species of frogs and toads, only the mating calls of certain male bullfrogs would evoke calling from the laboratory animals. By using a standardized experimental technique, quantitative measures of evoked calling were obtained for a large number of synthesized bullfrog mating calls. This technique permitted a detailed investigation of those features of an acoustic stimulus necessary to evoke the vocal response of the male bullfrog. These results were summarized in a proposed model whereby the degree of calling to a given sound can be predicted. The model was successfully tested with a number of natural bullfrog mating calls. R.N.A.

N66-11800# Joint Publications Research Service, Washington, D. C.
RECENT RESEARCH ON THE CLINICAL USE OF WHOLE-BODY RADIATION AND BONE MARROW TRANSPLANTS

Georges Mathe 26 Oct. 1965 10 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 10, no. 8, Aug. 1965 p 32–39
(JPRS-32559; TT-65-33038) CFSTI: $1.00

Hemopoietic cell transplants are discussed, and details are given on their use in treating myeloid insufficiency and certain neoplastic diseases. Allogenous hemopoietic cell transplants are also used as adaptive immunotherapy, based on the reaction of immunologically competent cells of transfused marrow against the leukemic cells or antigens. Animal and human experiments were conducted, and observational data are analyzed. The difficulties connected with the taking of the transplant, and the secondary diseases which complicate the transplantation are also described. The simultaneous use of several different donors was suggested to solve partially one of the basic problems concerning donor selection. It was also recommended that blood transfusions be avoided for marrow transplant candidates. M.G.J.

N66-11812# Joint Publications Research Service, Washington, D. C.
MEASURES OF PROTECTION, THERAPY AND PROPHYLAXIS TO BE TAKEN DURING WORK WITH RADIO-FREQUENCY OSCILLATORS
Yu. A. Osipov 4 Nov. 1965 55 p Transl. into ENGLISH from the book "Gigiyena Trude i Vliyaniye Na Rabotayushchikh Elektromagnitnykh Poley Radiochastot" Leningrad, Med. Publ. House, 1965 p 156–202, 219–220
(JPRS-32735; TT-65-33213) CFSTI: $3.00

The degree of biological activity of radio-frequency electromagnetic waves is directly dependent upon their magnitude, the amount of energy absorbed by living organisms, and the selective distribution of energy absorption within the individual. Human exposure to high-frequency, ultrahigh frequency, and superhigh-frequency electromagnetic fields requires clinical-statistical observations, accompanied by measurements of the irradiation rate at the workplace of each individual, to establish meaningful shielding and prevention systems. The maximum permissible exposure magnitude for medium and long waves is 5 v/m to 10 v/m, the maximum magnitude for centimeter waves depends on the length of exposure. Periodic medical examinations are extremely desirable for all personnel working with electromagnetic waves; they should include neuropathological and ophthalmological examinations, as well as electrocardiographic tests in cases where symptoms of neuro-circulatory disorders are suspected. G.G.

N66-11850# School of Aerospace Medicine, Brooks AFB, Tex.
DISEASE TRANSMISSION BY AIRCRAFT
Frederick R. Ritzinger May 1965 12 p refs Presented at the Joint Comm. on Aviation Pathol. Fifth Sci. Session, Washington, D. C., 12–14 Oct. 1964 *Its* Review No. 4-65
(AD-470689)

The airplane as a common vehicle for global travel has intensified and complicated the problem of spreading disease from one country to another. This paper calls attention to the various possibilities by which disease can be spread by air travel and identifies specific examples of such spread which have occurred. Dissemination of disease by infected passengers appears to be the greatest threat. Although a number of communicable diseases have been transported in aircraft, smallpox is the only disease which has been reported to have propagated serious outbreaks or epidemics. Although current International Sanitary Regulations are adequate, more stringent quarantine control and international cooperation might have averted many of these episodes. Author (TAB)

N66-11871# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECT OF MOTION SICKNESS ON THE DYNAMIC CHARACTERISTICS OF RESPONSES TO CORIOLIS STIMULATION, JANUARY–MAY 1965
Edwin W. Moore, Robert L. Cramer, and Patrick J. Dowd Sep. 1965 8 p refs
(SAM-TR-65-67; AD-472795)

Coriolis stimulation imposes a severe acceleratory stimulus on the vertical semicircular canals that stimulates some sensations perceived by pilots of supersonic aircraft. This stimulus produces responses such as vertical nystagmus and occasional motion sickness. The rate of decay of nystagmic responses for a group of sick flyers was compared to the rate for a group of nonsick flyers for both directions of tilt. A significantly different rate of decay was demonstrated by the experimental groups. It was also shown that motion sickness reduces the rate of decay for both directions of stimulation. The results were discussed in terms of the relationship of recovery from nystagmus as it affects the summation of automatic excitation. Author (TAB)

N66-11872# School of Aerospace Medicine, Brooks AFB, Fla.
EFFECT OF WHOLE SALIVA ON PERFORMANCE OF 0.1% STANNOUS FLUORIDE MOUTHWASH Final Report, Nov. 1964–Feb. 1965
Ira L. Shannon Jul. 1965 9 p refs
(SAM-TR-65-50; AD-470444)

The use of 2.5-ml portions of a flavored 0.1% stannous fluoride mouthwash produced a mean whole while saliva flow rate of 1.95 ml./min, when tested over two successive 1-minute periods. The mean of 2.16 ml./min. for the second 1-minute period was significantly higher than that of 1.74 ml./min. for the initial interval. A control preparation containing 0.1% stannous fluoride provided enamel surfaces with 45.5% (S.E. = 2.34) protection against acid decalcification. The dilution of 25.0 ml. of this mouthwash with 2.0, 5.0, and 10.0 ml. of water did not significantly reduce protective efficacy. The addition of identical amounts of pooled human whole saliva decreased protective performance to 34.5% (S.E. = 2.27), 26.9% (S.E. = 2.06), and 15.3% (S.E. = 1.72), respectively. Each of these decreases in protective capacity was highly significant. The decrease in effectiveness of the mouthwash in the presence of whole saliva in no way contraindicates the use of this preparation. The average flow of saliva was found to dilute the mouthwash by approximately 8% and, in the laboratory, this dilution provided a protective effectiveness of about 35% against acid decalcification. Author (TAB)

N66-11873# School of Aerospace Medicine, Brooks AFB, Tex.
MONITORING PSYCHOMOTOR RESPONSE TO STRESS BY EVOKED AUDITORY RESPONSE
J. A. Freeman May 1965 15 p refs
(SAM-TR-65-42; AD-471880)

Sensitive central nervous system (CNS) monitoring technic that can be correlated with behavior and with changes in the surrounding environment during aerospace flight is desirable to the flight surgeon interested in the early detection of possible adverse effects of the flight on the subject, to the neurophysiologist concerned with basic cerebral mechanisms occurring during the unique conditions of space flight, and to the systems engineer interested in any redundant indirect measurement of environmental parameters which serve to enhance the total system reliability. In this study, a special-purpose digital computer was used to obtain average EEG responses evoked from human subjects by repetitive, nondistracting clicks during sedentary activity, mildly symptomatic hyperventilation, hypoxia, and 2.5 +G acceleration on the SAM human centrifuge

and in an NF-100 aircraft. The waveforms obtained were qualitatively distinct for each group. No appreciable alteration of the relative amplitudes or latencies of the individual response components was caused by distraction, habituation, or variations in ambient noise. No significant effects were detectable in the corresponding EEG's. This preliminary investigation suggests that average evoked responses may be useful and sensitive indicators of CNS activity during aerospace flight. Author (TAB)

N66-11874# Pasadena Foundation for Medical Research, Calif.
THE POTENTIATION OF GAMMA RADIATION WITH ENERGY FROM A RUBY LASER, MARCH 1964–JANUARY 1965
Donald E. Rounds, John Booher, Fredy F. Strasser, and Robert S. Olson Brooks AFB, Tex., School of Aerospace Med., Jun. 1965 9 p refs
(Contract AF 41(609)-2247)
(SAM-TR-65-41; AD-469012)

Irradiation of an established line of human adeno-carcinoma cells with 20 joules from a nominal ruby laser or with 200 r gamma radiation depressed the cell number to 87.7% and 82.4% of controls, respectively. A theoretic additive effect was calculated to be 72.3% but the observed effect of the combination was only 49.7%. Therefore, laser radiation was considered to act synergistically with gamma radiation. Values below a theoretic additive effect were observed when a 6- to 48-hour recovery period from laser radiation was permitted prior to imposing gamma radiation. The ruby laser was observed to stimulate adenosine triphosphate (ATP) synthesis, but exposing luciferase to ruby laser energy resulted in a 10% inhibition of ATPase activity. The data suggested that synergism was medicated through a reduction of energy by laser radiation to prevent restitution of injury produced by gamma radiation. Author (TAB)

N66-11875# School of Aerospace Medicine, Brooks AFB, Tex.
EFFECTS OF IONIZING RADIATION ON ENOLASE, INACTIVATION AND CHEMICAL PROTECTION, 1 SEPTEMBER–31 DECEMBER 1964
Jack A. Winstead, Arthur E. Gass, Jr., and John P. Higdon Jul. 1965 9 p refs
(SAM-TR-65-20; AD-470850)

Rabbit-muscle enolase in aqueous solutions was inhibited by gamma irradiation. An exponential inactivation was observed. The G values increased with increasing protein concentration with a value of 0.21 for a 2.5×10^{-5} M enolase solution. Both sulfhydryl and nonsulfhydryl compounds were shown to be effective in protecting enolase against gamma radiation. Imidazole and analogs were found to be a very effective group of protective agents. It was postulated that the protective effects observed in this enzyme system were due to the mechanism of radical scavenging. Author (TAB)

N66-11914# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.
RADIOISOTOPES IN MEDICINE A Selected Literature Search
Helen L. Ward, comp. Oct. 1965 262 p
(TID-3077, Suppl. 1) CFSTI: $6.00

This annotated bibliography contains 3,160 selected references on the use of isotopes in medical diagnosis, therapy, and research. The major reference sources were *Nuclear Science Abstracts, Index Medicus, Biological Abstracts, Chemical Abstracts,* and *International Abstracts of Biological Science.* The period covered was 1958 through 1963. Author and report number-availability indexes are included. Author

N66-11927# School of Aerospace Medicine, Brooks AFB, Tex.
RADIOBIOLOGIC STUDIES OF MONKEYS IRRADIATED USING A NUCLEAR REACTOR Summary Report, Sep. 1952–Jun. 1964
George S. Melville, Jr., John E. Pickering, George W. Harrison, Jr., and James F. Wright Jul. 1965 27 p refs Prepared in Part at Tex. Univ.
(Contract AF 41(609)-2049)
(SAM-TR-65-49; AD-471884)

This report presents an experiment involving the periodic exposure of Macaca mulatta primates to mixed ionizing radiations from a nuclear reactor. The cumulative doses ranged from 18 to 387 rad of gamma rays and fast neutrons. Longevity, ophthalmology, hematology, and pathology were observed. The longevity and mortality of the animals do not appear to have been affected by the irradiation during the 8 1/2 years of the study. The only definitive radiation effect found was a depression in white blood cells in those animals which received 387 rad. Recovery from this damage occurred within 6 months following exposure, and the white blood cell values were similar to the control values thereafter. No impairment of vision nor lens damage was noted in the animals in the lower dose groups. A transient conjunctival erythema was noted through ophthalmologic examination of the high-dose animals at 67 days after the start of the experiment. The pathologic studies revealed no lesions which were considered to have resulted from irradiation. Author (TAB)

N66-11928# Armed Forces Radiobiology Research Inst., Bethesda, Md.
EARLY PHYSIOLOGIC CHANGES IN PRIMATES FOLLOWING MIXED GAMMA-NEUTRON PULSED RADIATION
Edward A. Rice, Donald C. Sawyer, Edwin T. Still, and Sarah E. Beard Brooks AFB, Tex., School of Aerospace Med., Jun. 1965 24 p refs
(SAM-TR-65-31; AD-470656)

Physiologic changes following mixed gamma-neutron radiation were studied in 26 rhesus primates (Macaca mulatta) by using dose levels of 500 to 50 000 rads delivered in 25 msec. The efficiency with which primates performed learned tasks was used to determine the effect of ionizing radiation of the functional integrity of the visual and motor systems. Changes were characterized by (1) a transient decrease in the availability of cerebrospinal fluid oxygen (as measured polarographically); (2) nystagmus; (3) excessive alpha activity (relative to control) in the EEG patterns of untrained primates, but not present in EEG patterns of primates trained to perform a task; and (4) vomiting in primates fed within 24 hours prior to exposures, whereas no vomiting occurred in unfed primates. The early physiologic effects of radiation were modified by pre-exposure hypoxia and the significance is discussed. Author (TAB)

N66-11933# Hospital for Special Surgery, New York. Research Labs.
BONE TISSUE KINETICS Final Report
Goran C. H. Bauer Jun. 1965 9 p refs
(Contract AT(30-1)-3234)
(NYO-3234-1)

Studies were made on: stable calcium isotopes; direct EDTA-titration of Ca and Mg in biological samples; heavy calcium isotopes as tracers of calcium; determination of ^{46}Ca and ^{48}Ca abundance in biological samples; estimation of the exchangeable calcium pool in children using ^{48}Ca; external counting of intravenously injected ^{47}Ca or ^{85}Sr in patients with myeloma, pagent's disease, septic spondylitis, and tumors; whole-body retention of ^{47}Ca or ^{85}Sr; effect

of motor denervation on muscle and bone; bone transplants in dogs; and radiation effect on the synovial membrane.
NSA

N66-11937# Joint Publications Research Service, Washington, D. C.
SOVIET STUDIES ON RADIATION INJURY AND SCARLATINIFORM FEVER
I. S. Glazunov et al 26 Nov. 1965 14 p refs Transl. into ENGLISH from Klin. Med. (USSR), v. 43, no. 8, Aug. 1965 p 14–18, 119–122
(JPRS-33039; TT-65-33616) CFSTI: $1.00

Studies are presented on autonomic vascular, visceral, and endocrinal dysfunctions, and diencephalic syndrome in radiation injuries and their treatment. Data is also included on a study of a new disease in the Primorskiy Kray, scarlatiniform fever. The causative agent of the scarlatiniform fever was found to be transmitted by the alimentary route with its source in mice-like rodents. No cases were observed in which the disease was transferred from a sick to a healthy person. Symptoms include spirochetoidal formations marked by motility and staining in the blood. Similar formations were found in the blood, organs, and in the urine of infected white mice.
R.N.A.

N66-11972# Army Medical Research Lab., Fort Knox, Ky.
AN ANALYSIS OF PAIRWISE AGREEMENTS AND DISAGREEMENTS INTO WITHIN AND BETWEEN COMPONENTS
James N Cronholm 15 Apr. 1965 31 p refs
(Rept. 625; AD-470442)

The purpose of this paper is to describe a method of analyzing pairwise agreements and disagreements among nominally scaled observations into within and between group components. Expected values, biases, sampling variances, and covariances of the components of agreement are derived for the special case of two groups. A general method of obtaining exact joint, conditional, and marginal sampling probabilities of the components is described, and several large sample criteria are discussed. The proposed method of agreement and disagreement analysis should prove useful as a means of describing the results of experiments and assessing statistical hypotheses.
Author (TAB)

N66-11982# Aerospace Research Labs., Wright-Patterson AFB, Ohio. Plasma Physics Research Lab.
THE INFLUENCE OF MAGNETIC HYSTERESIS ON SKIN EFFECT
John C. Corbin, Jr. Aug. 1965 39 p refs
(ARL-65-167; AD-622277)

This report derives the skin effect equations for current carrying cylindrical conductors and semi-infinite sheets taking into account weak magnetic hysteresis effects. Numerical solutions to the nonlinear equations are obtained for annealed iron conductors as a function of frequency and magnetic field intensity; results are compared with analytical solutions obtained if hysteresis effects are neglected. With hysteresis present the ratio of a-c reactance to d-c resistance decreases significantly whereas the ratio of a-c resistance to d-c resistance shows little change.
Author (TAB)

N66-12015# Mount Holyoke Coll., South Hadley, Mass.
FURTHER EXPERIMENTS ON THE RANGE OF VISUAL SEARCH Final Report
John Volkmann and Horace H. Corbin Bedford, Mass., Electron. Systems Div., Jan. 1965 100 p refs
(Contract AF 19(628)-2443)
(ESD-TDR-65-169; AD-622414)

The report describes six experiments on visual search. Two essential terms in the report are critical number and basal time, defined by the following operations. Median latency of search is plotted as a function of the number of elements in the matrix, for each subject and experimental condition. At low numbers of elements the latency is nearly constant; this is the basal time. Then there occurs a transition to longer latencies. The critical number is the number of elements at which the transition occurs. The aim of the first experiment was to discover whether the critical number varies with the density of the stimulus matrix. Over the entire range of densities employed, it does. Nevertheless, the area corresponding to the critical number is apparently constant over a range of low densities. (This is the area of fast search.) Over a range of high densities, this area decreases considerably. Basal time does not vary with density. The second experiment aimed to check the first one, and to provide evidence on the shape of the area of fast search. The analysis was in terms of the location of the critical elements in the matrix. The constancy of area at low densities was confirmed, although the check was very insensitive. Basal time is constant. The shape of the area appears to be as previously described: ovaloid, with the longer axis horizontal.
Author (TAB)

N66-12122# Applied Science Associates, Inc., Valencia, Pa.
GUIDELINES FOR TRAINING SITUATION ANALYSIS (TSA) Final Report
Andrew P. Chenzoff and John D. Folley, Jr. Port Washington, N. Y., Naval Training Device Center, Jul. 1965 199 p
(Contract N61339-1218)
(NAVTRADEVCEN-1218-4; AD-472155)

These guidelines represent a textbook for instruction in three phases of Training Situation Analysis (TSA), a standardized procedure, developed by NTDC, for systematically gathering and interpreting the information which is relevant to the planning of training and training devices. Three phases of TSA are described in detail: System Familiarization, Task Analysis Method (TAM) and Training Analysis Procedure (TAP). System Familiarization provides an orientation to the training problem, the system structure and flow, and the equipment. Task Analysis Method produces a set of task descriptions containing the information necessary for making training device decisions. Training Analysis Procedure produces a ranking of tasks based upon the potential benefit to system performance as a result of training and the cost of that training. Recommendations for the conduct of these three phases and suggested working forms are presented.
Author (TAB)

N66-12127*# Biotechnology, Inc., Arlington, Va.
DEVELOPMENT OF TESTS FOR MEASUREMENT OF PRIMARY PERCEPTUAL-MOTOR PERFORMANCE
James F. Parker, Jr., Raymond E. Reilly, Richard F. Dillon, Thomas G. Andrews, and Edwin A. Fleishman Washington, NASA, Dec. 1965 203 p refs
(Contract NAS9-2542)
(NASA-CR-335) CFSTI: HC $6.00/MF $1.25 CSCL 05H

A study was conducted to develop a prototype battery of tests suitable for measuring the primary dimensions of perceptual-motor performance. An extensive survey was made of the technical literature concerning perceptual-motor performance, with particular attention given to factor analytic

investigations. Based on results of this survey and a consideration of the kinds of activities likely to be required of crewmen in space vehicles, eighteen basic perceptual-motor abilities were identified as important. An integrated console was developed which would provide separate measures for each of these performance dimensions. Tests such as these will be of value in assessing the influence of the space environment on human performance. R.N.A.

IAA ENTRIES

A66-10076
A METHOD OF PREDICTING HUMAN RELIABILITY.
A. B. Pontecorvo (Aerojet-General Corp., Liquid Rocket Operations, Sacramento, Calif.).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 4TH, LOS ANGELES, CALIF., JULY 28-30, 1965. VOLUME 4 - PRACTICAL TECHNIQUES AND APPLICATION. [A66-10048 01-15]
Edited by John de S. Coutinho.
Washington, Spartan Books, Inc., 1965, p. 337-342.

Description of a method for deriving a reliability estimate of task performance for use as a design tool. Elements of the procedure combine task ratings with empirically based data in the derivation of a regression equation. An accompanying chart lists the subtasks investigated and their estimated reliabilities developed in the original study. For example, a gross task such as "Functional Check" or "Leak Check" would have the associated subtasks "Connect hose," "Rotate control valve," "Read gage," and others. The method has applicability during the early design phases to quantitatively assess the interaction of men and machines as well as provide data on detailed task analyses. M.M.

A66-10077
APPLICATION OF HUMAN FACTORS TO DESIGN FOR MAINTAINABILITY.
H. Ozkaptan, E. Levin (Grumman Aircraft Engineering Corp., Bethpage, N.Y.), and L. Jenney (Matrix Corp., Arlington, Va.).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 4TH, LOS ANGELES, CALIF., JULY 28-30, 1965. VOLUME 4 - PRACTICAL TECHNIQUES AND APPLICATION. [A66-10048 01-15]
Edited by John de S. Coutinho.
Washington, Spartan Books, Inc., 1965, p. 349-356.

Discussion of human factors in design for maintainability for the benefit of engineers concerned with the maintainability of complex systems as well as of human factors specialists. An attempt is made to show that neither the number and quality of human factor personnel assigned to a project, nor the amount and comprehensiveness of technical data will ensure an effective maintenance system. Recognition of and accommodation to the realities of an engineering environment are equally important. It is pointed out that failure to start early, establish rapport and to exercise judgment for initial design approximations can leave the human factors engineer and the best human engineering principles in the wake of the design process. M.M.

A66-10084
RELIABILITY FOR MANNED INTERPLANETARY TRAVEL.
Roy B. Carpenter, Jr. (North American Aviation, Inc., Space and Information Systems Div., Downey, Calif.).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 4TH, LOS ANGELES, CALIF., JULY 28-30, 1965. VOLUME 4 - PRACTICAL TECHNIQUES AND APPLICATION. [A66-10048 01-15]
Edited by John de S. Coutinho.
Washington, Spartan Books, Inc., 1965, p. 413-420.

Description of the availability concept for manned interplanetary travel. This is a reliability design technique applied to continuously operated ground systems such as the Air Force SAGE system (416L). The concept is applied to a space vehicle attitude control system which might be used for a Martian expedition. It is shown that the future for long manned space flights cannot depend on high reliability alone, but rather on a design optimized around the availability concept. It is foreseen that, using this approach, space travel can become a reality in our day; without it, space flights other than near-earth missions appear very risky. The application of the availability concept requires determining and designing within all of the constraints introduced by the necessity for maintenance. Some of these constraints are downtime, performance monitoring, spares, accessibility, tools, and the astronauts' capability to perform repairs. M.M.

A66-10117
MEASUREMENT AND PREDICTION OF HUMAN PERFORMANCE AS A QUANTITATIVE FACTOR IN SYSTEM EFFECTIVENESS.
Wilton P. Chase (Space Technology Laboratories, Inc., Redondo Beach, Calif.).
IN: ANNALS OF RELIABILITY AND MAINTAINABILITY; ANNUAL RELIABILITY AND MAINTAINABILITY CONFERENCE, 4TH, LOS ANGELES, CALIF., JULY 28-30, 1965. VOLUME 4 - PRACTICAL TECHNIQUES AND APPLICATION. [A66-10048 01-15]
Edited by John de S. Coutinho.
Washington, Spartan Books, Inc., 1965, p. 803-816. 12 refs.

Discussion of the methodologies which must be mastered and actively applied in system development programs to reduce the incidence of human error and, consequently, increase the reliability of human performance in system performance. Tables show the following: (1) summary of factors to be considered in allocating functional decisions requirements to equipment and personnel, (2) summary of progressive methodological approaches in system development, and their significance for human error prediction, and (3) summary of general orientation toward system management by government procuring agencies and their engineering contractors and requirements to implement an overall change of viewpoints by 1975. M.M.

A66-10200 #
QUESTIONS RELATING TO BODY STRUCTURE IN LIVING ORGANISMS [AUSLEGUNGSFRAGEN BEI LEBEWESEN].
Werner Albring (Dresden, Technische Universität, Institut für angewandte Strömungslehre, Dresden, East Germany).
(Deutsche Akademie der Wissenschaften, Sektion Maschinenbau, Meeting, Dresden, East Germany, Oct. 9, 1963, Paper.)
Wissenschaftliche Zeitschrift, vol. 14, no. 2, 1965, p. 349-358. 33 refs. In German.

Discussion of the relative specific energy capabilities of living organisms in relation to their environments. The order of magnitud of the required specific output is derived from the equilibrium equations for the steady-state flight of birds and the straight-line swimming of fishes. It is shown that, if the output per unit of mass is limited, then an increase in the body weight of a bird requires an improvement in its aerodynamic performance capability, if the bird is to remain flightworthy. When the resistance of the body of a fish to friction is reduced, it is found, in agreement with experiment, that a large fish can swim faster than a small one. The limiting effect of gravity on the size of terrestrial animals is discussed. Problems of the evolution of animal organisms over long periods of geological time are studied. D.P.F.

A66-10300 #
THE ORGANIC WORLD OF THE UNIVERSE [ORGANICHESKII MIR VSELENNOI].
IN: K. E. TSIOLKOVSKII - COLLECTED WORKS. VOLUME IV - NATURAL SCIENCE AND TECHNOLOGY [K. E. TSIOLKOVSKII - SOBRANIE SOCHINENII. VOLUME IV - ESTESTVOZNANIE I TEKHNIKA].
Edited by B. N. Vorob'ev.
Moscow, Izdatel'stvo "Nauka," 1964, p. 86-96. In Russian.

Discussion of the possibilities of life in the Universe. An attempt is made to ascertain the places in the Universe where life can arise and the conditions required for sustaining life. The stages in the formation of life on the planets of the solar system and on the earth, in particular, are outlined. The development of different forms of life as a response to changing environmental conditions is demonstrated. A. B. K.

A66-10302 #
MECHANICS IN BIOLOGY - SIMILARITY OF ORGANISMS AND DEVIATION FROM IT [MEKHANIKA V BIOLOGII - PODOBIE ORGANIZMOV I UKLONENIE OT NEGO].
IN: K. E. TSIOLKOVSKII - COLLECTED WORKS. VOLUME IV - NATURAL SCIENCE AND TECHNOLOGY [K. E. TSIOLKOVSKII - SOBRANIE SOCHINENII. VOLUME IV - ESTESTVOZNANIE I TEKHNIKA].
Edited by B. N. Vorob'ev.
Moscow, Izdatel'stvo "Nauka," 1964, p. 161-263. In Russian.

Application of the concept of similarity to a study of the work done by living creatures in various situations. The work output in a number of situations requiring muscular activity is ascertained, a distinction being made between the energy and power of various organisms. An estimate is made of the relative work done by various creatures as a function of height. The role of the temperature of animals on the mechanical energy of their muscles is taken into account. The development of the brain and the thinking power of living creatures and of man, in particular, is considered in some detail. An account is given of the rise of religion and of the reasons for its persistence. The effect of various environmental factors on body functions and motor activity is assessed. Motion under conditions of weightlessness is discussed, with special reference to motion in water. A study is made of the mechanics of wings in flying creatures and of flight in calm and moving media. The effect of changes in the height of humans on their muscle power is ascertained. A. B. K.

A66-10303 #
AN ANIMAL OF THE COSMOS [ZHIVOTNOE KOSMOSA].
IN: K. E. TSIOLKOVSKII - COLLECTED WORKS. VOLUME IV - NATURAL SCIENCE AND TECHNOLOGY [K. E. TSIOLKOVSKII - SOBRANIE SOCHINENII. VOLUME IV - ESTESTVOZNANIE I TEKHNIKA].
Edited by B. N. Vorob'ev.
Moscow, Izdatel'stvo "Nauka," 1964, p. 292-304. In Russian.

Survey of the prevalence and diversity of life in the Cosmos. The evolution of life in response to various environmental conditions is limned. It is noted that even the highest forms of animal life are in some ways structurally imperfect. The stages of development of the brain are described. It is hypothesized that the matter present in the Universe is the end product of lighter and more elastic matter which has evolved through an infinite number of epochs preceding the present one and is still evolving, giving rise to an infinite number of living creatures. A. B. K.

A66-10400
SOME IMPLICATIONS OF THE STOCHASTIC BEHAVIOR OF PRIMARY AUDITORY NEURONS.
William M. Siebert (Massachusetts Institute of Technology, Research Laboratory of Electronics and Dept. of Electrical Engineering, Cambridge, Mass.).
(International Organisation of Pure and Applied Biophysics, Meeting, Paris, France, June 22-27, 1964, Paper.)
Kybernetik, vol. 2, June 1965, p. 206-215. 10 refs.
Contract No. DA-36-039-AMC-03200(E); NSF Grant No. GP-2495; Grants No. MH-04737-04; No. NsG-496.

Description of a functional model of auditory nerve activity for steady, high-frequency (> 5kc) sinusoidal tone bursts of sufficient length (> 20msec) and with smooth enough transitions so that transient effects can be ignored. For such stimuli, preliminary calculations on the available physiological evidence suggest that (1) firings are not synchronized with the individual cycles of the stimulus, but may occur at any point in the cycle with equal likelihood; (2) successive intervals between firings may be considered independent random variables; and (3) effects of fatigue or adaptation in primary fibers are sufficiently small and slow that they may be ignored. B. B.

A66-10401
SIGNIFICANCE AND STATUS OF EXOBIOLOGY.
Gilbert V. Levin (Hazleton Laboratories, Inc., Falls Church, Va.).
(American Institute of Biological Sciences, Annual Meeting, Boulder, Colo., Aug. 26, 1964, Paper.)
BioScience, vol. 15, no. 1, 1965, p. 17-20. 25 refs.

Attempt to delimit the scope and significance of exobiology. The possibility of life on Mars is investigated, together with the theory of continuous generation of matter in the universe and the possibility of intelligent life elsewhere. The possible biological origin of certain materials found in meteorites is discussed and the concept of the moon as containing exobiological information is considered. The relative impossibility of future manned space travel beyond the solar system is analyzed and the capabilities of electromagnetic communications systems are evaluated. B. B.

A66-10416 #
MEDICAL AND BIOLOGICAL TESTS ABOARD THE VOSKHOD SPACESHIPS [MEDIKO-BIOLOGICHESKIE ISSLEDOVANIIA NA KOSMICHESKIKH KORABLIAKH TIPA "VOSKHOD"].
O. G. Gazenko and A. A. Giurdzhian.
Akademiia Nauk SSSR, Vestnik, vol. 35, Aug. 1965, p. 19-26. In Russian.

Preliminary results of some physiological tests conducted during the flight of Komarov, Egorov and Feoktistov on Oct. 12, 1964, in the Voskhod 1 spaceship and during Beliaev and Leonov's flight of Mar. 18, 1965, in Voskhod 2. Electrocardiograms, seismocardiograms, pneumograms, electroencephalograms, electrooculograms, blood tests, pulmonary ventilation, vestibular tests, and the hygienic parameters of the spacesuit medium are discussed. No indications of disorders in the basic functional systems of the men were observed and it is concluded that during the flight the cosmonauts maintained adequate physical and operational efficiency. V. Z.

A66-10481 #
FLASH BLINDNESS.
James F. Parker, Jr. (BioTechnology, Inc., Arlington, Va.).
Naval Research Reviews, vol. 18, Aug. 1965, p. 1-7.

Discussion of a program to investigate the impairment of vision which occurs when airmen and other military personnel are exposed to intense visible radiation. The measures being taken to protect men against this type of vision impairment are described. The comprehensiveness of the Navy program to develop devices and procedures to guard against temporary losses of vision becomes apparent when it is noted that the efforts range from laboratory investigations of flash blindness involving high-intensity light sources to the preparation of training and indoctrination materials for pilots. A prototype version of the flash-blindness training and indoctrination equipment being developed is shown. It consists of a high-intensity flash source which presents light comparable to that emitted by a nuclear weapon detonated at some distance in front of a pilot flying a low-level attack mission. By means of this source, it should be possible to produce all the effects of flash blindness, such as startle, intense afterimage, and visual incapacitation, without the risk of causing permanent damage to the visual system. By actually experiencing flash blindness, a pilot will better appreciate the need for protective devices and should be more highly motivated to use them correctly. M. M.

A66-10605 #
ELECTROCARDIOGRAPHY IN THE SELECTION AND PERIODIC EXAMINATION OF AIRCREW.
G. M. Fitzgibbon (Defence Research Board, Medical Centre, Cardio-Pulmonary Unit, Ottawa, Canada).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 51 p. 51 refs.

Review of electrocardiographic studies and case histories of flying personnel, and discussion of some specific problems. It is noted that the use of electrocardiography in aircrew selection is only one aspect of the application of this technique to the study of flying personnel. The periodic recording of electrocardiograms through the flying career, with increasing frequency in the older age groups, is vital, particularly in relation to the diagnosis of coronary heart disease in asymptomatic individuals. Considering the detection of coronary heart disease in asymptomatic individuals, it is pointed out that, among the electrographic tests devised, the two-step test popularized by Master is the best. The classic studies of Mattingly in particular, and of Rumball and Acheson, who used a more strenuous exercise test in RAF personnel, with their wealth of follow-up detail, are thought to have established the value of this test in military medicine. M. M.

A66-10606 #
PERSONALITY-CHARACTERISTICS OF PILOT-TRAINEES FROM THE SCHOOL-LEAVING POPULATION.
J. M. Nolan (Ireland, National University, University College, Dept. of Psychology, Dublin, Ireland).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 5 p.

Description of a practical, economical, and successful procedure for selecting likely pilots from among school-leaving applicants about whose background little is known. The stages of the procedure are: (1) a preliminary interview with a senior pilot-instructor and personnel officer to eliminate one in every three candidates; (2) pencil-and-paper intelligence and aptitude testing to eliminate three out of five of the remaining candidates; and (3) psychomotor testing, an interview with psychologists, an interview with senior pilot-instructors and personnel officer, and a medical examination. These final tests are evaluated concurrently and eliminate four out of five of the remaining candidates. Some aspects of the selection procedure are described, and the light they cast on the personality of the pilot-trainees is indicated. M.M.

A66-10607 #
DYNAMICS OF OCULOMOTOR CONTROL IN THE FLIGHT ENVIRONMENT.
G. Melvill Jones (Defence Research Board, Aviation Medical Research Unit; McGill University, Dept. of Physiology, Montreal, Canada).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 10 p.

Consideration of the phase of oculomotor control represented by the fixation, or stabilization, of the image of a visual target on the retina, during movement of the target and/or the head. The basic physiological mechanisms that make image stabilization possible are examined, together with the disturbance of the stabilizing system during flight. The slopes of log-linear plots of the decay in eye angular velocity after sudden angular velocity stimuli are shown. The slopes give what might be called the effective time constants of elastic restoration of the cupulae for the three orthogonal planes, yaw, pitch, and roll. The consequences of this are twofold. First, the rates of loss of vestibular assistance to ocular stabilization are normally greater than those familiar to those on the ground (where extended turning is largely confined to the yaw plane). Thus, for example, on the basis of the experimentally determined time constant in roll, a pilot performing a 360°, 60°/sec roll will feel he has only rolled through about 220° - i.e., he will feel upside down. Moreover, by the end of the roll his compensatory eye angular velocity in the roll plane will have fallen to about 10°/sec. A pilot flying a 3-g turn at 200 knots through 180° will feel he has only turned through one-half that angle - i.e., about 90°. M.M.

A66-10608 #
BEHAVIOUR OF RIGHT INTRAVENTRICULAR CONDUCTION IN MAN UNDER ACUTE ANOXIC ANOXIA.
E. Busnengo and G. Meineri (Ministry of Defence, Air Force, Medical Service, Rome, Italy).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 7 p.

Experimental investigation of the behavior of right intraventricular conduction in 148 flying cadets, both under normal conditions at sea level and under acute anoxic anoxia at a simulated altitude of 5500 m above sea level. The purpose of the investigation was to obtain clinical and diagnostic data from the behavior of the electrocardiogram for evaluating the subjects under examination. A disturbance of the right intraventricular conduction was found in 28.4% of subjects under normal conditions and in an additional 12.2% under hypoxia. It was concluded that, under the experimental conditions, there was a need for a more intense analysis of cardiocirculatory behavior in subjects affected by minor disturbances of right intraventricular conduction. M.M.

A66-10609 #
THE EFFECT OF HYPOXIA ON THE TAKING OF A SECOND GRAFT OF HOMOLOGOUS BONE MARROW IN PREVIOUSLY IRRADIATED AND GRAFTED MICE.
G. Mazzella (Ministry of Defence, Air Force, Medical Service, Rome, Italy).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 9 p. 9 refs.

Experimental investigation of tolerance of an additional general irradiation and of a second graft of homologous bone marrow in mice which had survived a previous experiment in which they had been irradiated in both air and under hypoxia and had subsequently been grafted with homologous bone marrow. At the end of 150 days after administration of the second treatment, the only survivors were: (1) 20% of the control batch irradiated while breathing air, (2) 0% of the mice re-grafted after re-irradiation in air; (3) 100% of the mice re-irradiated while breathing O_2 at 5.6%; and (4) 57% of the mice re-grafted after re-irradiation in O_2 at 5.6%. It is concluded that the data on the survival of the 4 batches on which the experiment was carried out clearly show that hypoxia, particularly hypoxic, provides effective protection, even the second time, to radiation-injured mice and to mice injured by radiation and then grafted with homologous bone marrow, a thing which does not occur in the absence of hypoxic protection. M.M.

A66-10610 #
LONGITUDINAL STUDY OF 1056 HEALTHY YOUNG MEN FOLLOWED OVER A TWENTY-FOUR YEAR PERIOD.
Robert E. Mitchell (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 12 p.

Discussion of findings of examinations of 1056 aviators over a 24-year period. Among the results obtained are: (1) of the 220 men who had died prior to the 1951-1952 follow-up, 192 were killed in aviation accidents, about one-third in aerial combat; (2) examination of the causes of death over the period of the study indicated a striking decrease in the number of deaths due to aviation and an increase in deaths due to disease. This is a reflection not only of the decrease in number of hours flown, but also of the age of the group, which makes the members subject to degenerative disease; (3) the men who remained on active duty were healthier for the most part than those who left the service after World War II. There were fewer who had high blood pressure, heart disease, psychiatric disease, and back complaints. They did have more hearing loss. Urinary tract disease was more prevalent, and they had a greater number of surgical procedures. General fitness was better; (4) flying per se was found to be neither directly detrimental nor contributory to the development of vascular or nonvascular disease; (5) weight gain and a family history of vascular disease were found to be associated with higher cholesterol levels and with greater concentrations of very low density lipoproteins; and (6) neither the initial appearance nor disappearance of borderline variation in the electrocardiogram was indicative of heart disease without substantiating clinical data. Data relative to the cardiovascular system derived from the individuals examined in 1963 and 1964 are tabulated. M.M.

A66-10611 #
HEMATOLOGICAL EFFECTS OF THERMAL TRANSIENTS TO 205°C (400°F).
R. H. Murray (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio; Indiana University, Medical Center, Dept. of Medicine, Indianapolis, Ind.).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 5 p.

Investigation of the hematological effects of intense heating transients on seven healthy young male volunteers seated in a special oven, the walls of which were heated for approximately 6 min to a peak of 205°C. Average rectal temperature levels rose approximately 0.5°C during a 20-min exposure and rose another 0.3°C over the next 30 to 40 minutes. Skin temperatures varied widely but mean, weighted skin temperature rose to 42°C and heat storage varied from 1.6 to 2.0 kcal/kg. The white blood cell count varied slightly but unpredictably during the period of heating but rose uniformly by the time of the final sample 40 min after the end of the heat exposure. The differential counts showed an increase in polymorphonuclear leukocytes and a concomitant fall in lymphocytes. Platelet rise averaged 18%. There was no evidence of

hemolysis. Hematocrites rose an average of 3.2 units, while plasma hemoglobin levels remained unchanged. The corrected erythrocyte sedimentation rate was also unchanged. Tests were carried out to evaluate the blood clotting system while hematocrite determinations were made every 5 min before, during, and after the heat stress. Hematocrite levels began to rise toward the end of the heat exposure, continued to rise for the next 30 min, and fell slightly toward control levels over the final 20 min. Plasma protein levels also rose slightly. It is pointed out that the short-term heat stress revealed evidence of a significant rise in platelets, and a bleeding tendency associated with a significant fall in prothrombin consumption time and an occasional significant rise in clotting time. It is concluded that it seems reasonable to expect that bleeding problems may be one of the important untoward effects of intense heating transients to which flying personnel may be subjected. M.M.

A66-10612 #
OCULOMOTOR RESPONSES TO VESTIBULAR AND OPTOKINETIC STIMULI AND SPINNING AIRCRAFT.
G. Melvill Jones (Defence Research Board, Aviation Medical Research Unit; McGill University, Dept. of Physiology, Montreal, Canada).
International Congress on Aeronautic and Space Medicine, 13th, Dublin, Ireland, Sept. 14-18, 1964, Paper. 4 p.

Experimental investigation of the degree to which disturbance of oculomotor control can contribute to the difficulties encountered by a pilot during a spin. Pilots and nonpilots were exposed to a series of eight-turn spins in jet trainer aircraft, and simultaneous records were obtained of the angular velocities of the aircraft relative to space, and of the eye relative to the skull, in the three planes of yaw, pitch, and roll. A sample of analyzed records of eye movement in the three planes at the point of recovery from the spin is shown. The following observations are made from the results: (1) for human, rather than aerodynamic reasons, recovery becomes rapidly more difficult as the spin progresses beyond the first 5 to 10 sec; (2) multiple-turn spins should not be employed in the early stages of training, and moreover, even experienced pilots should approach multiple turn spinning in stages; (3) a very effective measure is for the pilot to keep his head and eyes pointing toward the horizon, by craning his neck back and thus assuring that the vestibulo-ocular and optokinetic ocular stabilizing system is never exposed to stimulation in the roll plane (which is the plane in which the greatest penalty is incurred); (4) when embarking on a test spinning program, it is advisable to install special, easily seen, director-type indication of what to do with the controls for recovery at any stage, even if the spin becomes inverted; and (5) it becomes more and more apparent that it is really up to the aircraft designer to design out the possibility of aerodynamic spinning, not only because of the aerodynamic problems of recovery, but also because of the physiological problems experienced. M.M.

A66-10613
DETECTABILITY MEASURES IN VIGILANCE - COMMENT ON A PAPER BY WIENER, POOCK, AND STEELE.
M. M. Taylor (Defence Research Medical Laboratories, Toronto, Canada).
Perceptual and Motor Skills, vol. 20, June 1965, p. 1217-1221. 9 refs.

Reanalysis of results of a study of time sharing and vigilance reported by Wiener (1964) from the viewpoint of signal detection theory. The reported decline in probability of detecting a signal is shown to be due entirely to a progressive change in the observers' response criteria and not to a change in the detectability of the signal. In contrast to the original report that time sharing had a nonsignificant effect on the probability of detecting a signal, the effect on the detectability of the signal is large. The importance of considering detectability rather than detection measures in vigilance studies is stressed. M.F.

A66-10614
DECISION INTERVAL AND SIGNAL DETECTABILITY IN A VIGILANCE TASK.
Jane F. Mackworth (Defence Research Medical Laboratories, Toronto, Canada).
Canadian Journal of Psychology, vol. 19, no. 2, 1965, p. 111-117. 8 refs.

Discussion of the effect of the assumed decision interval on the measurement of d'. Previous experiments have revealed a decrement in the detectability (d') of signals during a particular vigilance task involving the detection of a brief pause in the movement of a clock hand. In order to measure the false alarm probability, subjects were required to make a decision once every 5 sec as to whether or not there had been a signal in the previous 5 sec. In the new experiments, subjects were required to respond as soon as they saw a signal, and it was assumed that the decision interval was the signal duration. The thirty-fold change in assumed decision interval produced very little change in the decrement in d' during the run. It is therefore concluded that the length of the assumed decision interval was not a critical factor in determining changes in d' during the continuous clock task. M.F.

A66-10616
THE EFFECT OF AMPHETAMINE ON THE DETECTABILITY OF SIGNALS IN A VIGILANCE TASK.
Jane F. Mackworth (Defence Research Medical Laboratories, Toronto, Canada).
Canadian Journal of Psychology, vol. 19, no. 2, 1965, p. 104-110. 15 refs.

Experiment designed to give information about the effect of amphetamine on the level and decline of the detectability of signals in a vigilance task. Ten milligrams of dl-amphetamine sulphate or placebo were given to 56 in three successive runs on a vigilance task requiring detection of a brief pause in the steady movement of a clock hand. Signals occurred at a rate of three per minute. Amphetamine had the same effect on the percentage of signals detected as on the detectability of the signals, as measured by d'. The initial level was unchanged, but the decrement was reduced. No evidence of learning was found in later runs. The effects of amphetamine and knowledge of results were additive. M.F.

A66-10785 #
A MATHEMATICAL MODEL FOR THE OTOLITHS AND ITS IMPLICATIONS ON HUMAN SPATIAL ORIENTATION.
Jacob L. Meiry (Massachusetts Institute of Technology, Dept. of Aeronautics and Astronautics, Man-Vehicle Control Laboratories, Cambridge, Mass.).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 30 p. 19 refs.
Grant No. NsG-577.

Results of experimental investigations of the function of the otoliths in perceiving linear accelerations along the X_e axis, and discussion of a mathematical model of the otoliths. It is noted that, by correlating the data of the upright with the supine position, it is evident that a unified presentation holds for any head orientation within the range of $\pm 90^{\circ}$ rotation of the head frame about the horizontal, earth-fixed axis Z_e. A mathematical model of the otoliths is shown in which the specific force in earth-fixed coordinates is resolved to components in the plane of the utricle and perpendicular to it by the orientation matrix and the alignment matrix. The components along the plane of the otoliths constitute the shear acceleration on the otoliths. This acceleration stimulates the otoliths which, after exceeding the threshold, send information to the central nervous system, where it is interpreted as subjective perception. The dynamic range of the sensor is not known precisely, however, it is at least 100 or more. The model also indicates that the sensor cannot distinguish between gravity and other acceleration forces. M.M.

A66-10793 #
OPHTHALMIC EFFECTS ASSOCIATED WITH IONIZING AND NON-IONIZING ELECTROMAGNETIC RADIATION FIELDS.
Milton M. Zaret (Zaret Foundation, Inc., Scarsdale, N.Y.).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 4 p.

Discussion of a methodology to determine the overall profile of ophthalmic injury, based on human response to radiation exposure. Unpublished material describing ionizing radiation injury of the conjunctiva and rf radiation cataract of the crystalline lens is reported. It is noted that the pathogenesis of rf radiation cataract has been documented by repeated slit-lamp examination and lens

photography in a number of microwave workers. Exposure factors, time evolution and lens photographs are presented. The data demonstrate that the primary pathology occurs in the capsule of the lens in a pathognomonic manner indicative of rf radiation injury. An integrated ophthalmological examination program is presented whereby base-line findings and various radiation signatures can be programed for individual astronauts. A bioassay method to investigate an individual's sensitivity to ionizing radiation by means of fractionated exposures of his own exfoliated conjunctival cells is also described. M.M.

A66-10803 #
ON THE PERMISSIBLE DOSES OF IONIZING RADIATION FOR SPACE PILOTS.
Y. G. Grigor'ev, A. K. Guskova, M. P. Domashlak, V. G. Vysotskii, S. A. Raevskaia, B. A. Markelov, and N. G. Darenskaia.
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 26 p. 73 refs.

Discussion of data on the permissible doses of ionizing radiation for short- and long-term spaceflights. Observations were carried out on 97 persons, mostly women, who were exposed to partial radiation either following a radical cancer operation or a metastatic cancer process. The single daily dose was 25 r for a total of 100 to 300 r. The general characteristics of the data accumulated with regard to the extent of reaction in response to radiation dose are tabulated. The data indicate that most patients withstood quite well radiation exposure at doses of 25 and 50 r (81.6% and 66.7%, respectively). As the total dose increased, the number of subjects showing no primary reaction decreased. At a dose of 125 r, only 35.8% of those tested revealed no clinical symptoms of general reaction. Another investigation was conducted on persons irradiated during accidental explosions of nuclear reactors, persons involved in atomic bomb explosions, and persons irradiated during treatment with large doses. It is concluded that, on the basis of data available on chronic irradiation of both humans and animals, it can be stated that a chronic exposure to a total dose of 100 rem per yr in the course of 3 yr is not lethal and causes no appreciable impairment of the performance of spacecrew members. This radiation level can be regarded as a dose of justified risk for spacepilots on their first long-duration flight. However, the dose of 100 rem per yr can be recommended with reservation because of possible remote consequences and of the relatively short period of clinical observation available. M.M.

A66-10807 #
THE ROLE OF CYBERNETICS IN BIOASTRONAUTICS.
Carl-Johan Clemedson.
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 12 p. 25 refs.

Discussion of developments in the field of cybernetics and of its role in bioastronautics. It is noted that the extensive work of recent years on the development not only of electronic computers, but also of lifelike machines, has been greatly enhanced by cybernetic methods. Cybernetics has been of great importance to the development of space technology as well as to that of space medicine and biology, and has been of much help in developing methods for the preflight training of astronauts, in designing automatic simulators for their training, and in establishing specifications that must be met by the spacecraft to comply with the physiological requirements of the astronaut. A cursory exemplification of some applications of cybernetics to bioastronautics is given. Areas in which cybernetics may contribute to space physiology and to information processing and biotelemetry are discussed together with Cyborg studies. It is pointed out that the superiority of cybernetics over conventional methods is clearly demonstrated when systems become complex. In manned space systems in which processes of regulation and control are of paramount importance, cybernetics plays a great role by providing means of explaining the structure of the control system, its dynamic characteristics and variations in its functions, and also possible disturbances in the function of the system. M.M.

A66-10818
HUMAN FACTORS CHALLENGES IN MANNED SPACE FLIGHT.
Stanley Deutsch (NASA, Office of Advanced Research and Technology, Washington, D.C.).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 4-8, 1965, Paper 650809. 18 p. 27 refs.
Members, $0.75; nonmembers, $1.00.

Study of a few of the important problem areas involved in a long duration manned space flight. Some of the problems discussed in detail that will be encountered in an extended space voyage are space vehicle maintenance and extravehicular activities, visual skill performance, and manual and automatic control of spacecraft systems. Although some of these areas have been studied in the Mercury and Gemini programs, additional testing must be undertaken before successful extended manned space flights can be carried out. M.F.

A66-10819
BIOMEDICAL REQUIREMENTS FOR MANNED SPACE FLIGHT.
William M. Helvey (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 4-8, 1965, Paper 650812. 7 p. 12 refs.
Members, $0.75; nonmembers, $1.00.

Review of American and Soviet space experience in terms of weightlessness, ionizing radiation, dynamic factors, cabin atmosphere contaminants, thermal environment, biological rhythms, and psychophysiological factors. Recommendations are given for biomedical requirements for second-generation manned space flights. It is shown that the design and planning lead time required for future manned space programs requires that adequate biomedical data be acquired in the immediate future. B.B.

A66-10820
MAN-MACHINE ASPECTS - FOUR-MAN SPACE CABIN SIMULATOR.
C. R. Adams, R. D. Dunlap, and R. L. Batterton (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Santa Monica, Calif.).
Society of Automotive Engineers, National Aeronautic and Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 4-8, 1965, Paper 650813. 24 p. 10 refs.
Members, $0.75; nonmembers, $1.00.
Research sponsored by the Douglas Independent Research and Development Program.

Recapitulation of the major design, development, and management of a program for the engineering development of integrated spacecraft environmental control and life support systems and for the solution of man-machine integration problems. The different phases of the program are applicable to a family of manned space laboratories and manned interplanetary space vehicles. Simulation techniques included the use of space-laboratory types of life support subsystems hardware of flight type, but not necessarily of flight weight. Most of the preliminary results of the first phase of this program and future phases are discussed and future phases are reviewed. M.F.

A66-10939
WARNING-SYSTEMS DESIGN.
Joseph L. Seminara (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
Machine Design, vol. 37, Sept. 30, 1965, p. 106-116.

Description of techniques for design and application of alerting systems based primarily on aerospace experience. The merits of visual, audible, and composite warnings are evaluated, human response characteristics are reviewed, and design requirements for a variety of operational situations are outlined. Such factors as crew alerting techniques, characteristics of nonverbal signals, criteria for selecting signals, and alarm urgency classifications are tabulated. It is concluded that because of their universal nature, such human-factors principles are found to carry over from military and aerospace to civilian product design with only minor modification. B.B.

A66-10981 #
SOME RESULTS OF PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS A LINK IN A CLOSED ECOLOGICAL SYSTEM [NEKOTORYE ITOGI FIZIOLOGO-EKOLOGICHESKOGO ISSLEDOVANIIA KUL'TURY KHLORELLY KAK ZVENA ZAKRYTOI EKOLOGICHESKOI SISTEMY].
E. Ia. Shepelev (Akademiia Nauk SSSR, Otdelenie Biologii, Moscow, USSR).
International Astronautical Federation, International Astronautical Congress, 16th, Athens, Greece, Sept. 13-18, 1965, Paper. 10 p. 20 refs. In Russian.

Investigation of the possible use of a closed metabolic cycle as a means of life support for spacecraft crews. The biological system investigated is Chlorella, a genus of single-cell seaweed considered to be a possible element in the photosynthetic link in a closed ecological system. The characteristics of the material balance of Chlorella cultures are studied to determine the role played by Chlorella in gas-exchange or closed metabolic systems. Tables are included showing (1) the relation between the increase in biological mass, absorption of carbon dioxide, and oxygen release in a Chlorella culture, (2) the accumulation of basic elements (nitrogen, phosphor, sulfur, potassium, magnesium, iron, and carbon) in Chlorella cells, and (3) the accumulation of carbon monoxide per 1 g of increase in dry Chlorella mass. V. P.

A66-11365
INFORMATION PROCESSING IN THE AUDITORY NEURAL MECHANISM.
Yasuji Katsuki (Tokyo Medical and Dental University, Tokyo, Japan).
(Joint Electrical Engineering Convention, Lecture, Waseda University, Tokyo, Japan, Apr. 6, 1964.)
Electronics and Communications in Japan, vol. 47, May 1964, p. 1-11. Translation.

Developmental study of the physiology of the auditory system, which begins with lower animals and progresses to higher forms of life. The hearing of insects and the ears of vertebrate animals are discussed, together with the frequency analysis of sound, and the sense of sound direction. An overall synthesizing operation of the cortex neurons and the function of the centrifugal nerve paths in the auditory system are examined. Finally, the relation of the auditory system to consciousness is evaluated. B. B.

A66-11491
AIR POLLUTION CONTROL AT CAPE KENNEDY.
M. E. McLouth and J. P. Terry (Pan American World Airways, Inc., Guided Missile Range Div., Environmental Health Section, Patrick AFB, Fla.).
(American Industrial Hygiene, Conference, Philadelphia, Pa., Apr. 26-30, 1964, Paper.)
American Industrial Hygiene Association, Journal, vol. 26, Mar.-Apr. 1965, p. 172-176. 6 refs.

Study of methods for reducing air-pollution hazards involved in the handling of toxic materials. Larger missiles and the increased use of toxic propellants require effective planning and operations to prevent the development of major air pollution problems. At Cape Kennedy Air Force Station, large-scale air-borne sources are of an instantaneous rather than a continuous nature. Significant air contamination sources include missile exhaust, aborts, spills of volatile propellants, disposal of toxic materials, and normal industrial or transportation activities. Abatement techniques incorporating equipment design, operations support, and environmental studies are discussed. Special emphasis is given controls, test data, and problems associated with the Titan II missile program. (Author)

A66-11492
THE MAINTENANCE OF A LIFE SUPPORT ATMOSPHERE IN SEALED SYSTEMS.
M. Schneider and S. Tobey (North American Aviation, Inc., Research and Development Div., Life Sciences Group, Los Angeles, Calif.).
(American Industrial Hygiene Association, National Conference, Philadelphia, Pa., Apr. 26-30, 1964, Paper.)
American Industrial Hygiene Association, Journal, vol. 26, Mar.-Apr. 1965, p. 177-186. 9 refs.

Two feasibility studies described here explored the conditions necessary for a life support system suitable for a manned space vehicle. White rats were placed in a closed system with a recirculating air loop. Solid potassium superoxide was used as a combination oxygen generator and carbon dioxide absorber, and potassium hydroxide was used as a supplemental carbon dioxide absorber. At the conclusion of the 25-day test period the rats remained alive and healthy. A thorough chemical analysis was performed to determine the average animal respiratory quotient and chemical system efficiencies. Three human subjects were maintained for 14 days in a sealed-environment life support system with dual air regeneration loops. The air regeneration system was evaluated at various oxygen and carbon dioxide partial pressures and relative humidities. At the conclusion of the test period, the subjects were examined and judged healthy. (Author)

A66-11601
CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
New York, Pergamon Press, Inc., 1965. 420 p.
$17.

CONTENTS:

PREFACE. Gregg Mamikunian (California Institute of Technology, Pasadena, Calif.), p. vii-x.

INTRODUCTION - WHY EXOBIOLOGY? J. R. Vallentyne (Cornell University, Ithaca, N.Y.), p. 1-12. 20 refs. [See A66-11602 02-04]

INVESTIGATION OF ORGANO-CHEMICAL EVOLUTION. J. J. Oró (Houston, University, Houston, Tex.), p. 13-76. 160 refs. [See A66-11603 02-04]

ORGANIC REMAINS IN METEORITES. F. L. Staplin (Imperial Oil, Ltd., Galgary, Canada), p. 77-92. 29 refs. [See A66-11604 02-30]

MICROORGANISMS OF MIDDLE PRECAMBRIAN AGE FROM THE ANIMIKIE SERIES, ONTARIO, CANADA. E. S. Barghoorn (Harvard University, Cambridge, Mass.) and S. A. Tyler (Wisconsin, University, Dept. of Geology, Madison, Wis.), p. 93-118.

THE SURVIVAL CAPABILITIES AND THE PERFORMANCE OF EARTH ORGANISMS IN SIMULATED EXTRATERRESTRIAL ENVIRONMENTS. S. M. Siegel, G. Renwick, O. Daly, C. Giumarro, G. Davis, and L. Halpern (Union Carbide Corp., Tarrytown, N.Y.), p. 119-178. 48 refs. [See A66-11605 02-04]

THE POSSIBILITY OF A PRIMORDIAL LUNAR LIFE. J. J. Gilvarry (General Dynamics Corp., San Diego, Calif.), p. 179-241. 127 refs. [See A66-11606 02-04]

POSSIBILITIES OF LIFE ON MARS. F. Jackson (London, University, London, England) and P. Moore, p. 243-259. 21 refs. [See A66-11607 02-04]

LIFE-DETECTION EXPERIMENTS. G. L. Hobby (California Institute of Technology, Pasadena, Calif.), p. 261-281. 29 refs. [See A66-11608 02-05]

BIOLOGICAL CONTAMINATION OF THE PLANETS. P. J. Geiger, L. D. Jaffe, and G. Mamikunian (California Institute of Technology, Pasadena, Calif.), p. 283-322. 86 refs. [See A66-11609 02-05]

THE RADIO SEARCH FOR INTELLIGENT EXTRATERRESTRIAL LIFE. F. D. Drake (National Radio Astronomy Observatory, Green Bank, W. Va.), p. 323-345. 16 refs. [See A66-11610 02-07]

TRENDS AND PROBLEMS IN EXOBIOLOGY. M. H. Briggs and G. Mamikunian (California Institute of Technology, Pasadena, Calif.), p. 347-358. 9 refs. [See A66-11611 02-04]

BIBLIOGRAPHY, p. 359-420. [See A66-11612 02-04]

A66-11602
INTRODUCTION - WHY EXOBIOLOGY?
J. R. Vallentyne (Cornell University, Dept. of Zoology, Ithaca, N.Y.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 1-12. 20 refs.

Examination of the possible influence of exobiological discoveries on the science of biology. Results that might be anticipated regarding

STUDIES ON THE SITE OF RIBOSOMAL BINDING OF F2 BACTERIOPHAGE RNA.
M. Takanami, Y. Yan, and T. H. Jukes (California, University, Space Sciences Laboratory, Berkeley, Calif.).
Journal of Molecular Biology, vol. 12, 1965, p. 761-773. 27 refs.
Grant No. NsG-479.

Studies of the interaction of messenger RNA and ribosomes were made using ^{32}P-labeled RNA of bacteriophage f2 as a model messenger in a cell-free Escherichia coli system. Only one ribosome was bound per f2 RNA molecule. The unattached portion

A66-11603
INVESTIGATION OF ORGANO-CHEMICAL EVOLUTION.
J. J. Oró (Houston, University, Dept. of Chemistry, Houston, Tex.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 13-76. 160 refs.
NSF Grant No. G-13117; Grant No. NsG-257-62.

Description and interpretation of some astrophysical observations and experimental results of organic synthesis which have a bearing on the abiogenic formation of biochemical compounds. A study of the relative abundances of the elements in living organisms and in the cosmos reveals that the composition of living matter is a better sample of the universe than the composition of the earth. The possibilities of organic synthesis within the solar system are considered for solar nebula, accretion bodies of the solar nebula, comets, jovian planets, and primitive terrestrial planets. Various types of simple organic synthesis involving formaldehyde-hydroxylamine, formaldehyde-hydrazine, and hydrogen cyanide-ammonia reactions are experimentally duplicated. The results of these experiments indicate that a number of important biochemical compounds can be formed spontaneously from very simple precursors.
D. P. F.

A66-11605
THE SURVIVAL CAPABILITIES AND THE PERFORMANCE OF EARTH ORGANISMS IN SIMULATED EXTRATERRESTRIAL ENVIRONMENTS.
S. M. Siegel, G. Renwick, O. Daly, C. Giumarro, G. Davis, and L. Halpern (Union Carbide Corp., Research Institute, Tarrytown, N.Y.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 119-178. 48 refs.

Results of experimental tests to determine the response of plant and animal organisms to simulated low pressure, low oxygen content, low temperature, and low humidity extraterrestrial conditions. The study was based upon the concept that the justification for environmental simulation as an experimental tool is the evaluation of the capabilities of familiar life forms in order to determine the directions in which they might depart if the environment and selection pressures changed in a particular manner. Experimental procedures for simulating extraterrestrial environmental conditions and observing their effect on various plants, insects, and animals are described in detail. Certain organisms were found capable of surviving prolonged exposure to atmospheres as low as 0.1 of sea level pressure, O_2 pressures corresponding to 0.05 of atmospheric pressure, and temperatures of -30°C. D. P. F.

A66-11606
THE POSSIBILITY OF A PRIMORDIAL LUNAR LIFE.
J. J. Gilvarry (General Dynamics Corp., General Dynamics/Astronautics, Space Science Laboratory, San Diego, Calif.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 179-241. 127 refs.

Review of experimental evidence and theoretical considerations for explaining the dark and smooth appearance of the lunar maria on the basis of the former presence of a hydrosphere and atmosphere, and a hypothesis justifying the assumption of a pristine lunar form of life. It is shown that the assumption of the presence of a lunar atmosphere and hydrosphere predicts a dimensional correlation for craters and maria which is found to exist in fact. The older lava hypothesis has no predictive capability and its postulates must be strained to explain many obvious features of the lunar surface, such as the existence of ghost craters and the low frequency of craters in the mare floors. No mechanism other than lunar life can account for the selective darkening of the mare surfaces; however, the case remains circumstantial. It is assumed that the moon and earth were formed at the same time. D. P. F.

A66-11607
POSSIBILITIES OF LIFE ON MARS.
F. Jackson (London, University, London, England) and P. Moore.
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 243-259. 21 refs.

Study of evidence in favor of the view that organisms of some sort are present on Mars. Life as we know it depends on the availability of water, among other things, and it is only recently that the presence of water vapor in the Martian atmosphere has been conclusively demonstrated. It is probably safe to conclude that the atmosphere of Mars is not likely to be actively toxic to terrestrial-type organisms at the present time. The current physical theory is that the Martian surface consists of crumbled rocks exposed to wide temperature variations and UV flux. The weight of evidence would still seem to favor the view that the changes in the dark areas are signs of biological activity. There is no reason why nonphotosynthetic organisms should not exist mingled with the photosynthetic ones, so that a cycling of materials could occur between plantlike and animallike organisms. There is a real possibility that Mars bears indigenous organisms of some kind, based on the following observational arguments: (1) the various colors, including green, exhibited by the dark areas; (2) the seasonal changes in the visual albedo and polarization of the dark areas; (3) the ability of the dark areas to regenerate after an extensive "dust storm;" (4) the presence of 2700- to 3000-cm absorption bands, attributed to organic molecules.
M. F.

A66-11608
LIFE-DETECTION EXPERIMENTS.
G. L. Hobby (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 261-281. 29 refs.

Description of tests for detecting the existence of extraterrestrial life. The chance seems high that life on Mars must involve a reductive photochemistry as well as an oxidative chemistry. It is quite probable that microorganisms constitute a significant portion of the Martian biosphere. The arguments presented support the thesis that if Martian life exists, it is fundamentally similar to terrestrial life. Of the environmental factors affecting life on Mars, the low abundance of water seems the most critical. Whether living systems based on carbon, hydrogen, oxygen, and nitrogen could evolve and survive under these conditions is one of the questions that life-detection experiments may answer. Lederberg has proposed microscopy as a life-detection technique. The chemical evolutionary hypothesis suggests that life will probably arise anywhere in the universe where conditions are favorable. It also implies that even if life never originated on a planetary system, the abiogenic formation of organic compounds is very probable. Enzyme activity occurs in terrestrial soils. Tests for enzyme activity in Martian soil would constitute one of the most important life-detection approaches. The demonstration of growth and reproduction in Martian samples would be one of the most definitive kinds of evidence for the presence of life. Different life-detection instruments are described. M. F.

A66-11609
BIOLOGICAL CONTAMINATION OF THE PLANETS.
P. J. Geiger, L. D. Jaffe, and G. Mamikunian (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 283-322. 86 refs.

Study of the possibility of the accidental introduction of terrestrial microorganisms to other planets during the course of space exploration by unmanned spacecraft. The sterilization of planetary spacecraft and their ancillary vehicles, or alternative methods for

avoiding accidental introduction of microorganisms, appears to be imperative. Examples of the persistence of terrestrial life are presented, and the probability of achieving and maintaining sterility of spacecraft with various suggested procedures at early stages of unmanned space exploration and alternative techniques for avoiding biological contamination of the planets are discussed. Since terrestrial microorganisms can be extremely hardy, careful consideration and design of sterilization methods and scrupulous application of such methods to all spacecraft destined for biological exploration are required in order to achieve the degrees of confidence that have been indicated. Among physical sterilization methods are moist heat, dry heat, radiation, filtration and ultrasonic methods. Among chemical sterilization methods are gaseous sterilants, liquid sterilants, internal chemical sterilization. The aseptic technique is also used. The most effective sterilization method that has been found is dry heat applied for 24 hr at 135°C. The problems of maintaining spacecraft sterility are considered. M. F.

A66-11611

TRENDS AND PROBLEMS IN EXOBIOLOGY.
M. H. Briggs and G. Mamikunian (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.).
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 347-358. 9 refs.

Discussion of some exobiological problems, including an investigation of the presence of organic matter on planets. There would seem to be four possible types of organic matter that may occur on any planet: organic matter surviving from the solar nebula prior to the origin of planets, the products of reactions in primitive planetary atmospheres, the products of biological activity, and organic matter added by meteoric materials. The incidence of life on planets other than the earth is investigated. Spontaneous origins of life are discussed. The interplanetary transfer of organisms is discussed, and the abundance and distribution of life in the universe as a whole is considered. The universe is so large that it is a statistical certainty that extraterrestrial life, even intelligent life, exists elsewhere. M. F.

A66-11612

BIBLIOGRAPHY.
IN: CURRENT ASPECTS OF EXOBIOLOGY.
Edited by Gregg Mamikunian and M. H. Briggs.
New York, Pergamon Press, Inc., 1965, p. 359-420.

Bibliography of current aspects of exobiology, divided into sections dealing with (1) the solar system, (2) life detection systems, (3) the origin of life, and (4) life in the universe. Subsections of (1) list works discussing the subject in general terms, and others discussing terrestrial organic matter, the moon, Mars, Venus, Jupiter, other planets, and meteorites. The second section gives titles which review the subject in general, and present accounts of specific devices. In section 3 the listed titles include reviews, the synthesis of organic compounds from simple precursors, the origins of cells, the natural interplanetary transfer of organisms, the artificial transfer of organisms, and the sterilization of space vehicles. Reviews, the incidence of planets, the origin of planets, and communication across interstellar distances are the subdivisions of the fourth section. F. R. L.

A66-11613

AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS.
New York, American Institute of Aeronautics and Astronautics, 1965. 343 p.
Members, $7.00; nonmembers, $14.

CONTENTS:

APOLLO LAUNCH OPERATIONS. Rocco A. Petrone (NASA, Kennedy Space Center, Fla.), p. 1-12. [See A66-11614 02-11]

MANNED SPACE SCIENCE AND APPLICATIONS. Willis B. Foster (NASA, Office of Space Science and Applications, Washington, D.C.), p. 13-17. [See A66-11615 02-05]

WEATHER MISSIONS FOR MANNED SPACECRAFT. J. Gordon Vaeth (U.S. Weather Bureau, Suitland, Md.), p. 18-20. [See A66-11616 02-20]

APOLLO EXTENSION SYSTEMS. William B. Taylor (NASA, Washington, D.C.), p. 21-26. [See A66-11617 02-31]

OPERATIONAL CONSIDERATIONS FOR A LUNAR SURFACE FIXED SHELTER WITH A SMALL ROVING VEHICLE. Howard J. Heglin (Northrop Corp., Hawthorne, Calif.), p. 27-35. 7 refs. [See A66-11618 02-30]

RELIABILITY CONCEPT FOR LONG SPACE MISSIONS. Roy B. Carpenter, Jr. (North American Aviation, Inc., Downey, Calif.), p. 36-45. 8 refs. [See A66-11619 02-15]

DESIGN AND OPERATIONS OF AN ORBITAL LAUNCH FACILITY (OLF). Floyd L. Loomis, Douglas B. Stoddard, and George B. Rickey (Boeing Co., Seattle, Wash.), p. 46-63. 5 refs. [See A66-11620 02-31]

SELECTION OF MANNED MISSIONS TO MARS AND VENUS THROUGH AN ANALYSIS OF PROGRAM EFFECTIVENESS. R. N. Austin and T. E. Peace (General Dynamics Corp., Fort Worth, Tex.), p. 64-79. [See A66-11621 02-30]

BIOLOGICAL PROBLEMS OF EXTENDED MANNED MISSIONS. E. R. Spangler (Thompson Ramo Wooldridge, Inc., Cleveland, Ohio), p. 80-90. 25 refs. [See A66-11622 02-05]

PLANETARY MISSION PROSPECTS FOR LOW-THRUST SYSTEMS. Robert V. Ragsac (United Aircraft Corp., East Hartford, Conn.), p. 91-105. 29 refs. [See A66-11623 02-30]

INTERIOR DESIGN PROBLEMS IN AN ARTIFICIAL G SPACECRAFT SIMULATOR. J. R. Milligan, B. D. Newsom, and R. S. French (General Dynamics Corp., San Diego, Calif.), p. 106-117. 13 refs. [See A66-11624 02-05]

MANNED FLIGHT SIMULATION OF THE AIR FORCE MODULAR MANEUVERING UNIT. Ronald C. Croston and James B. Griffin (Ling-Temco-Vought, Inc., Dallas, Tex.), p. 118-126. [See A66-11625 02-11]

NEUTRAL BUOYANCY SUBMERSION FOR THE ANALYSIS OF HUMAN PERFORMANCE IN ZERO G. Theodore Marton, Stacy R. Hunt, Theodore Klaus, and Carl R. Cording (General Electric Co., Philadelphia, Pa.), p. 127-133. [See A66-11626 02-05]

THE DESIGN OF SPACE TELESCOPES AND THEIR INTEGRATION INTO MANNED SPACECRAFT. Lewis C. Epstein and Michael L. Scott (Chrysler Corp., New Orleans, La.), p. 134-144. [See A66-11627 02-14]

DESIGN PRINCIPLES FOR AN INTEGRATED GUIDANCE AND CONTROL SYSTEM FOR THE LUNAR EXCURSION MODULE. George W. Cherry (Massachusetts Institute of Technology, Cambridge, Mass.), p. 145-157. 6 refs. [See A66-11628 02-21]

LAUNCH VEHICLES FOR THE APOLLO PROGRAM. Edmund F. O'Connor (NASA, Marshall Space Flight Center, Ala.), p. 158-170. [See A66-11629 02-31]

AN AUTONOMOUS-NAVIGATION EXPERIMENT FOR MANNED SPACECRAFT. P. B. Schoonmaker (McDonnell Aircraft Corp., St. Louis, Mo.), p. 171-176. [See A66-11630 02-21]

THERMAL CONTROL IN AN ADVANCED LIFE SUPPORT SYSTEM. B. W. Hryekewicz and C. D. King (General Dynamics Corp., San Diego, Calif.), p. 177-188. [See A66-11631 02-05]

A NEW CONCEPT IN ARTIFICIAL GRAVITY SYSTEMS. C. A. Lindley (Aerospace Corp., El Segundo, Calif.), p. 189-196. [See A66-11632 02-31]

HUMAN TRANSFER FUNCTIONS FOR MULTI-AXIS AND MULTI-LOOP PROBLEMS. James J. Adams (NASA, Langley Research Center, Va.), p. 197-202. [See A66-11633 02-05]

DESIGN OF ROCKETS FOR MAXIMUM PAYLOAD ENERGY. William F. Bos (NASA, Office of Manned Space Flight, Washington, D.C.), p. 203-210. 8 refs. [See A66-11634 02-31]

GEMINI LAUNCH VEHICLE - SPACECRAFT INTEGRATION AND TEST. J. C. Curlander and F. P. Kiefer (Martin Marietta Corp., Baltimore, Md.), p. 211-216. [See A66-11635 02-31]

GEMINI SPACECRAFT AND LAUNCH VEHICLE INTERFACE DESIGN, DEVELOPMENT AND CONFIGURATION CONTROL. Keith A. Rogers (NASA, Washington, D.C.; McDonnell Aircraft Corp., St. Louis, Mo.), p. 217-222. [See A66-11636 02-31]

FUNCTIONAL SYSTEM INTEGRATION AND TESTING. Charles W. Crawford and Ronald W. Mills (Boeing Co., Seattle, Wash.), p. 223-231. [See A66-11637 02-34]

AN APPROACH TOWARD A REAL-TIME EXPERIMENT MANAGEMENT SYSTEM. Leo C. Driscoll (Mitre Corp., Bedford, Mass.), p. 232-241. [See A66-11638 02-34]

DEVELOPMENT AND PERFORMANCE OF THE GEMINI ABLATIVE HEAT SHIELD. Paul E. Bauer and Donald L. Kummer (McDonnell Aircraft Corp., St. Louis, Mo.), p. 242-251. [See A66-11639 02-31]

THE EFFECTS OF SPACE ENVIRONMENT ON OPTIMUM MULTI-WALL STRUCTURAL DESIGN. R. L. Hammitt and L. A. Riedinger (Lockheed Aircraft Corp., Sunnyvale, Calif.), p. 252-262. 18 refs. [See A66-11640 02-32]

CARBON DIOXIDE REDUCTION SYSTEMS. Martin Macklin (Thompson Ramo Wooldridge, Inc., Cleveland, Ohio), p. 263-273. [See A66-11641 02-05]

THERMALLY INTEGRATED LIFE SUPPORT SYSTEMS. R. W. Murray, J. Mangialardi, and L. Cooper (General Electric Co., Philadelphia, Pa.), p. 274-285. [See A66-11642 02-05]

DESCRIPTION AND STATUS OF DOD GEMINI EXPERIMENT D-12 ASTRONAUT MANEUVERING UNIT (AMU). W. C. McMillin (Ling-Temco-Vought, Inc., Dallas, Tex.) and E. G. Givens, Jr. (USAF, Systems Command, Inglewood, Calif.; NASA, Manned Spacecraft Center, Tex.), p. 286-295. [See A66-11643 02-31]

RESULTS OF PRELIMINARY PHYSIOLOGICAL TESTING UNDER SIMULATED LUNAR AND MARTIAN GRAVITY CONDITIONS. Allyn B. Hazard (USAF, Systems Command, Los Angeles, Calif.), p. 296-302. [See A66-11644 02-05]

WORK IN A LOW FRICTION ENVIRONMENT. William R. Pierson and Raymond E. Geller (Lockheed Aircraft Corp., Burbank, Calif.), p. 303-305. 17 refs. [See A66-11645 02-05]

LIFE SUPPORT SYSTEMS DATA FROM SIXTY-TWO DAYS OF TESTING IN A MANNED SPACE LABORATORY SIMULATOR. T. C. Secord and M. S. Bonura (Douglas Aircraft Co., Inc., Santa Monica, Calif.), p. 306-317. 8 refs. [See A66-11646 02-05]

RADIATION DOSIMETRY ABOARD MANNED SPACE VEHICLES. Norman A. Baily (Hughes Aircraft Co., Malibu, Calif.) and Charles A. Sondhaus (California College of Medicine, Los Angeles, Calif.), p. 318-325. 14 refs. [See A66-11647 02-04]

REMOTE EXPERIMENTAL CYBERNETIC ANALYSIS OF DELAYED FEEDBACK OF ORAL BREATH PRESSURE CONTROL IN NORMAL AND EMPHYSEMA PATIENTS - APPLICATION TO SPACE MEDICINE. Karl U. Smith, Sherman D. Ansell (Wisconsin, University, Madison, Wis.), John P. Henry (U.S. Veterans Administration Center, White River Junction, Vt.), and Richard K. Junas (Ladish Corp., Milwaukee, Wis.), p. 326-337. 15 refs. [See A66-11648 02-05]

TRENDS IN EARTH-PLANETARY SPACE TRANSPORTATION SYSTEMS. Jerry N. Smith (NASA, Marshall Space Flight Center, Ala.), p. 338-343. [See A66-11649 02-31]

A66-11615 #

MANNED SPACE SCIENCE AND APPLICATIONS.
Willis B. Foster (NASA, Office of Space Science and Applications, Washington, D.C.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 13-17.

Study of the manned earth-orbital program. Such aspects of the Gemini series orbits as the effects of weightlessness on organisms, and weather and astronomical photography from the spacecraft are considered. The Apollo earth-orbiting program is also discussed, including such topics as solar deflection of starlight, measurement of solar oblateness, and of precession of a torque-free gyroscope, gravitational frequency shift in the earth's field, and the neutrino Mössbauer effect. B.B.

A66-11622 #

BIOLOGICAL PROBLEMS OF EXTENDED MANNED MISSIONS.
E. R. Spangler (Thompson Ramo Wooldridge, Inc., Cleveland, Ohio).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 80-90. 25 refs.

Discussion of four biological considerations which might cause major difficulties on extended manned spaceflight missions. Low g's for prolonged periods may cause skeletal damage, metabolic and circulatory damage, and vestibular decline. The pure oxygen atmosphere currently used in the U.S. space program is not considered a major problem; if current tests indicate the need for an atmospheric diluent, it is assumed that it will be provided and the penalties of the extra weight accepted. Trace contaminants in the atmosphere can arise from the metabolic processes of men and the outgassing and chemical change in supplies and materials in the spacecraft. The weight penalties of purging the cabin atmosphere and of detecting and removing contaminants are considered and compared. The dangers of removing men from the terrestrial periodicities with which their biorhythms may be intimately and critically connected are at present nearly unknown. Homeostasis and the general adaptation syndrome are discussed. R.A.F.

A66-11624 #

INTERIOR DESIGN PROBLEMS IN AN ARTIFICIAL G SPACECRAFT SIMULATOR.
J. R. Milligan, B. D. Newsom, and R. S. French (General Dynamics Corp., General Dynamics/Convair, Life Science Laboratory, San Diego, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 106-117. 13 refs.

Results from a 5-day rotation test in a manned revolving space station simulator. After the test, subjects (including physiologists and human-factors specialists) were questioned about irritations resulting from faulty interior design of the simulator. Their complaints and criticisms are tabulated with the design improvements and criteria suggested to correct the deficiencies. The value of such simulation experiments is discussed. R.A.F.

A66-11626 #

NEUTRAL BUOYANCY SUBMERSION FOR THE ANALYSIS OF HUMAN PERFORMANCE IN ZERO G.
Theodore Marton, Stacy R. Hunt, Theodore Klaus, and Carl R. Cording (General Electric Co., Philadelphia, Pa.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 127-133.

Investigation of human motor performance activities in a simulated weightless environment (neutral buoyancy submersion). Three modes of restraint - i.e., hand, thigh, and foot, were developed for evaluation under both the submergence and Keplerian modes. Base line control data in the normal environment have been collected, and the same data have also been collected during a neutrally buoyant condition for each of the three restraint modes. F.R.L.

A66-11631 #

THERMAL CONTROL IN AN ADVANCED LIFE SUPPORT SYSTEM.
B. W. Hryekewicz and C. D. King (General Dynamics Corp., General Dynamics/Convair, San Diego, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 177-188.
NASA-sponsored research.

Discussion of the design and fabrication of a thermal control subsystem as part of an advanced, integrated life support system. The system was designed to have sufficient capacity to accommodate a four-man crew on a one-year earth orbit mission, assuming a resupply period of 90 days. The major subsystems are atmospheric and contaminant control, water, waste, and food management, personal hygiene, and thermal control; they are briefly described. Problems of thermal and electrical loads, thermal control circuits, air circuit and control, liquid-coolant circuit, and waste-heat circuit receive attention. F.R.L.

A66-11633 #
HUMAN TRANSFER FUNCTIONS FOR MULTI-AXIS AND MULTI-LOOP PROBLEMS.
James J. Adams (NASA, Langley Research Center, Hampton, Va.)
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 197-202.

Data on multiaxis pilot response to illustrate an upper limit on response that is felt to be a limit on the pilot's information-processing capacity. The application of the data to a multiloop command maneuver is also presented. The measurements of the pilot's transfer function were made by matching an analog model to the pilot by automatically adjusting three gains in the model. The multiaxis data were obtained by using a fixed-base simulator. A three-axis artificial horizon, eight-ball instrument was used for the display, and a two-axis sidearm controller and rudder pedals were used to exercise control. The tests are described, and multiloop problems and the damper failure problem are considered. The model is applied to the design of the drive systems for a full-scale lunar landing simulator. As a result of the work, it is considered that constant coefficient transfer function can give a good representation of human pilot response in closed-loop control systems, even multiloop command guidance systems. F.R.L.

A66-11641 #
CARBON DIOXIDE REDUCTION SYSTEMS.
Martin Macklin (Thompson Ramo Wooldridge, Inc., Equipment Laboratories; Case Institute of Technology, Bio-Engineering Group, Cleveland, Ohio).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 263-273.

Discussion of the various methods of reducing carbon dioxide using chemical, electrochemical, and thermal energy. The processes of interest, based on their state of development, may be classified according to the equations for their overall reactions - direct decomposition, molten electrolyte, and solid electrolyte ($CO_2 \rightarrow O_2 + C$); sabatier ($CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$); and sabatier with methane cracking and Bosch ($CO_2 + 2H_2 \rightarrow C + 2H_2O$). In addition to carbon disposal, there are two other problems that are common to most of the physico-chemical reduction systems - carbon dioxide concentration and water electrolysis. Only one of the systems, molten electrolyte, concentrates carbon dioxide as an inherent feature of the main process. All other systems must be fed with concentrated carbon dioxide. Therefore, any comparison of systems must include a consideration of carbon dioxide concentration. Each reduction process is briefly discussed, and they are then compared. The similarities of the systems are examined, so that the common problems of and the differences between the various systems may be better described. M.F.

A66-11642 #
THERMALLY INTEGRATED LIFE SUPPORT SYSTEMS.
R. W. Murray, J. Mangialardi, and L. Cooper (General Electric Co., Missile and Space Div., Philadelphia, Pa.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 274-285.

Description of the basic life support functions in a semiclosed loop system, analysis of the endothermic power requirements for each function, and evaluation of the advantages of thermal integration of the processes with the waste heat source. The waste heat rejected in large quantities from the space radiator of the space vehicle's electrical power system can be used as a direct source of energy when integrated with a life support system. The oxygen recovery system is based on the Sabatier reaction, which requires prior collection and concentration of the CO_2 generated by the crew. The water contained in urine is recovered by distillation and pyrolysis, while wash water is recovered by simple distillation. The types of food which are low in residues but contain satisfactory amounts of essential nutrients and vitamins are discussed. Solid waste management is described using an automatic process. D.P.F.

A66-11644 #
RESULTS OF PRELIMINARY PHYSIOLOGICAL TESTING UNDER SIMULATED LUNAR AND MARTIAN GRAVITY CONDITIONS.
Allyn B. Hazard (USAF, Systems Command, Space Systems Div., Naval Field Office for Manned Orbiting Laboratory, Los Angeles, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 296-302.

Results of physiological testing under simulated reduced-gravity conditions, using a device in which the subject is suspended in a harness connected to a support cable and is made to walk and perform exercises on an inclined treadmill. The gravity level being simulated is determined by the angle made by the support cable with the horizontal, this angle being 80.5° when simulating lunar gravity (1/6 g) and 66.7° for Martian gravity (2/5 g). Comparisons are made of the cardiac responses and oxygen consumption at these reduced gravity levels and under earth gravity. It is tentatively concluded that walking on the moon could result in a pulse rate 15 beats per minute lower than earth, and possibly even 20 beats lower. The Mars pulse rate for walking is said to be about 10 beats per minute lower. The average lunar caloric expenditure is determined to be 52% of that on earth, while the corresponding figure determined for Mars gravity is found to be 72%. A.B.K.

A66-11645 #
WORK IN A LOW FRICTION ENVIRONMENT.
William R. Pierson and Raymond E. Geller (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 303-305. 17 refs.

Summary of initial work concerning the effects of a low-friction environment on maintenance operations. Results are given for three representative maintenance tasks performed in standard gravity and low-friction environments created by a six-degrees-of-freedom simulator. It is found that maintenance utilizing gripping forces require no more time or effort in low-friction simulation than in standard gravity, while tasks involving reaction-generating forces in low friction require greater effort and time to complete than the same tasks in standard gravity. A low-friction environment is said to have a decremental effect on torquing-force capability, while hand-eye coordination is found to be unaffected by a low-friction environment. Pressurization of a full-pressure suit is seen to increase the time and effort required to perform maintenance tasks. A.B.K.

A66-11646 #
LIFE SUPPORT SYSTEMS DATA FROM SIXTY-TWO DAYS OF TESTING IN A MANNED SPACE LABORATORY SIMULATOR.
T. C. Secord and M. S. Bonura (Douglas Aircraft Co., Inc., Missile and Space Systems Div., Advance Biotechnology Dept., Life and Environmental Systems Branch, Santa Monica, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 306-317. 8 refs.
Research sponsored by the Douglas Independent Research and Development Program.

Results of tests of advanced life support and environmental control systems in a manned space laboratory simulator. Tests were carried out on the following life support systems: (1) a two-gas atmospheric supply and control unit, (2) a regenerative CO_2 removal system, (3) a temperature control system, (4) an odor control unit, (5) a toxin burner, (6) a zero-g humidity control unit, (7) a zero-g waste management unit, (8) a food management system, (9) an atmospheric gas monitoring system, and (10) personal hygiene equipment. The systems were operated by a four-man crew in a 7-psia nitrogen-oxygen atmosphere for a 12-day checkout test and a 30-day test. Subsequently, life support system performance and human comfort data were obtained in 20 days of manned testing in both helium-oxygen and nitrogen-oxygen atmospheres at pressures of 5, 7, and 10 psia. A.B.K.

A66-11647 #
RADIATION DOSIMETRY ABOARD MANNED SPACE VEHICLES.
Norman A. Baily (Hughes Aircraft Co., Research Laboratories, Space Sciences Dept., Malibu, Calif.) and Charles A. Sondhaus (California College of Medicine, Los Angeles, Calif.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 318-325. 14 refs.

Investigation of the problems connected with the measurement and evaluation of radiation exposure in space flight. Although many types of radiation detectors are available for use as monitors on manned space flights, most are not suitable because of the unknown composition of radiations to which they may be exposed, due to the fact that their response is based on flux rather than dose. The tissue equivalent system, in which ionization chambers and linear energy-transfer counters are used to record ionization, which is a direct measure of the energy absorbed in tissue, is not subject to this limitation. Development of systems based on the tissue equivalent concept should incorporate devices for indicating both rate and integral values of the absorbed dose, as well as determining the energy absorbed per event in a representative tissue volume centered at the points where absorbed dose has been measured. D.P.F.

A66-11648 #
REMOTE EXPERIMENTAL CYBERNETIC ANALYSIS OF DELAYED FEEDBACK OF ORAL BREATH PRESSURE CONTROL IN NORMAL AND EMPHYSEMA PATIENTS - APPLICATION TO SPACE MEDICINE.
Karl U. Smith, Sherman D. Ansell (Wisconsin, University, Madison, Wis.), John P. Henry (U.S. Veterans Administration Center, White River Junction, Vt.), and Richard K. Junas (Ladish Corp., Industrial Relations Dept., Milwaukee, Wis.).
IN: AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, MANNED SPACE FLIGHT MEETING, 4TH, ST. LOUIS, MO., OCTOBER 11-13, 1965, TECHNICAL PAPERS. [A66-11613 02-05]
New York, American Institute of Aeronautics and Astronautics, 1965, p. 326-337. 15 refs.

Study of the effect of delayed feedback in respiratory disease by interposing a computer-controlled delay between somatic response and the sensory effect produced by the response as a means of developing behavioral cybernetic theory. Feedback delay can be defined as the transmission lag in any part of the closed-loop pathways that govern actions in organic systems. The subjects attempted to maintain constant intraoral breath pressure on a mouth tube by watching a visual oscilloscopic display which indicated pressure variations. The only variation introduced by the computer was a controlled delay interval, which ranged from 0.0 to 3.2 sec, for 20 subjects ten of which were normal and the other ten suffered from a respiratory disease. The tests indicated that patients with respiratory disease have lower control accuracies than for normal subjects. The results are applied to space medicine and physiology. D.P.F.

A66-11663 #
PROTECTION OF A COSMONAUT FROM ELECTRONS AND BREMSSTRAHLUNG IN THE EARTH'S RADIATION BELT [ZASHCHITA KOSMONAVTA OT ELEKTRONOV I TORMOZNOGO IZLUCHENIIA V RADIATSIONNOM POIASE ZEMLI].
E. E. Kovalev, D. P. Osanov, G. B. Radzievskii, and A. D. Mel'nik.
Kosmicheskie Issledovaniia, vol. 3, Sept.-Oct. 1965, p. 782-788. 16 refs. In Russian.

Discussion of the selection of a correct criterion for determining radiation hazard due to the earth's radiation belt for a cosmonaut inside a spaceship and outside it in a space suit, considering the geometry of protection, the radiation sensitivity of various organs and tissues, and the radiative effect of various electrons and bremsstrahlung. A spherical model of live tissue is used to investigate theoretically the distribution in depth of radiation doses from a surface bremsstrahlung source. Experimental data on the distribution in depth of electrons penetrated into light-atom materials are considered. A criterion based on measuring radiation doses over the depth of protective materials is seen to be sufficient to enable an effective protection to be developed. V.Z.

A66-11664 #
RADIOBIOLOGICAL EFFECTS IN ANIMALS PRE-EXPOSED TO THE EFFECT OF ACCELERATION [RADIOBIOLOGICHESKIE EFFEKTY U ZHIVOTNYKH POSLE PREDVARITEL'NOGO VOZDEISTVIIA USKORENIIA].
B. I. Davydov, V. V. Antipov, N. I. Konnova, and P. P. Saksonov.
Kosmicheskie Issledovaniia, vol. 3, Sept.-Oct. 1965, p. 789-795. 14 refs. In Russian.

Investigation of the reaction to ionizing radiation (400 to 900 roentgen doses) of mice subjected to 15- to 30-min centrifugation at 8 to 10 g. Survival rate, the dynamics of weight, and the average lifetime are determined for 1100 mice, and the weight of spleen and thymus, the number of leukocytes and erythrocites, and the hemoglobin content in blood are determined, in addition, for a fraction of that number. A survival curve indicates that the $LD_{50/30}$ is approximately 100 roentgen higher and radiation leukopenia is less pronounced in mice subjected to centrifugation. Possible mechanisms of this effect are discussed. V.Z.

A66-11665 #
EFFECT OF SOME FACTORS OF SPACEFLIGHT ON THE HEREDITARY STRUCTURES OF MAMMALS [VLIIANIE NEKOTORYKH FAKTOROV KOSMICHESKOGO POLETA NA NASLEDSTVENNYE STRUKTURY MLEKOPITAIUSHCHIKH].
M. A. Arsen'eva, L. A. Beliaeva, Iu. S. Demin, G. L. Pokrovskaia, A. V. Golovkina, and L. I. Gavrilina.
Kosmicheskie Issledovaniia, vol. 3, Sept.-Oct. 1965, p. 796-807. 8 refs. In Russian.

Investigation of the effects of vibration and acceleration, alone and combined with radiation, on cell division processes, the behavior of chromosomes, and the mitotic activity of bone marrow and spleen cells in mice. An increase in the incidence of chromosome adhesion and rearrangement events in the marrow and spleen cells is observed after vibration at 35 and 70 cps for periods of 15 min, 1 hr, and 4 hr, and a slight increase in the incidence of chromosome rearrangements and fragmentation is observed in mice subjected to acceleration up to 8 g for 5-min and 15-min periods. Vibration and acceleration are found to reduce radiation effects on the incidence of chromosome rearrangement events in the marrow and sex cells of mice. V.Z.

A66-11802 #
PROFICIENCY TRAINING FOR GEMINI PROGRAM FLIGHT CONTROLLERS.

Harold G. Miller (NASA, Manned Spacecraft Center, Mission Simulation Branch, Houston, Tex.) and Burton L. Sharpe (Lockheed Aircraft Corp., Lockheed Missiles and Space Co., Sunnyvale, Calif.).
American Institute of Aeronautics and Astronautics, Manned Space Flight Meeting, 4th, St. Louis, Mo., Oct. 11-13, 1965, Paper. 26 p.

Description of mission-simulation techniques for training Gemini flight controllers. Before each Project Gemini mission, each of NASA-MSC flight controllers, whether his console is at the Houston Mission Control Center or at one of several remote sites around the world, participates in several simulated missions and portions of missions. The purpose of the simulation exercise is twofold: to provide an environment in which all procedures and most ground equipment attendant to a given mission can be thoroughly tested and improved, if necessary; and to confirm the adequacy of responses by the flight controller team to anomalous situations, or "faults," inserted by simulation controllers. Mission simulation exercises are performed largely using a new simulation complex located within Mission Control Center. Simulation equipment interfaces with the real time computer complex and other operations systems to provide presentations of complete radar and telemetry data to flight controllers from simulated Gemini spacecraft and Agena target vehicles. Flight controllers regard these simulation exercises as an essential means of achieving confidence in the procedures and ground equipment they use in controlling Gemini missions. (Author)

A66-11807
STUDIES ON THE SITE OF RIBOSOMAL BINDING OF F2 BACTERIOPHAGE RNA.
M. Takanami, Y. Yan, and T. H. Jukes (California, University, Space Sciences Laboratory, Berkeley, Calif.).
Journal of Molecular Biology, vol. 12, 1965, p. 761-773. 27 refs.
Grant No. NsG-479.

Studies of the interaction of messenger RNA and ribosomes were made using ^{32}P-labeled RNA of bacteriophage f2 as a model messenger in a cell-free Escherichia coli system. Only one ribosome was bound per f2 RNA molecule. The unattached portion of f2 RNA was removed by digestion with pancreatic RNase, and the attached fragment which had resisted RNase was isolated from the ribosome as a homogeneous fragment with a sedimentation coefficient averaging 2.1 s. The nucleotide composition of the fragment was about 21% A, 25% C, 35% G and 20% U, as compared with 22.4% A, 26.5% C, 25.9% G and 25.2% U for total f2 RNA. It was concluded that the ribosome was attached to a specific locus of the RNA. The f2 RNA-ribosome complexes were incubated with the other components needed to complete an amino acid-incorporating system, following which the attached RNA fragments were isolated as before. It was found that the nucleotide composition of the isolated fragments differed markedly from the values obtained in the preceding experiment. The difference was thought to result from movement of the ribosome to another region of the f2 RNA strand, the movement being due to the process of protein synthesis. The 3'(OH)-terminal of f2 RNA was labeled by coupling with radioactive dinitrophenylhydrazine, and the RNA was allowed to interact with ribosomes as before. Radioactivity was not found in the attached portion after digestion with RNase. In another experiment, the rate of digestion of the f2 RNA-ribosome complexes by snake venom phosphodiesterase was compared with that of f2 RNA alone. As far as the initial rate was concerned, there was little difference between them. These results suggested that the binding site was not the 3'-terminal, but was either the other end or an intermediate region of the f2 RNA. (Author)

A66-11828
INCREASING VOICE COMMUNICATION CHANNELS USING MAN'S BINAURAL LISTENING CAPABILITY.
Maurice Rappaport (Agnews State Hospital, San Jose, Calif.).
Human Factors, vol. 7, Feb. 1965, p. 28-37. 8 refs.
Research supported by the Stanford Research Institute, the Office of Emergency Planning, and the Department of Mental Hygiene.

Study of man's binaural listening capability in a system where each message is sent over two separate channels simultaneously. Sending voice messages over pairs of channels makes available more channels for communication than would be possible if channels were used in a conventional manner and only one message was sent over one channel. Although this means that all channels under the dual channel system must carry several messages simultaneously, it is shown that for subjects wearing earphones, message intelligibility remains remarkably higher than if the same number of messages are sent over a single channel. The superiority of the dual channel method is attributed primarily to the unique capability of the human ear-brain system to perceive diotic signals as being located in the center of the head while all dichotic signals are perceived as being off to the side of the head. Where seven voices are talking simultaneously intelligibility of messages under the dual channel method of transmission is about 94% as compared to 11% under the single channel method. Practical implications of these findings for a number of military and civilian communication situations are discussed. M.F.

A66-11829
TASK LOADING OF PILOTS IN SIMULATED LOW-ALTITUDE HIGH-SPEED FLIGHT.
Stanley M. Soliday and Ben Schohan (North American Aviation, Inc., Human Factors Group, Columbus, Ohio).
Human Factors, vol. 7, Feb. 1965, p. 45-53. 8 refs.
Contract No. DA-44-177-AMC-66(T).

Experiment with pilots task-loaded to various degrees in simulated low-altitude, high-speed flight. Approximately 210 hrs of flight were made in a moving-base simulator that had a total vertical travel of 12 ft and an acceleration capability of ±6 g. A jet aircraft in the light fighter or attack category was mechanized on the simulator's analog computer. Flights were made over several types of terrain at several airspeeds under different conditions of navigation task and emergency task loading. Medium-heavy turbulence was simulated for the flights, each of which lasted 1 hr. Performance deteriorated markedly as terrain slopes increased in steepness and as airspeed increased from Mach 0.4 and Mach 0.7 to 0.9. Navigation and emergency task performance did not vary with any of the experimental conditions, and did not affect the pilots' ability to maintain a 500-ft terrain clearance. There was no evidence of fatigue during the flights. M.F.

A66-11830 #
SPACE RENDEZVOUS USING VISUAL CUES ONLY.
Herbert J. Clark (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).
Human Factors, vol. 7, Feb. 1965, p. 63-70. 6 refs.
USAF-sponsored research.

Experiment with seven trained subjects who flew simulated short range coplanar orbital rendezvous maneuvers, using direct visual cues only. Two rendezvous techniques were compared: line-of-sight and trajectory. In the former, the subject could control up-down and fore-aft thrust only; in the latter, he could, in addition, control pitch. Using either technique, all subjects were able to maneuver successfully to a position 100 ft directly in front of the target at a terminal velocity of less than 5 fps. Significantly less fuel was expended in performing the trajectory maneuver. The principal man-machine performance factors in the line-of-sight maneuver were tentatively described as the ability to conserve fuel used for longitudinal and vertical translation, the ability to conserve mission time, and the ability to proficiently close with the target. The principal factors for the trajectory maneuver were tentatively described as the ability to conserve fuel for longitudinal translation, the ability to conserve mission time, the ability to effectively apply longitudinal thrusts and conserve fuel used for vertical translation, and the ability to match the trajectory path of a minimum fuel two impulse maneuver. M.F.

A66-11832
CORRELATES OF REACTION TIME TO STARTLE.
Richard I. Thackray (USAF, Systems Command, Aerospace Medical Div., Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).

(Society for Psychophysiological Research, Annual Meeting, Washington, D. C., Oct. 17, 1964, Paper.)
Human Factors, vol. 7, Feb. 1965, p. 74-80. 11 refs.

The study described was concerned with behavioral and physiological correlates of response time to high intensity, "unexpected" auditory stimuli. Stimuli consisted of an initial 120 db startle tone followed by a series of 50 tones of 75 db and a final 120 db startle tone. Subjects responded by moving a control stick as rapidly as possible to the onset of each tone. Continuous recordings of heart rate and skin resistance were taken. Autonomic reactivity to the first intense stimulus was found to be positively correlated with response latency, while response time to the final intense stimulus suggests a negative relationship to autonomic levels and reactivity. The primary effect of the second high intensity tone was to significantly exaggerate pre-existing differences between individuals in their reaction time to the preceding moderate intensity stimuli. Possible relationships of this differential stress response to concepts of excitation and inhibition are briefly discussed. (Author)

A66-11866

ANALYSIS OF THE HUMAN PILOT [ANALISIS DEL PILOTO HUMANO].

José M. Carballar Prado.

Revista de Aeronáutica y Astronáutica, vol. 25, Sept. 1965, p. 758-765. In Spanish.

Study of the characteristics which determine the behavior of human pilots, as compared with automatic pilots, including concepts such as adaptability, response-time, and reliability. It is assumed that the human pilot's reaction to a given signal is linear; the establishment of a response on the part of the pilot (output signal) to a given signal (physical stimulus) is divided into five basic and simultaneous operations: (1) idle perception time, which is the time required to perceive a signal and which in the average pilot is of 0.15-sec duration, (2) neuro-muscular delay, which is the finite time required for the activation and functioning of the neuro-muscular system and which requires about 0.1 sec, (3) adaptive delay, which is a voluntary lapse of time imposed by the pilot when responding to a signal, (4) adaptive anticipation, which is the time by which a pilot voluntarily anticipates his response to a signal, and (5) adaptation to control or static gain. D. P. F.

A66-11985

THE PRINCIPLE OF A PREDICTION DISPLAY AND ITS APPLICATION TO THE PILOTING OF AIRCRAFT [DAS PRINZIP DER VORANZEIGE UND SEINE ANWENDUNG IN DER FLUGFÜHRUNG].

Rainer Bernotat (Berlin, Technische Universität, Institut für Flugführung und Luftverkehr, Berlin, West Germany).

Zeitschrift für Flugwissenschaften, vol. 13, Oct. 1965, p. 373-377. 12 refs. In German.

Explanation of the principles upon which a model for extrapolating data relative to the flight of an aircraft is constructed, including a detailed description of the method as applied to a prediction display based upon extrapolated data. When guiding a vehicle, man unconsciously predicts the future time-development of a value to be controlled. The task of piloting an aircraft can be considerably facilitated and greater control accuracy can be obtained, however, if the time-development of events is predicted by a computer. Test results are presented which correlate this theoretical concept with actual pilot responses, and it is shown that such a computerized system with a prediction display does in practice result in a higher degree of accuracy with reduced learning time. D. P. F.

A66-12012

PERSONAL THERMAL CONDITIONING.

D. R. Burton (Ministry of Aviation, Royal Aircraft Establishment, Farnborough, Hants., England).

World Aerospace Systems, vol. 1, Oct. 1965, p. 460-462, 464, 466.

Discussion of the characteristics of a personal conditioning system which enables the user to work in reasonable comfort in an adverse thermal environment which may be intolerable or would severely restrict his working capacity if he were not so protected. There are four main mechanisms by which the human body can exchange heat with its environment, namely convection, conduction, radiation and evaporation of water. The exchange of heat between the body and its immediate environment must be accomplished at such a rate and in such a direction as to preserve an almost constant internal body temperature. Liquids are much better heat transfer media than gases because the pumping power requirement is reduced by about three orders of magnitude. A series of live tests was done in order to be able to predict suit inlet temperature and mass flow combinations that would produce a given rate of cooling. M. F.

A66-12016

MEASUREMENT OF UNSTEADY STATE GROWTH RATES OF MICRO-ORGANISMS.

R. I. Mateles, D. Y. Ryu, and T. Yasuda (Massachusetts Institute of Technology, Dept. of Nutrition and Food Science, Cambridge, Mass.).

(American Chemical Society, National Meeting, 148th, Chicago, Ill., Aug. 30-Sept. 4, 1964, Paper.)
Nature, vol. 208, Oct. 16, 1965, p. 263-265. 10 refs.
Research supported by the Edanros Research Foundation; Grant No. NsG-496; NSF Grant No. G-21389.

Discussion of a technique for study of the growth rates of microorganisms under conditions where the rate changes with time. The technique combines continuous culture with continuous indirect measurement of the cell mass concentration to obtain accurate estimation of unsteady-state growth rates. The method is based on the principle of measuring continuously the concentration of a single nitrogen source - e.g., an ammonium salt, in the medium on which a microorganism is grown in continuous culture. It is shown that in the absence of excretion of nitrogen compounds and significant changes in intracellular amino acid pools, the nitrogen assimilation rate will correspond to the growth rate. The sensitivity of the technique resides in the fact that changes in medium nitrogen are easier to observe and measure accurately than changes in cellular nitrogen. Some results are discussed. F. R. L.

A66-12075

EFFECTS OF PHYSICAL LOCATION OF VISUAL STIMULI ON INTENTIONAL RESPONSE TIME.

John L. Kobrick (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.).

Journal of Engineering Psychology, vol. 4, Jan. 1965, p. 1-8. 13 refs.

Investigation of the effects of physical location of visual stimuli on the intentional response time (IRT). Sixteen subjects performed a simple manual response to flash stimuli located at 32 different positions in the visual field. The results indicated that IRT's were unaffected for most lower visual hemisphere locations. Significant decrements were only observed for locations higher than 30° above the horizontal for lateral displacements greater than 55° from center. No significant decrements were observed, even at the periphery, for locations along the horizontal line of sight. B.B.

A66-12076

THE EFFECT OF LIGHT AND SOUND VARIABLES ON REACTION TIME.

Raymond R. Medeiros, Robert K. White, and M.M. Ayoub (Texas Technological College, Lubbock, Tex.).

Journal of Engineering Psychology, vol. 4, Jan. 1965, p. 9-21. 10 refs.

Measurement of simple reaction time for eight college males at various combinations of light level, noise level, stimulus intensity, and shade of background to see if the interaction of these variables would significantly affect reaction time (RT). The effect of stimulus intensity is found to be highly significant, with the more intense stimuli causing the longer RT. Noise levels and light levels are seen to interact, suggesting that three phases of intersensory interaction between sound and vision receptors exist. B.B.

LC ENTRIES

A66-80001
PHYSIOLOGICAL OBSERVATION ON THE MOTILITY OF MAN PARTIALLY OR TOTALLY RELIEVED OF HIS BODY WEIGHT: I. MECHANISM OF WALKING AND OF ENERGY EXPENDITURE [OBSERVATIONS PHYSIOLOGIQUES SUR LA MOTILITE DE L'HOMME ALLEGE PARTIELLEMENT OU TOTALEMENT DE SON POIDS CORPOREL. I. MECANISME DE LA DEAMBULATION ET DEPENSE ENERGETIQUE].
T. Lomonaco, A. Scano, and G. Meineri (Centre d'Etudes et Rech. de Méd. Aéron. et Spatiale, Rome, Italy).
IN: INTERN. AERON. AND COSMON. MED. CONGR., MADRID, OCT. 1962, REPTS. AND COMMUNS., [Madrid, 1965], p. 153–162. 23 refs. In French.

A study of man's mobility following a reduction of body weight to simulate weightlessness is presented. The latter was achieved by suspending subjects at two points near the center of body mass by means of a special harness attached to a cable provided with variable counterpoise at its other end, or to elastic ropes attached to a trolley running along a horizontal metal beam. The minimum body weight permitting walking was determined to be about 1/20 of the total body weight. Subjects walked at an average speed of approximately 1 m./sec. Energy expenditure at different values of apparent body weight was recorded. Results indicate a rise of about 34% in oxygen consumption when walking in simulated weightless conditions. The practicability of employing this method to biological problems of space flight is discussed.

A66-80002
BENZINE TOXICITY [DIE BENZINSCHADLICHKEIT].
W. Miskolczy (Arbeitshyg. Zentrum des Bauwesens der DDR, Zentrale Poliklin. der Bauarbeiter, Berlin, East Germany).
Zeitschrift für die gesamte Hygiene und ihre Grenzgebiete, vol. 11, Aug. 1965, p. 590–598. 12 refs. In German.

The occurrence of benzine poisoning is on the increase because of the extensive use of the substance in industry and as a fuel. In many cases symptoms remain unrecognized or are mistaken for other illnesses. This paper is concerned with the pathological conditions arising from the exposure to benzene in various forms–inspiration, ingestion, contact, and injection. Poisoning by inspiration is the most frequently encountered form and particularly insidious because of the initial narcotic effect with accompanying dizziness, nausea, excitation and final paralysis. Chronic benzine poisoning affects primarily the bone marrow and its hematopoietic functions. The toxic effects on the skin are to be ascribed to the fat-dissolving property of benzine, leading to a disturbance of the electrolytic balance and liberation of alkali, as well as damage of the keratin and albumin. Antibacterial resistance is weakened and incidence of dermatitis is frequent ("benzine eczema"). Other symptoms of acute benzine poisoning are irritation of the eyes, the trachea, and the lower respiratory tract. Inspiration of benzine vapor concentrations of 30–40 mg./l. constitutes a threat to life after 5–10 minutes. The maximal admissible concentration is 0.3 mg./l.; but the susceptibility varies with the individual. Women are more susceptible than men. Various therapeutic measures are listed (change to fresh air, cold baths, administration of novocain and cortisone, etc.)

A66-80003
PERCEPTION OF DURATION [DE PERCEPTIE VAN DUUR].
J. A. Michon (Inst. voor Zintuigfysiol. RVO-TNO, Soesterberg, The Netherlands).
Nederlands Tijdschrift voor de Psychologie, vol. 20, Jul.–Aug. 1965, p 391–418. 72 refs. In Dutch.

This is a review of the present state of time psychology in its two aspects: time perspective, which is a subjective scale for dating events; and duration, which is the experienced interval between two points on the time Apart from the viewpoint that time is perceived by a special time sense, other theories fall into two main categories. The first group deals with the structural aspects of the time perceptive mechanism. The basic model here consists of a time-base generator, a gate, a counting mechanism, a memory store, and a comparator. The model can be quantified. The time base is assumed to be a periodic or quasi-periodic process. This leads to the quantum hypothesis of subjective time which is strengthened by new experimental evidence (Michon and Noë, 1965). The second category of time theories deals with the influence of external factors on the subjective experience of duration. The main weakness lies in the deficient definition of the external conditions. Information psychology may correct part of the problem.

A66-80004
PHYSIOLOGICAL GRADIENTS AND BEHAVIOR.
Robert B. Malmo (McGill U., Allan Mem. Inst., Montreal, Quebec, Canada).
Psychological Bulletin, vol. 64, Oct. 1965, p. 225–234. 36 refs.
Army, PHS, Natl. Med. Res. Councils, and Defence Res. Board of Canada supported research.

Physiological gradients accompanying mental activity have been found in skeletal-motor and autonomic recordings, commencing with the onset of the behavior sequence and terminating at its conclusion. Experimental evidence is presented indicating that these gradients do not signify increasing activation (or arousal) during the behavioral sequence (e.g., task or period of attentive listening). On the contrary, the EEG evidence clearly indicates that cortical activity remains relatively constant during the sequence when skeletal-motor and cardio-respiratory levels show progressive rise. While the gradients therefore appear not to represent increasing motivation, or the like, during the task, there is strong evidence indicating that the steepness of the gradients is a function of motivational level.

A66-80005
ARTERIAL PULSE WAVE VELOCITY AS PSYCHOPHYSIOLOGICAL MEASURE.
James G. L. Williams and Barbara Williams (Neb. U. Coll of Med., Psychiat. Inst., Omaha).
Psychosomatic Medicine, vol. 27, Sep.–Oct. 1965, p. 408–414. 13 refs.
Grant Natl. Inst. of Child Health and Human Develop. HD-00370.

It has been predicted theoretically and shown experimentally that the arterial pulse wave velocity will depend on the state of the arterial wall, this varying between individuals as a function of age and within the individual according to site and because the arterial wall does not obey Hooke's law, according to the internal pressure at any given moment. In the present research, comparisons were made between test–retest reliabilities of measures of the pulse wave velocity obtained from different sites, and the effects of age, psychological "stress," and a psychoactive drug were investigated. It was concluded that the upper-arm arterial pulse wave velocity can serve as a sensitive psychophysiological measure of high reliability.

A66-80006
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION.
Laverne C. Johnson, Elaine S. Slye, and William Dement (U. S. Naval Hosp., San Diego; and Stanford U. Med. School, Dept. of Psychiat., Palo Alto, Calif.)
Psychosomatic Medicine, vol. 27, Sep.–Oct. 1965, p. 415–423. 15 refs.
Grants NSF GB 922; and NIMH MH 08185; and Dept. of Navy Task MR 005-12-2304.

Simultaneous recordings of electroencephalogram (EEG), electrooculagram (EOG), electromyogram (EMG), heart rate (HR), galvanic skin response (GSR), respiration, skin temperature, and plethysmogram were obtained from a 17-year-old boy following 236, 246, and 264 hr. of wakefulness, during 3 recovery nights, 1 week, 6 weeks, and 7 months after end of deprivation. The EEG indicated dominant slow activity with minimum alpha during deprivation. Opening and closing of eyes had little effect on the EEG and stimuli did not produce alpha enhancement. Prolonged sleep loss caused a chronic shift to increased activity of the autonomic nervous system but with diminished responsiveness to external stimuli. During the early period of the first recovery sleep, increased responsiveness to stimuli was seen in all autonomic variables except GSR. Specific GSR's did not appear until the second recovery night. There was an increase in REM sleep during the first 3 recovery nights.

A66-80007
INDIVIDUAL DIFFERENCES IN AUTONOMIC RESPONSIVITY: PROBLEMS OF MEASUREMENT.
Alfred Steinschneider and Earle L. Lipton (N. Y. State U., Upstate Med. Center, Dept. of Pediat., Syracuse).
Psychosomatic Medicine, vol. 27, Sep.–Oct. 1965, p. 446–456. 33 refs.
Grants PHS MH-04605 and 1-K3-HD-21,852.

Proposed measures of autonomic nervous system functioning within an individual were reviewed. An important factor in the choice of such measures is the recognition that the magnitude response to stimulation is influenced, to a large extent, by the state of the individual prior to stimulation. From the point of view of informational content, there is little difference between the use of the magnitude change score and response level as the basic response datum when used in conjunction with the initial level. Consideration of the concept of the autonomic lability score as well as the

mean response score reveals that neither measure adequately corrects nor compensates for the effect of prestimulus level. Several magnitude measures suggested for the comparison of individuals include the slope of the regression of change score on initial level, variability around this line, a measure of discriminability, and a measure of maximal reactivity. The temporal aspects of the autonomic response are discussed and, because of their lack of dependence on prestimulus level, two measures are extracted for each aspect—the mean and variability.

A66-80008
THE CLINICAL AND PATHOLOGICAL EFFECTS OF PROLONGED SOLAR EXPOSURE. I. THE ASSOCIATION WITH AGEING OF THE SKIN.
Donald R. Marshall (Melbourne U., Royal Melbourne Hosp., Dept. of Plastic Surg. and Dept. of Surg., Australia).
Australian and New Zealand Journal of Surgery, vol. 34, Feb. 1965, p. 161–172. 23 refs.
Thomas Trust Scholarship supported research.

A histological study of the skin of 50 patients is presented comparing the findings in exposed and unexposed regions and relating the changes seen to age and exposure. The unexposed skin does not alter significantly in structure with age. The different appearance of the aged skin in unexposed areas is due to alterations in physical properties for which there is no matching alteration in morphology. The exposed skin shows changes predominatly in the dermis. These are described as "basophilic degeneration of collagen" or "elastotic degeneration of collagen" which are synonymous with "senile elastosis." It is found that the changes occur only on exposed regions and should be termed "solar degeneration" as they are not primarily due to age. The factors influencing the development of solar collagen degeneration are as follows. (a) The fair skinned lightly pigmented patient is most susceptible and despite prolonged exposure does not develop satisfactory protective pigmentation. Heavily pigmented skin is protected as evidenced by the lack of collagen degeneration in dark skinned people and particularly in the aboriginal. (b) The degree of collagen degeneration corresponds well with the degree of exposure. (c) As age increases the degree of collagen degeneration is greater. However, this is proportional to the amount of exposure rather than to the age. (d) Sex: Men are affected more than women but this is related to increased exposure rather than to a variable susceptibility.

A66-80009
NOISE INDUCED HEARING LOSS AMONGST ENGINEROOM PERSONNEL ON BOARD NORWEGIAN MERCHANT SHIPS.
Sverre Quist-Hanssen.
Acta Oto-Laryngologica, Supplementum 196, 1965, 25 p. 48 refs.
Norwegian engr. officers' organization supported research.

The aim of the investigation was to elucidate to what extent noise induced hearing loss in Norwegian merchant ship's engine personnel is caused by exposure to noise from diesel engines. Hearing loss induced by workshop noise could be shown to increase with increasing intensity of the noise and duration of employment, as is generally known. By calculation of the hearing loss risk incurred during workshop employment by the group exposed to both kinds of noise it could be shown that the hearing loss induced by diesel engine-room noise is faint. Examination of a small group exposed to diesel engine-room noise only supports this assumption. The main cause of hearing loss from diesel engine-room noise seems to have been impact noise from safety valves or produced when indicating diagrams are made. Technical noise abatement procedures may presumably eliminate hearing loss risk produced by the steady state noise in merchant ships' diesel engine-room. Engine room crews must however, protect their ears against impact noise from safety valves or produced when indicating diagrams are made.

A66-80010
THE EFFERENT VESTIBULAR SYSTEM: ELECTROPHYSIOLOGICAL RESEARCH
Oscar Sala (Padua U., Oto-Rhino-Laryngol Clin., Italy).
Acta Oto-Laryngologica, Supplementum, 197, 1965, 34 p. 96 refs

Experiments were performed on cats in order to study the modifications induced by the stimulation of the efferent vestibular system (e.v.s.) on the afferent vestibular activity recorded at the level of the vestibular nerve (v.n.) and of the vestibular receptors. The results led to the conclusion that the e.v.s. is capable of performing a modulating activity on the vestibular impulses, with an excitatory and inhibitory effect, according to the functional state of the receptors. The efferent vestibular centers of the brain stem and efferent fibers reaching labyrinthine receptors are to be considered as the terminal part, more peripheral and anatomically more easily demonstrable, of a specific polysynaptic system, as it was demonstrated for the olfactory and auditory efferent systems. These preliminary results allow to consider under a new light some common observations in human pathology and constitute the physiological basis for the psychosomatic interpretation of some troubles of the labyrinthine function.

A66-80011
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS.
Tore Bergquist, Bengt Kleman (Res. Inst. of the Natl. Defence, Phys. Dept., Stockholm, Sweden), and Björn Tengroth (Sahlgren Hosp. Gothenburg S.V., Univ. Gothenburg, Dept. of Ophthalmol., Sweden).
Acta Ophthalmologica, vol. 43, 1965, p. 331–349. 22 refs.

The action of laser radiation on rabbit eyes has been studied with four different ruby lasers and two Nd-glass lasers. The output of the lasers varied from a burst of pulses with a duration of 650 μs to a single pulse with a width of 35 ns. It has been found that with these lasers with widely different output characteristics there is a common threshold value in the peak irradiance at which lesions occur. The threshold refers to the irradiance level at which minimal lesions start to appear, as observed in an ophthalmoscope immediately after the irradiation. The threshold value for the peak corneal irradiance was about 6 $kWcm^{-2}$ when the rabbit's eye was in the direct beam at a short distance from the laser. This corresponds for ruby lasers to a threshold value in the peak retinal irradiance of 170 $MWcm^{-2}$. The results from these experiments are in good agreement with the results from a few cases of irradiation of human eyes. Various aspects of hazards of laser radiation to the human eye are considered. As yet there are relatively few papers in the literature dealing with problems concerning hazards to the eye of laser radiation.

A66-80012
VAGAL RELAXATION OF THE STOMACH: EXPERIMENTAL RE-INVESTIGATION OF THE CONCEPT OF THE TRANSMISSION MECHANISM.
Jan Martinson (Göteborg U., Dept. of Physiol., Sweden).
Acta Physiologica Scandinavica, vol. 64, Aug. 1965, p. 453–462. 14 refs.
Contract AF 61(052)-732; Grant PHS HE-05675-04; and Göteborg U. supported research.

The vagus nerves contain efferent fibers capable of relaxing the corpus and fundus of the stomach. In experiments on cats this atropine-resistant effect has been shown to differ in several respects from relaxation elicited by sympathetic stimulation or infusion of catecholamines. The vagal responses are more potent, their latency is shorter, and maximum response is attained at definitely lower frequencies. The responses to sympathetic stimulation wear off much more rapidly after the end of stimulation than does vagally induced gastric relaxation. Finally, the sympathetic or catecholamine gastric responses are more or less completely blocked by guanethidine or nethalide, which have hardly any effect on the vagal relaxation of the stomach. Hexamethonium inhibits vagal relaxation, and seems to be potentiated by atropine. It is concluded that the relaxation of the stomach on excitation of "high-threshold" efferent vagal nerve fibers is mediated via preganglionic vagal fibers, which do not exert their effect by any adrenergic mechanism. It is still not possible to say what peripheral mechanism is actually responsible for this along-lasting gastric relaxation.

A66-80013
DETERMINATION OF THE MIXED VENOUS CO_2 PRESSURE WITH A REBREATHING METHOD: CORRECTION FOR VOLUME CHANGES OF THE LUNG–BAG SYSTEM.
G. Lundin and D. Thomson (Lund U., Inst. of Physiol., Aero-Med. Lab., Sweden).
Acta Physiologica Scandinavica, vol. 64, Aug. 1965, p. 448–452. 7 refs.

For determining the cardiac output with Fick's equation the mixed venous CO_2 content can be determined with a rebreathing technique. During the rebreathing the nitrogen- and CO_2 percentages in the bag were simultaneously registered by fast nitrogen- and CO_2 meters. This allowed the correction of the CO_2 value caused by volume changes of the lung–rebreathing bag system due to the differences in O_2 uptake and CO_2 elimination. When this correction is applied, higher values for the cardiac output should be obtained.

A66-80014
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS AND CATECHOLAMINES AT EXERCISE IN MAN.
Arne Carlsten, Jan Häggendal, Bo Hallgren, Rudolf Jagenburg, Alvar Svanborg, and Lars Werkö (Göteborg U., Depts. of Clin. Physiol., Pharmacol., Med. Biochem., and Med., Sweden).
Acta Physiologica Scandinavica, vol. 64, Aug. 1965, p. 439–447. 19 refs.
Swedish Natl. Assoc. against Heart and Chest Diseases and Swedish Res. Council supported research.

The influence of exercise of submaximal load on the arterial concentration of catecholamines, free fatty acids (FFA), and amino acids was studied in 6 young healthy men. The noradrenaline (NA) level increased as a rule successively but the low adrenaline (A) level was unchanged. After 14–18 min. of work there was no change in the total FFA level, but among the individual FFA the percentage of stearic and oleic acid decreased, whereas that of palmitic, palmitoleic acid increased. The total amino nitrogen level

increased and among the individual amino acids there was a marked elevation in alanine. When the exercise was performed during the infusion of ganglionic blocking drugs the increase in NA was abolished or less marked but the changes in the arterial concentrations of glucose, lactic acid, pyruvic acid, amino acids and FFA were similar as without drugs. These results incidate that the role of the sympathetic nervous system is of minor importance for the regulation of the free fatty acid level in serum during exercise.

A66-80015
INFLUENCE OF PASSIVE AND ACTIVE HEATING ON THE TEMPERATURE REGULATION OF MAN.
Bodil Nielsen and Marius Nielsen (Copenhagen U., Zoophysiol. Lab. A, Denmark).
Acta Physiologica Scandinavica, vol. 64, Aug. 1965, p. 323-331. 18 refs.

The effect of passive heating through diathermia on thermoregulatory responses is compared to the effect of active heating by exercise on a Krogh bicycle ergometer in 2 human subjects. The rate of heat production in the two conditions was of the same magnitude (about 5 times the basal heat production). The rectal temperature increased with passive heating to about the same level as during active heating and appeared, within limits, to be independent of the environmental temperature. At the same mean skin temperature conductance and sweat rate with passive and active heating were much higher than during normal rest. But in the two conditions of heating the rates of skin blood flow were equal and the rates of sweating not much different, when compared at the same mean skin temperature. The results indicate therefore that the main stimulus for the increase of heat dissipation during the steady state of work caused by the work itself, is the increased internal temperature and that the changes in heat dissipation during work caused by changes in the environmental temperature within wide limits are mainly due to changes in skin temperature.

A66-80016
ON THE REGULATION OF SWEAT SECRETION IN EXERCISE.
Bodil Nielsen and Marius Nielsen (Copenhagen U., Zoophysiol. Lab. A, Denmark).
Acta Physiologica Scandinavica, vol. 64, Aug. 1965, p. 314-322. 21 refs.

With the exception of the first few minutes of muscular exercise, the sweat rate both in the work and the recovery period was found to follow closely the changes in deep esophageal and tympanic temperatures. In the steady state of work of various intensities, performed at a constant environmental temperature the mean skin temperature remained constant, whereas there was a linear relationship between sweat rate and internal temperatures measured as rectal, esophageal and tympanic temperatures. In the steady state of work of constant intensity but at various environmental temperatures (5°C. to 30°C.) the internal temperatures (rectal, esophageal and tympanic) remained constant, and the sweat rate (150 to 750 g. per hr.) increased nearly linearly with increasing mean skin temperature. The mean skin temperature was, however, even at 30°C. amb. temp., lower than that at which sweating was elicited in rest. Elimination of the temperature gradient along the esophagus by breathing air saturated with water vapor at body temperature had no effect on either sweat rate, or tympanic and other internal temperatures. The effect of vigorous cooling of the neck over the carotid arteries was only small.

A66-80017
STUDIES ON THE PERIPHERAL CIRCULATION AND METABOLISM IN MAN. IV. OXYGEN UTILIZATION AND LACTATE FORMATION IN THE LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE.
Bengt Pernow, John Wahren, and Staffan Zetterquist (Karolinska Inst., Serafimerlasarettet, Dept. of Clin. Physiol. Stockholm, Sweden).
Acta Physiologica Scandinavica, vol. 64, Aug. 1965, p. 289-298. 13 refs.
Swedish Med. Res. Council and Swedish Natl. Assoc. against Heart and Chest Diseases supported research.

Healthy young men exercised on a bicycle ergometer with increasing work loads. From catheters in the brachial artery and the femoral vein blood samples were drawn before, during and after exercise. The arterial-venous difference in the leg increased linearly in relation to heart rate and O_2 uptake to a mean value of 163 ml./l. at maximal work. At this intensity (heart rate 180-195 beats per minute) the mean value of the venous O_2 saturation was 9 per cent. A linear relationship existed between log lactate and heart rate during work as well as between log lactate and O_2 saturation of the femoral venous blood. The slope for the semilogarithmic regression of the femoral venous concentration of excess lactate on heart rate was significantly steeper than that of venous total lactate concentration. Venous blood pH decreased during exercise to a mean value of 7.09 at maximal load. A linear relation was obtained between decrease in pH and increase in lactate. The reproducibility of the above mentioned results was evaluated for 6 subjects. A comparison between exercise performed with one and two legs showed that heart rate increased almost identically in relation to O_2 uptake at both types of exercise. The venous O_2 saturation was somewhat lower at submaximal work loads during one-leg exercise, while the final venous O_2 saturation values at maximal work were almost identical. Lactate increased more rapidly during one-leg exercise. These data seem to indicate that blood flow in relation to O_2 demand is less adequate in one-leg than in two-leg exercise at comparable working intensities.

A66-80018
THE MECHANICS OF HUMAN SMOOTH PURSUIT EYE MOVEMENT.
D. A. Robinson (Johns Hopkins U. School of Med., Dept. of Med., Baltimore, Md.)
Journal of Physiology, vol. 180, Oct. 1965, p. 569-591. 14 refs.
Grants PHS AM-15524 and FR-00004.

Eye movements and net isometric tension in the horizontal recti were measured in humans tracking visual targets moving in an unpredictable fashion but in a manner to elicit smooth pursuit eye movements. The short time required for the eye to attain target velocity is made possible by central patterning of neural discharges that apply an excess rate of rise of net active-state muscle tension. The same static and dynamic relation between net active-state tension and globe rotation exists for both saccadic and smooth pursuit movements. The smooth pursuit system exhibits nonlinearity in that larger velocity changes are met with proportionately less excess rate of rise of muscle tension, take slightly longer to be accomplished and exhibit less or no velocity overshoot. Smooth pursuit and saccadic movements may occur with complete temporal independence. The smooth pursuit system is capable of individual responses to two target motions spaced 75 msec. apart. This is taken as evidence that the smooth pursuit system is a continuous as opposed to a sampled system. Under conditions of visual feedback, the smooth pursuit system is shown to be capable of smooth endless pursuit under positive feedback and sinusoidal oscillation under negative feedback after the fashion of continuous control systems.

A66-80019
TENSILE STRENGTH OF HUMAN LUNG.
John A. Pierce (Ark. U., Med. Center, Dept. of Med., Little Rock).
Journal of Laboratory and Clinical Medicine, vol. 66, Oct. 1965, p. 652-658. 5 refs.
Grants PHS HE04031, HTS5333, and FR-00208-01.

The delicate structure of lungs must be durable enough to sustain their morphology through decades of continuous stress. Accordingly, tensile strength was measured on dried strips of human lung tissue taken at necropsy from 16 subjects between 17 and 85 years of age who did not have pulmonary disease. The mean tensile strength of lung parenchyma was 1.1 kg. per square millimeter. Tensile strength varied widely among individuals, but there was no evidence of any change in tensile strength with advancing age. These results dispel any notion that pulmonary emphysema, a commonly encountered structural failure of the lungs, results primarily from decreased tensile strength of the lung connective tissues during old age.

A66-80020
TIME ESTIMATION AS A FUNCTION OF KNOWLEDGE AND ACHIEVEMENT.
Jerome M. Sattler (San Diego State Coll., Calif.)
Psychological Record, vol. 15, Oct. 1965, p. 529-534. 9 refs.

The effects of knowledge or lack of knowledge of a grade and achievement level on time estimation were investigated. Subjects were 54 college students distributed in six experimental groups. Three conditions of achievement and two conditions of knowledge were employed. Subjects estimated the meaning of five time intervals ranging from a very long time to a very short time on the basis of their waiting to see their examination papers. The results of an analysis of variance indicated that subjects knowing their grade gave significantly higher estimates than subjects not knowing their grade. No other variables were significant. The results appear to be complementary to the previous research that under conditions of stress time is overestimated.

A66-80021
THE EFFECT OF MANIFEST ANXIETY UPON THE TRAVEL AND MANIPULATION COMPONENTS OF HUMAN MOTION.
Charles B. Truax (Ark. U. and Ark. Rehabil. Res. and Training Center, Fayetteville) and Frank S. Murray (Ky. U., Lexington).
Psychological Record, vol. 15, Oct. 1965, p. 561-565. 5 refs.
Grant NSF 86-2109.

Forty undergraduates served as subjects to evaluate the effects of anxiety, defined by scores on the manifest Anxiety Scale, upon two measures of human motion in a paper placing task: travel movement time and manipulative movement time. High anxious subjects in comparison to low anxious subjects, performed better on the travel components and poorer on the manipulative component. However, no significant differences in overall performances were obtained. The results were discussed in relation to Hullian learning theory and a theory of human motion proposed by K. U. Smith (1962).

A66-80022
THE SIZE OF THE MASTOID AIR CELL SYSTEM: PLANIMETRY-DIRECT VOLUME DETERMINATION.
K. Flisberg and M. Zsigmond (Lund U., Dept. of Otolaryngol. and Roentgendiagn. Dept., Sweden).
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 23-29. 16 refs.

The mastoid air cell systems of healthy and diseased (chronic otitis media) ears were measured with a direct volumetric- and a planemetricical-roentgenological method. Diseased ears were found to have smaller areas and volumes than healthy ones. Good agreement was found between results obtained by both methods.

A66-80023
ORIENTATION OF THE ROTATION-AXIS RELATIVE TO GRAVITY: ITS INFLUENCE ON NYSTAGMUS AND THE SENSATION OF ROTATION.
Fred E. Guedry, Jr. (U. S. Naval Aviation Med. Center, U. S. Naval School of Aviation Med., Pensacola, Fla.)
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 30-48. 47 refs.
NASA supported research.

Subjective phenomena and nystagmus were compared under two conditions of rotation, one in which the axis of rotation was vertical, i.e., aligned with gravity, and one in which the rotation axis was horizontal. When the axis of rotation was horizontal, normal subjects exhibited nystagmus and sensations of rotation for periods of three minutes (and longer); deceleration produced very brief post-rotational reactions. Labyrinthine-defective subjects, men presumed to be without vestibular function, did not exhibit nystagmus or report sensations similar to those of normal subjects for either the vertical or horizontal axis of rotation. Because prolonged nystagmus occurred almost exclusively in normal subjects when the rotation axis was horizontal, it is concluded that vestibular function is a necessary condition for this response and that it may be dependent upon the continuous reorientation of the otolith system relative to gravity. The results emphasize the importance of increasing the range of experimental observations to check the accuracy of theoretical predictions.

A66-80024
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS.
F. Harbert and I. M. Young (Jefferson Med. Coll., Dept. of Otolaryngol., Philadelphia, Pa.)
(Acoust. Soc. of Am., 65th Meeting, New York City, May 16, 1963).
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 49-58. 24 refs.
Grant NIH B-2035.

Thresholds in the presence of various intensities of noise re 0.0002 dynes/cm.^{2} were compared for normal and pathologic ears. For all sensorineural loss without abnormal adaptation, wide band noise produced a masked threshold 15-20 db. below the level of the noise. The masked threshold at the center of the narrow band was approximately at the same intensity as noise. These findings are essentially the same as in normal ears. Conductively deafened ears showed the same masked thresholds as normal ears for white noise and for the center of the narrow band and for frequencies below. However, there was less spread of masking than normal for frequencies above the center of the narrow band. Cases with progressively increasing sensorineural hearing loss for frequencies above the narrow band showed most increased spread above the narrow band. Those with flat losses or more sensori-neural loss for frequencies below the narrow band showed a near symmetrical spread on each side of the narrow band. The clinical and audiological findings in the latter group indicated that the lesion was in the cochlea. For abnormally adapting ears, white noise caused greater masking than for normal ears, and masking effects at the center of a narrow band were also greater than in normal ears. In severely adapting ears, the lateral spread of masking approached the effect of white noise with narrow band masking.

A66-80025
THE EFFECT OF CONTRALATERAL OLIVO-COCHLEAR BUNDLE STIMULATION ON THE COCHLEAR POTENTIALS EVOKED BY ACOUSTIC STIMULI OF VARIOUS FREQUENCIES AND INTENSITIES.
H. Sohmer (Hebrew U., Hadassah Med. School, Rogoff Lab. of Physiol., Jerusalem, Israel).
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 59-70. 14 refs.

The cochlear action potential depression and cochlear microphonic potential augmentation observed during contra-lateral olivo-cochlear bundle stimulation are greatest at low intensity and low frequency acoustic stimulation. Physiological mechanisms responsible for these results are proposed. A plausible model of cochlear microphonic augmentation is presented.

A66-80026
THE ORAL AND LARYNGEAL COMPONENTS OF THE UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING.
Helge Schiratzki (Karolinska Sjukhuset, Dept. of Otolaryngol. and Dept. of Clin. Physiol; and Hosp. for Contagious Diseases, Lab. of Clin. Physiol., Stockholm, Sweden).
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 71-82. 12 refs.
Karolinska Inst. and Swedish Natl. Assoc. against Heart and Chest Diseases supported research.

The upper airway resistance may be considered as consisting of two components: the oral component between the oral aperture and the pharynx, about one centimeter above the top of the epiglottis; and the laryngeal component, between this part of the pharynx and the subglottic space. These two components of the upper air resistance were measured by introducing an additional point of measurement in the pharynx to the two used for determining the upper airway resistance as a whole. The mean oral resistance for 8 subjects at a flow of 0.5 liters/sec. was 0.5 cm.H_2O/liter/sec. The mean laryngeal resistance for 6 subjects at the same flow rate was 0.3 cm. H_2O/liter/sec. The value was the same for the 4 normal men and 2 male cases of unilateral cord paralysis composing this group. For 2 cases of bilateral cord paralysis the mean was 2.4 cm. H_2O/liter/sec. In view of the high oral resistance it would seem to be important in all kinds of examinations of the ventilatory capacity to standardize the space between the dental arches, and the posture of the head in relation to the body.

A66-80027
A FURTHER STUDY OF RECOVERY FROM TEMPORARY THRESHOLD SHIFT.
M. Rodda (Manchester U., Great Britain).
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 83-89. 16 refs.

Results are described of an analysis of 1950 curves of recovery from temporary threshold shift (TTS) to investigate the phenomena of diphasic recovery, sensitization and bounce higher than initial TTS. The phenomena were found to be closely related to the transition periods and the transition stimuli which are in turn associated with TTS. Individual differences in susceptibility were also revealed, although susceptibility to diphasic recovery was found to be associated with a lower susceptibility to sensitization and a higher susceptibility to bounce higher than the initial TTS. A "composite" theory is postulated to explain the phenomenon.

A66-80028
MAINTENANCE OF COCHLEAR POTENTIALS DURING ASPHYXIA.
Vincente Honrubia, Brian M. Johnstone, and Robert A. Butler (Chicago U., Dept. of Surg., Ill.)
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 105-112. 12 refs.
Grant PHS NB00682-11.

The perilymphatic space of the guinea pig cochlea was perfused with a variety of solutions which differed in O_2 content and K^+ concentration. Perfusion either preceded asphyxia and continued during the asphyxia interval or it followed by several minutes the onset of asphyxia and continued concomitantly with asphyxia for several additional minutes. Perfusion of *scala vestibuli served to maintain endocochlear potential*, cochlear microphonics and summating potential at relatively high levels when perfusion preceded asphyxia. The potentials elicited by tone bursts were partially restored when perfusion followed asphyxia. Perfusion of scala tympani, on the other hand, was without effect. So far as could be determined, the various perfusates did not have a differential influence on cochlear potentials. It appeared that perfusion rate was the critical variable with maintenance in the potentials being positively related to flow rate. This rate variable was not under strict experimental control. It is proposed that the primary role of perfusion was to remove from the cochlea toxic agents that accumulated during anaerobic metabolism. This, in turn, led to the salutary effects on cochlear potentials.

A66-80029
THE RELATION BETWEEN ENDOLYMPH AND THE ENDOCOCHLEAR POTENTIAL DURING ANOXIA.
Brian M. Johnstone (Chicago U., Dept. of Surg., Ill.)
Acta Oto-Laryngologica, vol. 60, Jul.-Aug. 1965, p. 113-120. 15 refs.
GRANTS PHS NB 00682-11 and NSF 12449 and G23,837.

The time courses of decline in endocochlear potential (E.P.) during continued anoxia are paralleled by changes in the conductance of the endolymph in such a direction as to indicate a running down of the high K, low Na perilymph. Chemical analysis of endolymph at various times during anoxia was attempted using techniques previously developed for measuring normal endolymph. While these analyses were not completely satisfactory, as possible perilymph comtamination cannot be excluded, the results were entirely consistent with the theory that the E.P. is a function of the differential ionic gradients, primarily that of K between scala media and plasma, of a similar nature to the resting membrane potentials of nerve and muscle.

A66-80030
CYTOCHEMICAL RESPONSE TO ACOUSTIC STIMULI IN THE SPIRAL GANGLION CELLS OF GUINEA PIGS.
O. Hallen, J.-E. Edstrom, and A. Hamberger (Göteborg U., Depts. of Oto-laryngol. and Histol., Sweden).
Acta Oto-Laryngologica, vol. 60, Jul.–Aug. 1965, p. 121–128. 17 refs. Grants Swedish Med. Res. Council U. 189 and U 407.

Three groups of guinea pigs have been exposed to "white" noise stimulation: 90 db. for 1 hr., 110 db. for 3 hrs. and 110 db. for 48 hrs., respectively. The animals were sacrificed immediately after the stimulation. Isolated cells from the spiral ganglion were analyzed with respect to cell volume, total dry weight, total RNA content, base composition of the RNA and cytochrome oxidase activity. The spiral ganglion cells have a volume of $3000\mu^3$. The total dry weight is 4000 $\mu\mu$g. The total amount of RNA is 33 $\mu\mu$g. The molar proportions of the purine and pyrimidine bases are: adenine 20.1%, guanine 30.6%, cytosine 27.7% and uracil 21.7%. The cytochrome oxidase activity is $1x10^{-4}\mu l\ O_2$ per hr. and cell at 37°C. In contrast to the results of earlier investigations and in spite of the greater accuracy of the methods employed no differences could be established with respect to the measured parameters between stimulated and control animals.

A66-80031
AN EXPERIMENTAL STUDY OF THE ACOUSTIC IMPEDANCE OF THE MIDDLE EAR AND ITS TRANSMISSION PROPERTIES.
Aage R. Møller (Karolinska Inst., Dept. of Physiol. II, Stockholm, Sweden).
Acta Oto-Laryngologica, vol. 60, Jul.–Aug. 1965, p. 129–149. 15 refs. Swedish Med. Res. Council supported research.

The acoustic impedance at the eardrum and the cochlear microphonic potential at constant sound pressure level at the eardrum were measured in anesthetized cats and rabbits. It was found that the inverse of the impedance (admittance) and the cochlear microphonic potential at constant sound pressure are proportional over a large frequency range. In addition, the effects of opening of the middle-ear cavities and of variation of the airpressure in the cavity, as well as of activity of the middle-ear muscles were studied. In further experiments, the impedance of the eardrum itself and of the middle ear with the cochlea disconnected was measured.

A66-80032
DEITERSIAN UNIT RESPONSE TO TILT.
Talmage G. Hiebert and Cesar Fernandez (Chicago U., Dept. of Surg., Ill.)
Acta Oto-Laryngologica, vol. 60, Jul.–Aug. 1965, p. 180–190. 15 refs. Contract AF 41(609)1479; and Grants NIH NB-1330-07, 4-K3-NB-17, and 856-03.

Recordings taken from 65 single Deitersian units showed typical resting discharges, but with two distinct types of resting frequency patterns which could be related to the depth of the cells in the nucleus: the deeper (more ventral) cells generally fired in doublets or small groups, the shallower (more dorsal) cells generally fired only in singlets. These resting patterns persisted during enhancement or suppression of frequency in response to slow changes of body position in the median and lateral planes. The possible indication of an anatomico-functional distribution within the lateral vestibular nucleus is discussed. The finding that frequency response patterns to slow changes in tilt were not consistently unidirectional is discussed in the light of the possible central integrating function on the nuclear level.

A66-80033
ANALYSIS OF THE SPONTANEOUS ELECTRIC ACTIVITY OF THE CENTRAL NERVOUS SYSTEM AND OF AN EVOKED SOMESTHETIC RESPONSE IN THE CAT DURING JET FLIGHT [ANALYSE DE L'ACTIVITE ELECTRIQUE SPONTANEE DU SYSTEME NERVEUX CENTRAL ET D'UNE REPONSE EVOQUEE SOMESTHESIQUE, CHEZ LE CHAT, LORS D'UN VOL EN FUSEE].
R. Grandpierre, G. Chatelier, and J. Ginet.
Revue de Médecine Aéronautique, vol. 4, Jan.–Fe. 1965, p. 7–11. In French.

Two awake cats with electrodes placed in the anterior and posterior *suprasylvien cortex, ventral hyppocampus, and mesencephalic reticular* formation were subjected to a rocket flight in October 1963, and an analysis was made of the animals' reactions during the different flight stages. Before take-off, the cats were kept in a dark and quiet environment and exhibited no emotional reaction. During the propulsion phase, the animals passed into *a state of extreme vigilance. During the subgravity period the physiological* parameters recorded (respiratory rhythm, electrocardiogram, electroencephalogram) revealed normal aspects. The state of vigilance decreased and a state of relaxation was reached which led to sleep. It was not possible to determine whether the animals attained the sleep state or whether the somesthetic decrease observed was directly related to the absence of gravity. However, the absence of desynchronized and rapid cortical activity indicated that the animals were not experiencing any emotional reactions. The evoked somesthetic responses appeared normal in latency, amplitude, and aspect. Vegetative reactions showed that the reentry period was the least tolerated. Unfortunately the electroencephalographic tracings could not be interpreted for this period. The cats recuperated rapidly after return to normal conditions. Included are representative graphs of the parameters studied before take-off, and of the propulsion and reentry stages.

A66-80034
ON THE APPLICATION OF PLETHYSMOGRAPHY IN THE STUDY OF RESPIRATORY EQUIPMENT [DE L'APPLICATION DE LA PLETHYSMOGRAPHIE A L'ETUDE DES EQUIPEMENTS RESPIRATOIRES].
J. Timbal, P. Varene, J. Demange, and C. Jacquemin (Centre d'Essais en Vol, Lab. de Méd. Aérospatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 13–18. 15 refs. In French.

The principle and technique of plethysmography is described and diagrammed as used to measure the mechanical characteristics of masks and head equipment of pressurized suits. Two aspects are considered: measurement of pulmonary volume, and measurement of the resistance to alveolar gas flow to the atmosphere starting from air pressure variations contained in an airtight box (plethysmograph) with the subject under various experimental conditions. The results showed that the plethysmographic method can be used with certain reservations (positive pressure) to test respiratory equipment used in aviation. It has the advantage of being able to test the subject together with the equipment. Included are representative tables of pulmonary volume and expiratory/inspiratory resistance measurements made by plethysmography for masks and helmet.

A66-80035
LIGHT ACCOMMODATION OF THE IRIS: PRESENTATION OF A MEASURING APPARATUS [L'ACCOMMODATION IRIENNE A LA LUMIERE: PRESENTATION D'UN APPAREIL DE MESURE].
André G. Corteel.
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 19–21. In French.

A description is presented of the technique and apparatus used to subjectively test the reflex of the iris to light. The apparatus consists of a dark chamber with two openings, one for the subject's eyes and the other for a motion picture camera to record ocular reactions to light. In subjects having worked for several hours and in those fatigued contraction of the iris sphincter occurs slowly. Experience with the apparatus indicated relative imprecision of determination, especially errors in reading for the very darkly tinted iris. Moreover, it is not a good indicator of ocular fatigue, although to date no other valid test for evaluating fatigue has been reported. The technique used is advantageous, however, in that it permits rapid, ambulatory analysis of the eye.

A66-80036
NEW FATIGUE AND TRAINING TEST: INDEX OF WORK POTENTIAL AND OF WORK LOAD; CARDIOTACHOMETRIC INTEGRATION COMPUTER (I.C.T.M.) [NOUVEAU TEST DE FATIGUE ET D'ENTRAINEMENT: INDICE DE POTENTIEL ET DE CHARGE DE TRAVAIL COMPUTEUR D'INTEGRATION CARDIOTACHYMETRIQUE (I.C.T.M.)].
F. Riff.
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 23–32. 14 refs. In French.

A description is presented of the cardiotachymetric integration index (ICTM) which is a new cardiovascular concept of the metabolic response regarding effort, training, or fatigue. By means of a cardiotachymetric computer-integrator, determination of the ICTM index is made and is expressed as the total number of systoles resulting from cardiac expenditure due to a definite physical effort (twenty leg bends in forty seconds with rest periods after three minutes). This expenditure is a standard of measurement of work potential or work charge. The ICTM computer permits rapid individual surveillance of physical fitness, the detection of fatigue, and its eventual summation, and is of great value when applied to civil aviation where flights of long duration and time changes present fatigue problems for aviators.

A66-80037
CLIMATE CONTROL IN SUPERSONIC TRANSPORT PLANES [LA CLIMATISATION DES AVIONS DE TRANSPORT SUPERSONIQUES].
J. Colin and Y. Houdas (Lab. de Méd. Aéro-Spatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 33–44. 32 refs. In French.

A discussion is presented on the creation of a comfortable thermal environment for the cabin of a supersonic transport aircraft. Reviewed are various environmental formulae and graphs used to determine the effective, resultant, and operative temperatures. An analytical study is presented which permits complete evaluation of temperature in terms of the metabolic production of heat, body heat loss by evaporation, and gain or loss of heat by radiation, convection, or conduction. Equations are included for the type of heat transfer, and consideration is given to the problem of hygrometry in aircraft environments.

A66-80038
ENZYMATIC INHIBITIONS AND HYPEROXIA [INHIBITIONS ENZYMATIQUES ET HYPEROXIE].
J. Fabre and G. Coudert (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 45–47. In French.

Rats were exposed to hyperoxia (96% oxygen) for three days, and normoxia for one day over a four day period. Oxygen consumption during the first two days of hyperoxia was significantly higher than that observed in normoxia. This increase was possibly related to increased muscular activity, specific dynamic action, or tissue oxidation. On the third day of hyperoxia, oxygen consumption was significantly less than that found in normoxia. Glucose metabolism and two intermediaries of Krebs cycle metabolism (pyruvate and succinate) were studied for twenty-four hours in the enzyme levels: –25% for D-glucose and succinate, and–36% for pyruvate. Animals with partial hepatectomy exhibited still lower enzyme levels during hyperoxia. It is concluded that hyperoxia inhibits enzyme mechanisms in the liver as evidenced by the phenomenon of compensatory liver hypertrophy after hepatectomy. This is also manifest in normoxia, but to a lesser degree.

A66-80039
PHYSIOLOGICAL PROBLEMS POSED BY CLIMATE CONTROL OF AN ALERTED INTERCEPTOR PLANE ON THE GROUND [PROBLEMES PHYSIOLOGIQUES POSES PAR LA CLIMATISATION D'UN AVION D'INTERCEPTION EN ALERTE AU SOL].
Yvon Houdas and Jean Colin (Centre d'Essais en Vol, Lab. de Méd. Aéro-Spatiale, Bretigny-sur-Orge (Seine-et-Oise), France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 48–51. In French.

Various tests were executed with subjects in a simulated Mirage III cockpit for an hour under temperatures ranging from –30°C. to + 60°C. Tabulated were the environmental temperatures, temperature of ventilated air, average skin temperature, and the temperature at helmet level. Ground tests were also performed in a Mirage III aircraft under moderate environmental temperature, with the subject exposed to a retractable cockpit sunshade or while wearing the general flight suit, and during high temperatures when the subject was wearing the general flight suit or a stratospheric suit. The nomograms obtained during these latter preliminary laboratory tests indicate that in the case of the stratospheric suit, climatization (meaning ventilation and protection from heat rays) was good up to + 40°C. in a relatively dry atmosphere and remained so up to 45°C. Climatization was effective with the general flight suit but limited to +35°C.

A66-80040
APPLICATIONS OF RESEARCH ON RESPIRATORY FUNCTIONS TO AVIATION PHYSIOLOGY [APPLICATIONS DE L'EXPLORATION FONCTIONNELLE RESPIRATOIRE A LA PHYSIOLOGIE AERONAUTIQUE].
Charles Jacquemin, Pierre Varene, Jean Timbal, and Jean Demange (Centre d'Essai en Vol, Lab. de Méd. Aérospatiale, Bretigny-sur-Orge, France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 52–56. 26 refs. In French.

A discussion is presented on the problems encountered by the flight surgeon in the detection and diagnosis of camouflaged or latent respiratory disorders during medical screening or periodical medical control examinations. Consideration is given to medico-legal factors, and to the attitudes of the examining physician and the aviator. An example is provided of a so-called "social handicap" whereby a test pilot of 32 years of age incurred a rib fracture with hemothorax during a car accident. After dynamic radioscopy, the subject was given various respiratory function tests (spirography, positive pressure test, stratospheric suit training, decompression and centrifuge tests) and showed no signs of functional respiratory disorders. The difficulties are stressed in cases such as this of rendering a decision of temporary inability to fly or declassification, for the personnel involved.

A66-80041
NOTE CONCERNING ANTHOCYANIN GLUCOSIDE ACTIVITY RELATED TO SCOTOPIC VISION AND MESOPIC VISUAL ACTIVITY IN NORMAL SUBJECTS [NOTE CONCERNANT L'ACTIVITE DES GLUCOSIDES D'ANTHOCYANES SUR LA VISION SCOTOPIQUE ET L'ACUITE VISUELLE MESOPIQUE DES SUJETS NORMAUX].
A. Mercier, G. Perdriel, and H. Carves (Centre de vision Nocturne de l'Armée de l'Air, Paris, France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 57, 59. In French.

Nineteen subjects, 20 years of age, with normal vision were given two tablets containing 100 gr. of anthocyanin extracts of vaccinium myrtillus (anthocyanin glucoside) twice daily. Examinations of mesopic visual acuity and adaptometry were made before the experiment and on the twenty-first day. An improvement of certain parameters of scotopic activity and mesopic visual acuity was evidenced, especially after prolonged absorption of the drug. This factor may assist personnel in flying under conditions of low illumination.

A66-80042
AVIATION SAFETY AND THE INTERNATIONAL SAFETY FOUNDATION [LA SECURITE AERONAUTIQUE ET LA FONDATION INTERNATIONALE DE SECURITE].
B. R. Stanojlovic and C. Pinet.
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 60. In French.

The International Foundation for Flight Safety was established in 1948. Its primary function is to prevent aircraft accidents, and the organization is therefore involved in studies and publications which deal with the medico-physiological selection of flight personnel, the effects of air pollution, problems of sensory illusions in pilots, loss of control in high speed flight, the various aspects of aircraft collisions at low altitude, and aircraft accident investigations. The Flight Safety Foundation incorporates the Aviation Safety and Research Center, Phoenix, Arizona, and the Cornell Guggenheim Aviation Safety Center.

A66-80043
PHYSIOLOGICAL ASPECTS OF HYPOGLYCEMIAS IN AVIATION [ASPECTS PHYSIOLOGIQUES DES HYPOGLYCEMIES EN AERONAUTIQUE].
M. Pingannaud and J. Fabre.
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 61–62. In French.

Following a brief general discussion of the symptoms, etiology, and diagnosis of hypoglycemia, examples are given of two nonfatal aircraft accidents of undetermined origin, which could possibly be attributed to the occurrence of hypoglycemia in the pilots. Mention is made of the difficulty in detecting hypoglycemia in flying personnel.

A66-80044
ON THE SUBJECT OF TOLERANCE OF A HUMAN SUBJECT IMMERSED IN COLD WATER AND HIS PROTECTION [AU SUJET DE LA TOLERANCE DE L'HOMME IMMERGE EN EAU FROIDE ET DE SA PROTECTION].
Jean Colin and Yvon Houdas (Centre d'Essais en Vol, Lab. de Méd. Aéro-Spatiale, Bretigny-sur-Orge (Seine-et-Oise), France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 63–67. 10 refs. In French.

A study is reported on cold water immersion of subjects wearing (1) a watertight anti-immersion suit over a summer flight suit in water at 17°C; (2) a watertight anti-immersion suit over a winter flight suit in water at 10°C.; and (3) a neoprene anti-immersion suit over a stratospheric flight suit in water at 5°C. Protection against the cold of men wearing these suits was good. The neoprene suit provided better protection than the classical watertight rubber aviation suit. The maximum value of the heat debt for many hours of water immersion was calculated at 110 kcal/m^{-2}/h^{-1}.

A66-80045
UTILIZATION OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASURING THE MECHANICS OF RESPIRATION [L'UTILISATION DES TECHNIQUES DE DECOMPRESSION EXPLOSIVE DANS LES MESURES DE MECHANIQUE VENTILATOIRE].
P. Varene, J. Timbal, J. DeMange, and C. Jacquemin (Centre d'Essais en Vol, Lab. de Méd. Aéro-Spatiale, Bretigny-sur-Orge (Seine-et-Oise), France).
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 68–70. 15 refs. In French.

A description is presented of the methods used for measuring pulmonary compliance and tissue resistance during explosive decompression. In one method, pulmonary positive pressure is kept permanent after decompression permitting measurement of the elastic parameters (compliance); in the other method measurement is made during the transitory phase of alveolar pressure variation permitting estimation of the dynamic parameters (tissue resistance). These methods appear to be reliable for measuring the parameters of mechanical ventilation. Included are two tables representing the results obtained with the methods using various subjects.

A66-80046
CONSIDERATIONS ON VOMITING DURING FLIGHT [CONSIDERATIONS SUR LES VOMISSEMENTS EN VOL].
L. Tabusse, R. Pannier, and G. Leguay.
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 71–75. In French.

Vomiting during flight may occur during airsickness or pseudo-airsickness. The former involves the vomiting center which receives various afferences (digestive, olfactory, visual, cortical), and pneumogastric, phrenic, and abdominal muscle nerve efferences. Rare among passengers due to the progress of commerical aviation, vomiting due to airsickness frequently occurs in student pilots. However, the pilots adapt rapidly to flight conditions and the vomiting phenomena disappear. Fortunately it does not occur frequently in patients with severe wounds during aeromedical evacuation. Vomiting in pseudo-airsickness results from local phenomena arising from (1) the inert force of gastric liquid during negative, radial acceleration as experienced by fighter pilots, and from (2) the increase of gas in the digestive tube of patients with an occlusive or subocclusive condition (especially

anuric). Included are eight case histories representative of vomiting during flight occurring in fighter pilots, flight surgeon, student pilot, and patients.

A66-80047
SIMULATION ON THE CENTRIFUGE OF A TAILSPIN OF THE MIRAGE III [SIMULATION SUR CENTRIFUGEUSE DE LA VRILLE DU MIRAGE III].
R. Auffret and H. Seris.
Revue de Médecine Aéronautique, vol. 4, Jan.–Feb. 1965, p. 76–77. In French.

Physiological studies were made on subjects in a Martin-Baker AM.4 ejection seat equipped with a parachute harness ensemble of the Etendard IV or Mirage III type cockpit on the arm of a centrifuge. The results indicate that insufficient exterior cockpit visibility always produced a tailspin under night conditions or during flight without visibility. At 2 g, the subjects had the impression of being suspended by the back; at 4 g it was impossible to keep the head up for more than 10–15 seconds; at 5 g protection of the hands, forearm and legs was necessary to prevent pain and petechias; and at 7.5 g thoracolumbar pains occurred. Throughout the test, respiratory rhythm was increased, and no electrocardiographic abnormalities occurred. Body action necessary to bring the aircraft out of a tailspin was possible only up to 4.5 g. Reservation is expressed for a favorable ejection in the configuration studied. The Martin-Baker harness of the Mirage III caused marked displacement of the pilot forward as seen by TV and motion picture analyses of the results. Simulation of this type permits pilots to test their reactions and to know their limitations and equipment prior to actual test flight.

A66-80048
EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY.
Samuel Sutton, Margery Braren, Joseph Zubin (Columbia U.; and N.Y. State Dept. of Mental Hyg., Biometrics Res., New York), and E. R. John (N. Y. Med. Coll., Dept. of Psychiat., Brain Res. Labs., New York).
Science, vol. 150, Nov. 26, 1965, p. 1187–1188.
Grants NIMH MH 07776 (SS) and MH 08579 (ERJ).

The average evoked-potential waveforms to sound and light stimuli recorded from scalp in awake human subjects show differences as a function of the subject's degree of uncertainty with respect to the sensory modality of the stimulus to be presented. Differences are also found n the evoked potential as a function of whether or not the sensory modality of the stimulus was anticipated correctly. The major waveform alteration is in the amplitude of a positive-going component which reaches peak amplitude at about 300 milliseconds.

A66-80049
ANALYSIS OF CRAINOCEREBRAL INJURIES IN FLIGHT PERSONNEL [ANALIZA KRANIOCEREBRALNIH POVREDA U LETACA].
Nikola Gazivoda.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 628–631. 10 refs. In Serbo-Croatian.

A study on craniocerebral injuries was carried out by analyzing data collected from air force personnel over a period of 12 years. Only four cases were severe, complicated by prolonged unconsciousness, coma, acute psychological symptoms, or posttraumatic mental deviations. No direct correlations could be established between severeness of injuries and later mental reactions or between duration of coma and other pathological conditions. While neurotic symptoms after head injuries were less common in pilots well adjusted to their duties, they were observed frequently in less well adapted subjects. Crainocerebral injuries do not preclude later flight duty unless they are followed by neurotic posttraumatic symptoms or organic neurological sequelae that interfere with normal flight operations.

A66-80050
ANALYSIS OF SYSTEMATIC EXAMINATION OF AVIATION MECHANICS [ANALIZA SISTEMATSKIH PREGLEDA AVIO-MEHANICARA].
Zoran Đorđević.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 632–634. In Serbo-Croatian.

Physical examinations of 315 aviation mechanics led to the following basic conclusions: (1) A great number of cases manifested hearing loss that could be attributed to working conditions. (2) A high percentage of refraction anomalies were observed in ophthalmological examinations. These findings are significant since the work of aviation mechanics demands good visual control in the handling of delicate and sensitive instruments. (3) A considerably high percentage of chronical gastric diseases (gastritis, duodenal ulcers, etc.) were discovered. The causative factors of the latter are discussed. (4) Toxicological examinations showed a small incidence rate of symptoms even if work with toxic substances was involved. This could be attributed to the fact that work was performed in large, well ventilated hangars.

A66-80051
"PILOT ERROR" AND "HUMAN FACTOR" IN AIRCRAFT ACCIDENTS [UDEO "GRESKE PILOTA" U "LJUDSKOM FAKTORU" PRI VAZDUHOPLOVNIM UDESIMA].
Alfred Najfeld.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 635–640. 6 refs. In Serbo-Croatian.

The immense responsibility the pilot carries in view of the growing demands put upon him by technical developments and increasingly sophisticated operational requirements make continuous psychological observation and examination mandatory. It would be unrealistic to deny that human capabilities are limited, particularly with regard to high-speed controls and simultaneous monitoring of diverse information inputs. It is difficult, however, to establish psychological tolerance limits. In view of the increased technological complexity of airplane flight, incidents of pilot error have to be judged more understandingly than heretofore and put in their right perspective. Further development of airplane systems must take human limitations into account.

A66-80052
ACCIDENT PRONENESS IN AVIATION AS A PSYCHOLOGICAL PROBLEM [SKLONOST KA UDESIMA U VAZDUHOPLOVSTVU KAO PSIHOLOSKI PROBLEM].
Stojan Cmelić.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 641–646. 8 refs. In Serbo-Croatian.

After an analysis of the underlying factors of accident proneness in piloting, the following conclusions are reached: (1) Accident proneness is not a unified psychological phenomenon but a conglomeration of various psychological factors, some constant some transitory. (2) Pilots may experience psychological trauma after suffering an accident due to technical failure. (3) Not every accident, however, is a traumatic experience; in certain types of personality a minor accident may result in greater preparedness in future accident situations. (4) So far it has been found extremely difficult to predict accident proneness in pilots. (5) In defining a pilot's personality one has to consider the whole picture, i.e. compensatory factors with the personality deficiencies. (6) However, accident proneness is a factor that should be taken into consideration in the selection of aviation personnel. Minimum standards of intelligence, of psychomotor performance capability, and of emotional stability should be established and observed. Pilots with a history of accidents should be given special training and psychotherapy.

A66-80053
DEPTH PSYCHOLOGICAL ASPECTS OF MOTIVATION FOR FLYING [DUBINSKOPSIHOLSKI ASPEKTI MOTIVACIJE ZA VAZDUHOPLOVSTVOM].
Ivan Milaković.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 647–652. 7 refs. In Serbo-Croatian.

Motivational factors in pilots are interpreted in terms of depth-psychological mechanisms, and two basic roots are identified—(a) an early infantile anal and sadistic, and (b) later puberty phase. The total personality picture is a composite of these as well as various environmental factors. They should be taken into consideration in the evaluation of the person's psychological stress tolerance under flying conditions. Personality deviations in pilots are discussed, and a hypothesis is formulated that there exists a latency phase preceding a psychological crisis, attributable to the fact that basic drive tendencies have not been fulfilled. Conditions under which a crisis may develop are described and modes of prevention indicated.

A66-80054
DRUGS THE FLIGHT SURGEON SHOULD BE CONCERNED ABOUT [MEDIKAMENTI O KOJIMA TREBA DA VODI RACUNA LETACKI LEKAR].
Stevan Petrović.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 653–657. In Serbo-Croatian.

The use of drugs by pilots and aviation personnel poses no problems provided correct doses are prescribed on the basis of reliable diagnoses and the prescriptions are meticulously followed. However, in the majority of cases, the fact that a pilot needs medication is per se an indication that the pilot's fitness is impaired and he should be suspended from flight duty. In view of the fact that the flight surgeon is in no position to control correct administration of drugs, it is imperative that he provides the pilot with clear and correct instructions regarding their use. Under no circumstances should a pilot be allowed to operate an airplane under the influence of drugs which impair his psychological functions and reactions. Pilots should be periodically briefed on the hazards of drugs.

A66-80055
PROGNOSTICAL VALIDITY OF PSYCHOLOGICAL INSTRUMENTS IN SELECTION OF FLIGHT PERSONNEL [PROGNOSTICKA VALJANOST PSIHOLOSKIH INSTRUMENATA ZA SELEKCIJU LETACA].
Ranko Popović.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 605–609. 20 refs. In Serbo-Croatian.

In order to determine the prognostic validity of psychological instruments for pilot selection by subjective evaluation, the author examined 43 student pilots. The scale for evaluation of success in each variable consists of four categories, three for success and one for failure. Examinations have shown that the average success of examined subjects in elements of flying piston engine aircraft is distributed from 3.11 to 4.33 with a medium value of 3.88 and mean dispersion of 0.49. The average success in flying jet aircraft has been 3.46 with a deviation of 0.39.

A66-80056
EFFECT OF THE PRESSURE SUIT ON THE CARDIOVASCULAR SYSTEM [DELOVANJE ODELA SA NATPRITISKOM NA KARDIOVASKULARNI SISTEM].
Aleksandar Radović, Rudi Debijadi, and Jovan Davidović.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 610–615. 13 refs. In Serbo-Croatian.

The cardiovascular adaptation of pilots, when breathing in pressure suits, was studied. All pilots examined were divided into three groups. The first group included pilots breathing at sea level pressure 100% O_2 in partial pressure suits pressurized to 800–2,000 mm./H_2O pressure. The second group, also in partial pressure suits, were exposed to simulated altitudes up to 16,000 m. at corresponding overpressure, while the third group was re-exposed to an altitude of 12,500 m. using the oxygen regulator and mask. It was found that the pulse rate is growing at increasing pressure; but in the second and third group a significant increase was observed soon after beginning of pressure breathing. Some pilots responded to increased pressure by bradycardia and one by collapse. There was a correlation between physical condition and degree of pressure tolerance.

A66-80057
ROLE OF SPEECH AUDIOMETRY IN THE EXAMINATION OF HEARING LOSS IN FLIGHT PERSONNEL [ULOGA GOVORNE AUDIOMETRIJE PRI ISPITIVANJU LEZIJA SLUHA U LETACA].
Antun Risavi, Krunoslava Drakulić, and Radivoje Mihajlović.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 616–620. 6 refs. In Serbo-Croatian.

In 29 pilots with severe hearing lesions, tonal-audiogram speech audiometry was carried out in order to prove how the pilots are using residual hearing. The test showed disagreement between tonal audiometric findings and hearing loss. It was observed that the pilots used their residual hearing capability very well. Because of that, the flying licenses were not taken away from this group of examinees.

A66-80058
OBSERVATIONS ON AN ATTEMPT OF TREATMENT OF CEREBRAL EDEMA BY EXPOSURE TO SIMULATED ALTITUDE [PRILOG POKUSAJU TERAPIJE EDEMA MOZGA FIKTIVNOM VISINOM].
R. Debijadi, N. Dekleva, A. Radović, J. Davidović, and V. Doković.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 621–624. 20 refs. In Serbo-Croatian.

Protracted traumatic cerebral edema in dogs (2 hours after mechanical trauma) disappeared in the course of 20 min. during exposure to a simulated altitude of 6,000 m. in the climatic pressure chamber. The disappearance of manifested traumatic cerebral edema during altitude exposure is ascribed to the physical effects of barometric depression while the animals were breathing 100% oxygen. Cerebral edema was determined macroscopically and microscopically. After altitude exposure, the histological halo characteristics for cerebral edema, were scarcely seen. Besides, changes of venous pressure in the sagittal sinus were observed, and it was noted that venous pressure was increasing during development of cerebral edema and decreasing significantly during exposure to altitude. At the same time ECG and EEG changes were recorded.

A66-80059
EFFECTS OF NOISE ON RESISTANCE TO ACUTE HYPOXIA [UTICAJ BUKE NA OTPORNOST PREMA AKUTNOJ HIPOKSIJI].
Jovan Davidović, Rudi Debijadi, Stojanka Elčić, and Vukosava Davidović.
Vojnosanitetski Pregled, vol. 22, Oct. 1965, p. 625–627. In Serbo-Croatian.

Experiments were carried out on adult laboratory rats. Noise intensity was 115–120 db., frequency varied between 800 and 1100 c.p.s. The animals were exposed to such intensity for one hour daily for 6 consecutive days in one group and in another for only one hour on the whole. The average oxygen consumption increased significantly under the influence of noise as compared to the controls. However, the total catecholamine concentration in the adrenals was decreased to a greater extent when the duration of the noise exposure was longer. Previous exposure of animals to intensive noise also significantly decreased resistance to acute hypoxia equivalent to an altitude of 12,000 m. in the low-pressure chamber.

A66-80060
LIPOPROTEIN LIPID TRANSPORT BY LIVERS FROM NORMAL AND CCl_4-POISONED ANIMALS.
Murray Heimberg, Ira Weinstein, Guinn Dishmon, and Melvin Fried (Vanderbilt U., School of Med., Dept. of Pharmacol., Nashville, Tenn.; and Fla. U., School of Med., Dept. of Biochem., Gainesville).
American Journal of Physiology, vol. 209, Nov. 1965, p. 1053–1060. 36 refs.
Grants PHS 1 ROI OH 00117-01, AM 01677-06, AM 02457-04; Am. Heart Assoc. 61 G97; and Am. Cancer Soc. IN 25C.

Triglyceride release by livers isolated from normal fed animals has been shown previously to be stimulated by the addition of palmitate to the perfusate. It may be concluded from the data reported herein that the output of cholesterol and phospholipid into the density (d) < 1.006 lipoprotein class is proportional to release of triglyceride into this fraction. Triglyceride, cholesterol and phospholipid may be secreted in constant proportion in order to maintain a physical-chemical stability and solubility of the very low density lipoprotein whose primary function is transport of triglyceride from liver to extrahepatic tissues. CCl_4 which inhibits triglyceride release by the liver, also inhibits output of cholesterol and phospholipid into the d<1.006 lipoprotein. Release of cholesterol into the d < 1.063 lipoprotein is not clearly related to nonesterified fatty acid levels in the medium, to triglyceride release by the liver, or to other lipids present in this fraction. The serum lipoprotein class containing the largest initial concentration of any lipid is not necessarily identical with the fraction having the major net hepatic release of that lipid. Thus, each lipoprotein class released may have specific and different lipid carrier functions.

A66-80061
INFLUENCE OF PARTIAL IMMERSION AND EXERCISE ON LIPID METABOLISM IN THE RAT.
C. C. Kratzing (Queensland U., Dept. of Physiol., Brisbane, Australia).
American Journal of Physiology, vol. 209, Oct. 1965, p. 781–784. 24 refs.
Natl. Health and Med. Res. Council, Australia supported research.

Young rats kept on a choline-deficient diet were forced to swim 2 1/2 or 5 hr. daily for 3 weeks in water at 18 or 27–30°C. Livers from rats which swam the longer time had a total lipid and liver cholesterol content similar to that of choline-supplemented rats. The duration of swimming affected the extent to which total lipid was lowered. Factors other than exercise were involved since rats which stood in water for 2 1/2 hr. had hepatic lipid and cholesterol values comparable with those which swam 2 1/2 hr.

A66-80062
INVESTIGATIONS ON THE FREQUENCY OF HEARING DAMAGE INFLICTED BY SUDDEN LOUD NOISE DURING SERVICE IN THE ARMED FORCES [UNTERSUCHUNGEN UBER DIE HAUFIGKEIT KNALLBEDINGTER OHRSCHADEN WAHREND DER DIENSTZEIT BEI DER BUNDESWEHR].
V. Czech and R. Schroer (Bundeswehrlazarett, Giessen, West Germany).
Wehrmedizinische Monatsschrift, vol. 9, Apr. 1965, p. 2–4. In German.

In addition to hearing damage from a single exposure to a sudden loud noise, the cumulative effect of long term exposure to blast trauma of lesser intensity (rifle fire, machine gun) may lead to permanent hearing loss of the inner ear. Pre-existing perceptual impairment is a pre-disposing factor. Audiograms were made of a group of 581 army recruits at the time of induction, repeated with 503 of the same group after basic training, and repeated once more with 148 soldiers of the original group at the end of their tour of duty. After basic training, 27.5% of the group with pre-existing perceptual impairment of the inner ear type had further deterioration, while only 6.9% of the normal group exhibited similar hearing loss. Of the group retested at the end of their tour of duty, 18.2% had suffered a hearing loss.

A66-80063
ON MEDICAL METHODS FOR REDUCTION OF RADIATION DAMAGE IN THE ORGANISM [UBER MEDIZINISCHE MOGLICHKEITEN, DIE STRAHLENWIRKUNG IM KORPER HERABZUSETZEN].
H. Dinkloh.
Wehrmedizinische Monatsschrift, vol. 9, Apr. 1965, p. 8–11. In German.

The biological effects of ionizing radiation are dependent in addition to the absorbed energy also on the time and manner of exposure, i.e. whether the total dose is administered all at once or fractionated. Pathophysiological changes in the human body after radiation exposure are described. Next to organ-specific sensitivity, the type of radiation used determines the severity of biological injury. The first therapeutic efforts consisted of blood transfusions in cases of radiation sickness, along the lines of substitution therapy. Based on the premise, that irradiation of water releases free radical and hydrogen peroxide, the treatment has been aimed at experimental inhibition of chemical

oxidation. Pre-exposure administration of cysteine in animal experiments has resulted in a high survival rate.

A66-80064
CLINICAL CONSIDERATIONS REGARDING THE PROBLEM OF ACUTE CARDIAC DEATH AND HEAT STRESS IN YOUNG SOLDIERS [KLINISCHE UBERLEGUNGEN ZUM PROBLEM DES AKUTEN HERZTODES UND DER HITZESCHADEN BEI JUNGEN SOLDATEN].
H. W. Bansi (Allgem. Krankenhaus St. Georg, I. Inn. Abt., Hamburg, West Germany).
Wehrmedizin, vol. 3, Feb. 1965, p. 1-8. 9 refs. In German.

Endomyocarditis constitutes one of the causes in the sudden death of young soldiers after physical exertion. It may arise from a minor infection. Complaints of heart palpitation and tachycardia in the morning are early symptoms which require a follow-up cardiovascular examination. Blood cholesterol determination should be carried out if there are signs suggestive of hypercholesteremia which may be associated with early atherosclerosis (lipoxanthomatosis, arcus senilis, positive family history). Heat disturbances tend to occur in weather conditions with high humidity. Poor development of sweat glands and psychological factors also contribute. Pathologically the event is characterized by hypertonic dehydration through the loss of hypotonic fluid (sweat). Sudden fall in blood pressure is a serious sign of impending heat stroke with danger of anuria due to acute tubular atrophy and acute liver atrophy. Therapeutic measures are described.

A66-80065
STUDIES CONCERNING THE PREVENTION OF A BAROTRAUMA (BAROTITIS) BY LOCAL APPLICATION OF DECONGESTANTS FOR THE MUCOSA OF THE NOSE [UNTERSUCHUNGEN ZUR VERMEIDUNG EINES BAROTRAUMAS (BAROTITIS) DURCH LOCALE ANWENDUNG VON NASENSCHLEIMHAUTABSCHWELLERN].
H. Linde (Memmingen, Fliegerhorst, Dienststelle Fliegerarzt, West Germany), H. Hartmann (Arztliche Forschungsstelle für Caissonkrankh., Bad Godesberg, West Germany), H. P. Brauer (Bundeswehrlazarett, HNO-fachärztliche Untersuchungsstelle, Kiel-Kronshagen, West Germany).
Wehrmedizin, vol. 3, Jun. 1965, p. 94-101. In German.

Anatomy and physiology of the eardrum and the eustachian tube are discussed in relation to causes of barotitis. Results are reported of the administration of "Dexa-Rhinospray" and "Rhinospray" in decompression chamber workers, and marine divers, who often require rhinologics before they are fit for work. This is followed by reports on tubal patency by means of Valsalva's test after administration of above rhinologics in persons taking a physical examination for service in the Navy as divers, submarine personnel, or combat swimmers. Both decongestants can be recommended. They show a rapid and long-term action without side-effects. The instantaneous action is caused by the imidazoline content, the prolonged therapeutical effect results from the corticosteroid component due to its antiphlogistic effect. A particular advantage of Dexa-Rhinospray is the fact that the spray container may be exposed to pressure loss up to an altitude of 15 kilometers without bursting.

A66-80066
THE ASSESSMENT OF THE PHYSICAL POTENTIAL BY MEANS OF INDICES [*DIE BEURTEILUNG DER LEISTUNGSFAHIGKEIT MIT HILFE VON INDICES*].
K. Burkhart and H. W. Kirchhoff (Flugmed. Inst. der Luftwaffe, Furstenfeldbruck, West Germany).
Wehrmedizin, vol. 3, Aug. 1965, p. 107-118. 6 refs. In German.

Three types of indices of physical capacity are compared on the basis of data from an experimental group of 100 subjects from three distinct occupational groups (manual laborers, soldiers and office workers). The indices considered were: (1) Hettinger-Rohdal's Performance Index derived from a step exercise test with registration of pulse rate, and systolic blood pressure at rest and after exercise, (2) E. A. Miller's Performance Pulse Index based on a progressive ergometric exercise with a proportional increase in pulse rate, and (3) Burkhart's Performance Index derived from the course of the amplitudes of pulse and systolic and diastolic pressures, and the length of adaptation to "steady state" values. The last index was found to yield three distinct maxima, one for each occupational group, the soldiers with the best number and the office workers with the worst index number. Burkhart's method of deriving an index is the more detailed one since it is based on a larger number of criteria. A slight positive correlation was obtained between body weight and index, but none with age.

A66-80067
ELECTROCARDIOGRAPHIC FIELD EXAMINATIONS (METHODS, PRACTICAL PROCEDURE, EVALUATION) [ELEKTROKARDIOGRAPHISCHE REIHENUNTERSUCHUNGEN (METHODIK, PRAKTISCHE DURCHFUHRUNG, BEWERTUNG)].
Karl Wagner (Landesversicherungsanstalt Schleswig-Holstein, Sozialmed. Klin., Lübeck, West Germany).
Wehrmedizin, vol. 3, Aug. 1965, p. 119-128.

The author describes a personally developed method for electrocardiographic serial examinations. By means of a direct multirecorder and special electrodes which may be applied rapidly, this method permits the recording of 120 electrocardiograms with 12 simultaneously recorded leads in one hour. The personnel required consists of one or two physicians with special training, one medico-technical assistant, and 6 helpers instructed according to the circumstances. Suspect findings are determined during the examination process and, together with the person examined, are referred to an experienced internist for special examination. The problems of the method are critically dealt with. In conclusion, the author points out the value and practical significance of this examination method from personal experience.

A66-80068
RAPID AND RELIABLE DETERMINATION OF THE OXYGEN CONTENT IN BLOOD BY MEANS OF GAS CHROMATOGRAPHY [RASCHE UND ZUVERLASSIGE BESTIMMUNG DES SAUERSTOFFGEHALTES IM BLUT MITTELS GASCHROMATOGRAPHIE].
C. Albers and L. E. Farhi (N. Y. State U., Dept. of Physiol., Buffalo).
Zeitschrift für die gesamte experimentelle Medizin, vol. 139, 1965, p. 485-505. 19 refs. In German.

A gas-chromatographic method for the determination of blood oxygen is described. Sample size was 0.5-0.1 ml., reproducibility + 0.1 vol.-%, duration of a single analysis 5 min. Equilibration with atmospheric air yielded good agreement between determinations of the oxygen capacity by the gasometric technique and by photometric determination of hemoglobin content.

A66-80069
ON PROBLEMS OF ACCLIMATIZATION DURING ALTITUDE TRAINING [UBER PROBLEME DER AKKLIMATISATION BEI HOHENTRAINING].
H. Wuschech and H. Cobet (Charite, I. Med. Universitätsklin., Berlin, East Germany).
Das deutsche Gesundheitswesen, vol. 19, Nov. 19, 1964, p. 2199-2203. 15 refs. In German.

Eight trained male athletes underwent rigorous mountain training at 2000 to 3000 m. altitude in Obergurgl. Capacity for physical work was evaluated by ergometric tests before and after altitude training. All physiological parameters (oxygen pulse, respiratory minute volume, oxygen uptake, respiratory equivalent) show a distinct improvement after altitude training. A high training load adjusted to the individual athlete is recommended for the first few days at altitude. On the 6th and 7th day the training load should be lighter since there is a shift toward a sympathetic nervous influence on the cardiovascular system. Symptoms of overtraining or of insufficient acclimatization were not observed. Daily checking of pulse and blood pressure is believed to be sufficient for early diagnosis of overtraining.

A66-80070
IMPULSE DISTRIBUTION OF THE CONTINUOUS ACTIVITY OF SINGLE FIBERS ON N. OPTICUS. INFLUENCES OF LIGHT, ISCHEMIA, STRYCHNINE AND BARBITURATE [DIE IMPULSVERTEILUNG DER DAUERAKTIVITAT VON EINZELFASERN DES N. OPTICUS. EINFLUSSE VON LICHT, ISCHAMIE, STRYCHNIN UND BARBITURAT].
W.-D. Heiss and H. Bornschein (Vienna U., Physiol. Inst. and Inst. für allgem. und vergleichende Physiol., Austria).
Pflügers Archiv für die gesamte Physiologie, vol. 286, 1965, p. 1-18. 21 refs.

Activity of 80 single fibers of the optic nerve was recorded in seven cats. Interspike interval histograms were computed for groups of 500 spikes. The spontaneous activity of 62 neurons recorded in darkness ranged from 1.4/sec. to 70/sec. (mean 35.8/sec.). Diffuse illumination of the retina produced significant changes in 15 neurons: the interval histogram was flattened and widened, the mean interval shifted to higher values. In retinal ischemia (17 neurons) the survival time varied between 5 and 90 sec. In some neurons the activity disappeared gradually, in others there was a sudden breakdown after an initial increase. Intravenous injection of 1 mg. strychnine resulted in similar constriction as during and/or after ischemia. Intravenous injection of 25 mg. sodium pentathol reduced or even extinguished spontaneous activity. Five neurons showed multimodal histograms. The data are discussed from the viewpoint, whether or not the regulation of activity observed under abnormal conditions may be due to uncovering of the specific rhythm of the neuron. Inhibitory phases in response to light are preserved after administration of strychnine.

A66-80071
THE BEHAVIOR OF HEART RATE IN THE PRE-PRESSURE, PRESSURE AND POST-PRESSURE PHASE DURING THE VALSALVA EXPERIMENT: INVESTIGATIONS OF 817 MALE AND FEMALE SUBJECTS IN THE AGE RANGE OF 5 to 23 YEARS [DAS VERHALTEN DER HERZSCHLAGFREQUENZ IN DER PRAPRESSORISCHEN, PRESSORISCHEN UND POSTPRESSORISCHEN PHASE BEIM VALSALVASCHEN VERSUCH].
F. Klimt (Stadtische Klin., I. Kinderklin; and Deut. Adad. der Wiss., Arbeitsstelle für Infektionskrankh., Berlin, East Germany).
Das Deutsche Gesundheitswesen, vol. 19, Apr. 23, 1964, p. 749-759. In German.

Heart rate was measured at rest, after forced respiration, during the pressure (Valsalva experiment), and in the recovery phase. Seven hundred and one children and adolescents, and 116 young adults, ages ranging from 18 to 23 years served as subjects. Mean values and standard deviations for heart rate during the above conditions have been presented in relation to body height, body weight, age, and sex.

A66-80072
RETINAL RESPONSES TO ISCHEMIA AND HYPEROXIA.
Banks Anderson (Duke U. Med. Center, Div. of Ophthalmol., Dept. of Surg., Durham, N. C.)
(Med. Soc. of the State of N. C., Sect. of Ophthalmol., Charlotte, May 4, 1965).
North Carolina Medical Journal, vol. 26, Oct. 1965, p. 446-449. 17 refs.

Retinal function is extremely sensitive to ischemia-even more sensitive than cerebral function. Retinal cells, on the other hand, appear to be relatively resistant to ischemic cell death as compared with those of the brain. Full return of function may occur after as long as 22 minutes of occlusion of both the choroidal and retinal circulations. The retinal response to hyperoxia is primarily vascular. Vasoconstriction in the adult retina and vasoconstriction and vaso-obliteration in the immature retina are the usual primary responses. The prevalence of retrolental fibroplasia in the immature human retina and the toxic effects of hyperoxia on mature animal retinas suggest that it may be possible to produce irreversible retinal damage in adult humans by prolonged and severe hyperoxygenation.

A66-80073
PSYCHOTROPIC EFFECTS OF CAFFEINE IN MAN. II. ALERTNESS, PSYCHOMOTOR COORDINATION, AND MOOD.
Avram Goldstein, Sophia Kaizer, and Richard Warren (Stanford U. School of Med., Dept. of Pharmacol., Palo Alto, Calif.)
Journal of Pharmacology and Experimental Therapeutics, vol. 150, Oct. 1965, p. 146-151. 7 refs.
Gen. Foods Corp. supported research.

Experiments were conducted with 20 subjects on 9 evenings to study the effects of caffeine (150 mg. and 300 mg.) as compared with placebo upon objective tests of alertness and psychomotor coordination. Simultaneously, mood was assessed by means of a self-rating inventory. The same 20 subjects had also participated in an earlier study on the effects of caffeine upon sleep. Caffeine had no demonstrable effect upon either objectively measured performance although at the same time it made the subjects feel more alert and physically active. In some subjects caffeine caused a feeling of nervousness rather than of alertness. There was a strong positive association between a subject's sensitivity to a mood-elevating effect of caffeine in this experiment and his sensitivity to the wakefulness caused by the drug in earlier experiments on sleep.

A66-80074
NEED FOR STIMULATION AS A SOURCE OF STRESS RESPONSE TO PERCEPTUAL ISOLATION.
Marvin Zuckerman (Albert Einstein Med. Center, Div. Endocrinol. and Reprod., Res. Labs., Philadelphia, Pa.), and Merry Marquit Haber (Adelphi Coll., Garden City, N. Y.)
Journal of Abnormal Psychology, vol. 70, Oct. 1965, p. 371-377. 29 refs.
Grant PHS MH-07926-01.

The study was undertaken to see if subjects who had shown a greater stress reaction in terms of galvanic skin response (GSR) to perceptual isolation could be shown to have a greater need for stimulation than those who were not so stressed by isolation. Subjects selected on the basis of their high or low GSR reactions to the prior isolation experiment were tested in a second 3-hr. perceptual isolation situation, only this time they were given the opportunity to make an operant response which would produce random visual or auditory stimulation depending on their choice. These previously stressed by isolation made significantly more responses for visual and auditory reinforcement than the low stress group. All subjects responded more for visual than for auditory reinforcement.

A66-80075
MIGRAINE-LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT.
Banks Anderson, Albert Heyman, Robert E. Whalen, and Herbert A. Saltzman (Duke U. Med. Center, Divs. of Ophthalmol., Neurol., and Med., Hyperbaric Unit, Durham, N. C.)
Neurology, vol. 15, Nov. 1965, p. 1035-1040. 11 refs.
Grants PHS HE-07896, HE-07563, and NB-00669.

A migraine-like syndrome has been observed in four medical personnel, immediately after returning to normal atmospheric pressures from simulated depths of 68 to 135 ft. below sea level in a hyperbaric chamber. Each of the subjects developed scintillating scotomas, sometimes followed by headaches, paresthesias, and focal electroencephalographic abnormalities corresponding to the appropriate cerebral hemisphere. Comparative symptoms due to changes in barometric pressure have been observed in high altitude flight and upon descent. The mechanisms underlying the cerebrovascular phenomena in these subjects are unknown, but factors other than intravascular bubble formation seem likely.

A66-80076
STUDIES IN LEAD POISONING: COMPARISON BETWEEN DIFFERENT LABORATORY TESTS.
Kim Cramér and Stig Selander (Sahlgrenska Sjukhuset, Med. Serv. I, Goteborg, Sweden).
British Journal of Industrial Medicine, vol. 22, Oct. 1965, p. 311-314. 14 refs.

The urinary output of δ-aminolaevulic acid (ALA), coproporphyrins, and lead in 15 lead-intoxicated workers was determined and correlated with the degree of intoxication. Raised levels of ALA in the urine show the best agreement with clinical evidence of intoxication. In addition these values were correlated with the amount of lead excreted after treatment with a total dosage of 9 g. penicillamine. Weak correlations were found between therapeutically excreted lead and initial values for lead and coproporphyrin in urine. In contrast the initial values for ALA correlate very closely ($P < 0.001$). It is concluded that determination of the output of ALA are to be preferred in the evaluation of lead intoxication and that they point directly to the amount of metabolically active lead in the organism.

A66-80077
FURTHER OBSERVATIONS ON THE MECHANICAL FRAGILITY OF THE RED CELL IN LEAD POISONING.
A. J. de Kretser and H. A. Waldron (Vauxhall Motors Ltd., Med. Dept., Dunstable and Luton, Great Britain).
British Journal of Industrial Medicine, vol. 22, Oct. 1965, p. 315-320. 8 refs.

Further experiments on the effects of lead on the mechanical fragility of the red cell confirm previous findings, that lead does not increase the mechanical fragility index of the red cell at the blood lead levels found in clinical plumbism. Above these levels lead does increase the mechanical fragility index, reaching its maximum effect at about 50 μg. of lead/ml. blood.

A66-80078
EFFECT OF CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN ON HYPERVENTILATION BUILD-UP IN THE ELECTROENCEPHALOGRAM OF VOLUNTEER SUBJECTS.
John R. Whittier and Andreas Dhrymiotis (Creedmoor State Hosp. and Creedmoor Inst. for Psychobiol. Studies, Jamaica, N. Y.)
Angiology, vol. 16, Oct. 1965, p. 575-579.
Mead Johnson and Co., U. S. Vitamin and Pharm. Corp., and Ives-Cameron Co. supported research.

By the oral route, in acute dosage, the vasorelaxants cyclandelate, isoxsuprine and nylidrin prevented cerebral vasoconstruction, manifested by blocking of the electroencephalogram build-up response to hyperventilation in human volunteers. Nylidrin and isoxsuprine were first and second by order of effectiveness in dosage of twice tablet strength (8 of 10 subjects blocked at 12 mg. and 6 of 10 blocked at 20 mg., respectively); cyclandelate was much less effective (1 subject blocked at 400 mg.). All three drugs were similar in onset time and duration of effect at twice tablet strength (30 or 60 min.). Given intramuscularly 10 mg. dosage nylidrin and isoxsuprine blocked the build-up in all subjects. Onset of effect tended to be earlier for isoxsuprine, and duration of the effect longer and less variable. Side effects, especially palpitation were more frequent with nylidrin in the dosage employed.

A66-80079
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA.
Nicholas P. DePasquale, George E. Burch, and Albert L. Hyman (Tulane U. School of Med., Dept. of Med., New Orleans, La.)
American Heart Journal, vol. 70, Oct. 1965, p. 486-493. 11 refs.
PHS supported research.

The studies were performed to learn the responses of the pulmonary circulation, particularly the pulmonary veins, in intact dogs to immersion in water-baths of various temperatures. The most significant aspect of these studies is the observation that the pulmonary venous responses to immersion in tepid, hot and cold water are similar to those which would be predicted from knowledge of the behavior of the peripheral veins. Little information on pulmonary venomotor activity is available for intact animals. However, changes in the distensibility characteristics of the pulmonary veins in response to both physiologic and pathologic stimuli must be taken into consideration, when appropriate, in the interpretation of hemodynamic phenomena.

A66-80080
EVALUATION OF DEVICES FOR PERSONAL PROTECTION OF HEARING AGAINST NOISE WITH REGARD TO THEIR FUNCTIONAL EFFICIENCY [HODNOCENI PROSTREDKU OSOBNI OCHRANY SLUCHU PROTI KLUKU Z HLEDISKA JEJICH FUNKCNI UCINNOSTI].

Věra Pšeničková, and Jiří Stikar (ROH, Res. Inst. for Occupational Safety, Prague, Czechoslovakia).
Pracovní Lékařství, vol. 17, Sep. 1965, p. 313–317. In Czech.

Damping of noise by various ear plugs produced in Czechoslovakia, used as individual protection, were assessed by the threshold value of the intensity of noise, which still could be perceived when using the ear plug. The ear plugs (made from a mixture of paraffin, ceresin, vaseline and barium sulphate) and resonance protectors introduced into the auditory meatus were more effective than earphone protectors. In very loud noises, where the importance of bone conductivity is greater, the construction of other types of protectors must be considered.

A66-80081
DEATH IN AN ATMOSPHERE WITH A LOW OXYGEN CONTENT [UMRTI V ATMOSFERE S NEDOSTATKEM KYSLIKU].
Alexandr Fuchs.
(Czech Med. Soc. J. Ev. Purkyne, Occupational Med. Sec., Seminar, Jan. 29, 1964, Prague, Czechoslovakia).
Pracovní Lékařství, vol. 17, Sep. 1965, p. 318–321. 8 refs. In Czech.

The author describes several cases of working accidents in an atmosphere with insufficient oxygen content, which in most instances proved fatal and which were due to lack of adherence to safety regulations in different plants of chemical industry. The equipment of the plant where deaths occurred is described, as well as the circumstances of the accident, in order to prevent similar accidents in the future. In conclusion the author discusses some physiological problems of gas exchange in the lungs. It is emphasized that unconsciousness and death occur suddenly without prodromal warning symptoms and dyspnea, and therefore medical aid is usually late unless the necessary preventive measures are taken to protect the life of the workers.

A66-80082
EVALUATION OF CARDIAC OUTPUT, CARDIAC WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS.
W. John Dawson, Jr., Frederic J. Kottke, William G. Kubicek, Mildred E. Olson, Karyne Harstad, J. E. Bearman, P. L. Canner, and James B. Canterbury (Minn. U., Minneapolis).
(Am Congr. of Phys. Med. and Rehabil., 42nd Ann. Session, Boston, Aug. 25, 1964).
Archives of Physical Medicine and Rehabilitation, vol. 46, Sep. 1965, p. 605–614. 14 refs.
Grant Vocational Rehabil. Admin. RT-2.

Cardiac performance has been studied in six normal young men following resting states, hydrotherapy, and step-test exercise. Cardiac output was greater at supine rest than at sitting rest. Exercise produced marked increases in both cardiac output and work, while hydrotherapy showed little such effects. While no appreciable differences were shown between the first and second weeks of experimentation, cardiac output was definitely less on the Tuesday test days than on the Thursday test days. Exercise increased oxygen consumption to 5.7 times rest values, doubled the pulse rate, and increased blood pressure slightly. Hydrotherapy increased oxygen consumption only to 1.2 times and pulse rate only to 1.4 times rest rates. Experimental design attempted to duplicate actual therapeutic conditions.

A66-80083
A CIVILIAN AEROMEDICAL LIFESAVING PLAN, HELP.
Richard N. Myers, Angelo P. Angelides, and George J. Haupt (Lankenau Hosp., *Dept. of Surg. and Dept. of Med., Philadelphia, Pa.*)
Pennsylvania Medical Journal, vol. 68, Oct. 1965, p. 51–53. 7 refs.

The organization of a civilian casualty helicopter evacuation service, Helicopter Emergency Lifesaving Patrol (HELP), for the Philadelphia area, is described. Proven wartime experience is recounted as a basis for using helicopters in civilian accidents and disasters. It is pointed out that under certain circumstances, the availability of such a service should significantly reduce morbidity and mortality among critically injured civilians.

A66-80084
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS.
Victoria Middleton, Alan Van Poznak, Joseph F. Artusio (Cornell U. Med. Coll., New York City, N.Y.), and Scott M. Smith (Latter-day Saints Hosp., Salt Lake City, Utah).
Anesthesiology, vol. 26, Nov.–Dec. 1965, p. 715–719. 11 refs.

Small amounts of carbon monoxide are endogenously produced by the breakdown of hemoglobin. Accumulation of carbon monoxide was measured in a series of patients anesthetized with a closed circle system; clinically significant values were occasionally reached. Factors affecting carbon monoxide levels were blood transfusion before and during operation and prolonged use of the closed system.

A66-80085
BLOOD FLOW PATTERNS IN THE CEREBRAL VESSELS AND CORTEX IN MAN STUDIED BY INTRACAROTID INJECTION OF RADIOISOTOPES AND COOMASSIE BLUE DYE.
William Feindel, Henry Garretson, Y. Lucas Yamamoto, Phanor Perot, and Nicholas Rumin (*McGill U., Dept. of Neurol., Montreal; and Montreal Neurol. Inst., Cone Lab. for Neurosurg. Res., Canada*).
(Harvey Cushing Soc., Meeting, Los Angeles, Calif., Apr. 20, 1964).
Journal of Neurosurgery, vol. 23, Jul. 1965, p. 12–22. 24 refs.
Grant Natl. Inst. of Neurol. Diseases and Blindness 1F11 NB 1222-01.

A method was devised to study the characteristics of blood flow in the superficial circulation of the brain exposed at operation. Injections of a suitable radioactive tracer into the internal carotid artery are monitored at selected sites on the cortex by means of miniature gamma detectors. The intracarotid injection of a small amount of a high contrast dye combined with cinematography provided an additional dimension for study of the flow patterns. The use of the dye provided convenient means of confirming the correct placement of the injection catheter in the internal carotid artery by checking its appearance in the retinal and supra-orbital circulation. Exact quantitative recordings of timing and blood flow through these individual vascular components can be consistently reproduced. Records obtained with this method show abnormalities in regional flow in cerebral vascular occlusive disease, in a cerebral glioma, and particularly in an arterio-venous angioma. This technique of intracarotid injection of a radioisotope with simultaneous multiple monitoring from the exposed surface of the brain may be termed cerebral radio-angiography. The method can be combined with techniques now available for measuring clearance rate of diffusible radioisotopes and also with those giving information on the values of blood gases and other metabolic constituents from local areas of the brain.

A66-80086
STRESS AND VERBAL ORIGINALITY IN SENSORY DEPRIVATION.
Peter Suedfeld (Rutgers-The State U., New Brunswick, N. J.), and Jack Vernon (Princeton U., N. J.)
Psychological Record, vol. 15, Oct. 1965, p. 567–570. 14 refs.
NSF supported research.

No relationship was found between degree of stress experienced by 14 subjects in a sensory deprivation experiment and changes in verbal originality. The consideration of previous research and of a pilot study indicates that a curvilinear function may accurately describe the correlation between originality and a greater range of stress levels.

A66-80087
VITAMINS IN THE TREATMENT OF CHRONIC BENZENE POISONING.
Ethel Browning.
(Am. Ind. Hyg. Assoc., Meeting, Houston, Tex., May 3–7, 1965).
Journal of Occupational Medicine, vol. 7, Nov. 1965, p. 554–559. 47 refs.

A review is given of the work done on the therapeutic effects of vitamins in benzene poisoning. The review covers treatment with adenine (vitamin B_4), pyridoxine (vitamin B_6), cyanocobalamin (vitamin B_{12}) and ascorbic acid (vitamin C). These treatments point out that there is no uniform success with these compounds. However, with adenine, pyridoxine, and ascorbic acid there were definite signs of a hematopoietic response which counteracts the benzene effects of a depressed bone marrow activity. Adenine seemed to show no such effects on the blood cells. Some toxic effects with cyanocobalamin have been reported. The reports, although not completely conclusive, do indicate that further work be done considering that there is no other cure for benzene poisoning.

A66-80088
THE WATER REQUIREMENTS OF HUMANS.
N. B. Strydom, C. H. Van Graan, and L. D. Holdsworth (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab., Johannesburg, South Africa).
Journal of Occupational Medicine, vol. 7, Nov. 1965, p. 581–587. 40 refs.

A review is presented of water requirements for humans. For inactive man in a temperate climate this is about one liter per day. With an increase in activity or increase in temperature, water requirements change depending on acclimatization of the individual, his physical condition, etc. Physiological problems of water deprivation are discussed, and the deleterious effects of voluntary dehydration are cautioned against. Practices recommended are for survival situations where there is a lack of water. These include ways of cooling the body, conserving body water, drinking rates of water that is available, securing water, animal, and plant sources, and contraindications against impure or saline water.

A66-80089
EYE-MOVEMENT PATTERNS DURING VISUAL INFORMATION PROCESSING.
John D. Gould and Amy Schaffer (IBM Res. Center, Yorktown Heights, N. Y.)
Psychonomic Science, vol. 3, Oct. 15, 1965, p. 317–318. 5 refs.

Eye movement patterns were recorded while subjects visually scanned 5-cell patterns to compare the sum of the three digits in each of 4 peripheral cells with the sum of the 3 digits in the central "target" cell. Both larger target sums and greater target-non-target similarity caused significantly longer fixations; number and pattern of fixations were independent of experimental variables. Results supported predictions based upon previous studies correlating eye-movement patterns and visual stimuli.

A66-80090
REPETITION REDUNDANCY AND VISUAL FORM DISCRIMINATION.
G. R. Lockhead (Duke U., Durham, N. C.)
Psychonomic Science, vol. 3, Oct. 15, 1965, p. 319-320.
Grant PHS MH 11769-01.

An experiment by Eriksen and Lappin (1965) was partially replicated with the addition of a control condition. The results demonstrate that a theoretical model proposed by those authors is not correct and that simultaneously repeating a visual form in different areal portions of the retina leads to improved discrimination performance only when subjects are operating under position uncertainty, i.e., when they do not know where the stimulus will appear.

A66-80091
SPATIAL DETERMINANTS OF VISUAL MASKING: EFFECTS OF MASK SIZE AND RETINAL POSITION.
Joseph F. Sturr, Thomas E. Frumkes, and Donna M. Veneruso (Syracuse U., N. Y.)
Psychonomic Science, vol. 3, Oct. 15, 1965, p. 327-328. 6 refs.

Visual masking was studied in three observers by measuring the threshold for detection of a small black disc (test target) with and without prior exposure to a concentric larger black disc (masking target). Independent variables were size of mask and retinal position. Results showed that: (1) for all retinal positions, decreasing the size of the masking target produced a greater masking effect; (2) for each size of mask, there was a greater masking effect in the periphery than in the fovea; (3) in the fovea, the largest mask produced a lowered threshold for test target detection, suggesting summation or facilitation. These results were discussed in terms of contour interaction and signal-to-noise ratio.

A66-80092
AUDITORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION.
P. D. Duda and J. P. Zubek (Manitoba U., Winnipeg, Canada).
Psychonomic Science, vol. 3, Oct. 15, 1965, p. 359-360. 8 refs.
Grants Natl. Res. Council, Canada APT-106 and Defence Res. Board, Canada 9425-08.

Subjects who were placed in darkness for a week but otherwise were exposed to a normal and varied sensory environment showed a significant increase in auditory flutter fusion frequency. This effect was still present one day after the termination of visual deprivation. The absolute threshold of hearing for five frequencies was not affected.

A66-80093
ULTRASONIC ENERGY: BIOLOGICAL INVESTIGATIONS AND MEDICAL APPLICATIONS.
Elizabeth Kelly, ed. (Ill. U., Biophys. Res. Lab., Urbana).
Symp. on Ultrasound in Biol. and Med., U. of Ill., Urbana, Jun. 1962.
Urbana, University of Illinois Press, 1965. 388 p. Many refs. $12.50.

Twenty-six papers and discussions from the Symposium on Ultrasound in Biology and Medicine, held at the University of Illinois in June, 1962, are included in this publication. Physical principles of high-intensity and weak ultrasound on various biological materials such as anterior pituitary gland, liver, skeletal muscle, and internal ear are recorded. The surgical and diagnostic uses of ultrasound in breast tumors, heart, abdominal, and intracranial diseases, in the treatment of cancer, in registration of movement of heart and cardiac walls, and in the ultrasonic tomograph are also presented.

A66-80094
PHYSICAL PRINCIPLES INVOLVED IN THE ACTION OF WEAK ULTRASOUND.
Wesley L. Nyborg (Vt. U., Burlington).
IN: ULTRASONIC ENERGY: BIOL. INVEST. AND MED. APPLICATIONS. Edited by Elizabeth Kelly.
(Symp. on Ultrasound in Biol. and Med., U. of Ill., Urbana, Jun. 1962).
Urbana, University of Illinois Press, 1965, p. 1-5; discussion, p. 6-8.
12 refs.

The problems of small-scale circulation or microeddying which occur under conditions of high-amplitude sound with suppressed collapse-type cavitation and under relatively low sound levels were studied by means of resonant gas bubbles and other spheres and also by means of vibrating bars and needles. The eddying near the tip of a vibrating needle is similar in scale to that of a vibrating resonant bubble which has a radial vibration amplitude of one-tenth its mean radius. Since a resonant bubble achieves such a vibration amplitude in a relatively weak sound field, it is reasonable to conclude that cells can be broken in low-amplitude sound fields due to the presence of resonant bubbles. The vigorous eddying which was observed near the tip of the vibrating needle presumably caused the disintegration of the biological cells and microorganisms in some of the experiments.

A66-80095
BIOLOGICAL IMPLICATIONS OF THE ACTION OF WEAK ULTRASOUND.
David E. Hughes (Oxford U., Great Britain).
IN: ULTRASONIC ENERGY: BIOL. INVEST. AND MED. APPLICATIONS. Edited by Elizabeth Kelly.
(Symp. on Ultrasound in Biol. and Med., U. of Ill., Urbana, Jun. 1962).
Urbana, University of Illinois Press, 1965, p. 9-18; discussion, p. 18-22.
21 refs.

Several experiments are summarized to show that collapse-type cavitation is not necessary for disintegrating biological cells and bacteria. The rapid circulation and eddying of the liquid surrounding vibrating bubbles and needles are sufficient to injure cells and, if high sound pressures are employed, to disintegrate cells. The main cell organelles of a yeast and a bacterial cell are presented to clarify stepwise disintegration of cells at different sound intensities. Interruption of some vital dynamic chemical process, called a biochemical lesion, probably underlies the more gross cellular changes detectable some time after ultrasound treatment. The different effects of liquid shear and free radical formation on desoxyribonucleic acid are presented.

A66-80096
ULTRASONIC ABSORPTION BY BIOLOGICAL MATERIALS.
Floyd Dunn (Ill. U., Biophys. Res. Lab., Urbana).
IN: ULTRASONIC ENERGY: BIOL. INVEST. AND MED. APPLICATIONS. Edited by Elizabeth Kelly.
(Symp. on Ultrasound in Biol. and Med., U. of Ill., Urbana, Jun. 1962).
Urbana, University of Illinois Press, 1965, p. 51-62; discussion, p. 62-65.
12 refs.

Previously published experimental data are discussed concerning the dependence of the ultrasonic absorption coefficient upon the acoustic field variables of frequency and wave amplitude, and state variables, such as temperature and concentration. In the absence of cavitation, the ultrasonic absorption coefficient also depends upon the physical parameters of the biological materials. The absorption coefficients of various tissues such as eye, lung, fat, muscle, liver, nerve, and bone are reviewed separately. The acoustic amplitude absorption coefficient per unit path length in bone is approximately an order of magnitude greater than that of most soft tissues at the same temperature and frequency.

A66-80097
THE USE OF HIGH-INTENSITY ULTRASOUND TO ALTER THE CELLULAR STRUCTURE OF THE ANTERIOR PITUITARY.
Rolfs Krumins, Elizabeth Kelly, Francis J. Fry, and William J. Fry (Ill. U., Biophys. Res. Lab., Urbana).
IN: ULTRASONIC ENERGY: BIOL. INVEST. AND MED. APPLICATIONS. Edited by Elizabeth Kelly.
(Symp. on Ultrasound in Biol. and Med., U. of Ill., Urbana, Jun. 1962).
Urbana, University of Illinois Press, 1965, p. 77-83; discussion, p. 83-84.

Histological studies were made on the pituitary glands of cats at three days to three months after treatment with high-intensity ultrasound. The thermal lesions produced at the base of the gland were dependent on the combined effects of direct heat transfer from the bone of the skull and ultrasound. It was determined that, depending on the dosage, ultrasound per se may produce a variety of effects on the cells of the anterior pituitary gland, ranging from partial depopulation to complete destruction.

A66-80098
ACTION OF INTENSE ULTRASOUND ON THE INTACT MOUSE LIVER.
Joseph C. Curtis (Brown U., Providence, R. I.)
IN: ULTRASONIC ENERGY: BIOL. INVEST. AND MED. APPLICATIONS. Edited by Elizabeth Kelly.
(Symp. on Ultrasound in Biol. and Med., U. of Ill., Urbana, Jun. 1962).
Urbana, University of Illinois Press, 1965, p. 85-109; discussion, p. 109-116. 34 refs.

The relative importance of intensity and duration of ultrasound was studied in mice livers and correlated with the frequency of hepatic lesions and the types of cytological changes produced. Lesion size and degree of infarctive injury were related to intensity or, in pulsed ultrasound, to the pulse rate. Some of the cytological changes observed immediately after treatment were hepatic sinusoids distended and congested with red blood cells, and cellular injuries: cytoplasmic vacuolation, glycogen disruption, swollen mitochondria, pyknotic nuclei, and a disruption of desoxyribonucleic and ribonucleic acids. No selective action of ultrasound upon tissue elements or cells was demonstrable. The nonselective nature of tissue destruction and the predominant localization of such destruction to the surface of the liver suggest that the injury is dependent upon a selective heating of the surface.

A66-80099
BIOLOGICAL CLOCKS IN MEDICINE AND PSYCHIATRY.
Curt Paul Richter (Johns Hopkins Med. School, Baltimore, Md.)
Springfield, Ill., Charles C. Thomas Publisher, 1965, viii+108. 101 refs.
NSF and NIH supported research. $8.50.

Rats and other rodents in their normal state and after various forms of experimental interference exhibit a great variety of clocks which operate independently of external and internal influences. When compared to rodents and other animals, the normal man manifests far fewer timing mechanisms. However, during various physical or mental conditions, many types of timing devices are operating. A summary is given of the knowledge of biological clocks which includes a description of homeostatic, central, and peripheral clocks; a comparison of clocks in rats and man; specific and non-specific manifestations; conditions or forms of interference conducive to their appearance; and major characteristics (accuracy, constance, and independence of external and internal events).

A66-80100
CHRONIC EXPERIMENTAL LESIONS OF THE COLON DUE TO CHANGES IN BAROMETRIC PRESSURE [LESIONS CHRONIQUES EXPERIMENTALES DU COLON PAR VARIATIONS DE LA PRESSION BAROMETRIQUE].
M. V. Strumza, J. M. Strumza-Puton-Net, and M. R. Pages (Fac. de Méd., Lab. de Biol. Aéron., Paris, France).
Revue de Médicine Aéronautique, vol. 4, May-Jun. 1965, p. 8-10. 11 refs. In French.

Rapid decrease of barometric pressure is known to distend gas within body cavities. The effect of rapid decompression on gas within the colon was investigated in 102 rats. No adverse effect on the digestive tract was demonstrable on rats fed a soft diet, but serious lesions, hypertrophy, ulcers, tumors, and abcesses of the colon were found in rats fed a diet containing fermentable or mechanically irritating elements.

A66-80101
RECORDING OF PHYSIOLOGICAL AND PHYSICAL PARAMETERS RELATIVE TO A PARACHUTE JUMP WITH RETARDED OPENING [ENREGISTREMENT DE PARAMETRES PHYSIOLOGIQUES ET PHYSIQUES AU COURS D'UN SAUT EN PARACHUTE A OUVERTURE RETARDEE].
R. Grandpierre, J. Bourdinaud, R. Brice, C. Robert, L. Jouffray, Garreta, B. Cailler, J. P. Gicquel, F. Vacquie, and F. Plas (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 11-14. 22 refs. In French.

Electrodes were affixed to a parachute jumper and cardiac beat and rate plus g forces encountered were telemetered during a jump from 4,875 m., with the opening of the parachute at 600 m. A sinus tachycardia (180 to 160 beats/min.) was observed throughout the descent. The tachydardia was of undertermined etiology.

A66-80102
ON THE EFFECTS OF HYPEROXIA ON VISION OF THE AVIATOR [A PROPOS DE L'ACTION DE L'HYPEROXIE SUR LA VISION DE L'AVIATEUR].
G. Perdriel, J. Fabre, C. Violette, and M. Leblanc (Centre d'Enseignement et de Rech. de Méd. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 15-16. 12 refs. In French.

Electroretinographic studies of rabbits were made during conditions of hyperoxia (66% to 95% oxygen) lasting from several hours to several days. Abnormal tracings were observed after four hours in 95% oxygen, and tended to extinction after 32 hours. In 66% and 80% oxygen, increased amplitude was observed up to the 16th hour, but the tracing returned to normal values thereafter. Cellular degeneration of the retina was seen in 30 to 36 hours and was complete after 48 hours. A short discussion is presented of the theorized inhibitory effect of oxygen on glycolysis, and especially of those enzymes containing a free sulfhydryl group. From this experiment on rabbits, it appears that oxygen breathing by aviators, although mandatory in high-altitude flights, may have detrimental effects on the senses, especially vision.

A66-80103
LOSS OF CONSCIOUSNESS IN FLIGHT AND VENTRICULAR EXTRASYSTOLES [PERTE DE CONNAISSANCE EN VOL ET EXTRA-SYSTOLES VENTRICULAIRES].
G. Mariani, P. Pesquies, and P. Jaouen (C. E. M. P. N. A., Aix-en-Provence, France).
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 17-20. In French.

One incidence of loss of consciousness in a pilot trainee during a flight at 1500 to 2000 m. is examined. The occurrence was probably caused by ventricular extrasystole during the flight, and not by anoxemia, tachycardia, or vasoconstriction. No extrasystole or other abnormality was detectable in the subject prior to the flight. It is emphasized that during pilot training, the subject learns not only a trade but also becomes aware of his personal physiological tolerance.

A66-80104
NOTE ON MITOSIS CHANGES ENCOUNTERED IN CONNECTION WITH MECHANICAL VIBRATIONS [NOTE SUR LES ALTERATIONS DE LA MITOSE RENCONTREES AU COURS DES VIBRATIONS MECANIQUES].
P. Grognot, R. Loubiere, and A. Pfister (Centre d'Enseignement et de Rech. de Méd. Aéron., Lab. Central de Biol. Aéron., Paris, France).
Revue de Médecine Aéronautique, vol. 4, May- Jun. 1965, p. 21. In French.

Ehrlich ascites tumor cells were inoculated into mice and the mice were mechanically vibrated for 7, 15, or 30 minutes six days after inoculation and killed 24 hours later. Abnormal anaphases were observed in 13.6% of the neoplastic cells from the control animals but were present in 43.7% of the cells from the animals vibrated for 7, 15, or 30 minutes.

A66-80105
STATISTICAL DATA ON THE CAUSES OF UNFITNESS OBSERVED DURING MEDICAL SCREENING OF FLIGHT TECHNICIANS IN CIVIL AVIATION [DONNEES STATISTIQUES SUR LES CAUSES D'INAPTITUDES LORS DES VISITES MEDICALES D'ADMISSION DU PERSONNEL NAVIGANT TECHNIQUE DE L'AVIATION CIVILE].
P. Galban, E. Granotier, R. Carre, and J. Robion (Aéron., Centre Principal d'Expertise Méd. du Personnel Navigant, Paris, France).
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 22-27. In French.

Of 2003 flight candidates screened during 1961 to 1964, 19% (384) were found to be unfit; of the rejections, 186 were due to ophthalmological causes, 157 to general pathology, and 41 to defective oto-rhino-laryngological apparatus. The principal ophthalmological causes of unfitness were insufficient visual acuity and dyschromatopsia. General underdevelopment, obesity, cardiovascular, respiratory, digestive, urogenital, or neuropsychiatric abnormalities, and general traumatology were the major causes of unfitness due to general pathology. The principal reason for failure of the oto-rhino-laryngological system was hypoacousia.

A66-80106
ANTHROPOMETRIC STUDY ON CRANIOMETRY OF FLIGHT PERSONNEL: APPLICATION TO THE STUDY OF A HELMET [ETUDE ANTHROPOMETRIQUE SUR LA CRANIOMETRIE DU PERSONNEL NAVIGANT: APPLICATION A L'ETUDE D'UN CASQUE].
M. H. Seris, A. Coblentz, and R. Auffret.
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 28-30. In French.

New measurements of head dimensions were made on French flight and ground personnel in order to obtain a more perfect fit for all types of headgear and especially for pressure-suit helmets. Significant measurements are tabulated. The figures were serve also as a base for the group of measurements required for the designing and engineering of safe and comfortable space cabin equipment.

A66-80107
PROBLEMS POSED IN HIGH-PERFORMANCE AVIATION BY THE EXISTENCE OF CONGENITAL ANOMALIES OF THE SPINAL COLUMN [LES PROBLEMES POSES PAR L'EXISTENCE D'ANOMALIES CONGENITALES DU RACHIS DANS L'AVIATION DE HAUTE PERFORMANCE].
R. P. Delahaye, H. Mangin, and G. Gueffier (H. M. I. Dominique-Larrey, Serv. d'Electrocardiol., Versailles, France).
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 31-34. 13 refs. In French.

Congenital anomalies of the spinal column pose problems both of flight aptitude and for differential diagnosis in case of an accident. In high-performance aircraft (over 600 km./hr.), the risk of traumatic injuries to the spinal column appears greatest in cases of malfunction and forced ejection. The principal types of spinal column anomalies and fractures and their relations to flight restrictions are described.

A66-80108
EFFECTS OF UNBALANCED REGIMENS ON GLYCEMIC REGULATION [EFFETS DES REGIMES DESEQUILIBRES SUR LA REGULATION GLYCEMIQUE].
J. Fabre, P. M. Pingannaud, and G. Daudin.
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 35-36. In French.

In order to clarify the mechanism of glucose metabolism, blood glucose was measured in rats after one month of either normal feeding or a hyperglycemic diet. The rats were fasted, divided into three groups, and the blood glucose was measured before and after feeding of glucose, exogenous insulin, or the hypoglycemic agent, Tolbutamide. After glucose feeding, hyperglycemia was evident from 20 to 60 minutes after feeding, but both values returned to normal in approximately 90 minutes. Rats on a hyperglycemic diet responded to insulin by a pronounced hypoglycemia but were not adversely affected by intraperitoneal Tolbutamide. Rats on a normal diet were sensitive to Tolbutamide but less sensitive to exogenous insulin.

A66-80109
INVESTIGATION ON VISCERAL LESIONS OBSERVED IN MICE AND RATS EXPOSED TO ULTRASHORT WAVES: SPECIAL STUDY ON THE EFFECTS OF THESE WAVES ON THE ANIMALS' REPRODUCTION [RECHERCHES SUR LES LESIONS VISCERALES OBSERVEES CHEZ DES SOURIS ET DES RATS EXPOSES AUX ONDES ULTRA-COURTES: ETUDE PARTICULIERE DES EFFETS DE CES ONDES SUR LA REPRODUCTION DE CES ANIMAUX].
Luis Miro, Robert Loubière, and André Pfister.
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 37-39. In French.
Recherches DRME supported research.

Rats were exposed to ultrashort waves (10-cm. waves of 3105 MHz ± 15 MHz frequency) for 190, 300, and 450 hours. The animals suffered no ill effects of general anatomy nor of physiology when there was a means of eliminating the heat formed in the body from the electromagnetic transformation of energy. The specific effects of ultrashort waves on gonad structure and reproductive function were investigated in mice and rats. The waves had no adverse effect on either gonad structure or reproductive function.

A66-80110
PLETHYSMOGRAPHIC STUDY OF RESPIRATORY TRACT RESISTANCE AT ALTITUDE [ETUDE PLETHYSMOGRAPHIQUE DES RESISTANCES DES VOIES RESPIRATOIRES EN ALTITUDE].
J. Timbal, P. Varene, J. Demange, Ch. Jacquemin, and Y. Almoyner.
Revue de Médecine Aéronautique, vol. 4, May-Jun. 1965, p. 40-42. 10 refs. In French.

The respiratory resistance of five subjects was measured by Pflüger's maneuver by means of a plethysmograph at one atmosphere and one-half atmosphere pressure (5,500 m. simulated altitude). The results confirm previous findings on the diminution of respiratory resistance at altitude, due in part to decreased density of respired gases without obvious change in gas viscosity. The results are interpreted according to Rohrer's formula.

A66-80111
THE EFFECT OF ACUTE AND CHRONIC COLD EXPOSURE ON TISSUE LIPIDS IN THE RAT.
D. G. Therriault and R. H. Poe (U. S. Army Res. Inst. of Environ. Med., Natick, Mass.)
(Symp. on Carnitine, MIT, Cambridge, Mass., July 24, 1964).
Canadian Journal of Biochemistry, vol. 43, 1965, p. 1427-1435. 25 refs.

The liver and gastrocnemius muscles from rats undergoing acute and chronic cold exposure to 5°C. were totally excised after an in situ perfusion with isotonic saline. Total lipid was extracted from the tissue and the lipid classes separated by countercurrent distribution. There was no difference between the groups in the amount of phospholipid present in either liver or muscle. However, the neutral lipids of both tissues were decreased in the acclimated group. Though acute exposure caused a decrease in the neutral lipid levels of muscle, the liver levels remained unchanged. Only the free fatty acid levels in liver were affected by acute exposure, and these increased. The decrease in neutral lipid of muscle in the acutely exposed group suggests that there is an immediately available source of lipid in muscle in response to the stress of cold exposure.

A66-80112
MEANS AND METHODS OF BIO-MEDICAL EXPERIMENTS IN SPACE FLIGHTS [METODY I SREDSTVA MEDITSINSKIKH I BIOLOGICHESKIKH ISSLEDOVANII V USLOVIIAKH KOSMICHESKOGO POLETA].
I. T. Akulinichev, R. M. Baevskii, and O. G. Gazenko (USSR, Acad. of Sci., Moscow).
IN: PROC. FIRST INTERN. SYMP. ON BASIC ENVIRON. PROBL. OF MAN IN SPACE, PARIS, 1962.
Wien, Springer-Verlag, 1965, p. 425-499; discussion, p. 450-451. In Russian and English.

Research methods in space biology and medicine involving rudimentary organisms to the highest vertebrates are described and discussed. Biological telemetry has been widely used to obtain the necessary scientific information. Biological measurements during flight can be roughly divided into three categories: medical monitoring, medical research and the collection of biological data. The latest achievements in biology, electronics and computing techniques must be applied in order to ensure the high quality and range or results. Pre-and-post flight examinations are also extremely important; they should cover a very wide range, designed to extract the maximum biological and medical information from every flight experiment. Lengthy observation of astronauts and biological subjects during the post-flight period is of considerable importance in this respect. The prospect of increasing the duration and range of space flights poses extremely serious problems as regards the devising of new ways and means of conducting biomedical research and dynamic medical monitoring. These principles are illustrated by concrete examples drawn from bio-telemetric measurements made in the course of bio-medical research on the 2nd, 3rd, 4th and 5th sputnik and the "Vostok" space ships.

A66-80113
BIOMEDICAL DATA COLLECTION FOR SPACE PROGRAMS.
Stanley C. White (NASA Manned Spacecraft Center, Houston, Tex.)
IN: PROC. FIRST INTERN. SYMP. ON BASIC ENVIRON. PROBL. OF MAN IN SPACE, PARIS, 1962.
Wien, Springer-Verlag, 1965, p. 452-460; discussion, p. 460-462. 5 refs.

A discussion is presented of the biomedical data system first used in manned space flight and the approaches now being developed for future flights. The philosophy and events which led to the early program of data collection and ways how present events have changed the approach are reviewed. The biomedical data gathering system first used in the United States was directed toward the question of answering whether man could survive in space flight. Flight safety was of prime importance. This objective dictated the requirement for animals to precede man in flight. Additional information which could be gleaned from the mission directed data system was gratefully accepted but did not dictate the choice of instruments or the methods of data handling. Gross screening studies were carried out in an attempt to identify body system problems. The goals of the biomedical data gathering systems have shifted to the objective of gathering information which will permit better integration of man into a useful position in spacecraft operation. The system still must meet the flight safety requirements, however, and the instruments must search for the mechanisms by which the body systems meet space flight. The large payloads and the shifting to the new spacecraft permit the use of the full spectrum of data sources. Not only can biosensors placed on the man be used, but now the use of small inflight experiments, the obtaining of special samples and the more elaborate in-flight data available through direct study become possible.

A66-80114
MAN OR AUTOMATION IN SPACE?
K. Steinbuch (Inst. of Technol., Karlsruhe (Baden), West Germany).
IN: PROC. FIRST INTERN. SYMP. ON BASIC ENVIRON. PROBL. OF MAN IN SPACE, PARIS, 1962.
Wien, Springer-Verlag, 1965, p. 473-491; discussion, p. 491-492. 30 refs.

At present unmanned spacecraft can only be used for tasks requiring an inferior "degree of intelligence", e.g., for the investigation of physical parameters like irradiation density or for photographing defined regions. For tasks of higher "degree of intelligence", unmanned spacecraft are temporarily out of the question, e.g., for the assembly of a space station or repairing space vehicles. Some decades from now it might be possible to realize by mechanical systems every important function of intelligence for space flight. To accomplish this goal three problems are especially important: (1) the invention of mechanical perceptors, (2) the miniaturization of electronic circuitries, and (3) to develop in a mechanical system a capacity of self correction. When these problems are solved, there will be no more technical reasons to equip spacecraft with human pilots.

A66-80115
DATA SENSORS AND INFORMATION ACQUISITION.
A. M. Mayo, C. L. Buddecke, and G. R. Tenery (Ling-Temco-Vought, Chance Vought Corp., Astronautics Div., Advan. Sys. Dept., Dallas, Tex.)
IN: PROC. FIRST INTERN. SYMP. ON BASIC ENVIRON. PROBL. ON MAN IN SPACE, PARIS, 1962.
Wien, Springer-Verlag, 1965, p. 493-506. 10 refs.

Much of the knowledge potential from space exists as energy patterns not directly accessible through the human sense organs to the intellect. Accelerated effort toward the acquisition of information in a form directly comparable to existing knowledge shows promise of improved effectiveness of space exploration. Transformations used in improving the intelligibility of information include: (1) energy-frequency transforms exemplified by the shift of frequency occurring when certain minerals, exposed to ultraviolet energy, radiate various colors of visible light; (2) the amplification of energy patterns as exemplified by radio and television reception; (3) temporal transforms as exemplified by ultra-highspeed and time lapse photography; (4) sensor modality transforms exemplified by the increased use of hearing and touch senses of the blind; and (5) classification transforms exemplified by the "self-programming" computer techniques of organizing geometric and temporal sensed energy patterns. The transformation processes are explored as a means to stimulate ingenuity in instrumenting scientific payloads for improved effectiveness. Improved understanding of human and other biosensory and cognitive functions is fundamental to effective progress.

A66-80116
BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT SLEEP.
Arnold J. Mandell and Mary P. Mandell (Calif. U., Health Sci. Center, Dept. of Psychiat., Los Angeles).
(Am. Psychiat. Assoc., 121st Ann. Meeting, New York, N.Y., May 3-7, 1965).
American Journal of Psychiatry, vol. 122, Oct. 1965, p. 391-401. 53 refs.
NASA Grant NsG 237-62; U.C.L.A. Health Sci. Center sponsored research.

There have been two approaches taken to uncover the biochemical mechanisms in sleep and rapid eye movement state (REMS). (1) Influencing

REMS through an exxaggeration of the normal neurochemical environment of the brain by peripheral or central nervous injections of atropine, eserine, imipramine, oxytremorine, carbachol, cholinergics, C3–C10 carboxylic acids, β-hydroxybutyrate, 4-hydroxybutyrate (and lactone), β-keto acids, γ-hydroxybutyrate, deoxycorticosterone, 11-desoxycortisol, cortisol, hydroxydione, progesterone, chorionic gonadotrophin, gonadotrophins, oxytocin, testosterone, estrogen, thyrotrophin, adrenocorticotrophin, growth hormone, epinephrine, norepinephrine, hydrazine monoamine oxidase inhibitor, amphetamine, tryptophan, 5-hydroxytryptamine, reserpine, and dihydroxyphenylalanine. Physiological and pharmacological effects are to be distinguished with this approach. (2) Sampling of central or peripheral biochemical concomitants of REMS (plasma free fatty acids; impedance of hypothalamus, reticular formation, cortex, and hippocampus, hypothalamic, and cortical temperature, direct current shifts of cortex and subcortical areas, etc.). Elevations of 17-hydroxysteroids toward the end of REMS, and increased 3-methoxy-4-hydroxymandelic acid excretion after REMS have been demonstrated. REMS is hypothesized to be the concomitant of a periodic discharge of the neuroendocrine apparatus of energy metabolism during the long fast of sleep.

A66-80117
THE CORRELATION OF THE TWO KINDS OF POSTRADIATIONAL DESTRUCTION OF CELLS IN THE BONE MARROW OF MICE EITHER PROTECTED OR UNPROTECTED BY MEXAMINE [SOOTNOSHENIE DVUKH FORM POSTRADIATSIONNOI KLETOCHNOI GIBELI V KOSTNOM MOZGE MYSHEI, ZASHCHISHCHENNYKH I NEZASHCHISHCHENNYKH MEKSAMINOM].
I. D. Aleksandrov.
Doklady Akademii Nauk SSSR, vol. 164, no. 2, Sep. 11, 1965, p. 437–440. 18 refs. In Russian.

A study of post-radiation damage of the bone marrow cells in the interphases was conducted in mice, who received intraperitoneal injections of mecamylamine. In the radiation protected animals the degeneration curve was displaced, showing a higher primary peak than the non-protected animals. However, the plateau and the post-mitotic curve were slightly lower than in the controls. The study of the mitotic phases in the protected animals indicated a shortening of the mitotic cycle due to the radiation-protector injections. The limited protective effect of mecamylamine may be due to structural changes in the chromosomes and to lack of protection during the first interphase before the first mitosis. This picture resembles the one observed in cases when the anoxia was used as a radiation protection method. Such resemblance was also noted in cases when other indoles were employed.

A66-80118
EFFECT OF SOUND ON DISTRIBUTION OF NUCLEIC ACIDS AND VARIATION IN THE SIZE OF NUCLEI IN THE HAIR CELLS OF THE ORGAN OF CORTI [RASPREDELENIE NUKLEINOVYKH KISLOT I IZMENENIE RAZMEROV IADER V VOLOSKOVYKH KLETKAK KORTIEVA ORGANA PRI ZVUKOVOM VOZDEISTVII].
V. F. Anichin.
Doklady Akademii Nauk SSSR, Serita Biologita, vol. 163, no. 6, p. 1495–1498. 11 refs. In Russian.

Guinea pigs and rats were subjected to continuous sound of various frequencies and intensities. A 6-hr exposure to 4,000 c.p.s. and 100 db. intensity produced considerable change in the nuclear size of the hair cells of the guinea pigs. Some nuclei increased by 290%, others shrunk by 41%. These changes were reversible, and normalization took place within 1–3 hrs. after exposure. An increase in intensity and frequency resulted in reduction in size of a greater number of nuclei. In rats, the effect was less pronounced. DNA granules and minute lumps were observed, located peripherally. With an increase in intensity and frequency, the granules became larger. Diffused RNA of the karyoplasm was almost absent. The shrinkage of nuclei of the hair cells may be explained by two factors: (a) expenditure of the RNA-bound proteins during the long exposure to intense sound, and (b) synthesis resumed to bring the equilibrium to normal.

A66-80119
AN INVESTIGATION OF THE AUTO-KINETIC EFFECT EMPLOYING AN AFTER-IMAGE.
D. J. Piggins (Waterloo U., Dept. of Psychol., Ontario, Canada).
British Journal of Physiological Optics, vol. 22, 1965, p. 143–147. 17 refs.

Autokinesis was studied with 25 subjects in a completely dark room and heads restrained, viewing monocularly the following three conditions of stimuli: (a) a single light source; (b) a single light source and the after-image of an arrow; and (c) the after-image of an arrow. Most subjects experienced autokinesis in conditions (a) and (c), indicating that the effect occurs for both retinally stabilized images and for retinally unstabilized images. Though most subjects reported a reduction of autokinesis in (b), some reported only movement of both stimuli together with unvarying separation, while others reported movement of both stimuli together with varying separation. It is concluded that the results do not support either a purely peripheral or a purely central explanation of autokinesis with regard to existing theories.

A66-80120
GLARE: A STUDY INTO GLARE RECOVERY TIME WITH NIGHT DRIVING SPECTACLES.
A. J. Philips and Alan Rutstein (Northampton Coll. of Advan. Technol., London, Great Britain).
British Journal of Physiological Optics, vol. 22, 1965, p. 153–164. 29 refs.

Fourteen of 18 subjects expressed an increase in comfort during glare when wearing night-driving glasses. This agrees with results found by other surveys and would explain their continued popularity. All 18 subjects showed an increase in glare recovery time, the mean value being 54 per cent. Thus although the 14 were more comfortable their visual performance was inferior. Although the glare source was brought much nearer than encountered in normal conditions, this was done only to determine the effect of wearing the night-driving spectacles under the severest of conditions. No attempt was made to determine results under actual driving conditions.

A66-80121
EFFECTS OF ADAPTATION ON THE LATERAL GENICULATE RESPONSE TO LIGHT INCREMENT AND DECREMENT.
Gerald H. Jacobs (Tex. U., Dept. of Psychol. and Defense Res. Lab., Austin).
Journal of the Optical Society of America, vol. 55, Nov. 1965, p. 1535–1540. 15 refs.
NASA Grant R-129; and Grant NSF G24125.

Response characteristics of two types of cells in the lateral geniculate nucleus of the squirrel monkey have been examined in experiments in which the luminance of a stimulus is shifted in stepped increments and decrements from an adaptation luminance. These two types of cells are found to show opposite changes in discharge frequency in response to shifts in stimulus luminance; some respond with an increase in firing rate to increases in luminance and show a decrease in response rate when luminance is decreased; other behave in the opposite fashion. The magnitude of change of the response is graded according to the amount of change of the stimulus. For any cell, the direction of change of the response for a given change of stimulus is dependent on the adaptation luminance. The total range of change of luminance over which any cell shows a good differentiation is usually not more than ± 1 log unit around the adaptation luminance. An analysis of the discriminatory ability of these units as a function of adaptation luminance and the amount of change of the stimulus is presented.

A66-80122
EFFECT OF MICROWAVES ON THE ABSORPTIVE CAPACITY OF THE SYNOVIAL MEMBRANE OF THE KNEE JOINT UNDER CONDITIONS OF SEVERING OF THE SPINAL CORD [VPLYV MIKROKHVYL' NA VSMOKTUVAL' NU ZDATNIST' SYNOVIAL'NOI OBOLONKY KOLINNOGO SUGLOBA V UMOVAKH PERERIZANNIA SPYNNOGO MOZKU].
M. I. Iatsenko (Makeev Physiotherap. Hosp. of Donetsk Reg.; and Odessa, I. I. Mechnikov State U., Dept. of Human and Animal Physiol., Ukr. SSR).
Fiziologichnyi Zhurnal, vol. 11, Jul.–Aug. 1965, p. 516–519. 19 refs. In Ukrainian.

Absorption of radioactive phosphorus from the cavity of the knee joint was studied in rabbits in the normal state of the joint, when acted on by microwaves, under conditions of severing of the spinal cord and irradiation of the joint with microwaves. The investigations showed that the absorptive function of the normal joint was raised under the effect of irradiation with microwaves. Severing the spinal cord retards absorption of the knee joint. The effect of high frequency vibrations of the knee joint region under conditions of a severed spinal cord raised the absorptive activity of the synovial membrane of the joint.

A66-80123
THE CONNECTION BETWEEN RADIO-PROTECTIVE AND ANTINEOPLASTIC EFFECT OF ANTIOXIDANT-INHIBITORS [SVIAZ' MEZHDU RADIOZASHCHITNYM I PROTIVOOPUKHOLEVYM DEISTVIEM INGIBITOROV-ANTIOKISLITELEI].
E. B. Burlakova, V. D. Gaintseva, L. V. Slepukhina, N. G. Khrapova, and N. M. Emanuel'.
Doklady Akademii Nauk SSSR, vol. 164, Oct. 1, 1965, p. 934–936. 7 refs. In Russian.

The relationship between the radiation-protective character of 4-methyl-2,6-di-tri-butyophenol and its antitumor action was studied in mice exposed to a 500 r dose, which is normally lethal to these animals. The most effective protective dose was found to be 50 mg./kg. An increase in the dose caused reduction of the protective effect. A 100 mg./kg. dose gave no protection (C_{Neg}). However, this amount was still below the tolerance limit, which is about 400 mg./kg. In the carcinolytic studies, the doses used were higher than the radiation-protective doses. If the mechanism of action of a compound were the same in radiation protection and carcinolytic effect, there should be a definite correlation between the degree of biological effect in both reactions. The experimental data indicated a definite relationship: the coefficient of suppression of leucemia (K_S) showed a linear relation with the ratio of the therapeutic dose for carcinogenesis (C_{ther}) and the ineffective

dose for radiation protection (C_{ther}/C_{Neg}). The carcinolytic effect increased with an increase in the C_{ther}/C_{Neg} ratio. The effective compounds were those which had a low C_{Neg}.

A66-80124
CLINICAL PICTURE AND PREVENTION OF LEAD INTOXICATION. [KLINIKA I PROFILAKTIKA SVINTSOVOI INTOKSIKATSII].
V. M. Ermakova (Minsk Ind. Unit., Med.-Sanit. Div., USSR).
Fel'dsher i Akusherka, no. 8, Aug. 1965, p. 15-19. In Russian.

In industrial plants, where lead is used, either in a molten state or as oxides or salts, human intoxication manifests itself primarily in a progressive drop in hemoglobin concentration, with the appearance of stippling in the erythrocytes. Prolonged exposure may lead to disturbances in the central nervous system, resulting in encephalopathy and motor polyneurites. Abdominal colic is a typical clinical symptom. The clinical picture may imitate appendicitis, ulcers, hepatitis or neuritis. Treatment consists of intravenous injections of calcium disodium edathamil, atropin and platyphylline. Emphasis should be put, however, on prophylactic measures (face masks to prevent inhalation of lead dust and vapors and thorough cleansing procedures to remove lead particles from the skin). Personnel working with paints containing lead should have periodic physical examinations. The buildings should be equipped with good ventilating systems.

A66-80125
ADRENALINE AND NORADRENALINE: RELATION TO PERFORMANCE IN A VISUAL VIGILANCE TASK.
J. F. O'Hanlon, Jr. (Human Factors Res., Inc., Santa Barbara, Calif.)
Science, vol. 150, Oct. 22, 1965, p. 507-509. 13 refs.
Contract Nonr 4120(00).

Concentrations of adrenaline and noradrenaline in the circulating blood were measured in blood samples taken from subjects as they performed a visual vigilance task or viewed movies, both under identical conditions. For those subjects whose vigilance performance deteriorated it was concluded that the concentration of circulating adrenaline decreases as a function of time in a vigilance task but not under "relaxed" conditions, such as watching motion pictures.

A66-80126
BACTERIAL CONTAMINATION OF SOME CARBONACEOUS METEORITES.
J. Oro and T. Tornabene (Houston U., Depts. of Chem. and Biol., Tex.)
Science, vol. 150, Nov. 19, 1965, p. 1046-1048. 10 refs.
NASA Grant NsG-257-62.

Three samples of carbonaceous meteorites: Murray, Mokoia and Orgueil, weighing 89.5 mg., 84.6 mg., and 138.7 mg., respectively were tested for bacterial contamination. Cultures of fragment washings produced bacterial growth in the Mokoia sample only, which gave a Quebec count of 20 colonies per milliliter. Powder washings produced growth from the Murray and Mokoia samples. The count was 530 and 150, respectively. The organisms isolated from the Murray sample were identified as Bacillus cereus and B. badius, of a 5 to 1 ratio. From the Mokoia sample Staphylococcus epidermidis was isolated. Solvents and agar medium were sterile. Particle plating was not attempted. This was the first definite identification of viable common bacterial contamination of carbonaceous chondrites. The presence of these microorganisms may account for some organic compounds, which are found in the meteorites, and may be the products of bacterial metabolism.

A66-80127
THE EFFECT OF OCCLUDING THE RETINAL AND CHOROIDAL CIRCULATIONS ON THE ELECTRORETINOGRAM OF MONKEYS.
T. Fujino and D. L. Hamasaki (Miami U. School of Med., Bascom Palmer Eye Inst., Dept. of Ophthalmol., Fla.)
Journal of Physiology, vol. 180, Oct. 1965, p. 837-845.
Grants Natl. Inst. of Neurol. Diseases and Blindness NB 04630-2 and Natl. Council to Combat Blindness, Inc., N. Y. (G)F-185.

Electroretinogram response to occlusion of choroidal and retinal blood circulation of the monkey was investigated. When all blood flow to the eye was blocked, there was an immediate loss of the b-wave leaving the PI and PIII components. PI was lost after 5 min. and PIII 20-40 min. after the occlusion. Retinal circulation occlusion resulted in an immediate depression of the b-wave followed by its complete abolition in 60 sec. The remaining PI and PIII components could be maintained for at least 60 min. by the choroidal circulation. Choroidal occlusion also resulted in a loss of the b-wave at times comparable to that seen with retinal occlusion. The remaining PI and PIII could not be maintained by the retinal circulation and were lost after 20-40 min. The observation that the b-wave was the first wave to be lost under all experimental conditions demonstrated the high sensitivity of the elements, which give rise to it, to alterations in blood-flow patterns. Little can be said about the identity of these structures.

A66-80128
CELLULAR PATTERN AND NERVE SUPPLY OF THE HUMAN ORGAN OF CORTI. A PRELIMINARY REPORT.
Goran Bredberg, Hans Engstrom (Goteborg U., Ear, Nose, and Throat Dept., Sweden), and Harlow W. Ades (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Archives of Otolaryngology, vol. 82, Nov. 1965, p. 462-469. 7 refs.
Contract ONR N62558-4264; and Swedish Med. Council supported research.

By the application of recently developed techniques the normal development of the human organ of Corti was investigated showing that it is possible to study in detail the pattern of sensory cells and supporting elements. Already at 4 months fetal age the geometrical pattern seen in other mammals is clearly visible. With increasing age the human cochlea undergoes a modification resulting in a disorderly arrangement of the cells not observed in other mammals studied. By the techniques used it will be possible to get quite new parameters in these studies of cochlear malformation, congenital deafness, and also on the interrelation between hearing loss and cochlear damage in man in general. For problems like the structural background of recruitment the surface specimen technique and nerve staining used will undoubtedly contribute to an understanding.

A66-80129
INDIVIDUAL MASKING LEVELS IN PURE TONE AUDIOMETRY.
Florence Abt Veniar (Veterans Admin. Reg. Office, Audiol. and Speech Pathol. Serv., Newark, N. J.)
Archives of Otolaryngology, vol. 82, Nov. 1965, p. 518-521. 6 refs.

A procedure for clinical masking during audiometric examination is described. It involves the determination of a minimum effective masking level (MEML) for each person at each frequency. MEML is found by introducing the masking stimulus into the same ear that is receiving the air-conduction signal at threshold intensity. The noise intensity is increased in steps of 10 db. until it just obliterates the signal. It is this MEML which is used initially to mask the ear when the bone-conduction (BC) threshold of the opposite (test ear) is being validated. The rationale for the procedure is also described. Threshold sensation in the nontest ear is the same regardless of the nature of the stimulus which evokes that sensation. It is assumed, therefore, that MEML required to mask that threshold sensation remains constant.

A66-80130
INFLUENCE OF STRENGTHENING EXERCISE ON SPEED OF LIMB MOVEMENT.
Leon E. Smith (Iowa U., Motor Performance Lab., Iowa City) and Jim D. Whitley (Calif. U., Dept. of Phys. Educ., Riverside).
Archives of Physical Medicine and Rehabilitation, vol. 46, Nov. 1965, p. 772-777. 8 refs.

Thirty-one college men participated in an eight-week strength-training program which involved isotonic and "multipositional" isometric exercises. The object of the experiment was to determine whether a substantial increase in strength was associated with a proportional transfer to speed of movement. As a result of the strength program there was a 22% increase in strength and a 6% increment in speed. The strength training resulted in significant and nearly identical strength increases at each of the six measurement angles. This overall strength increase had an insignificant effect on net speed at timing station one, significant losses at stations two and three, with highly significant gains in speed at stations four and five.

A66-80131
EFFECT OF EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN THE UNANESTHETIZED DOG.
Edward M. Khouri, Donald E. Gregg, and Claudia R. Rayford (Walter Reed Medical Center, Walter Reed Army Inst. of Res., Dept. of Cardiorespirat. Diseases, Washington, D. C.)
(Am. Physiol. Soc., San Francisco, Calif., Aug. 1960).
Circulation Research, vol. 17, Nov. 1965, p. 427-437. 30 refs.

Cardiac output, left coronary artery flow, central aortic blood pressure and myocardial metabolism have been studied in the intact unanesthetized dog during exercise. Cardiac output and left coronary artery flow increase 350 to 400% during moderately severe exercise. The primary mechanical determinant of this increase appears to be cardio-acceleration; the stroke volume and stroke coronary flow contribution is relatively mild. Myocardial oxygen usage increases 300% or more with only a small elevation of the percentage of extraction of oxygen. The large increase of coronary flow in the dog and the significant elevation in hematocrit supply the extra oxygen.

A66-80132
EFFECTS OF AMBIGUOUS TRAINING MATERIALS ON CUE DISCRIMINATION.

Alfred G. Klipple and Alvin J. Abrams (U. S. Naval Personnel Res. Activity, Navy Training Res. Lab., San Diego, Calif.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 359–365.

A test was made of the hypothesis that subjects who are required to discriminate highly ambiguous sonar pip shapes early in training will be less accurate in discriminating unambiguous pip shapes following training than will subjects who are not required to attempt these difficult discriminations. Twenty-eight male college students were used as subjects: fourteen were trained on ambiguous materials and 14 were trained on unambiguous materials. Results indicate that subjects trained on ambiguous materials were less accurate in judging ambiguous pip shapes than subjects trained on unambiguous materials. There was no difference between groups in the judgment of ambiguous pip shapes.

A66-80133
MONOCULAR STEREOSCOPIC PERCEPTION OF DISPARATE IMAGES.
Eugene A. Stasiak (Waterloo, New Toronto U., Lakeshore Psychiat. Hosp., Canada).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 371–374. 7 refs.

Twenty subjects were presented stereograms alternately to one eye. In a range of alternation rates of 2.1 to 10.0 c.p.s. with a mean of 5.5 c.p.s., 18 subjects reported perception of stereoscopy. Due to retinal interactions between the two views the scene was also seen as vibrating. This phenomenon is important both to the question of the relation between monocular movement parallax and binocular stereopsis and to the theory of a binocular cyclopean field (Hochberg, 1964).

A66-80134
ADDITION OF CONTROLLED DISTORTION TO DELAY OF AUDITORY FEEDBACK.
William C. Roehrig (Columbia U.; and N. Y. State Dept. of Mental Hyg., Biometrics Res., New York City).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 407–413. 8 refs.
Grant NIH NB-03852.

In an attempt to determine what types of sensory information are processed by the feedback mechanism used to monitor speech production, the accuracy and duration of the speech production of 22 subjects was assessed when auditory feedback was undelayed or delayed (.197 sec. delay), and undistorted or distorted either by " infinite " peak clipping or by differentiation following by "infinite" peak clipping and integration. It was found that the degree to which speech was disrupted under delayed auditory feedback (DAF) could not be accounted for by the intelligibility of the auditory feedback. The results suggested that speech was maximally disrupted under DAF when the auditory feedback not only was highly intelligible but also contained information about the amplitude variation of the effector output (speech).

A66-80135
DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS.
Melvin I. Barton, Harold Goodglass, and Amnon Shai (Veterans Admin. Hosp., Boston, Mass.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 431–437. 18 refs.

In this study, the role of lateral cerebral dominance in the consistent finding of lower tachistoscopic thresholds in the right than in the left visual field for alphabetic material was tested for readers of Hebrew and English. Twenty Israeli subjects were presented with Hebrew and English three-letter words, printed vertically, through a monocular tachistoscope, displaced to left or right of fixation by 2·21°. Ten American subjects were also tested for three-letter English words, under similar conditions. Significantly lower thresholds in the right field were found for both groups and for both languages, despite the fact that Hebrew, unlike English, is read from right and left. These findings tend to support the hypothesis that alphabetic stimuli arriving in the major cerebral hemisphere are more readily recognized than similar stimuli arriving in the hemisphere contralateral to the language areas.

A66-80136
JUDGMENT OF SIZE WITH VARYING CONDITIONS OF STIMULUS DURATION AND ILLUMINATION.
L. R. Newsome (Queensland U., Great Britain).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 447–452. 7 refs.

Forty subjects assigned stimuli consisting of square grey patches of side lengths 1 in., 1 1/4 in., 1 3/4 in., and 2 in., into 5 categories according to perceived size. The stimuli were viewed tachistoscopically under 4 conditions of duration–625, 125, 25, and 5 msec.–and two conditions of illumination–1.00 and 0.80 log ft. L. on white. Half the subjects experienced high illumination conditions and the other half low. The differences in slope and position of the graph of scale values against real size for the two illumination conditions suggest that the size shrinkage effect is a function of the interaction of illumination and duration.

A66-80137
JUDGING WITH WHICH EYE ONE IS VIEWING A THREE-DIMENSIONAL SCENE.
Gerald V. Barrett and Thomas R. Williamson (Goodyear Aerospace Corp., Akron, Ohio).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 455–458. 10 refs.

Fifteen subjects were asked to judge whether they were using either eye alone or both eyes while viewing a three-dimensional scene. The judgments were made through an apparatus which occluded vision in either eye without the subject's awareness. It was found that while the subject could make the judgments above the chance level, they were in error on approximately 30% of the trials.

A66-80138
HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN: TRANSFER AND RETENTION OF EFFECTS FROM TWELVE DAYS OF ROTATION AT 10 RPM.
Fred E. Guedry, Jr. (U. S. Naval Aviation Med. Center, U. S. Naval School of Aviation Med., Pensacola, Fla.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 459–481. 31 refs.
NASA supported research.

Nine men rotated at 10 r.p.m. for 12 days. Control subjects were tested at comparable intervals. Tests conducted before and after the 12-day run demonstrated that nystagmus and subjective effects produced by head movements during the accustomed counter clockwise direction of rotation had diminished markedly, whereas during clockwise rotation, 1 hr. after the 12-day run, nystagmus and subjective reactions approximately equaled reactions prior to the 12-day run. The unequal reduction was attributed to conditioned compensatory reactions. Two days later, responses to both rotation directions were suppressed as compared with initial levels of response; compensatory reactions had apparently dissipated. Some response decline was still present after 3 wk. rest, but tests after 3 mo. revealed considerable recovery toward initial response levels. Reactions to passive wholebody angular acceleration were not greatly altered by the 12-day run.

A66-80139
COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION.
Mymon Goldstein and William B. Turpin (Princeton U., N. J.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 491–496.
Grants AF-AFOSR-62-197 and AF-AFOSR-965-65.

A 4-display contingent identity discrimination design was combined with a 4-display contingent position discrimination design to produce a merged task, whose 8 displays appeared repeatedly over a sequence of trials. Human subjects solved the contingent identity portion of the task first in nearly all cases and maintained a high level of accuracy on the solved portion while coping with the remainder. Experimental variations related to the visual distinctiveness of the two portions proved unimportant.

A66-80140
MOTOR SKILLS BIBLIOGRAPHY: XLV. PSYCHOLOGICAL ABSTRACTS, 1964, VOLUME 38, SECOND HALF.
C. H. Ammons and R. B. Ammons (Mont. U., Missoula).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 515–518. 102 refs.

This is a selected list of 102 items concerned with motor skills from Psychological Abstracts, vol. 38, 2nd half, 1964.

A66-80141
HUMAN AND ANIMAL VIGILANCE.
Harry J. Jerison (Antioch Coll., Behavior Res. Lab., Yellow Springs, Ohio).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 580–582.
Grant AF-AFOSR-150-64.

Experiments with both men and monkeys, summarized in this report, indicate that vigilance decrements are associated with the ease of difficulty of observing. A given set of signals may be detected often or rarely by human observers, depending on how easy it is to watch the background of stimulus events within which signals can occur.

A66-80142
CONSISTENCY AND STYLE OF AUTOKINETIC MOVEMENT.
John F. Santos, Bobby J. Farrow, and James R. Haines (Menninger Found., Topeka, Kan.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 583–586.
Grant PHS MH 03924.

The records of subjects who were given a series of autokinetic (AK) trials in separate experimental sessions were discussed in terms of their interindividual differences and intra-individual similarities.

A66-80143
ALTERATIONS OF INTERHIPPOCAMPAL IMPULSES IN MAN DURING NATURAL SLEEP AND DISTRACTION.
R. Guerrero-Figueroa and Robert G. Heath (Tulane U. School of Med. and Southeast La. Hosp., New Orleans).
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 591-594. 5 refs.
Edward Schlieder Educ. Found., New Orleans supported research.

Interhippocampal evoked responses (IHR) were studied in two fully conscious men during wakefulness (W), natural sleep associated with slow wave electroencephalographic (EEG) activity (SS), sleep associated with rapid EEG activity (RS) and with rapid eye movements (REM), or both, and during distraction or attention. Striking incremental changes in amplitude of pre- and postsynaptic components of the IHR appeared during SS, whereas there was marked diminution in the amplitude of all components of the IHR during RS and REM, and while subjects solved a mathematics problem. It was suggested that hippocampal pre- and postsynaptic inhibition during attention and dreaming is dependent upon inhibitory influences from mesencephalic reticular formation.

A66-80144
GESTALT STUDY OF TIME ESTIMATION.
Charles M. Friel and William T. Lhamon (Cornell School of Med., Ithaca, N. Y.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 603-606. 7 refs.

In order to investigate the relationship between the temporal proximity of associational processes and the experience of time, 40 male subjects were asked to reproduce a series of 1-min. time intervals in which they wrote down words input to them at various rates. Half the group was given nonsense syllables and the other half was given words with high associational value. Subjects who heard nonsense syllables gave progressively shorter estimates of the 1-min. interval as the rate of input of these stimuli was increased. However, subjects who heard words with high associational value showed no difference in their time estimates as the rate of input was increased. The study suggests that time estimates are in part a function of the frequency of associational processes initiated during a given temporal duration.

A66-80145
ERROR CORRELATIONS IN A TWO-DIMENSIONAL COMPENSATORY TRACKING TASK.
R. G. Lathrop (Chico State Coll., Calif.)
Perceptual and Motor Skills, vol. 21, Oct. 1965, p. 653-654.

Earlier studies utilizing two-dimensional compensatory tracking have generally computed either a single dimension average error or have taken the simple sum of the two average errors each computed separately. Results of the current study indicate that average error computed on the more highly variant of the two dimensions accounts for approximately 85 to 90% of the variance of the simple sum average error. For most experiments, the reduction in the number of computer amplifiers required may justify the use of the single dimension average error.

A66-80146
ALTERATIONS IN PULMONARY SURFACE ACTIVE LIPIDS DURING EXPOSURE TO INCREASED OXYGEN TENSION.
Thomas E. Morgan, Theodore N. Finley, Gary L. Huber, and Helen Fialkow (Wash. U., School of Med., Depts. of Med. and Anesthesiol., Seattle).
Journal of Clinical Investigation, vol. 44, Nov. 1965, p. 1737-1744. 26 refs.

The syndrome of progressive respiratory distress, pulmonary edema, and increased pulmonary surface tension was induced in eight dogs by exposure to oxygen tensions greater than 550 mm. Hg for 44.5 to 52 hours. Pulmonary surfactant was extracted by endobronchial washing for measurement of lipid composition and surface activity. Five dogs developed respiratory distress without pulmonary edema. In these dogs endobronchial wash surface tension was normal or slightly increased, and total lipid distribution was essentially normal. Esterified fatty acids in the lecithin fraction were consistently altered with a reduction in palmitate and total saturated fatty acids. Three dogs developed pulmonary edema with increased surface tension, increased total lipid and protein, and relatively decreased total phospholipid in the endobronchial washings. Esterified fatty acids in the lecithin fraction were markedly altered with palmitate levels about one-third normal. Esterified arachidonate was present that was attributed to intra-alveolar plasma. Electron micrographs of the lung after oxygen exposure showed thickening of alveolar basement membrane and alterations in the structure of the lamellar bodies of the type II alveolar epithelial cells.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography* FEBRUARY 1966

Listing of Subject Headings of Reports

A Notation of Content, rather than the title of the document, appears under each subject heading; it is listed under several headings to provide multiple access to the subject content. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one subject heading, the accession numbers are arranged in sequence.

A

ABIOGENESIS
ASTROPHYSICAL OBSERVATION AND EXPERIMENTAL RESULTS OF ORGANIC SYNTHESIS BEARING ON ABIOGENIC FORMATION OF BIOCHEMICAL COMPOUNDS FORMED FROM SIMPLE PRECURSOR IN AQUEOUS OR AQUEOUS AMMONIA SYSTEM A66-11603

ACCELERATION
EFFECT OF ACCELERATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW
REPT.-64-RD-8 N66-10736

ACCELERATION STRESS
RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE A66-11665

COMBINED EFFECTS OF WHOLE BODY IRRADIATION ON RATS SUBJECTED TO PROLONGED INCREASED ACCELERATIVE FORCES
AD-620403 N66-11336

ACCIDENT PREVENTION
INTERNATIONAL FOUNDATION FOR FLIGHT SAFETY AND ACCIDENT PREVENTION A66-80042

DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

ACCIDENT PRONENESS
PERSONALITY PROBLEMS AND ACCIDENT PRONENESS IN PILOTS AS RELATED TO PERSONNEL SELECTION TESTING A66-80052

ACCLIMATIZATION
ACCLIMATIZATION AND TRAINING OF ATHLETES IN MOUNTAINOUS AREA
JPRS-32290 N66-10517

ACTIVATION /BIOL/
PHYSIOLOGICAL GRADIENTS IN SKELETAL-MOTOR AND AUTONOMIC RECORDINGS, MENTAL ACTIVITY, AND BEHAVIOR A66-80004

ADAPTATION
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS A66-80024

AEROSOL
AEROSOL AND RADIATION PHYSICS, BODY RADIOACTIVITY MEASUREMENTS, AND RADIATION MEDICINE RESEARCH
AERE-PR/HPM-7/U/ N66-10190

AEROSPACE MEDICINE
ELECTROCARDIOGRAPHY AS RELATED TO FLYING PERSONNEL INCLUDING CASE HISTORIES A66-10605

BEHAVIOR OF RIGHT INTRAVENTRICULAR CONDUCTION IN 148 FLYING CADETS UNDER NORMAL SEA-LEVEL CONDITIONS AND ACUTE ANOXIC ANOXIA A66-10608

MEDICAL HISTORY OF 1056 AVIATORS OVER 24-YEAR PERIOD A66-10610

AMERICAN AND SOVIET EXPERIENCE CONSIDERING WEIGHTLESSNESS, IONIZING RADIATION, DYNAMIC AND BIOLOGICAL FACTORS, ETC
SAE PAPER 650812 A66-10819

BIOLOGICAL PROBLEMS IN EXTENDED MANNED MISSIONS CAUSED BY LOW G, ARTIFICIAL ATMOSPHERE AND ABSENCE OF TERRESTRIAL PERIODICITIES A66-11622

EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

ANNOTATED BIBLIOGRAPHY OF AEROSPACE MEDICINE AND BIOLOGY
NASA-SP-7011/16/ N66-10316

PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

ANGULAR MOTION EFFECTS ON VESTIBULAR APPARATUS - NYSTAGMUS - AEROSPACE MEDICINE
FTD-TT-65-216/1&2 N66-11356

RESEARCHES IN AEROSPACE MEDICINE DEALING WITH PHYSIOLOGICAL RESPONSES TO BED REST, DRUGS, HEAT STRESS, PROTON IRRADIATION, AND WATER IMMERSION
NASA-CR-67948 N66-11753

PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

DISEASE COMMUNICATION THROUGH AIR TRANSPORTATION - AEROSPACE MEDICINE
AD-470689 N66-11850

AEROSPACE VEHICLE
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

AFTERIMAGE
AUTOKINESIS IN DARK ADAPTED SUBJECTS EXPOSED TO LIGHT AND AFTERIMAGE PRESENTED ALONE AND TOGETHER A66-80119

AGE FACTOR
FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION

NASA-TT-F-9760 N66-11615

AGING
CLINICAL AND PATHOLOGICAL EFFECTS OF PROLONGED SOLAR EXPOSURE OF SKIN ASSOCIATED WITH AGING IN MAN A66-80008

AIR BLAST
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
CEX-65.4 N66-10963

AIR POLLUTION
EFFECTIVE PLANNING AND OPERATIONS REQUIRED FOR CONTROL OF AIR POLLUTION DUE TO INCREASED USE OF TOXIC PROPELLANTS IN LARGER MISSILES A66-11491

AIR POLLUTION, AND INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN U.S.S.R.
JPRS-32565 N66-10199

AIR TRANSPORTATION
HELP PROJECT - HELICOPTER EMERGENCY LIFESAVING PATROL - A CIVILIAN PROJECT A66-80083

DISEASE COMMUNICATION THROUGH AIR TRANSPORTATION - AEROSPACE MEDICINE
AD-470689 N66-11850

AIRCRAFT ACCIDENT
HYPOGLYCEMIA AS POSSIBLE CAUSE OF AIRCRAFT ACCIDENTS A66-80043

PILOT ERROR AND HUMAN FACTORS IN AIRCRAFT ACCIDENTS MAKE PSYCHOLOGICAL OBSERVATION AND EXAMINATION OF FLYING PERSONNEL MANDATORY A66-80051

AIRCRAFT CARRIER
DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

AIRCRAFT CONTROL
PREDICTION DISPLAY BASED ON COMPUTER EXTRAPOLATED DATA IN AIRCRAFT PILOTING A66-11985

AIRCRAFT INSTRUMENT
PREDICTION DISPLAY BASED ON COMPUTER EXTRAPOLATED DATA IN AIRCRAFT PILOTING A66-11985

AIRCRAFT INSTRUMENTATION
COMPARATIVE MERITS OF VISUAL, AUDIBLE AND COMPOSITE AIRCRAFT WARNING SYSTEMS FOR OPTIMUM HUMAN RESPONSE TO CAUSAL CONDITION A66-10939

AIRCREW
THRESHOLD OF VESTIBULAR CORIOLIS EFFECT - SIGNIFICANCE TO AIRCREW
SAM-TR-65-55 N66-10569

ALTITUDE SIMULATION
CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS A66-80110

AMINO ACID
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN A66-80014

EFFECTS OF AMINO ACIDS ON GROWTH OF HYDROGENOMONAS EUTROPHA
NASA-CR-67927 N66-10956

AMPHETAMINE
EFFECT OF AMPHETAMINE ON SIGNAL DETECTABILITY IN VIGILANCE TASK A66-10616

ANATOMY
MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

ANESTHETICS
VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

ANGULAR VELOCITY
ANGULAR MOTION EFFECTS ON VESTIBULAR APPARATUS - NYSTAGMUS - AEROSPACE MEDICINE
FTD-TT-65-216/1&2 N66-11356

ANIMAL STUDY
HYPOXIA PROTECTION ON TAKING OF SECOND GRAFT OF HOMOLOGOUS BONE MARROW IN PREVIOUSLY IRRADIATED AND GRAFTED MICE A66-10609

U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

SYMPOSIUM ON PHYSICAL ACTION AND BIOLOGICAL EFFECTS OF ULTRASOUND A66-80093

BIOLOGICAL AND BEHAVIORAL ASPECTS OF BIOLOGICAL CLOCKS IN ANIMALS A66-80099

MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT A66-80112

BIOMEDICAL DATA COLLECTION FOR ANIMAL STUDY AND MANNED SPACE FLIGHT PROGRAMS. A66-80113

EFFECT OF CONTINUOUS SOUND OF HIGH INTENSITY AND FREQUENCY ON SIZE OF NUCLEI IN HAIR CELLS AND LOCATION OF NUCLEIC ACIDS IN ORGAN OF CORTI OF RATS AND GUINEA PIGS A66-80118

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE N66-10164

ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS N66-10167

MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY
ARL-TR-65-10 N66-10478

ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

ANOXIA
ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA A66-80029

ANTHROPOMETRY
ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

ANTICHOLINERGICS
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN A66-80014

ANTIOXIDANT
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

ANTIRADIATION DRUG
RADIATION DAMAGE OF BONE MARROW CELLS DURING INTERPHASE IN MICE WHO RECEIVED PRELIMINARY INJECTIONS OF MECAMYLAMINE A66-80117

APOLLO PROJECT
GEMINI AND APOLLO EARTH-ORBITAL PROGRAMS A66-11615

AROUSAL
EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE A66-80073

ARTERY
COMPARATIVE ARTERIAL OSCILLOGRAPHIC INVESTIGATIONS OF FOREARM AND LEG IN YOUNGER AND OLDER PERSONS
NASA-TT-F-9759 N66-11614

ARTHROPOD
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

ARTIFICIAL GRAVITY
INTERIOR DESIGN PROBLEMS IN ARTIFICIAL G SPACECRAFT SIMULATOR A66-11624

ARTIFICIAL RESPIRATION
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS N66-10369

ASPHYXIA
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS A66-80028

ASTRONAUT
SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

ASTRONAUT PERFORMANCE
PHYSIOLOGICAL TEST RESULTS ON COSMONAUTS DURING VOSKHOD I AND II FLIGHTS INCLUDING ELECTROCARDIOGRAMS, ELECTROENCEPHALOGRAMS, PNEUMOGRAMS, BLOOD TESTS, SPACESUIT PARAMETERS, ETC A66-10416

IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS A66-10803

PROBLEM AREAS IN LONG DURATION MANNED SPACE FLIGHT NOTING VEHICLE MAINTENANCE, EXTRAVEHICULAR ACTIVITIES, VISUAL SKILL PERFORMANCE, SPACECRAFT CONTROL, ETC
SAE PAPER 650809 A66-10818

AMERICAN AND SOVIET EXPERIENCE CONSIDERING WEIGHTLESSNESS, IONIZING RADIATION, DYNAMIC AND BIOLOGICAL FACTORS, ETC
SAE PAPER 650812 A66-10819

RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC A66-11663

TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

ASTRONAUT TRAINING
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

ATMOSPHERIC PRESSURE
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

LOW BAROMETRIC PRESSURE EFFECTS ON COLON IN RATS A66-80100

ATTITUDE CONTROL
AVAILABILITY CONCEPT IN ATTITUDE CONTROL SYSTEM FOR MANNED MARS EXPEDITION A66-10084

AUDIOLOGY
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS A66-80024

RECOVERY FROM TEMPORARY SHIFT AS FUNCTION OF STIMULUS AND TEST TONE VARIABLES. A66-80027

SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

INDIVIDUAL MASKING LEVELS IN PURE TONE AUDIOMETRY A66-80129

AUDITORY PERCEPTION
INFORMATION PROCESSING IN AUDITORY NEURAL MECHANISM, EXAMINING SYNTHESIS OPERATION OF CORTEX NEURONS AND FUNCTION OF CENTRIFUGAL NERVE PATHS A66-11365

AUDITORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION A66-80092

ADDITION OF CONTROLLED DISTORTION TO DELAY OF AUDITORY FEEDBACK A66-80134

INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
ESD-TR-65-461 N66-11058

AUDITORY SENSATION AREA
STOCHASTIC BEHAVIOR OF PRIMARY AUDITORY NEURONS ILLUSTRATED BY FUNCTIONAL MODEL SUBJECTED TO

STEADY HF SINUSOIDAL TONE BURSTS
A66-10400

AUDITORY STIMULUS
BEHAVIOR AND PHYSIOLOGICAL CORRELATES OF HUMAN RESPONSE TIME TO HIGH INTENSITY AUDITORY STIMULI
A66-11832

SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS
A66-80024

CONTRALATERAL OLIVO-COCHLEAR BUNDLE STIMULATION INFLUENCE ON COCHLEAR POTENTIALS OF CAT EVOKED BY ACOUSTIC STIMULI OF VARIOUS FREQUENCIES AND INTENSITIES
A66-80025

RECOVERY FROM TEMPORARY SHIFT AS FUNCTION OF STIMULUS AND TEST TONE VARIABLES.
A66-80027

MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES
A66-80031

EFFECT OF CONTINUOUS SOUND OF HIGH INTENSITY AND FREQUENCY ON SIZE OF NUCLEI IN HAIR CELLS AND LOCATION OF NUCLEIC ACIDS IN ORGAN OF CORTI OF RATS AND GUINEA PIGS
A66-80118

INDIVIDUAL MASKING LEVELS IN PURE TONE AUDIOMETRY
A66-80129

AUTOKINESIS
AUTOKINESIS IN DARK ADAPTED SUBJECTS EXPOSED TO LIGHT AND AFTERIMAGE PRESENTED ALONE AND TOGETHER
A66-80119

INTRAINDIVIDUAL DIFFERENCES AND SIMILARITIES IN STYLE AND CONSISTENCY OF AUTOKINETIC MOVEMENT
A66-80142

AUTOMATIC CONTROL
HUMAN PILOT BEHAVIOR COMPARED WITH AUTOMATIC PILOTS IN TERMS OF ADAPTABILITY, RESPONSE TIME AND RELIABILITY
A66-11866

AUTOMATION
AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039
N66-11937

AUTONOMIC NERVOUS SYSTEM
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION
A66-80006

PROBLEMS OF MEASUREMENT ENGENDERED BY INDIVIDUAL DIFFERENCES IN AUTONOMIC RESPONSIBILITY
A66-80007

VAGAL RELAXATION OF STOMACH - EXPERIMENTAL INVESTIGATION OF CONCEPT OF TRANSMISSION MECHANISM IN CATS
A66-80012

B

BACTERIA
BACTERIAL CONTAMINATION OF MURRAY, ORGUEIL AND MOKOIA CARBONACEOUS METEORITES
A66-80126

DESCRIPTIVE CHARTS AND CULTURAL CHARACTERISTICS OF SOIL DIPTHEROIDS - CORNEBACTERIUM
NASA-CR-67686
N66-10773

EFFECTS OF AMINO ACIDS ON GROWTH OF HYDROGENOMONAS EUTROPHA
NASA-CR-67927
N66-10956

POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1
N66-11696

BARBITURATE
LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT
A66-80070

BAROTRAUMA
PREVENTION OF BAROTITIS IN FLIERS, CAISSON WORKERS, AND DIVERS THROUGH DECONGESTANTS
A66-80065

BED REST
RESEARCHES IN AEROSPACE MEDICINE DEALING WITH PHYSIOLOGICAL RESPONSES TO BED REST, DRUGS, HEAT STRESS, PROTON IRRADIATION, AND WATER IMMERSION
NASA-CR-67948
N66-11753

BEHAVIOR
BIOLOGICAL AND BEHAVIORAL ASPECTS OF BIOLOGICAL CLOCKS IN ANIMALS
A66-80099

BENZENE POISONING
HEMATOPOIETIC EFFECT WITH VARIOUS VITAMINS IN TREATING CHRONIC BENZENE POISONING
A66-80087

BIBLIOGRAPHY
BIBLIOGRAPHY OF CURRENT ASPECTS OF EXOBIOLOGY DEALING WITH SOLAR SYSTEM, LIFE DETECTION SYSTEM, ORIGIN OF LIFE AND LIFE IN UNIVERSE
A66-11612

SELECTED LIST OF REFERENCES ON MOTOR SKILLS
A66-80140

ANNOTATED BIBLIOGRAPHY OF AEROSPACE MEDICINE AND BIOLOGY
NASA-SP-7011/16/
N66-10316

ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1
N66-11914

BINAURAL HEARING
VOICE COMMUNICATION CHANNELS EXPANSION, USING MANS BINAURAL LISTENING CAPABILITY
A66-11828

BIOASTRONAUTICS
CYBERNETICS METHODS SUITED TO COMPLEX SYSTEMS ASSOCIATED WITH BIOASTRONAUTICS
A66-10807

CONSTRUCTION, PLUMBING, CAPABILITY, AND OPERATION OF LIFE SUPPORT SYSTEMS EVALUATOR - BIOASTRONAUTICS
AMRL-TDR-63-43
N66-10918

BIOCHEMISTRY
ASTROPHYSICAL OBSERVATION AND EXPERIMENTAL RESULTS OF ORGANIC SYNTHESIS BEARING ON ABIOGENIC FORMATION OF BIOCHEMICAL COMPOUNDS FORMED FROM SIMPLE PRECURSOR IN AQUEOUS OR AQUEOUS AMMONIA SYSTEM
A66-11603

MARTIAN LIFE POSSIBILITIES DISCUSSING ITS ATMOSPHERE, CLOUDS, VIOLET LAYER, TEMPERATURE AND BIOLOGICAL INTERPRETATION OF DARK AREAS
A66-11607

BIODYNAMICS
RELATIVE SPECIFIC ENERGY CAPABILITIES OF FISH AND BIRDS AND BODY STRUCTURE RELATIVE TO ENVIRONMENT
A66-10200

BIOELECTRIC POTENTIAL
CONTRALATERAL OLIVO-COCHLEAR BUNDLE STIMULATION INFLUENCE ON COCHLEAR POTENTIALS OF CAT EVOKED BY ACOUSTIC STIMULI OF VARIOUS FREQUENCIES AND INTENSITIES
A66-80025

MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA
A66-80029

ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY IN MAN A66-80048

UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

BIOINSTRUMENTATION
BIOMEDICAL DATA COLLECTION FOR ANIMAL STUDY AND MANNED SPACE FLIGHT PROGRAMS. A66-80113

ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

BIOLOGICAL CELL
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION A66-80030

SYMPOSIUM ON PHYSICAL ACTION AND BIOLOGICAL EFFECTS OF ULTRASOUND A66-80093

PHYSICAL PRINCIPLES INVOLVED IN ACTION OF WEAK ULTRASOUND ON BIOLOGICAL CELLS A66-80094

EFFECT OF WEAK ULTTRASOUND ON BIOLOGICAL CELL A66-80095

TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

BIOLOGICAL EFFECT
BIOLOGICAL PROBLEMS IN EXTENDED MANNED MISSIONS CAUSED BY LOW G, ARTIFICIAL ATMOSPHERE AND ABSENCE OF TERRESTRIAL PERIODICITIES A66-11622

VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE A66-11665

RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

BIOLOGICAL MODEL
CONSTRUCTION, AND APPLICATION OF BIONIC MODELS
JPRS-32502 N66-10370

BIOLOGICAL RHYTHM
BIOLOGICAL AND BEHAVIORAL ASPECTS OF BIOLOGICAL CLOCKS IN ANIMALS A66-80099

BIOLOGY /GEN/
BIOLOGIC MEMORY AND NUCLEIC ACIDS
JPRS-32266 N66-10203

ANNOTATED BIBLIOGRAPHY OF AEROSPACE MEDICINE AND BIOLOGY
NASA-SP-7011/16/ N66-10316

PHILOSOPHICAL IMPLICATIONS OF MODERN BIOLOGICAL AND CHEMICAL SCIENCES ON CONCEPT OF LIFE
JPRS-32457 N66-10559

BIOMECHANICS
SIMILARITY CONCEPT APPLIED TO STUDY OF WORK DONE BY LIVING CREATURES IN VARIOUS SITUATIONS A66-10302

BIONICS
CONSTRUCTION, AND APPLICATION OF BIONIC MODELS
JPRS-32502 N66-10370

BIOPHYSICS
EXOBIOLOGY CONCEPTS SUGGEST THAT APPARENT INHERENT LIMITATIONS ON TEMPERATURE, PRESSURE OR CHEMICAL ENVIRONMENT FOR LIVING MATTER ARE GEOCENTRIC MYTHS A66-11602

SYMPOSIUM ON PHYSICAL ACTION AND BIOLOGICAL EFFECTS OF ULTRASOUND A66-80093

PHYSICAL PRINCIPLES INVOLVED IN ACTION OF WEAK ULTRASOUND ON BIOLOGICAL CELLS A66-80094

BIRD
RELATIVE SPECIFIC ENERGY CAPABILITIES OF FISH AND BIRDS AND BODY STRUCTURE RELATIVE TO ENVIRONMENT A66-10200

BLOOD
DETERMINATION OF MIXED VENOUS CO2 PRESSURE WITH A REBREATHING METHOD IN MAN A66-80013

BLOOD OXYGEN CONTENT MEASURED RELIABLY BY MEANS OF GAS CHROMATOGRAPHY A66-80068

WATER AND SOLUTE FLUXES BETWEEN BLOOD AND INTRAPERITONEAL GLUCOSE INFUSATE OF DOG
SAM-TR-65-5 N66-10849

PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNAIKEMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

EFFECT OF EXPERIMENTAL HYPOXIC HYPOXIA ON BLOOD CLEARING FACTOR
JPRS-32781 N66-11658

BLOOD CIRCULATION
ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION A66-80127

BLOOD FLOW
EFFECT OF ACCELERATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW
REPT.-64-RD-8 N66-10736

BLOOD PLASMA
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

BLOOD PRESSURE
ARTERIAL PULSE WAVE VELOCITY AS PSYCHOPHYSIOLOGICAL MEASURE A66-80005

BODY FLUID
ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA A66-80029

BODY MEASUREMENT /BIOL/
MEASUREMENT OF TENSILE STRENGTH OF HUMAN LUNG TISSUE OBTAINED AT NECROPSY A66-80019

AEROSOL AND RADIATION PHYSICS, BODY RADIOACTIVITY MEASUREMENTS, AND RADIATION MEDICINE RESEARCH
AERE-PR/HPM-7/U/ N66-10190

BODY TEMPERATURE /BIOL/
EFFECT OF PASSIVE HEATING BY DIATHERMY AND ACTIVE HEATING BY PHYSICAL EXERCISE ON TEMPERATURE REGULATION IN MAN A66-80015

REGULATION OF SWEAT SECRETION DURING EXERCISE IN MAN - CORRELATION OF SWEATING TO BODY TEMPERATURE

A66-80016

BONE
PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS. A66-80022

RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

BONE MARROW
HYPOXIA PROTECTION ON TAKING OF SECOND GRAFT OF HOMOLOGOUS BONE MARROW IN PREVIOUSLY IRRADIATED AND GRAFTED MICE A66-10609

TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

BORON FLUORIDE
NEUTRON DOSE EQUIVALENT RATE MEASUREMENTS AROUND PULSED NEUTRON GENERATORS BY BORON TRIFLUORIDE PULSE COUNTER OR ION CHAMBER
AERE-R-4883 N66-10192

BRAIN
BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT STATE A66-80116

ALTERATIONS OF INTERHIPPOCAMPAL IMPULSES IN MAN DURING SLEEP, REM STATE, AND WAKEFULNESS A66-80143

BRAIN INJURY
ANALYSIS OF CRANIOCEREBRAL INJURIES IN FLIGHT PERSONNEL AS RELATED TO SUBSEQUENT CAPABILITY TO PERFORM DUTIES A66-80049

BREATHING MODE
ORAL AND LARYNGEAL COMPONENTS OF UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING A66-80026

BREMSSTRAHLUNG
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC A66-11663

C

CAFFEINE
EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE A66-80073

CALCIUM
PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

CAPE KENNEDY
EFFECTIVE PLANNING AND OPERATIONS REQUIRED FOR CONTROL OF AIR POLLUTION DUE TO INCREASED USE OF TOXIC PROPELLANTS IN LARGER MISSILES A66-11491

CARBOHYDRATE METABOLISM
OXYGEN CONSUMPTION AND LIVER GLUCOSE, SUCCINATE, AND PYRUVATE LEVELS IN HYPEROXIC RATS A66-80038

HYPOGLYCEMIA AS POSSIBLE CAUSE OF AIRCRAFT ACCIDENTS A66-80043

UNBALANCED DIET EFFECTS ON GLUCOSE METABOLISM IN RATS A66-80108

CARBON DIOXIDE
CARBON DIOXIDE REDUCTION SYSTEMS USING CHEMICAL, ELECTROCHEMICAL AND THERMAL ENERGY A66-11641

CARBON DIOXIDE TENSION
DETERMINATION OF MIXED VENOUS CO2 PRESSURE WITH A REBREATHING METHOD IN MAN A66-80013

CARBON MONOXIDE
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS A66-80084

CARBON TETRACHLORIDE POISONING
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS A66-80060

CARBONACEOUS METEORITE
BACTERIAL CONTAMINATION OF MURRAY, ORGUEIL AND MOKOIA CARBONACEOUS METEORITES A66-80126

CARDIOTACHOMETRY
TEST OF FATIGUE AND TRAINING USING CARDIOTACHOMETRIC INTEGRATION INDEX A66-80036

CARDIOVASCULAR SYSTEM
BEHAVIOR OF RIGHT INTRAVENTRICULAR CONDUCTION IN 148 FLYING CADETS UNDER NORMAL SEA-LEVEL CONDITIONS AND ACUTE ANOXIC ANOXIA A66-10608

TEST OF FATIGUE AND TRAINING USING CARDIOTACHOMETRIC INTEGRATION INDEX A66-80036

TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS A66-80101

METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

CASE HISTORY
ASPECTS OF VOMITING DURING MOTION SICKNESS IN FLIGHT - CASE HISTORIES OF FLYING PERSONNEL A66-80046

CASE HISTORIES OF MIGRAINE LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT A66-80075

CAT
ELECTROPHYSIOLOGICAL RESEARCH IN EFFERENT VESTIBULAR SYSTEM IN CAT A66-80010

VAGAL RELAXATION OF STOMACH - EXPERIMENTAL INVESTIGATION OF CONCEPT OF TRANSMISSION MECHANISM IN CATS A66-80012

CONTRALATERAL OLIVO-COCHLEAR BUNDLE STIMULATION INFLUENCE ON COCHLEAR POTENTIALS OF CAT EVOKED BY ACOUSTIC STIMULI OF VARIOUS FREQUENCIES AND INTENSITIES A66-80025

VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT A66-80070

RETINAL RESPONSE TO ISCHEMIA AND HYPEROXIA IN MAN AND CAT A66-80072

SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION A66-80091

CATALYST
EXTRATERRESTRIAL LIFE DETECTION FROM ENZYME CATALYSIS OF OXYGEN-18 EXCHANGE REACTIONS
NASA-CR-67924 N66-10939

CATECHOLAMINE
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN A66-80014

RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

CELL DIVISION
DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

CENTRIFUGAL FORCE
CENTRIFUGAL SIMULATION WITH PILOT OF MIRAGE III AIRCRAFT TAILSPIN A66-80047

CEREBRAL CORTEX
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION A66-80006

ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS A66-80135

CHEMICAL COMPOUND
ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

CHEMICAL ENERGY
CARBON DIOXIDE REDUCTION SYSTEMS USING CHEMICAL, ELECTROCHEMICAL AND THERMAL ENERGY A66-11641

CHEMICAL STERILIZATION
ACCIDENTAL BIOLOGICAL CONTAMINATION OF PLANETS DURING SPACE EXPLORATION, NOTING DIFFERENT PHYSICAL AND CHEMICAL STERILIZATION METHODS A66-11609

CHEMISTRY /GEN/
PHILOSOPHICAL IMPLICATIONS OF MODERN BIOLOGICAL AND CHEMICAL SCIENCES ON CONCEPT OF LIFE JPRS-32457 N66-10559

CHIMPANZEE
FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY ARL-TR-65-10 N66-10478

CHLORELLA
PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS LINK IN CLOSED ECOLOGICAL SYSTEM A66-10981

CHOLINE
HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

CHROMOSOME
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS EUR-2451.E N66-10594

CIVIL AVIATION
STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

CLOSED CYCLE
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS A66-80084

CLOSED ECOLOGICAL SYSTEM
PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS LINK IN CLOSED ECOLOGICAL SYSTEM A66-10981

COBALT 60
ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

COCHLEA
CONTRALATERAL OLIVO-COCHLEAR BUNDLE STIMULATION INFLUENCE ON COCHLEAR POTENTIALS OF CAT EVOKED BY ACOUSTIC STIMULI OF VARIOUS FREQUENCIES AND INTENSITIES A66-80025

MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS A66-80028

ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA A66-80029

ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

EFFECT OF CONTINUOUS SOUND OF HIGH INTENSITY AND FREQUENCY ON SIZE OF NUCLEI IN HAIR CELLS AND LOCATION OF NUCLEIC ACIDS IN ORGAN OF CORTI OF RATS AND GUINEA PIGS A66-80118

DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

COCKPIT SIMULATOR
PHYSIOLOGICAL PROBLEMS CAUSED BY ENVIRONMENTAL TEMPERATURE OF MIRAGE III AIRCRAFT COCKPIT SIMULATOR A66-80039

CODE
COMPUTER CODE FOR DEPTH-DOSE IN TISSUE IRRADIATED BY PROTONS UCRL-16154 N66-11656

COLD TOLERANCE /BIOL/
TOLERANCE OF MAN TO IMMERSION IN COLD WATER AND HIS PROTECTIVE CLOTHING A66-80044

COLOR PERCEPTION
COLOR PERCEPTION OF ADDITIVE COLOR GROUP DISPLAYS - HUMAN PERFORMANCE RADC-TR-65-278 N66-10831

COMMAND SYSTEM
INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING ESD-TR-65-461 N66-11058

METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING TR-1-052 N66-11059

COMMUNICATION
EVOKED VOCAL RESPONSE OF BULLFROG - COMMUNICATION BY SOUND NASA-CR-67962 N66-11774

COMPENSATORY TRACKING
ERROR CORRELATIONS IN TWO - DIMENSIONAL COMPENSATORY TRACKING TASK A66-80145

COMPONENT RELIABILITY
ANALYSIS OF PAIRWISE AGREEMENTS AND DISAGREEMENTS INTO WITHIN AND BETWEEN COMPONENTS REPT.-625 N66-11972

COMPUTER
COMPUTER CODE FOR DEPTH-DOSE IN TISSUE IRRADIATED BY PROTONS UCRL-16154 N66-11656

COMPUTER PROGRAMMING
UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC

SIGNAL DATA N66-10055

COMPUTER SIMULATION
TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT A66-11829

COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION N66-11483

CONDITIONED RESPONSE
SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS TR-16 N66-10820

METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM FTD-TT-65-60/1&2 N66-11341

ELECTROENCEPHALOGRAPHIC CHANGES IN ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER EFFECT OF TRANQUILIZERS JPRS-32810 N66-11657

CONDUCTOR
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION ARL-65-167 N66-11982

CONFERENCE
A IAA MANNED SPACE FLIGHT MEETING AT ST. LOUIS IN OCTOBER 1965 A66-11613

CONGENITAL ANOMALY
SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

CONSTRUCTION
CONSTRUCTION, AND APPLICATION OF BIONIC MODELS JPRS-32502 N66-10370

CONSTRUCTION, PLUMBING, CAPABILITY, AND OPERATION OF LIFE SUPPORT SYSTEMS EVALUATOR - BIOASTRONAUTICS AMRL-TDR-63-43 N66-10918

CONTAMINATION
BACTERIAL CONTAMINATION OF MURRAY, ORGUEIL AND MOKOIA CARBONACEOUS METEORITES A66-80126

CONTOUR
COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION N66-11483

CONTROL DEVICE
UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

MOTIONS, GRIPPING, AND CONTROL REQUIREMENTS FOR PROSTHETIC EQUIPMENT, MANIPULATORS, AND ARTIFICIAL LIMBS AND HANDS N66-10067

CONTROL SIMULATOR
MISSION SIMULATION TECHNIQUES FOR TRAINING GEMINI FLIGHT CONTROLLERS A66-11802

CONTROL SYSTEM
CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

DESIGN, CONTROL, AND MANUFACTURING CONCEPTS FOR REMOTE HANDLING DEVICES, MANIPULATORS, REMOTELY CONTROLLED TOOLS, AND PROSTHETIC EQUIPMENT N66-10066

INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING ESD-TR-65-461 N66-11058

METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING TR-1-052 N66-11059

CORIOLIS EFFECT
THRESHOLD OF VESTIBULAR CORIOLIS EFFECT - SIGNIFICANCE TO AIRCREW SAM-TR-65-55 N66-10569

EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION SAM-TR-65-67 N66-11871

CORONARY CIRCULATION
EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

COSMIC RADIATION
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS JPRS-32265 N66-10499

CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS UCRL-TRANS-1225 N66-11419

CRANIUM
ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

CREATIVITY
VERBAL ORIGINALITY MEASURE AND DEGREE OF STRESS EXPERIENCED IN SENSORY DEPRIVATION A66-80086

CULTURE /BIOL/
DESCRIPTIVE CHARTS AND CULTURAL CHARACTERISTICS OF SOIL DIPTHEROIDS - CORNEBACTERIUM NASA-CR-67686 N66-10773

CULTURE TECHNIQUE
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE A66-12016

CYBERNETICS
CYBERNETICS METHODS SUITED TO COMPLEX SYSTEMS ASSOCIATED WITH BIOASTRONAUTICS A66-10807

EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

CYSTEINE
CHEMICAL THERAPY AND PROTECTION WITH CYSTEINE AIMED AT REDUCING BIOLOGICAL EFFECTS OF RADIATION A66-80063

CYTOLOGY
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS EUR-2451.E N66-10594

D

DARK ADAPTION
AUTOKINESIS IN DARK ADAPTED SUBJECTS EXPOSED TO LIGHT AND AFTERIMAGE PRESENTED ALONE AND TOGETHER A66-80119

DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS AD-620016 N66-10782

DATA ACQUISITION
BIOMEDICAL DATA COLLECTION FOR ANIMAL STUDY AND MANNED SPACE FLIGHT PROGRAMS. A66-80113

DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

DECISION THEORY
INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
ESD-TR-65-461 N66-11058

DECOMPRESSION SICKNESS
CASE HISTORIES OF MIGRAINE LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT
A66-80075

DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

DECOMPRESSION DISEASES - THEORY, THERAPY, AND PROBLEMS OF UNDERGROUND ENGINEERING, WORKING HYGIENE, AND OCCUPATIONAL MEDICINE
DLR-FB-65-35 N66-11758

DECONGESTANT
PREVENTION OF BAROTITIS IN FLIERS, CAISSON WORKERS, AND DIVERS THROUGH DECONGESTANTS
A66-80065

DEHYDRATION
WATER REQUIREMENTS OF HUMANS - PROBLEMS OF DEHYDRATION AND SURVIVAL A66-80088

DELAY LINE
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

DEOXYRIBONUCLEIC ACID /DNA/
U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

DEPTH PERCEPTION
MONOCULAR STEREOSCOPIC PERCEPTION OF DISPARATE IMAGES. A66-80133

JUDGING WITH WHICH EYE ONE IS VIEWING THREE-DIMENSIONAL SCENE A66-80137

DIAGNOSIS
CLINICAL DIAGNOSIS AND PROPHYLACTIC MEASURES IN INDUSTRIAL LEAD POISONING A66-80124

METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

DIET
UNBALANCED DIET EFFECTS ON GLUCOSE METABOLISM IN RATS A66-80108

DIGITAL COMPUTER
ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

DIMENSIONAL ANALYSIS
TRAINING PATTERN-CLASSIFYING SYSTEMS BY MODE-SEEKING AND ERROR-CORRECTION METHODS USING 2-, 10-, AND 100-DIMENSIONAL PATTERNS
RADC-TR-65-257 N66-10905

DISEASE
PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS.
A66-80022

AIR POLLUTION, AND INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN U.S.S.R.
JPRS-32565 N66-10199

DECOMPRESSION DISEASES - THEORY, THERAPY, AND PROBLEMS OF UNDERGROUND ENGINEERING, WORKING HYGIENE, AND OCCUPATIONAL MEDICINE
DLR-FB-65-35 N66-11758

DISEASE COMMUNICATION THROUGH AIR TRANSPORTATION - AEROSPACE MEDICINE
AD-470689 N66-11850

AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039 N66-11937

DISPLAY SYSTEM
METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

DOG
CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS
A66-80079

EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS
A66-80146

DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

WATER AND SOLUTE FLUXES BETWEEN BLOOD AND INTRAPERITONEAL GLUCOSE INFUSATE OF DOG
SAM-TR-65-5 N66-10849

DOSIMETRY
RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

DRUG
VAGAL RELAXATION OF STOMACH - EXPERIMENTAL INVESTIGATION OF CONCEPT OF TRANSMISSION MECHANISM IN CATS A66-80012

AVIATION PERSONNEL USE OF DRUGS DURING FLIGHT DUTY AS RELATED TO INSTRUCTIONS FROM FLIGHT SURGEON
A66-80054

VASODILATION BY CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN IN HYPERVENTILATION IN ELECTROENCEPHALOGRAM OF HUMANS A66-80078

DYNAMIC RESPONSE
EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

E

EAR
PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS.
A66-80022

EAR PROTECTOR
EVALUATION OF DEVICES FOR INDIVIDUAL PROTECTION OF HEARING AGAINST NOISE WITH REGARD TO THEIR FUNCTIONAL EFFICIENCY IN MAN A66-80080

EARDRUM
ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR

MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

EDEMA
CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

ELECTROCARDIOGRAPHY
ELECTROCARDIOGRAPHY AS RELATED TO FLYING PERSONNEL INCLUDING CASE HISTORIES A66-10605

ELECTROCARDIOGRAPH SERIAL EXAMINATION DEVELOPED FOR FIELD CONDITIONS A66-80067

ELECTROCHEMISTRY
CARBON DIOXIDE REDUCTION SYSTEMS USING CHEMICAL, ELECTROCHEMICAL AND THERMAL ENERGY A66-11641

ELECTRODE
ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

ELECTRODERMAL RESPONSE
NEED FOR STIMULATION AS SOURCE OF STRESS RESPONSE TO PERCEPTUAL ISOLATION A66-80074

ELECTROENCEPHALOGRAM /EEG/
VASODILATION BY CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN IN HYPERVENTILATION IN ELECTROENCEPHALOGRAM OF HUMANS A66-80078

ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

ELECTROENCEPHALOGRAPHY
ELECTROENCEPHALOGRAPHIC CHANGES IN ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER EFFECT OF TRANQUILIZERS
JPRS-32810 N66-11657

ELECTROMAGNETIC RADIATION
OVERALL PROFILE OF OPHTHALMIC INJURY ASSOCIATED WITH IONIZING AND NONIONIZING ELECTROMAGNETIC RADIATION FIELDS BASED ON HUMAN RESPONSE TO RADIATION EXPOSURE A66-10793

ELECTRON DISTRIBUTION
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC A66-11663

ELECTRON MICROSCOPY
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

ELECTRON OSCILLATION
PROTECTIVE MEASURES FOR HUMANS WORKING WITH RADIO-FREQUENCY OSCILLATORS
JPRS-32735 N66-11812

ELECTRORETINOGRAM
HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION A66-80127

ELEMENT ABUNDANCE
ASTROPHYSICAL OBSERVATION AND EXPERIMENTAL RESULTS OF ORGANIC SYNTHESIS BEARING ON ABIOGENIC FORMATION OF BIOCHEMICAL COMPOUNDS FORMED FROM SIMPLE PRECURSOR IN AQUEOUS OR AQUEOUS AMMONIA SYSTEM A66-11603

ELIMINATION
ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

EMBRYOLOGY
DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

ENDOCRINE SYSTEM
ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

ENERGY
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

ENERGY ABSORPTION
ENERGY ABSORPTION BY BIOLOGICAL MATERIAL OF ULTRASOUND A66-80096

ENERGY REQUIREMENT
PHYSICAL EXERCISE AND ENERGY EXPENDITURE OF HUMAN SUBJECTS DURING SIMULATED WEIGHTLESSNESS A66-80001

ENGINEERING DEVELOPMENT
SYSTEM ENGINEERING METHODOLOGIES TO SHOW HOW PREDICTION OF HUMAN ERROR LEADS TO HIGHER SYSTEM PERFORMANCE RELIABILITIES A66-10117

SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

ENVIRONMENT SIMULATION
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

LOW FRICTION ENVIRONMENT EFFECTS ON MAINTENANCE OPERATIONS IN SIMULATOR NOTING TORQUING-FORCE CAPABILITY, HAND-EYE COORDINATION, ETC A66-11645

ENVIRONMENTAL CONTROL
ANIMAL AND HUMAN TEST OF MANNED SPACECRAFT LIFE SUPPORT SYSTEM CONSISTING OF CLOSED SYSTEM WITH RECIRCULATING AIR LOOP, EXAMINING POTASSIUM SUPEROXIDE-POTASSIUM HYDROXIDE CHEMISTRY A66-11492

TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR LANDING AND RECONNAISSANCE MISSION MARS
NASA-CR-68000 N66-11759

ENVIRONMENTAL TEMPERATURE
ENVIRONMENTAL TEMPERATURE OF SUPERSONIC AIRCRAFT A66-80037

PHYSIOLOGICAL PROBLEMS CAUSED BY ENVIRONMENTAL TEMPERATURE OF MIRAGE III AIRCRAFT COCKPIT SIMULATOR A66-80039

ENZYME
EXTRATERRESTRIAL LIFE DETECTION FROM ENZYME CATALYSIS OF OXYGEN-18 EXCHANGE REACTIONS
NASA-CR-67924 N66-10939

ENZYME ACTIVITY
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION A66-80030

OXYGEN CONSUMPTION AND LIVER GLUCOSE, SUCCINATE, AND PYRUVATE LEVELS IN HYPEROXIC RATS

A66-80038

INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

EPINEPHRINE
BLOOD EPINEPHRINE AND NOREPINEPHRINE RELATED TO PERFORMANCE IN VISUAL VIGILANCE TASK A66-80125

ERROR CORRECTING DEVICE
TRAINING PATTERN-CLASSIFYING SYSTEMS BY MODE-SEEKING AND ERROR-CORRECTION METHODS USING 2-, 10-, AND 100-DIMENSIONAL PATTERNS
RADC-TR-65-257 N66-10905

ERROR FUNCTION
ERROR CORRELATIONS IN TWO - DIMENSIONAL COMPENSATORY TRACKING TASK A66-80145

ERYTHROCYTE
EFFECT OF LEAD ON RED BLOOD CELL FRAGILITY IN LEAD POISONING A66-80077

ETHYLENE DIAMINE TETRAACETIC ACID EDTA
RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

EUSTACHIAN TUBE
PREVENTION OF BAROTITIS IN FLIERS, CAISSON WORKERS, AND DIVERS THROUGH DECONGESTANTS A66-80065

EVACUATION
HELP PROJECT - HELICOPTER EMERGENCY LIFESAVING PATROL - A CIVILIAN PROJECT A66-80083

EXCRETION
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - *COUNTING TECHNIQUES*, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO *ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM* FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

EXPLOSIVE DECOMPRESSION
USE OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASUREMENT OF VENTILATORY MECHANICS A66-80045

EXTRATERRESTRIAL ENVIRONMENT
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

EXTRATERRESTRIAL LIFE
POSSIBILITY OF LIFE ORIGINATING IN DIFFERENT FORMS IN VARIOUS PARTS OF UNIVERSE AS RESPONSE TO CHANGING ENVIRONMENTAL CONDITIONS A66-10300

PREVALENCE AND DIVERSITY OF LIFE IN COSMOS, TRACING DIVERGENT EVOLUTION IN RESPONSE TO VARIETY OF ENVIRONMENT CONDITIONS A66-10303

EXTRATERRESTRIAL LIFE OR EXOBIOLOGY NOTING LIFE POSSIBILITY ON MARS, MOON AS POSSIBLE INFORMATION SOURCE, CONTINUOUS GENERATION OF MATTER IN UNIVERSE, ETC A66-10401

PAPERS ON EXPERIMENTAL AND THEORETICAL ASPECTS OF EXOBIOLOGY A66-11601

EXOBIOLOGY CONCEPTS SUGGEST THAT APPARENT INHERENT LIMITATIONS ON TEMPERATURE, PRESSURE OR CHEMICAL ENVIRONMENT FOR LIVING MATTER ARE GEOCENTRIC MYTHS A66-11602

ASTROPHYSICAL OBSERVATION AND EXPERIMENTAL RESULTS OF ORGANIC SYNTHESIS BEARING ON ABIOGENIC FORMATION OF BIOCHEMICAL COMPOUNDS FORMED FROM SIMPLE PRECURSOR IN AQUEOUS OR AQUEOUS AMMONIA SYSTEM A66-11603

LUNAR ATMOSPHERE AND HYDROSPHERE, PREDICTING DIMENSIONAL CORRELATION FOR CRATERS AND MARIA OF PRIMORDIAL LUNAR LIFE, NOTING DARK AND SMOOTH APPEARANCE A66-11606

MARTIAN LIFE POSSIBILITIES DISCUSSING ITS ATMOSPHERE, CLOUDS, VIOLET LAYER, TEMPERATURE AND BIOLOGICAL INTERPRETATION OF DARK AREAS A66-11607

MARTIAN LIFE-DETECTION INSTRUMENTS AND EXPERIMENTS, EXAMINING BIOLOGICAL CRITERIA AND VISUAL, ORGANIC, CHEMICAL AND METABOLIC TESTS A66-11608

EXOBIOLOGICAL TREND AND PROBLEMS INDICATING TYPES OF ORGANIC MATTER ON PLANET AND ORIGIN AND TRANSFER OF ORGANISMS IN SOLAR SYSTEM A66-11611

EXTRATERRESTRIAL LIFE DETECTION FROM ENZYME CATALYSIS OF OXYGEN-18 EXCHANGE REACTIONS
NASA-CR-67924 N66-10939

EXTRAVEHICULAR OPERATION
HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE *HANDLING EQUIPMENT* AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS N66-10057

EYE
ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION A66-80127

STEADY STATE AND FLASH REACTIONS OF PUPIL WITH REGARD TO RECEPTOR PROPERTIES AND ORGANIZATION OF RECEPTIVE FIELD N66-10438

EYE MOVEMENT
BASIC PHYSIOLOGICAL OCULOMOTOR MECHANISMS THAT MAKE HUMAN IMAGE STABILIZATION POSSIBLE, EXAMINING FLIGHT DISTURBANCE EFFECT ON SYSTEM STABILITY A66-10607

OCULOMOTOR RESPONSES TO VESTIBULAR AND OPTOKINETIC STIMULI DURING EIGHT-TURN SPINS IN JET TRAINER AIRCRAFT A66-10612

HUMAN SMOOTH PURSUIT EYE MOVEMENT AND EYE MUSCLE TENSION A66-80018

EYE-MOVEMENT PATTERNS DURING VISUAL INFORMATION PROCESSING A66-80089

EYE PROTECTION
PROTECTION DEVICES AGAINST VISION IMPAIRMENT OCCURRING DURING EXPOSURE OF AIRMEN AND MILITARY PERSONNEL TO INTENSE VISIBLE RADIATION A66-10481

OVERALL PROFILE OF OPHTHALMIC INJURY ASSOCIATED WITH IONIZING AND NONIONIZING ELECTROMAGNETIC RADIATION FIELDS BASED ON HUMAN RESPONSE TO RADIATION EXPOSURE A66-10793

F

FATTY ACID
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN A66-80014

FEEDBACK CONTROL SYSTEM
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

FISH
RELATIVE SPECIFIC ENERGY CAPABILITIES OF FISH AND BIRDS AND BODY STRUCTURE RELATIVE TO ENVIRONMENT A66-10200

FLASH BLINDNESS
PROTECTION DEVICES AGAINST VISION IMPAIRMENT OCCURRING DURING EXPOSURE OF AIRMEN AND MILITARY PERSONNEL TO INTENSE VISIBLE RADIATION
A66-10481

FLIGHT CONTROL
HUMAN PILOT BEHAVIOR COMPARED WITH AUTOMATIC PILOTS IN TERMS OF ADAPTABILITY, RESPONSE TIME AND RELIABILITY A66-11866

FLIGHT DUTY
AVIATION PERSONNEL USE OF DRUGS DURING FLIGHT DUTY AS RELATED TO INSTRUCTIONS FROM FLIGHT SURGEON
A66-80054

FLIGHT FITNESS
ANALYSIS OF CRANIOCEREBRAL INJURIES IN FLIGHT PERSONNEL AS RELATED TO SUBSEQUENT CAPABILITY TO PERFORM DUTIES A66-80049

FLIGHT SAFETY
INTERNATIONAL FOUNDATION FOR FLIGHT SAFETY AND ACCIDENT PREVENTION A66-80042

CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

FLIGHT SIMULATION
TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT
A66-11829

ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

FLIGHT SURGEON
AVIATION PERSONNEL USE OF DRUGS DURING FLIGHT DUTY AS RELATED TO INSTRUCTIONS FROM FLIGHT SURGEON
A66-80054

FLUID SWITCHING ELEMENT
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS
N66-10369

FLUORIDE
EFFECT OF SALIVA UPON STANNOUS FLUORIDE TREATED ENAMEL SURFACES
SAM-TR-65-28 N66-10848

EFFECT OF WHOLE SALIVA ON PERFORMANCE OF STANNOUS FLUORIDE MOUTHWASH
SAM-TR-65-50 N66-11872

FLYING PERSONNEL
ELECTROCARDIOGRAPHY AS RELATED TO FLYING PERSONNEL INCLUDING CASE HISTORIES A66-10605

ASPECTS OF VOMITING DURING MOTION SICKNESS IN FLIGHT - CASE HISTORIES OF FLYING PERSONNEL
A66-80046

ANALYSIS OF CRANIOCEREBRAL INJURIES IN FLIGHT PERSONNEL AS RELATED TO SUBSEQUENT CAPABILITY TO PERFORM DUTIES A66-80049

DEPTH PSYCHOLOGICAL ASPECTS OF MOTIVATION FOR FLYING - TESTING AND PERSONALITY ASSESSMENT
A66-80053

AVIATION PERSONNEL USE OF DRUGS DURING FLIGHT DUTY AS RELATED TO INSTRUCTIONS FROM FLIGHT SURGEON
A66-80054

PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

FORM PERCEPTION
REPETITION REDUNDANCY AND VISUAL FORM DISCRIMINATION A66-80090

FRICTIONLESS ENVIRONMENT
LOW FRICTION ENVIRONMENT EFFECTS ON MAINTENANCE OPERATIONS IN SIMULATOR NOTING TORQUING-FORCE CAPABILITY, HAND-EYE COORDINATION, ETC
A66-11645

FROG
EVOKED VOCAL RESPONSE OF BULLFROG - COMMUNICATION BY SOUND
NASA-CR-67962 N66-11774

FUNCTION TEST
TEST OF FATIGUE AND TRAINING USING CARDIOTACHOMETRIC INTEGRATION INDEX
A66-80036

USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

THREE INDICES OF PHYSICAL FUNCTION COMPARED FOR ASSESSMENT OF PHYSICAL CAPACITY
A66-80066

FUNCTIONAL ANALYSIS
FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION
NASA-TT-F-9760 N66-11615

G

G FORCE
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

GAMMA GLOBULIN
GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

GAMMA RADIATION
ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

GAS CHROMATOGRAPHY
BLOOD OXYGEN CONTENT MEASURED RELIABLY BY MEANS OF GAS CHROMATOGRAPHY A66-80068

GASOLINE
GASOLINE POISONING - OCCURRENCE, PHYSIOLOGICAL EFFECTS, SYMPTOMS, AND THERAPY A66-80002

GASTROINTESTINAL SYSTEM
HEARING, VISUAL, AND GASTROINTESTINAL DISORDERS IN GROUNDCREW MECHANICS REVEALED IN ROUTINE PHYSICAL EXAMINATION A66-80050

GEMINI PROJECT
GEMINI AND APOLLO EARTH-ORBITAL PROGRAMS
A66-11615

MISSION SIMULATION TECHNIQUES FOR TRAINING GEMINI FLIGHT CONTROLLERS A66-11802

GENETICS
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

GESTALT THEORY
GESTALT STUDY OF TIME ESTIMATION
A66-80144

GLARE
RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS WEARING NIGHT DRIVING GLASSES A66-80120

GRAVITY
NYSTAGMUS IN NORMAL AND LABYRINTHINE DEFECTIVES AS RELATED TO ORIENTATION OF ROTATION AXIS RELATIVE TO GRAVITY A66-80023

GROUND CREW
HEARING, VISUAL, AND GASTROINTESTINAL DISORDERS IN GROUNDCREW MECHANICS REVEALED IN ROUTINE PHYSICAL EXAMINATION A66-80050

GROUND HANDLING
HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS
N66-10057

GROWTH
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE
A66-12016

EFFECTS OF AMINO ACIDS ON GROWTH OF HYDROGENOMONAS EUTROPHA
NASA-CR-67927 N66-10956

GUINEA PIG
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA
A66-80029

CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION
A66-80030

H

HABITUATION
HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN - TRANSFER AND RETENTION OF EFFECTS FROM EXTENDED PERIOD OF ROTATION A66-80138

HAND
MOTIONS, GRIPPING, AND CONTROL REQUIREMENTS FOR PROSTHETIC EQUIPMENT, MANIPULATORS, AND ARTIFICIAL LIMBS AND HANDS N66-10067

HANDBOOK
HANDBOOK FOR TRAINING SITUATION ANALYSIS - FAMILIARIZATION, TASK ANALYSIS, AND PROCEDURES
NAVTRADEVCEN-1218-4 N66-12122

HANDLING EQUIPMENT
METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES
N66-10052

HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS
N66-10057

CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS
N66-10060

DESIGN, CONTROL, AND MANUFACTURING CONCEPTS FOR REMOTE HANDLING DEVICES, MANIPULATORS, REMOTELY CONTROLLED TOOLS, AND PROSTHETIC EQUIPMENT
N66-10066

HAZARD
HAZARDS OF LOW OXYGEN ATMOSPHERE IN INDUSTRIAL PLANTS A66-80081

HEALTH
PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS.
A66-80022

RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

HEARING LOSS
NOISE INDUCED HEARING LOSS AMONG ENGINE ROOM PERSONNEL ON NORWEGIAN MERCHANT SHIP
A66-80009

SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS
A66-80024

RECOVERY FROM TEMPORARY SHIFT AS FUNCTION OF STIMULUS AND TEST TONE VARIABLES.
A66-80027

HEARING, VISUAL, AND GASTROINTESTINAL DISORDERS IN GROUNDCREW MECHANICS REVEALED IN ROUTINE PHYSICAL EXAMINATION A66-80050

SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

HEARING LOSS DUE TO REPEATED EXPOSURE TO SUDDEN LOUD NOISE DURING SERVICE IN ARMED FORCES
A66-80062

EVALUATION OF DEVICES FOR INDIVIDUAL PROTECTION OF HEARING AGAINST NOISE WITH REGARD TO THEIR FUNCTIONAL EFFICIENCY IN MAN A66-80080

DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

HEART DISEASE
HEAT STRESS AND ACUTE CARDIAC DEATH IN YOUNG SOLDIERS AFTER PHYSICAL EXERTION
A66-80064

HEART FUNCTION
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

SYNCOPE AND EXTRASYSTOLES INCURRED DURING AIRPLANE FLIGHT AT 1500 TO 2000 METER ALTITUDE
A66-80103

EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

HEART RATE
PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

NORMAL VALUES FOR HEART RATE DURING DIFFERENT PHASES OF VALSALVA EXPERIMENT A66-80071

HEAT REGULATION
PERSONAL THERMAL CONDITIONING SYSTEM EMPHASIZING HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT TO PROVIDE COMFORT WITH WATER-COOLED PROTECTIVE CLOTHING A66-12012

HEAT REJECTION DEVICE
HEAT REJECTION FROM SPACE RADIATOR OF POWER SYSTEM USED AS ENERGY SOURCE WHEN INTEGRATED WITH LIFE SUPPORT SYSTEM A66-11642

HEAT STROKE
HEAT STRESS AND ACUTE CARDIAC DEATH IN YOUNG SOLDIERS AFTER PHYSICAL EXERTION A66-80064

HEAT TOLERANCE
HEMATOLOGICAL CHANGES IN SEVEN HEALTHY YOUNG MALES SUBJECTED TO INTENSE HEATING TRANSIENTS A66-10611

HELICOPTER
HELP PROJECT - HELICOPTER EMERGENCY LIFESAVING PATROL - A CIVILIAN PROJECT A66-80083

HELMET
ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

HEMATOLOGY
HEMATOLOGICAL CHANGES IN SEVEN HEALTHY YOUNG MALES SUBJECTED TO INTENSE HEATING TRANSIENTS A66-10611

HEMATOPOIETIC SYSTEM
HEMATOPOIETIC EFFECT WITH VARIOUS VITAMINS IN TREATING CHRONIC BENZENE POISONING A66-80087

HEMODYNAMIC RESPONSE
RESEARCHES IN AEROSPACE MEDICINE DEALING WITH PHYSIOLOGICAL RESPONSES TO BED REST, DRUGS, HEAT STRESS, PROTON IRRADIATION, AND WATER IMMERSION
NASA-CR-67948 N66-11753

HIGH SPEED FLYING
SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

HIGH TEMPERATURE ENVIRONMENT
EFFECT OF PASSIVE HEATING BY DIATHERMY AND ACTIVE HEATING BY PHYSICAL EXERCISE ON TEMPERATURE REGULATION IN MAN A66-80015

HORMONE
PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

HUMAN
EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

PHENOMENA OCCURRING IN HUMAN ORGANISM WITH ABRUPT PRESSURE DROP AT ALTITUDES ABOVE 20 KILOMETERS
FTD-TT-65-603/1&4 N66-11523

EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

HUMAN BEHAVIOR
HUMAN PILOT BEHAVIOR COMPARED WITH AUTOMATIC PILOTS IN TERMS OF ADAPTABILITY, RESPONSE TIME AND RELIABILITY A66-11866

HUMAN BODY
FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY
ARL-TR-65-10 N66-10478

ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

HUMAN ENGINEERING
PROBLEM AREAS IN LONG DURATION MANNED SPACE FLIGHT NOTING VEHICLE MAINTENANCE, EXTRAVEHICULAR ACTIVITIES, VISUAL SKILL PERFORMANCE, SPACECRAFT CONTROL, ETC
SAE PAPER 650809 A66-10818

COMPARATIVE MERITS OF VISUAL, AUDIBLE AND COMPOSITE AIRCRAFT WARNING SYSTEMS FOR OPTIMUM HUMAN RESPONSE TO CAUSAL CONDITION A66-10939

INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
ESD-TR-65-461 N66-11058

METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

HUMAN FACTOR
HUMAN FACTORS IN DESIGN CRITERIA FOR MAINTAINABILITY AND RELIABILITY A66-10077

HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS N66-10057

REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS N66-10060

HUMAN PATHOLOGY
METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

HUMAN PERFORMANCE
RELIABILITY ESTIMATION PROCEDURE COMBINES TASK RATINGS WITH EMPIRICALLY BASED DATA IN DERIVATION OF REGRESSION EQUATION A66-10076

SYSTEM ENGINEERING METHODOLOGIES TO SHOW HOW PREDICTION OF HUMAN ERROR LEADS TO HIGHER SYSTEM PERFORMANCE RELIABILITIES A66-10117

SIMILARITY CONCEPT APPLIED TO STUDY OF WORK DONE BY LIVING CREATURES IN VARIOUS SITUATIONS A66-10302

TIME SHARING AND VIGILANCE STUDY BY WIENER REANALYZED FROM SIGNAL DETECTION THEORY VIEWPOINT A66-10613

DECISION INTERVAL EFFECT ON SIGNAL DETECTABILITY IN VIGILANCE TASK INVOLVING CLOCK A66-10614

EFFECT OF AMPHETAMINE ON SIGNAL DETECTABILITY IN VIGILANCE TASK A66-10616

HUMAN MOTOR PERFORMANCE ACTIVITIES IN SIMULATED WEIGHTLESS ENVIRONMENT A66-11626

PHYSIOLOGICAL TESTING UNDER SIMULATED REDUCED GRAVITY CONDITIONS WITH SUBJECT SUSPENDED AND PERFORMING EXERCISES ON INCLINED TREADMILL A66-11644

LOW FRICTION ENVIRONMENT EFFECTS ON MAINTENANCE OPERATIONS IN SIMULATOR NOTING TORQUING-FORCE CAPABILITY, HAND-EYE COORDINATION, ETC A66-11645

EFFECTS OF PHYSICAL LOCATION OF VISUAL STIMULI ON INTENTIONAL RESPONSE TIME / IRT/ A66-12075

LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME A66-12076

APPLICATION OF HUMAN OPERATOR PERFORMANCE FOR VARIED PARAMETERS TO DESIGN OF MAN-MACHINE SYSTEM
NASA-CR-67625 N66-10758

COLOR PERCEPTION OF ADDITIVE COLOR GROUP DISPLAYS - HUMAN PERFORMANCE
RADC-TR-65-278 N66-10831

EXPERIMENTS IN HUMAN VISUAL SEARCH ACUITY
ESD-TDR-65-169 N66-12015

TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

HUMAN REACTION
HUMAN TRANSFER FUNCTION FOR PILOT RESPONSE FOR MULTIAXIS AND MULTILOOP PROBLEMS
A66-11633

ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

HUMAN TOLERANCE
PERSONAL THERMAL CONDITIONING SYSTEM EMPHASIZING HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT TO PROVIDE COMFORT WITH WATER-COOLED PROTECTIVE CLOTHING A66-12012

PROLONGED HUMAN EXPOSURE TO MAGNETIC FIELD OF 8 GAMMA GRADIENT N66-11286

PROTECTIVE MEASURES FOR HUMANS WORKING WITH RADIO-FREQUENCY OSCILLATORS
JPRS-32735 N66-11812

HYDRAZINE
STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

HYDROGENOMONAS
EFFECTS OF AMINO ACIDS ON GROWTH OF HYDROGENOMONAS EUTROPHA
NASA-CR-67927 N66-10956

HYGIENE
DECOMPRESSION DISEASES - THEORY, THERAPY, AND PROBLEMS OF UNDERGROUND ENGINEERING, WORKING HYGIENE, AND OCCUPATIONAL MEDICINE
DLR-FB-65-35 N66-11758

HYPEROXIA
RETINAL RESPONSE TO ISCHEMIA AND HYPEROXIA IN MAN AND CAT A66-80072

HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

HYPERTHERMIA
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS
A66-80079

HYPERVENTILATION
VASODILATION BY CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN IN HYPERVENTILATION IN ELECTROENCEPHALOGRAM OF HUMANS A66-80078

HYPOTHERMIA
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS
A66-80079

HYPOXIA
HYPOXIA PROTECTION ON TAKING OF SECOND GRAFT OF HOMOLOGOUS BONE MARROW IN PREVIOUSLY IRRADIATED AND GRAFTED MICE A66-10609

RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

EFFECT OF EXPERIMENTAL HYPOXIC HYPOXIA ON BLOOD CLEARING FACTOR
JPRS-32781 N66-11658

HYSTERESIS
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

I

ILLUMINATION
JUDGMENT OF SIZE WITH VARYING CONDITIONS OF STIMULUS DURATION AND ILLUMINATION
A66-80136

IMMERSION
TOLERANCE OF MAN TO IMMERSION IN COLD WATER AND HIS PROTECTIVE CLOTHING A66-80044

HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS
A66-80079

EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

IMPLANTATION
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

INDUSTRIAL SAFETY
HAZARDS OF LOW OXYGEN ATMOSPHERE IN INDUSTRIAL PLANTS A66-80081

AIR POLLUTION, AND INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN U.S.S.R.
JPRS-32565 N66-10199

INDUSTRY
INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

INFECTION
POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

INFORMATION PROCESSING
EYE-MOVEMENT PATTERNS DURING VISUAL INFORMATION PROCESSING A66-80089

DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

INFORMATION THEORY
TIME PERCEPTION THEORIES REVIEWED
A66-80003

INHIBITION
INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

INHIBITOR
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

INJURY
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS
A66-80011

EFFECT OF WEAK ULTTRASOUND ON BIOLOGICAL CELL
A66-80095

HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

INJURY IN MOUSE LIVERS FROM INTENSE ULTRASOUND
A66-80098

SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039 N66-11937

INSTRUCTION
AVIATION PERSONNEL USE OF DRUGS DURING FLIGHT DUTY AS RELATED TO INSTRUCTIONS FROM FLIGHT SURGEON
A66-80054

INTESTINE
LOW BAROMETRIC PRESSURE EFFECTS ON COLON IN RATS
A66-80100

IODIDE
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

ION CHAMBER
NEUTRON DOSE EQUIVALENT RATE MEASUREMENTS AROUND PULSED NEUTRON GENERATORS BY BORON TRIFLUORIDE PULSE COUNTER OR ION CHAMBER
AERE-R-4883 N66-10192

IONIZATION COUNTER
MEASUREMENT AND EVALUATION OF RADIATION EXPOSURE IN SPACE FLIGHT, NOTING TISSUE EQUIVALENT SYSTEM FOR IONIZATION RECORDING A66-11647

IONIZING RADIATION
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

UNITED KINGDOM PROTECTION CODES FOR IONIZING RADIATION AND RADIOACTIVE MATERIALS
AHSB-/RP/-M-35 N66-10496

RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

IRRADIATION
INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

ISCHEMIA
LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT
A66-80070

RETINAL RESPONSE TO ISCHEMIA AND HYPEROXIA IN MAN AND CAT A66-80072

J

JOINT /BIOL/
EFFECT OF MICROWAVES ON ABSORPTIVE CAPACITY OF SYNOVIAL MEMBRANE OF KNEE JOINT AFTER SECTION OF SPINAL CORD IN RABBITS A66-80122

K

KEYING
DESCRIPTIVE CHARTS AND CULTURAL CHARACTERISTICS OF SOIL DIPTHEROIDS - CORNEBACTERIUM
NASA-CR-67686 N66-10773

KNEE
EFFECT OF MICROWAVES ON ABSORPTIVE CAPACITY OF SYNOVIAL MEMBRANE OF KNEE JOINT AFTER SECTION OF SPINAL CORD IN RABBITS A66-80122

L

LACTATE
OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN A66-80017

LARYNX
ORAL AND LARYNGEAL COMPONENTS OF UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING
A66-80026

LASER
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS
A66-80011

LEAD POISONING
COMPARISON OF LABORATORY TESTS IN LEAD POISONING
A66-80076

EFFECT OF LEAD ON RED BLOOD CELL FRAGILITY IN LEAD POISONING A66-80077

CLINICAL DIAGNOSIS AND PROPHYLACTIC MEASURES IN INDUSTRIAL LEAD POISONING A66-80124

LEARNING
MANIFEST ANXIETY EFFECT ON TRAVEL AND MANIPULATION COMPONENTS OF HUMAN MOTION A66-80021

LEG
COMPARATIVE ARTERIAL OSCILLOGRAPHIC INVESTIGATIONS OF FOREARM AND LEG IN YOUNGER AND OLDER PERSONS
NASA-TT-F-9759 N66-11614

LEUKEMIA
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

LIFE
PHILOSOPHICAL IMPLICATIONS OF MODERN BIOLOGICAL AND CHEMICAL SCIENCES ON CONCEPT OF LIFE
JPRS-32457 N66-10559

LIFE DETECTOR
MARTIAN LIFE-DETECTION INSTRUMENTS AND EXPERIMENTS, EXAMINING BIOLOGICAL CRITERIA AND VISUAL, ORGANIC, CHEMICAL AND METABOLIC TESTS
A66-11608

LIFE SCIENCE
POSSIBILITY OF LIFE ORIGINATING IN DIFFERENT FORMS IN VARIOUS PARTS OF UNIVERSE AS RESPONSE TO CHANGING ENVIRONMENTAL CONDITIONS
A66-10300

PREVALENCE AND DIVERSITY OF LIFE IN COSMOS, TRACING DIVERGENT EVOLUTION IN RESPONSE TO VARIETY OF ENVIRONMENT CONDITIONS A66-10303

PAPERS ON EXPERIMENTAL AND THEORETICAL ASPECTS OF EXOBIOLOGY A66-11601

BIBLIOGRAPHY OF CURRENT ASPECTS OF EXOBIOLOGY DEALING WITH SOLAR SYSTEM, LIFE DETECTION SYSTEM, ORIGIN OF LIFE AND LIFE IN UNIVERSE
A66-11612

LIFE SUPPORT SYSTEM
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS LINK IN CLOSED ECOLOGICAL SYSTEM A66-10981

ANIMAL AND HUMAN TEST OF MANNED SPACECRAFT LIFE SUPPORT SYSTEM CONSISTING OF CLOSED SYSTEM WITH RECIRCULATING AIR LOOP, EXAMINING POTASSIUM SUPEROXIDE-POTASSIUM HYDROXIDE CHEMISTRY A66-11492

THERMAL CONTROL IN ADVANCED INTEGRATED LIFE SUPPORT SYSTEM DESIGN TO ACCOMMODATE FOUR-MAN CREW ON ONE-YEAR EARTH ORBIT MISSION A66-11631

HEAT REJECTION FROM SPACE RADIATOR OF POWER SYSTEM USED AS ENERGY SOURCE WHEN INTEGRATED WITH LIFE SUPPORT SYSTEM A66-11642

TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

CONSTRUCTION, PLUMBING, CAPABILITY, AND OPERATION OF LIFE SUPPORT SYSTEMS EVALUATOR - BIOASTRONAUTICS
AMRL-TDR-63-43 N66-10918

MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR LANDING AND RECONNAISSANCE MISSION MARS
NASA-CR-68000 N66-11759

LIGHT
APPARATUS FOR MEASURING ACCOMMODATION OF IRIS TO LIGHT A66-80035

LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT A66-80070

AUTOKINESIS IN DARK ADAPTED SUBJECTS EXPOSED TO LIGHT AND AFTERIMAGE PRESENTED ALONE AND TOGETHER A66-80119

LIGHT ABSORPTION
STEADY STATE AND FLASH REACTIONS OF PUPIL WITH REGARD TO RECEPTOR PROPERTIES AND ORGANIZATION OF RECEPTIVE FIELD N66-10438

LIGHT ADAPTATION
ADAPTATION EFFECT ON SQUIRREL MONKEY LATERAL GENICULATE NUCLEUS RESPONSE TO LIGHT INCREMENT AND DECREMENT A66-80121

LIMB
EFFECT OF STRENGTH EXERCISES ON SPEED OF ARM MOVEMENT A66-80130

MOTIONS, GRIPPING, AND CONTROL REQUIREMENTS FOR PROSTHETIC EQUIPMENT, MANIPULATORS, AND ARTIFICIAL LIMBS AND HANDS N66-10067

FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION
NASA-TT-F-9760 N66-11615

LIPID METABOLISM
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS A66-80060

HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

LIVER
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS A66-80060

HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

INJURY IN MOUSE LIVERS FROM INTENSE ULTRASOUND A66-80098

LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

LOCALIZATION
EFFECTS OF PHYSICAL LOCATION OF VISUAL STIMULI ON INTENTIONAL RESPONSE TIME / IRT/ A66-12075

LOW ALTITUDE
SYNCOPE AND EXTRASYSTOLES INCURRED DURING AIRPLANE FLIGHT AT 1500 TO 2000 METER ALTITUDE A66-80103

LOW TEMPERATURE ENVIRONMENT
LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

LUNAR ATMOSPHERE
LUNAR ATMOSPHERE AND HYDROSPHERE, PREDICTING DIMENSIONAL CORRELATION FOR CRATERS AND MARIA OF PRIMORDIAL LUNAR LIFE, NOTING DARK AND SMOOTH APPEARANCE A66-11606

LUNG
MEASUREMENT OF TENSILE STRENGTH OF HUMAN LUNG TISSUE OBTAINED AT NECROPSY A66-80019

CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS A66-80146

M

MAGNETIC FIELD
PROLONGED HUMAN EXPOSURE TO MAGNETIC FIELD OF 8 GAMMA GRADIENT N66-11286

MAINTAINABILITY
HUMAN FACTORS IN DESIGN CRITERIA FOR MAINTAINABILITY AND RELIABILITY A66-10077

MAINTENANCE
REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS N66-10060

MAMMAL
ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

HUMAN AND ANIMAL VIGILANCE A66-80141

MAN-MACHINE SYSTEM
RELIABILITY ESTIMATION PROCEDURE COMBINES TASK RATINGS WITH EMPIRICALLY BASED DATA IN DERIVATION OF REGRESSION EQUATION A66-10076

SERVOCONTROLLED-WEARABLE EXOSKELETAL DEVICE WORN BY MAN TO AMPLIFY MUSCULAR STRENGTH N66-10056

CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

APPLICATION OF HUMAN OPERATOR PERFORMANCE FOR VARIED PARAMETERS TO DESIGN OF MAN-MACHINE SYSTEM

NASA-CR-67625 N66-10758

MANNED ORBITAL SPACE STATION /MOSS/
INTERIOR DESIGN PROBLEMS IN ARTIFICIAL G SPACECRAFT SIMULATOR A66-11624

MANNED SPACE FLIGHT
AVAILABILITY CONCEPT IN ATTITUDE CONTROL SYSTEM FOR MANNED MARS EXPEDITION A66-10084

PROBLEM AREAS IN LONG DURATION MANNED SPACE FLIGHT NOTING VEHICLE MAINTENANCE, EXTRAVEHICULAR ACTIVITIES, VISUAL SKILL PERFORMANCE, SPACECRAFT CONTROL, ETC
SAE PAPER 650809 A66-10818

AMERICAN AND SOVIET EXPERIENCE CONSIDERING WEIGHTLESSNESS, IONIZING RADIATION, DYNAMIC AND BIOLOGICAL FACTORS, ETC
SAE PAPER 650812 A66-10819

A IAA MANNED SPACE FLIGHT MEETING AT ST. LOUIS IN OCTOBER 1965 A66-11613

GEMINI AND APOLLO EARTH-ORBITAL PROGRAMS A66-11615

BIOLOGICAL PROBLEMS IN EXTENDED MANNED MISSIONS CAUSED BY LOW G, ARTIFICIAL ATMOSPHERE AND ABSENCE OF TERRESTRIAL PERIODICITIES A66-11622

BIOMEDICAL DATA COLLECTION FOR ANIMAL STUDY AND MANNED SPACE FLIGHT PROGRAMS. A66-80113

MANNED SPACECRAFT
MAN OR AUTOMATION IN SPACE EXPLORATION IN RELATION TO DEVELOPMENT OF MECHANICAL SYSTEM WITH PERCEPTION CAPABILITIES A66-80114

MANUAL CONTROL
METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES N66-10052

MARS /PLANET/
MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR LANDING AND RECONNAISSANCE MISSION MARS
NASA-CR-68000 N66-11759

MARS ENVIRONMENT
MARTIAN LIFE POSSIBILITIES DISCUSSING ITS ATMOSPHERE, CLOUDS, VIOLET LAYER, TEMPERATURE AND BIOLOGICAL INTERPRETATION OF DARK AREAS A66-11607

MARTIAN LIFE-DETECTION INSTRUMENTS AND EXPERIMENTS, EXAMINING BIOLOGICAL CRITERIA AND VISUAL, ORGANIC, CHEMICAL AND METABOLIC TESTS A66-11608

MARS SPACECRAFT
AVAILABILITY CONCEPT IN ATTITUDE CONTROL SYSTEM FOR MANNED MARS EXPEDITION A66-10084

MASKING
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS A66-80024

SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION A66-80091

INDIVIDUAL MASKING LEVELS IN PURE TONE AUDIOMETRY A66-80129

MEASURING APPARATUS
DETERMINATION OF MIXED VENOUS CO2 PRESSURE WITH A REBREATHING METHOD IN MAN A66-80013

PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS. A66-80022

ORAL AND LARYNGEAL COMPONENTS OF UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING A66-80026

PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

APPARATUS FOR MEASURING ACCOMMODATION OF IRIS TO LIGHT A66-80035

ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

MECHANICAL PROPERTY
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS N66-10369

MECHANICAL SYSTEM
MAN OR AUTOMATION IN SPACE EXPLORATION IN RELATION TO DEVELOPMENT OF MECHANICAL SYSTEM WITH PERCEPTION CAPABILITIES A66-80114

MEDICAL ELECTRONICS
MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT A66-80112

MEDICINE /GEN/
ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

MEMORY
BIOLOGIC MEMORY AND NUCLEIC ACIDS
JPRS-32266 N66-10203

MENTAL PERFORMANCE
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

MENTAL STRESS
TIME ESTIMATION AS FUNCTION OF KNOWLEDGE AND ACHIEVEMENT A66-80020

MERCAPTO COMPOUND
ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

METABOLISM
OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN A66-80017

EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT STATE A66-80116

EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES,

PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

METAL
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

METEOROID CRATER
LUNAR ATMOSPHERE AND HYDROSPHERE, PREDICTING DIMENSIONAL CORRELATION FOR CRATERS AND MARIA OF PRIMORDIAL LUNAR LIFE, NOTING DARK AND SMOOTH APPEARANCE A66-11606

MICROBIOLOGY
MARTIAN LIFE-DETECTION INSTRUMENTS AND EXPERIMENTS, EXAMINING BIOLOGICAL CRITERIA AND VISUAL, ORGANIC, CHEMICAL AND METABOLIC TESTS A66-11608

POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

MICROORGANISM
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE A66-12016

DESCRIPTIVE CHARTS AND CULTURAL CHARACTERISTICS OF SOIL DIPTHEROIDS - CORNEBACTERIUM
NASA-CR-67686 N66-10773

MICROSCOPE
ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

MICROWAVE RADIATION
EFFECT OF MICROWAVES ON ABSORPTIVE CAPACITY OF SYNOVIAL MEMBRANE OF KNEE JOINT AFTER SECTION OF SPINAL CORD IN RABBITS A66-80122

MIDDLE EAR
ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

MISSION PLANNING
ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR LANDING AND RECONNAISSANCE MISSION MARS
NASA-CR-68000 N66-11759

MITOSIS
MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

MOLECULAR STRUCTURE
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

MONKEY
ADAPTATION EFFECT ON SQUIRREL MONKEY LATERAL GENICULATE NUCLEUS RESPONSE TO LIGHT INCREMENT AND DECREMENT A66-80121

ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION A66-80127

MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

MONOCULAR VISION
MONOCULAR STEREOSCOPIC PERCEPTION OF DISPARATE IMAGES. A66-80133

JUDGING WITH WHICH EYE ONE IS VIEWING THREE-DIMENSIONAL SCENE A66-80137

MOON ILLUSION
OBSERVER ELEVATION EFFECT ON MOON ILLUSION - VISUAL SPACE PERCEPTION
SAM-TR-65-46 N66-10566

MOTION PERCEPTION
MATHEMATICAL MODEL FOR OTOLITHIC ORGANS USED TO ANALYZE HUMAN SPATIAL ORIENTATION A66-10785

MOTION SICKNESS
EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

MOTIVATION
PHYSIOLOGICAL GRADIENTS IN SKELETAL-MOTOR AND AUTONOMIC RECORDINGS, MENTAL ACTIVITY, AND BEHAVIOR A66-80004

TIME ESTIMATION AS FUNCTION OF KNOWLEDGE AND ACHIEVEMENT A66-80020

DEPTH PSYCHOLOGICAL ASPECTS OF MOTIVATION FOR FLYING - TESTING AND PERSONALITY ASSESSMENT A66-80053

MOTOR SYSTEM /BIOL/
SELECTED LIST OF REFERENCES ON MOTOR SKILLS A66-80140

TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

MOUNTAIN
ACCLIMATIZATION AND TRAINING OF ATHLETES IN MOUNTAINOUS AREA
JPRS-32290 N66-10517

MOUSE
INJURY IN MOUSE LIVERS FROM INTENSE ULTRASOUND A66-80098

MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

RADIATION DAMAGE OF BONE MARROW CELLS DURING INTERPHASE IN MICE WHO RECEIVED PRELIMINARY INJECTIONS OF MECAMYLAMINE A66-80117

CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE N66-10164

ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND

RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

MULTICHANNEL RECEIVER
VOICE COMMUNICATION CHANNELS EXPANSION, USING MANS BINAURAL LISTENING CAPABILITY A66-11828

MUSCLE
LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

MUSCULAR STRENGTH
EFFECT OF STRENGTH EXERCISES ON SPEED OF ARM MOVEMENT A66-80130

SERVOCONTROLLED-WEARABLE EXOSKELETAL DEVICE WORN BY MAN TO AMPLIFY MUSCULAR STRENGTH
N66-10056

FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY
ARL-TR-65-10 N66-10478

MUSCULAR SYSTEM
SIMILARITY CONCEPT APPLIED TO STUDY OF WORK DONE BY LIVING CREATURES IN VARIOUS SITUATIONS
A66-10302

HUMAN SMOOTH PURSUIT EYE MOVEMENT AND EYE MUSCLE TENSION A66-80018

MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

MYOELECTRIC POTENTIAL
UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

N

NERVOUS SYSTEM
PHYSIOLOGICAL GRADIENTS IN SKELETAL-MOTOR AND AUTONOMIC RECORDINGS, MENTAL ACTIVITY, AND BEHAVIOR A66-80004

ELECTROPHYSIOLOGICAL RESEARCH IN EFFERENT VESTIBULAR SYSTEM IN CAT A66-80010

CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION
A66-80030

VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

ADAPTATION EFFECT ON SQUIRREL MONKEY LATERAL GENICULATE NUCLEUS RESPONSE TO LIGHT INCREMENT AND DECREMENT A66-80121

DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

NEURON
STOCHASTIC BEHAVIOR OF PRIMARY AUDITORY NEURONS ILLUSTRATED BY FUNCTIONAL MODEL SUBJECTED TO STEADY HF SINUSOIDAL TONE BURSTS
A66-10400

LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT
A66-80070

NEUROPHYSIOLOGY
INFORMATION PROCESSING IN AUDITORY NEURAL MECHANISM, EXAMINING SYNTHESIS OPERATION OF CORTEX NEURONS AND FUNCTION OF CENTRIFUGAL NERVE PATHS
A66-11365

PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

NEUTRON COUNTER
NEUTRON DOSE EQUIVALENT RATE MEASUREMENTS AROUND PULSED NEUTRON GENERATORS BY BORON TRIFLUORIDE PULSE COUNTER OR ION CHAMBER
AERE-R-4883 N66-10192

NIGHT VISION
EFFECT OF ANTHOCYANIN GLUCOSIDE ON SCOTOPIC VISION AND MESOPIC VISUAL ACUITY OF NORMAL SUBJECTS
A66-80041

RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS WEARING NIGHT DRIVING GLASSES A66-80120

DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

NITROGEN COMPOUND
STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

NOISE
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS
A66-80024

CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION
A66-80030

RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

NOISE HAZARD
NOISE INDUCED HEARING LOSS AMONG ENGINE ROOM PERSONNEL ON NORWEGIAN MERCHANT SHIP
A66-80009

EVALUATION OF DEVICES FOR INDIVIDUAL PROTECTION OF HEARING AGAINST NOISE WITH REGARD TO THEIR FUNCTIONAL EFFICIENCY IN MAN A66-80080

NOISE INJURY
HEARING LOSS DUE TO REPEATED EXPOSURE TO SUDDEN LOUD NOISE DURING SERVICE IN ARMED FORCES
A66-80062

NOISE INTENSITY
LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME
A66-12076

NONLINEAR EQUATION
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

NOREPINEPHRINE
BLOOD EPINEPHRINE AND NOREPINEPHRINE RELATED TO

PERFORMANCE IN VISUAL VIGILANCE TASK
A66-80125

NUCLEAR RADIATION
EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

NUCLEIC ACID
BIOLOGIC MEMORY AND NUCLEIC ACIDS
JPRS-32266 N66-10203

NUMERICAL ANALYSIS
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

NYSTAGMUS
NYSTAGMUS IN NORMAL AND LABYRINTHINE DEFECTIVES AS RELATED TO ORIENTATION OF ROTATION AXIS RELATIVE TO GRAVITY A66-80023

ANGULAR MOTION EFFECTS ON VESTIBULAR APPARATUS - NYSTAGMUS - AEROSPACE MEDICINE
FTD-TT-65-216/1&2 N66-11356

O

OCEAN
RADIOACTIVE CONTAMINATION OF SEA
RT/BIO /65/18 N66-11655

OPERATOR PERFORMANCE
HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS
N66-10057

APPLICATION OF HUMAN OPERATOR PERFORMANCE FOR VARIED PARAMETERS TO DESIGN OF MAN-MACHINE SYSTEM
NASA-CR-67625 N66-10758

ORBITAL RENDEZVOUS
TRAJECTORY VS LINE-OF-SIGHT SPACE RENDEZVOUS, USING DIRECT VISUAL CUES ONLY A66-11830

ORGAN
TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

ORGANIC MATERIAL
EXOBIOLOGICAL TREND AND PROBLEMS INDICATING TYPES OF ORGANIC MATTER ON PLANET AND ORIGIN AND TRANSFER OF ORGANISMS IN SOLAR SYSTEM
A66-11611

ORGANISM
PHENOMENA OCCURRING IN HUMAN ORGANISM WITH ABRUPT PRESSURE DROP AT ALTITUDES ABOVE 20 KILOMETERS
FTD-TT-65-603/1&4 N66-11523

CHEMISM OF ACUTE WEIGHT LOSSES - RELATION BETWEEN WATER AND SALTS IN ORGANISMS
NASA-TT-F-9740 N66-11613

OSCILLOGRAPH
COMPARATIVE ARTERIAL OSCILLOGRAPHIC INVESTIGATIONS OF FOREARM AND LEG IN YOUNGER AND OLDER PERSONS
NASA-TT-F-9759 N66-11614

OTOLITH
MATHEMATICAL MODEL FOR OTOLITHIC ORGANS USED TO ANALYZE HUMAN SPATIAL ORIENTATION
A66-10785

OXYGEN
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

OXYGEN CONSUMPTION
OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN A66-80017

OXYGEN CONSUMPTION AND LIVER GLUCOSE, SUCCINATE, AND PYRUVATE LEVELS IN HYPEROXIC RATS
A66-80038

OXYGEN DEFICIENCY
BEHAVIOR OF RIGHT INTRAVENTRICULAR CONDUCTION IN 148 FLYING CADETS UNDER NORMAL SEA-LEVEL CONDITIONS AND ACUTE ANOXIC ANOXIA
A66-10608

HAZARDS OF LOW OXYGEN ATMOSPHERE IN INDUSTRIAL PLANTS A66-80081

OXYGEN MASK
PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

OXYGEN TENSION
BLOOD OXYGEN CONTENT MEASURED RELIABLY BY MEANS OF GAS CHROMATOGRAPHY A66-80068

CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS
A66-80146

ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

OXYGEN 18
EXTRATERRESTRIAL LIFE DETECTION FROM ENZYME CATALYSIS OF OXYGEN-18 EXCHANGE REACTIONS
NASA-CR-67924 N66-10939

P

PARACHUTING
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

PATHOLOGICAL EFFECT
PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

PATTERN RECOGNITION
TRAINING PATTERN-CLASSIFYING SYSTEMS BY MODE-SEEKING AND ERROR-CORRECTION METHODS USING 2-, 10-, AND 100-DIMENSIONAL PATTERNS
RADC-TR-65-257 N66-10905

COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION
N66-11483

PERCEPTION
MAN OR AUTOMATION IN SPACE EXPLORATION IN RELATION TO DEVELOPMENT OF MECHANICAL SYSTEM WITH PERCEPTION CAPABILITIES A66-80114

PERFORMANCE PREDICTION
VALIDITY OF PSYCHOLOGICAL TESTING IN SELECTING PILOTS FOR PISTON ENGINE AND JET AIRCRAFT
A66-80055

PERFUSION
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS A66-80028

PERSONALITY
PERSONALITY PROBLEMS AND ACCIDENT PRONENESS IN PILOTS AS RELATED TO PERSONNEL SELECTION TESTING A66-80052

EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE A66-80073

INTRAINDIVIDUAL DIFFERENCES AND SIMILARITIES IN STYLE AND CONSISTENCY OF AUTOKINETIC MOVEMENT A66-80142

PERSONALITY ASSESSMENT
DEPTH PSYCHOLOGICAL ASPECTS OF MOTIVATION FOR FLYING - TESTING AND PERSONALITY ASSESSMENT A66-80053

PERSONNEL SELECTION
USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

PHILOSOPHY
PHILOSOPHICAL IMPLICATIONS OF MODERN BIOLOGICAL AND CHEMICAL SCIENCES ON CONCEPT OF LIFE
JPRS-32457 N66-10559

PHYSICAL EXAMINATION
HEARING, VISUAL, AND GASTROINTESTINAL DISORDERS IN GROUNDCREW MECHANICS REVEALED IN ROUTINE PHYSICAL EXAMINATION A66-80050

ELECTROCARDIOGRAPH SERIAL EXAMINATION DEVELOPED FOR FIELD CONDITIONS A66-80067

PHYSICAL EXERCISE
PHYSICAL EXERCISE AND ENERGY EXPENDITURE OF HUMAN SUBJECTS DURING SIMULATED WEIGHTLESSNESS A66-80001

EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN A66-80014

EFFECT OF PASSIVE HEATING BY DIATHERMY AND ACTIVE HEATING BY PHYSICAL EXERCISE ON TEMPERATURE REGULATION IN MAN A66-80015

REGULATION OF SWEAT SECRETION DURING EXERCISE IN MAN - CORRELATION OF SWEATING TO BODY TEMPERATURE A66-80016

OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN A66-80017

HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

ACCLIMATIZATION PROBLEMS AND PHYSICAL TRAINING AT ALTITUDE A66-80069

EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

EFFECT OF STRENGTH EXERCISES ON SPEED OF ARM MOVEMENT A66-80130

EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

PHYSICAL FITNESS
PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

THREE INDICES OF PHYSICAL FUNCTION COMPARED FOR ASSESSMENT OF PHYSICAL CAPACITY A66-80066

STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

PHYSICS /GEN/
AEROSOL AND RADIATION PHYSICS, BODY RADIOACTIVITY MEASUREMENTS, AND RADIATION MEDICINE RESEARCH
AERE-PR/HPM-7/U/ N66-10190

PHYSIOLOGICAL FACTOR
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

PHYSIOLOGICAL INDEX
PHYSIOLOGICAL GRADIENTS IN SKELETAL-MOTOR AND AUTONOMIC RECORDINGS, MENTAL ACTIVITY, AND BEHAVIOR A66-80004

ARTERIAL PULSE WAVE VELOCITY AS PSYCHOPHYSIOLOGICAL MEASURE A66-80005

PROBLEMS OF MEASUREMENT ENGENDERED BY INDIVIDUAL DIFFERENCES IN AUTONOMIC RESPONSIBILITY A66-80007

TEST OF FATIGUE AND TRAINING USING CARDIOTACHOMETRIC INTEGRATION INDEX A66-80036

THREE INDICES OF PHYSICAL FUNCTION COMPARED FOR ASSESSMENT OF PHYSICAL CAPACITY A66-80066

FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION
NASA-TT-F-9760 N66-11615

PHYSIOLOGICAL PHENOMENON
BASIC PHYSIOLOGICAL OCULOMOTOR MECHANISMS THAT MAKE HUMAN IMAGE STABILIZATION POSSIBLE, EXAMINING FLIGHT DISTURBANCE EFFECT ON SYSTEM STABILITY A66-10607

MATHEMATICAL MODEL FOR OTOLITHIC ORGANS USED TO ANALYZE HUMAN SPATIAL ORIENTATION A66-10785

PHYSIOLOGICAL RESPONSE
PHYSIOLOGICAL TEST RESULTS ON COSMONAUTS DURING VOSKHOD I AND II FLIGHTS INCLUDING ELECTROCARDIOGRAMS, ELECTROENCEPHALOGRAMS, PNEUMOGRAMS, BLOOD TESTS, SPACESUIT PARAMETERS, ETC A66-10416

HEMATOLOGICAL CHANGES IN SEVEN HEALTHY YOUNG MALES SUBJECTED TO INTENSE HEATING TRANSIENTS A66-10611

PHYSIOLOGICAL TESTING UNDER SIMULATED REDUCED GRAVITY CONDITIONS WITH SUBJECT SUSPENDED AND PERFORMING EXERCISES ON INCLINED TREADMILL A66-11644

RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN,

MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

COMBINED EFFECTS OF WHOLE BODY IRRADIATION ON RATS SUBJECTED TO PROLONGED INCREASED ACCELERATIVE FORCES
AD-620403 N66-11336

RESEARCHES IN AEROSPACE MEDICINE DEALING WITH PHYSIOLOGICAL RESPONSES TO BED REST, DRUGS, HEAT STRESS, PROTON IRRADIATION, AND WATER IMMERSION
NASA-CR-67948 N66-11753

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

PHYSIOLOGICAL TELEMETRY
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT
A66-80112

PHYSIOLOGY
NEW TECHNIQUES IN PHYSIOLOGY TO AID MEDICAL SCIENCE
JPRS-32585 N66-10201

METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

PILOT
MEDICAL HISTORY OF 1056 AVIATORS OVER 24-YEAR PERIOD A66-10610

CENTRIFUGAL SIMULATION WITH PILOT OF MIRAGE III AIRCRAFT TAILSPIN A66-80047

PILOT ERROR
PILOT ERROR AND HUMAN FACTORS IN AIRCRAFT ACCIDENTS MAKE PSYCHOLOGICAL OBSERVATION AND EXAMINATION OF FLYING PERSONNEL MANDATORY
A66-80051

PILOT PERFORMANCE
OCULOMOTOR RESPONSES TO VESTIBULAR AND OPTOKINETIC STIMULI DURING EIGHT-TURN SPINS IN JET TRAINER AIRCRAFT A66-10612

HUMAN TRANSFER FUNCTION FOR PILOT RESPONSE FOR MULTIAXIS AND MULTILOOP PROBLEMS
A66-11633

TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT
A66-11829

HUMAN PILOT BEHAVIOR COMPARED WITH AUTOMATIC PILOTS IN TERMS OF ADAPTABILITY, RESPONSE TIME AND RELIABILITY A66-11866

DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

PILOT SELECTION
ELECTROCARDIOGRAPHY AS RELATED TO FLYING PERSONNEL INCLUDING CASE HISTORIES A66-10605

PILOT-TRAINEE SELECTION PROCEDURES FOR SCHOOL-LEAVING POPULATION, USING INTERVIEWS AND TESTINGS
A66-10606

PERSONALITY PROBLEMS AND ACCIDENT PRONENESS IN PILOTS AS RELATED TO PERSONNEL SELECTION TESTING
A66-80052

VALIDITY OF PSYCHOLOGICAL TESTING IN SELECTING PILOTS FOR PISTON ENGINE AND JET AIRCRAFT
A66-80055

STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

PILOTED AIRCRAFT
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

PITUITARY GLAND
HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

PLANETARY LANDING
MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR LANDING AND RECONNAISSANCE MISSION MARS
NASA-CR-68000 N66-11759

PLANT /BIOL/
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS
A66-11605

PLASTIC
INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

POISONING
GASOLINE POISONING - OCCURRENCE, PHYSIOLOGICAL EFFECTS, SYMPTOMS, AND THERAPY A66-80002

POSITIONING
NYSTAGMUS IN NORMAL AND LABYRINTHINE DEFECTIVES AS RELATED TO ORIENTATION OF ROTATION AXIS RELATIVE TO GRAVITY A66-80023

POSTURE
VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

POTASSIUM
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA
A66-80029

POTASSIUM COMPOUND
ANIMAL AND HUMAN TEST OF MANNED SPACECRAFT LIFE SUPPORT SYSTEM CONSISTING OF CLOSED SYSTEM WITH RECIRCULATING AIR LOOP, EXAMINING POTASSIUM SUPEROXIDE-POTASSIUM HYDROXIDE CHEMISTRY
A66-11492

POWER GENERATOR
THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

PREDICTION THEORY
PREDICTION DISPLAY BASED ON COMPUTER EXTRAPOLATED DATA IN AIRCRAFT PILOTING A66-11985

PRESSURE
INTERFACE TESTS FOR EVALUATING ABILITY OF PRESSURE FOR SUBJECTS TO PERFORM LUNAR SCIENTIFIC TASKS
NASA-TM-X-1170 N66-10319

PRESSURE DROP
PHENOMENA OCCURRING IN HUMAN ORGANISM WITH ABRUPT PRESSURE DROP AT ALTITUDES ABOVE 20 KILOMETERS
FTD-TT-65-603/1&4 N66-11523

PRESSURIZED SUIT
PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF

PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

PROBLEM SOLVING
COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION INVOLVING CONTINGENT IDENTITY AND CONTINGENT POSITION A66-80139

PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

PROJECTION
COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION N66-11483

PROPAGATION
PHYSICAL PHENOMENA ORIGINATING UPON PROPAGATION OF ULTRASOUND VIBRATIONS OF HIGH INTENSITY WITHIN FLUID
JPRS-32532 N66-10518

PROSTHETICS
DESIGN, CONTROL, AND MANUFACTURING CONCEPTS FOR REMOTE HANDLING DEVICES, MANIPULATORS, REMOTELY CONTROLLED TOOLS, AND PROSTHETIC EQUIPMENT N66-10066

MOTIONS, GRIPPING, AND CONTROL REQUIREMENTS FOR PROSTHETIC EQUIPMENT, MANIPULATORS, AND ARTIFICIAL LIMBS AND HANDS N66-10067

PROTECTION
STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

PROTECTIVE CLOTHING
PERSONAL THERMAL CONDITIONING SYSTEM EMPHASIZING HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT TO PROVIDE COMFORT WITH WATER-COOLED PROTECTIVE CLOTHING A66-12012

TOLERANCE OF MAN TO IMMERSION IN COLD WATER AND HIS PROTECTIVE CLOTHING A66-80044

METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES N66-10052

SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

PROTEIN
INTERACTION OF MESSENGER RNA AND RIBOSOMES STUDIED, USING F-2 BACTERIOPHAGE RNA AS MODEL MESSENGER IN CELL-FREE ESCHERICHIA A66-11807

PROTEIN METABOLISM
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

PROTON IRRADIATION
COMPUTER CODE FOR DEPTH-DOSE IN TISSUE IRRADIATED BY PROTONS
UCRL-16154 N66-11656

RESEARCHES IN AEROSPACE MEDICINE DEALING WITH PHYSIOLOGICAL RESPONSES TO BED REST, DRUGS, HEAT STRESS, PROTON IRRADIATION, AND WATER IMMERSION
NASA-CR-67948 N66-11753

PSYCHOLOGICAL EFFECT
EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

PSYCHOLOGICAL TESTING
PILOT-TRAINEE SELECTION PROCEDURES FOR SCHOOL-LEAVING POPULATION, USING INTERVIEWS AND TESTINGS A66-10606

PILOT ERROR AND HUMAN FACTORS IN AIRCRAFT ACCIDENTS MAKE PSYCHOLOGICAL OBSERVATION AND EXAMINATION OF FLYING PERSONNEL MANDATORY A66-80051

PERSONALITY PROBLEMS AND ACCIDENT PRONENESS IN PILOTS AS RELATED TO PERSONNEL SELECTION TESTING A66-80052

DEPTH PSYCHOLOGICAL ASPECTS OF MOTIVATION FOR FLYING - TESTING AND PERSONALITY ASSESSMENT A66-80053

VALIDITY OF PSYCHOLOGICAL TESTING IN SELECTING PILOTS FOR PISTON ENGINE AND JET AIRCRAFT A66-80055

PSYCHOMOTOR
ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

PSYCHOMOTOR PERFORMANCE
PHYSIOLOGICAL GRADIENTS IN SKELETAL-MOTOR AND AUTONOMIC RECORDINGS, MENTAL ACTIVITY, AND BEHAVIOR A66-80004

MANIFEST ANXIETY EFFECT ON TRAVEL AND MANIPULATION COMPONENTS OF HUMAN MOTION A66-80021

EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE A66-80073

SELECTED LIST OF REFERENCES ON MOTOR SKILLS A66-80140

PULMONARY CIRCULATION
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS A66-80079

EFFECT OF ACCELERATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW
REPT.-64-RD-8 N66-10736

PULMONARY FUNCTION
ORAL AND LARYNGEAL COMPONENTS OF UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING A66-80026

USE OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASUREMENT OF VENTILATORY MECHANICS A66-80045

PULSE RATE
FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION
NASA-TT-F-9760 N66-11615

PULSED GENERATOR
NEUTRON DOSE EQUIVALENT RATE MEASUREMENTS AROUND PULSED NEUTRON GENERATORS BY BORON TRIFLUORIDE PULSE COUNTER OR ION CHAMBER
AERE-R-4883 N66-10192

PUPIL
STEADY STATE AND FLASH REACTIONS OF PUPIL WITH REGARD TO RECEPTOR PROPERTIES AND ORGANIZATION OF RECEPTIVE FIELD N66-10438

PURINE
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION A66-80030

PYRIMIDINE
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF

GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION
A66-80030

R

RABBIT
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS
A66-80011

HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

EFFECT OF MICROWAVES ON ABSORPTIVE CAPACITY OF SYNOVIAL MEMBRANE OF KNEE JOINT AFTER SECTION OF SPINAL CORD IN RABBITS A66-80122

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

RADIATION DOSE
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE
N66-10164

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

RADIATION EFFECT
OVERALL PROFILE OF OPHTHALMIC INJURY ASSOCIATED WITH IONIZING AND NONIONIZING ELECTROMAGNETIC RADIATION FIELDS BASED ON HUMAN RESPONSE TO RADIATION EXPOSURE A66-10793

VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE
A66-11665

GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

COMBINED EFFECTS OF WHOLE BODY IRRADIATION ON RATS SUBJECTED TO PROLONGED INCREASED ACCELERATIVE FORCES
AD-620403 N66-11336

GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

RADIATION EXPOSURE
MEASUREMENT AND EVALUATION OF RADIATION EXPOSURE IN SPACE FLIGHT, NOTING TISSUE EQUIVALENT SYSTEM FOR IONIZATION RECORDING A66-11647

RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

RADIATION HAZARD
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC
A66-11663

RADIATION MEDICINE
AEROSOL AND RADIATION PHYSICS, BODY RADIOACTIVITY MEASUREMENTS, AND RADIATION MEDICINE RESEARCH
AERE-PR/HPM-7/U/ N66-10190

TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

RADIATION PROTECTION
PROTECTION DEVICES AGAINST VISION IMPAIRMENT OCCURRING DURING EXPOSURE OF AIRMEN AND MILITARY PERSONNEL TO INTENSE VISIBLE RADIATION
A66-10481

CHEMICAL THERAPY AND PROTECTION WITH CYSTEINE AIMED AT REDUCING BIOLOGICAL EFFECTS OF RADIATION
A66-80063

RADIATION DAMAGE OF BONE MARROW CELLS DURING INTERPHASE IN MICE WHO RECEIVED PRELIMINARY INJECTIONS OF MECAMYLAMINE A66-80117

CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE
N66-10164

ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS

OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

UNITED KINGDOM PROTECTION CODES FOR IONIZING RADIATION AND RADIOACTIVE MATERIALS
AHSB-/RP/-M-35 N66-10496

CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

PROTECTIVE MEASURES FOR HUMANS WORKING WITH RADIO-FREQUENCY OSCILLATORS
JPRS-32735 N66-11812

RADIATION SICKNESS
AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039 N66-11937

RADIATION THERAPY
ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

RADIATION TOLERANCE
HYPOXIA PROTECTION ON TAKING OF SECOND GRAFT OF HOMOLOGOUS BONE MARROW IN PREVIOUSLY IRRADIATED AND GRAFTED MICE A66-10609

RADIO FREQUENCY RADIATION
PROTECTIVE MEASURES FOR HUMANS WORKING WITH RADIO-FREQUENCY OSCILLATORS
JPRS-32735 N66-11812

RADIOACTIVE CONTAMINATION
RADIOACTIVE CONTAMINATION OF SEA
RT/BIO /65/18 N66-11655

RADIOACTIVE DATING
EXOBIOLOGY CONCEPTS SUGGEST THAT APPARENT INHERENT LIMITATIONS ON TEMPERATURE, PRESSURE OR CHEMICAL ENVIRONMENT FOR LIVING MATTER ARE GEOCENTRIC MYTHS A66-11602

RADIOACTIVE ISOTOPE
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

RADIOACTIVE MATERIAL
UNITED KINGDOM PROTECTION CODES FOR IONIZING RADIATION AND RADIOACTIVE MATERIALS
AHSB-/RP/-M-35 N66-10496

RADIOBIOLOGY
RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

RANDOM PROCESS
STOCHASTIC BEHAVIOR OF PRIMARY AUDITORY NEURONS ILLUSTRATED BY FUNCTIONAL MODEL SUBJECTED TO STEADY HF SINUSOIDAL TONE BURSTS A66-10400

RARE EARTH
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

RAT
OXYGEN CONSUMPTION AND LIVER GLUCOSE, SUCCINATE, AND PYRUVATE LEVELS IN HYPEROXIC RATS A66-80038

RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS A66-80060

HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

LOW BAROMETRIC PRESSURE EFFECTS ON COLON IN RATS A66-80100

UNBALANCED DIET EFFECTS ON GLUCOSE METABOLISM IN RATS A66-80108

ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS N66-10167

ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

COMBINED EFFECTS OF WHOLE BODY IRRADIATION ON RATS SUBJECTED TO PROLONGED INCREASED ACCELERATIVE FORCES

AD-620403 N66-11336

REACTION TIME
BEHAVIOR AND PHYSIOLOGICAL CORRELATES OF HUMAN RESPONSE TIME TO HIGH INTENSITY AUDITORY STIMULI A66-11832

EFFECTS OF PHYSICAL LOCATION OF VISUAL STIMULI ON INTENTIONAL RESPONSE TIME / IRT/ A66-12075

LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME A66-12076

RECIRCULATIVE FLUID FLOW
ANIMAL AND HUMAN TEST OF MANNED SPACECRAFT LIFE SUPPORT SYSTEM CONSISTING OF CLOSED SYSTEM WITH RECIRCULATING AIR LOOP, EXAMINING POTASSIUM SUPEROXIDE-POTASSIUM HYDROXIDE CHEMISTRY A66-11492

RECONNAISSANCE
MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

RECOVERY
RECOVERY FROM TEMPORARY SHIFT AS FUNCTION OF STIMULUS AND TEST TONE VARIABLES. A66-80027

RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS WEARING NIGHT DRIVING GLASSES A66-80120

REFLEX
ELECTROENCEPHALOGRAPHIC CHANGES IN ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER EFFECT OF TRANQUILIZERS
JPRS-32810 N66-11657

RELATIVE BIOLOGICAL EFFECTIVENESS /RBE/
RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

RELIABILITY
RELIABILITY ESTIMATION PROCEDURE COMBINES TASK RATINGS WITH EMPIRICALLY BASED DATA IN DERIVATION OF REGRESSION EQUATION A66-10076

HUMAN FACTORS IN DESIGN CRITERIA FOR MAINTAINABILITY AND RELIABILITY A66-10077

REMOTE CONTROL
METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES N66-10052

HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS N66-10057

CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS N66-10060

DESIGN, CONTROL, AND MANUFACTURING CONCEPTS FOR REMOTE HANDLING DEVICES, MANIPULATORS, REMOTELY CONTROLLED TOOLS, AND PROSTHETIC EQUIPMENT N66-10066

REPRODUCTIVE SYSTEM
ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

RESPIRATION
USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

RESPIRATORY DISEASE
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

RESPIRATORY IMPEDANCE
ORAL AND LARYNGEAL COMPONENTS OF UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING A66-80026

PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS A66-80110

RESPIRATORY SYSTEM
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS A66-80084

RESTRAINT
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

RETINA
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS A66-80011

RETINAL RESPONSE TO ISCHEMIA AND HYPEROXIA IN MAN AND CAT A66-80072

REPETITION REDUNDANCY AND VISUAL FORM DISCRIMINATION A66-80090

SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION A66-80091

ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION A66-80127

MONOCULAR STEREOSCOPIC PERCEPTION OF DISPARATE IMAGES. A66-80133

RIBONUCLEIC ACID
INTERACTION OF MESSENGER RNA AND RIBOSOMES STUDIED, USING F-2 BACTERIOPHAGE RNA AS MODEL MESSENGER IN CELL-FREE ESCHERICHIA A66-11807

CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION A66-80030

ROCKET FLIGHT
ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

ROTATING ENVIRONMENT
NYSTAGMUS IN NORMAL AND LABYRINTHINE DEFECTIVES AS RELATED TO ORIENTATION OF ROTATION AXIS RELATIVE TO GRAVITY A66-80023

HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN - TRANSFER AND RETENTION OF EFFECTS FROM EXTENDED PERIOD OF ROTATION A66-80138

RUBY LASER
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

S

SALT
CHEMISM OF ACUTE WEIGHT LOSSES - RELATION BETWEEN WATER AND SALTS IN ORGANISMS

NASA-TT-F-9740 N66-11613

SCIENCE /GEN/
NEW TECHNIQUES IN PHYSIOLOGY TO AID MEDICAL SCIENCE
JPRS-32585 N66-10201

INTERFACE TESTS FOR EVALUATING ABILITY OF PRESSURE FOR SUBJECTS TO PERFORM LUNAR SCIENTIFIC TASKS
NASA-TM-X-1170 N66-10319

SEMICIRCULAR CANAL
PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

SENSOR
DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

SENSORY DEPRIVATION
NEED FOR STIMULATION AS SOURCE OF STRESS RESPONSE TO PERCEPTUAL ISOLATION A66-80074

VERBAL ORIGINALITY MEASURE AND DEGREE OF STRESS EXPERIENCED IN SENSORY DEPRIVATION A66-80086

AUDITORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION A66-80092

SENSORY FEEDBACK
ADDITION OF CONTROLLED DISTORTION TO DELAY OF AUDITORY FEEDBACK A66-80134

SENSORY PERCEPTION
TIME SHARING AND VIGILANCE STUDY BY WIENER REANALYZED FROM SIGNAL DETECTION THEORY VIEWPOINT A66-10613

EFFECT OF AMPHETAMINE ON SIGNAL DETECTABILITY IN VIGILANCE TASK A66-10616

SENSORY STIMULATION
EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY IN MAN A66-80048

SERVOCONTROL
SERVOCONTROLLED-WEARABLE EXOSKELETAL DEVICE WORN BY MAN TO AMPLIFY MUSCULAR STRENGTH N66-10056

CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

SERVOSTABILITY CONTROL
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

SHORT WAVE RADIATION
ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

SIGNAL DETECTION
TIME SHARING AND VIGILANCE STUDY BY WIENER REANALYZED FROM SIGNAL DETECTION THEORY VIEWPOINT A66-10613

DECISION INTERVAL EFFECT ON SIGNAL DETECTABILITY IN VIGILANCE TASK INVOLVING CLOCK A66-10614

HUMAN AND ANIMAL VIGILANCE A66-80141

SIGNAL PROCESSING
UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

SIMILARITY HYPOTHESIS
SIMILARITY CONCEPT APPLIED TO STUDY OF WORK DONE BY LIVING CREATURES IN VARIOUS SITUATIONS A66-10302

SIMULATION
CENTRIFUGAL SIMULATION WITH PILOT OF MIRAGE III AIRCRAFT TAILSPIN A66-80047

SIMULATOR
SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS
TR-16 N66-10820

SIMULATOR TRAINING
TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

MISSION SIMULATION TECHNIQUES FOR TRAINING GEMINI FLIGHT CONTROLLERS A66-11802

SIZE PERCEPTION
JUDGMENT OF SIZE WITH VARYING CONDITIONS OF STIMULUS DURATION AND ILLUMINATION A66-80136

SKIN /BIOL/
CLINICAL AND PATHOLOGICAL EFFECTS OF PROLONGED SOLAR EXPOSURE OF SKIN ASSOCIATED WITH AGING IN MAN A66-80008

UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

SKIN FRICTION
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

SKIN TEMPERATURE /BIOL/
PERSONAL THERMAL CONDITIONING SYSTEM EMPHASIZING HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT TO PROVIDE COMFORT WITH WATER-COOLED PROTECTIVE CLOTHING A66-12012

SLEEP
BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT STATE A66-80116

ALTERATIONS OF INTERHIPPOCAMPAL IMPULSES IN MAN DURING SLEEP, REM STATE, AND WAKEFULNESS A66-80143

SLEEP DEPRIVATION
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION A66-80006

SODIUM
ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA A66-80029

PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNATREMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

SOLAR RADIATION
CLINICAL AND PATHOLOGICAL EFFECTS OF PROLONGED SOLAR EXPOSURE OF SKIN ASSOCIATED WITH AGING IN MAN A66-80008

SOLAR SYSTEM
EXOBIOLOGICAL TREND AND PROBLEMS INDICATING TYPES OF ORGANIC MATTER ON PLANET AND ORIGIN AND TRANSFER OF ORGANISMS IN SOLAR SYSTEM A66-11611

BIBLIOGRAPHY OF CURRENT ASPECTS OF EXOBIOLOGY DEALING WITH SOLAR SYSTEM, LIFE DETECTION SYSTEM, ORIGIN OF LIFE AND LIFE IN UNIVERSE A66-11612

SOUND
PHYSICAL PHENOMENA ORIGINATING UPON PROPAGATION OF

ULTRASOUND VIBRATIONS OF HIGH INTENSITY WITHIN FLUID
JPRS-32532 N66-10518

EVOKED VOCAL RESPONSE OF BULLFROG - COMMUNICATION BY SOUND
NASA-CR-67962 N66-11774

SOUND TRANSMISSION
ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

SPACE CABIN SIMULATOR
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

SPACE EXPLORATION
MAN OR AUTOMATION IN SPACE EXPLORATION IN RELATION TO DEVELOPMENT OF MECHANICAL SYSTEM WITH PERCEPTION CAPABILITIES A66-80114

DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

SPACE FLIGHT
PHYSIOLOGICAL TEST RESULTS ON COSMONAUTS DURING VOSKHOD I AND II FLIGHTS INCLUDING ELECTROCARDIOGRAMS, ELECTROENCEPHALOGRAMS, PNEUMOGRAMS, BLOOD TESTS, SPACESUIT PARAMETERS, ETC A66-10416

MEASUREMENT AND EVALUATION OF RADIATION EXPOSURE IN SPACE FLIGHT, NOTING TISSUE EQUIVALENT SYSTEM FOR IONIZATION RECORDING A66-11647

MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT A66-80112

PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

SPACE FLIGHT STRESS
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE A66-11665

SPACE LABORATORY
TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

SPACE MAINTENANCE
LOW FRICTION ENVIRONMENT EFFECTS ON MAINTENANCE OPERATIONS IN SIMULATOR NOTING TORQUING-FORCE CAPABILITY, HAND-EYE COORDINATION, ETC A66-11645

SPACE RENDEZVOUS MANEUVER
TRAJECTORY VS LINE-OF-SIGHT SPACE RENDEZVOUS, USING DIRECT VISUAL CUES ONLY A66-11830

SPACE SIMULATOR
INTERIOR DESIGN PROBLEMS IN ARTIFICIAL G SPACECRAFT SIMULATOR A66-11624

SPACE STATION
THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

SPACE SUIT
SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

SPACECRAFT CONTAMINATION
ACCIDENTAL BIOLOGICAL CONTAMINATION OF PLANETS DURING SPACE EXPLORATION, NOTING DIFFERENT PHYSICAL AND CHEMICAL STERILIZATION METHODS A66-11609

SPACECRAFT CONTROL
PROBLEM AREAS IN LONG DURATION MANNED SPACE FLIGHT NOTING VEHICLE MAINTENANCE, EXTRAVEHICULAR ACTIVITIES, VISUAL SKILL PERFORMANCE, SPACECRAFT CONTROL, ETC
SAE PAPER 650809 A66-10818

MISSION SIMULATION TECHNIQUES FOR TRAINING GEMINI FLIGHT CONTROLLERS A66-11802

SPACECRAFT ENVIRONMENT
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

SPACECRAFT RADIATOR
HEAT REJECTION FROM SPACE RADIATOR OF POWER SYSTEM USED AS ENERGY SOURCE WHEN INTEGRATED WITH LIFE SUPPORT SYSTEM A66-11642

SPACECRAFT RELIABILITY
AVAILABILITY CONCEPT IN ATTITUDE CONTROL SYSTEM FOR MANNED MARS EXPEDITION A66-10084

SPACECRAFT STERILIZATION
ACCIDENTAL BIOLOGICAL CONTAMINATION OF PLANETS DURING SPACE EXPLORATION, NOTING DIFFERENT PHYSICAL AND CHEMICAL STERILIZATION METHODS A66-11609

SPACECREW
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS A66-10803

SPATIAL ORIENTATION
MATHEMATICAL MODEL FOR OTOLITHIC ORGANS USED TO ANALYZE HUMAN SPATIAL ORIENTATION A66-10785

SPATIAL PERCEPTION
OBSERVER ELEVATION EFFECT ON MOON ILLUSION - VISUAL SPACE PERCEPTION
SAM-TR-65-46 N66-10566

SPEECH
ADDITION OF CONTROLLED DISTORTION TO DELAY OF AUDITORY FEEDBACK A66-80134

SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS
TR-16 N66-10820

SPEECH DISCRIMINATION
VOICE COMMUNICATION CHANNELS EXPANSION, USING MANS BINAURAL LISTENING CAPABILITY A66-11828

SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

SPLEEN
ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

STATISTICAL ANALYSIS
METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

ANALYSIS OF PAIRWISE AGREEMENTS AND DISAGREEMENTS INTO WITHIN AND BETWEEN COMPONENTS
REPT.-625 N66-11972

STATISTICS
STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

STIMULATION
EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

STIMULUS
SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS
TR-16 N66-10820

STOMACH
VAGAL RELAXATION OF STOMACH - EXPERIMENTAL INVESTIGATION OF CONCEPT OF TRANSMISSION MECHANISM IN CATS A66-80012

STRATEGY
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

STREPTOMYCIN
PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

STRESS /BIOL/
ARTERIAL PULSE WAVE VELOCITY AS PSYCHOPHYSIOLOGICAL MEASURE A66-80005

HEAT STRESS AND ACUTE CARDIAC DEATH IN YOUNG SOLDIERS AFTER PHYSICAL EXERTION A66-80064

VERBAL ORIGINALITY MEASURE AND DEGREE OF STRESS EXPERIENCED IN SENSORY DEPRIVATION A66-80086

ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

STRONTIUM
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

STRUCTURAL MATERIAL
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

STRYCHNINE
LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT A66-80070

SUBSYSTEM
MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

SUPERSONIC AIRCRAFT
ENVIRONMENTAL TEMPERATURE OF SUPERSONIC AIRCRAFT A66-80037

SURFACE
EFFECT OF SALIVA UPON STANNOUS FLUORIDE TREATED ENAMEL SURFACES
SAM-TR-65-28 N66-10848

SURFACTANT
CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS A66-80146

SURVIVAL
WATER REQUIREMENTS OF HUMANS - PROBLEMS OF DEHYDRATION AND SURVIVAL A66-80088

SWEATING
REGULATION OF SWEAT SECRETION DURING EXERCISE IN MAN - CORRELATION OF SWEATING TO BODY TEMPERATURE A66-80016

SYNCOPE
SYNCOPE AND EXTRASYSTOLES INCURRED DURING AIRPLANE FLIGHT AT 1500 TO 2000 METER ALTITUDE A66-80103

SYSTEMS ANALYSIS
CONSTRUCTION, PLUMBING, CAPABILITY, AND OPERATION OF LIFE SUPPORT SYSTEMS EVALUATOR - BIOASTRONAUTICS
AMRL-TDR-63-43 N66-10918

SYSTEMS ENGINEERING
SYSTEM ENGINEERING METHODOLOGIES TO SHOW HOW PREDICTION OF HUMAN ERROR LEADS TO HIGHER SYSTEM PERFORMANCE RELIABILITIES A66-10117

T

TARGET RECOGNITION
EFFECTS OF EARLY TRAINING WITH AMBIGUOUS SHAPE ON LATER ACCURACY IN DISCRIMINATION OF SONAR PIP SHAPES A66-80132

DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS A66-80135

TASK COMPLEXITY
RELIABILITY ESTIMATION PROCEDURE COMBINES TASK RATINGS WITH EMPIRICALLY BASED DATA IN DERIVATION OF REGRESSION EQUATION A66-10076

TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT A66-11829

PILOT ERROR AND HUMAN FACTORS IN AIRCRAFT ACCIDENTS MAKE PSYCHOLOGICAL OBSERVATION AND EXAMINATION OF FLYING PERSONNEL MANDATORY A66-80051

COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION INVOLVING CONTINGENT IDENTITY AND CONTINGENT POSITION A66-80139

TAYLOR MANIFEST ANXIETY SCALE
MANIFEST ANXIETY EFFECT ON TRAVEL AND MANIPULATION COMPONENTS OF HUMAN MOTION A66-80021

TELECHIRICS
METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES N66-10052

REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS N66-10060

TEMPERATURE CONTROL
THERMAL CONTROL IN ADVANCED INTEGRATED LIFE SUPPORT SYSTEM DESIGN TO ACCOMMODATE FOUR-MAN CREW ON ONE-YEAR EARTH ORBIT MISSION A66-11631

EFFECT OF PASSIVE HEATING BY DIATHERMY AND ACTIVE HEATING BY PHYSICAL EXERCISE ON TEMPERATURE

REGULATION IN MAN A66-80015

TENSILE STRENGTH
MEASUREMENT OF TENSILE STRENGTH OF HUMAN LUNG TISSUE OBTAINED AT NECROPSY A66-80019

TERRAIN FOLLOWING AIRCRAFT
TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT A66-11829

TEST EQUIPMENT
TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

TEST METHOD
COMPARISON OF LABORATORY TESTS IN LEAD POISONING A66-80076

THERAPY
GASOLINE POISONING - OCCURRENCE, PHYSIOLOGICAL EFFECTS, SYMPTOMS, AND THERAPY A66-80002

CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

CHEMICAL THERAPY AND PROTECTION WITH CYSTEINE AIMED AT REDUCING BIOLOGICAL EFFECTS OF RADIATION A66-80063

EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

CLINICAL DIAGNOSIS AND PROPHYLACTIC MEASURES IN INDUSTRIAL LEAD POISONING A66-80124

DECOMPRESSION DISEASES - THEORY, THERAPY, AND PROBLEMS OF UNDERGROUND ENGINEERING, WORKING HYGIENE, AND OCCUPATIONAL MEDICINE
DLR-FB-65-35 N66-11758

AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039 N66-11937

THERMAL COMFORT
PERSONAL THERMAL CONDITIONING SYSTEM EMPHASIZING HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT TO PROVIDE COMFORT WITH WATER-COOLED PROTECTIVE CLOTHING A66-12012

THERMAL EFFICIENCY
THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

THERMAL ENERGY
CARBON DIOXIDE REDUCTION SYSTEMS USING CHEMICAL, ELECTROCHEMICAL AND THERMAL ENERGY A66-11641

THRESHOLD
THRESHOLD OF VESTIBULAR CORIOLIS EFFECT - SIGNIFICANCE TO AIRCREW
SAM-TR-65-55 N66-10569

TIME DEPENDENCY
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE A66-12016

TIME DISCRIMINATION
TIME PERCEPTION THEORIES REVIEWED A66-80003

TIME ESTIMATION AS FUNCTION OF KNOWLEDGE AND ACHIEVEMENT A66-80020

GESTALT STUDY OF TIME ESTIMATION A66-80144

TIME FACTOR
RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS WEARING NIGHT DRIVING GLASSES A66-80120

TISSUE
MEASUREMENT AND EVALUATION OF RADIATION EXPOSURE IN SPACE FLIGHT, NOTING TISSUE EQUIVALENT SYSTEM FOR IONIZATION RECORDING A66-11647

ENERGY ABSORPTION BY BIOLOGICAL MATERIAL OF ULTRASOUND A66-80096

COMPUTER CODE FOR DEPTH-DOSE IN TISSUE IRRADIATED BY PROTONS
UCRL-16154 N66-11656

TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

TOLERANCE /BIOL/
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
CEX-65.4 N66-10963

TONE
RECOVERY FROM TEMPORARY SHIFT AS FUNCTION OF STIMULUS AND TEST TONE VARIABLES. A66-80027

TOXICITY
ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

TOXICITY AND SAFETY HAZARD
EFFECTIVE PLANNING AND OPERATIONS REQUIRED FOR CONTROL OF AIR POLLUTION DUE TO INCREASED USE OF TOXIC PROPELLANTS IN LARGER MISSILES A66-11491

TOXICOLOGY
INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

TRACER
USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

TRAINING
ACCLIMATIZATION PROBLEMS AND PHYSICAL TRAINING AT ALTITUDE A66-80069

EFFECTS OF EARLY TRAINING WITH AMBIGUOUS SHAPE ON LATER ACCURACY IN DISCRIMINATION OF SONAR PIP SHAPES A66-80132

TRAINING PATTERN-CLASSIFYING SYSTEMS BY MODE-SEEKING AND ERROR-CORRECTION METHODS USING 2-, 10-, AND 100-DIMENSIONAL PATTERNS
RADC-TR-65-257 N66-10905

HANDBOOK FOR TRAINING SITUATION ANALYSIS - FAMILIARIZATION, TASK ANALYSIS, AND PROCEDURES
NAVTRADEVCEN-1218-4 N66-12122

TRANQUILIZER
ELECTROENCEPHALOGRAPHIC CHANGES IN ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER EFFECT OF TRANQUILIZERS

JPRS-32810 N66-11657

TRANSFER FUNCTION
HUMAN TRANSFER FUNCTION FOR PILOT RESPONSE FOR MULTIAXIS AND MULTILOOP PROBLEMS A66-11633

TRANSPLANTATION
TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

TREE
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

TUMOR
MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

U

U.S.S.R.
AIR POLLUTION, AND INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN U.S.S.R.
JPRS-32565 N66-10199

INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

ULTRASONIC RADIATION
SYMPOSIUM ON PHYSICAL ACTION AND BIOLOGICAL EFFECTS OF ULTRASOUND A66-80093

PHYSICAL PRINCIPLES INVOLVED IN ACTION OF WEAK ULTRASOUND ON BIOLOGICAL CELLS A66-80094

EFFECT OF WEAK ULTTRASOUND ON BIOLOGICAL CELL A66-80095

ENERGY ABSORPTION BY BIOLOGICAL MATERIAL OF ULTRASOUND A66-80096

HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

INJURY IN MOUSE LIVERS FROM INTENSE ULTRASOUND A66-80098

ULTRAVIOLET RADIATION
U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

UNMANNED SPACECRAFT
MAN OR AUTOMATION IN SPACE EXPLORATION IN RELATION TO DEVELOPMENT OF MECHANICAL SYSTEM WITH PERCEPTION CAPABILITIES A66-80114

V

VALSALVA MANEUVER
NORMAL VALUES FOR HEART RATE DURING DIFFERENT PHASES OF VALSALVA EXPERIMENT A66-80071

VASODILATION
VASODILATION BY CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN IN HYPERVENTILATION IN ELECTROENCEPHALOGRAM OF HUMANS A66-80078

VELOCITY
EFFECT OF STRENGTH EXERCISES ON SPEED OF ARM MOVEMENT A66-80130

VERTEBRAL COLUMN
SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

VESTIBULAR APPARATUS
ELECTROPHYSIOLOGICAL RESEARCH IN EFFERENT VESTIBULAR SYSTEM IN CAT A66-80010

NYSTAGMUS IN NORMAL AND LABYRINTHINE DEFECTIVES AS RELATED TO ORIENTATION OF ROTATION AXIS RELATIVE TO GRAVITY A66-80023

EFFECT OF CONTINUOUS SOUND OF HIGH INTENSITY AND FREQUENCY ON SIZE OF NUCLEI IN HAIR CELLS AND LOCATION OF NUCLEIC ACIDS IN ORGAN OF CORTI OF RATS AND GUINEA PIGS A66-80118

HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN - TRANSFER AND RETENTION OF EFFECTS FROM EXTENDED PERIOD OF ROTATION A66-80138

ANGULAR MOTION EFFECTS ON VESTIBULAR APPARATUS - NYSTAGMUS - AEROSPACE MEDICINE
FTD-TT-65-216/1&2 N66-11356

VESTIBULAR EFFECT
THRESHOLD OF VESTIBULAR CORIOLIS EFFECT - SIGNIFICANCE TO AIRCREW
SAM-TR-65-55 N66-10569

VIBRATION
MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

PHYSICAL PHENOMENA ORIGINATING UPON PROPAGATION OF ULTRASOUND VIBRATIONS OF HIGH INTENSITY WITHIN FLUID
JPRS-32532 N66-10518

VIGILANCE
BLOOD EPINEPHRINE AND NOREPINEPHRINE RELATED TO PERFORMANCE IN VISUAL VIGILANCE TASK A66-80125

HUMAN AND ANIMAL VIGILANCE A66-80141

VISIBLE RADIATION
PROTECTION DEVICES AGAINST VISION IMPAIRMENT OCCURRING DURING EXPOSURE OF AIRMEN AND MILITARY PERSONNEL TO INTENSE VISIBLE RADIATION A66-10481

VISION
HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

VISUAL ACCOMMODATION
APPARATUS FOR MEASURING ACCOMMODATION OF IRIS TO LIGHT A66-80035

VISUAL ACUITY
BASIC PHYSIOLOGICAL OCULOMOTOR MECHANISMS THAT MAKE HUMAN IMAGE STABILIZATION POSSIBLE, EXAMINING FLIGHT DISTURBANCE EFFECT ON SYSTEM STABILITY A66-10607

EFFECT OF ANTHOCYANIN GLUCOSIDE ON SCOTOPIC VISION AND MESOPIC VISUAL ACUITY OF NORMAL SUBJECTS A66-80041

EXPERIMENTS IN HUMAN VISUAL SEARCH ACUITY
ESD-TDR-65-169 N66-12015

VISUAL AID
RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS WEARING NIGHT DRIVING GLASSES A66-80120

VISUAL CUE
TRAJECTORY VS LINE-OF-SIGHT SPACE RENDEZVOUS, USING DIRECT VISUAL CUES ONLY A66-11830

VISUAL DISPLAY
COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION INVOLVING CONTINGENT IDENTITY AND CONTINGENT POSITION A66-80139

VISUAL FIELD
DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS A66-80135

VISUAL PERCEPTION
EYE-MOVEMENT PATTERNS DURING VISUAL INFORMATION PROCESSING A66-80089

SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION A66-80091

AUDITORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION A66-80092

OBSERVER ELEVATION EFFECT ON MOON ILLUSION - VISUAL SPACE PERCEPTION
SAM-TR-65-46 N66-10566

INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
ESD-TR-65-461 N66-11058

TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

VISUAL STIMULUS
EFFECTS OF PHYSICAL LOCATION OF VISUAL STIMULI ON INTENTIONAL RESPONSE TIME / IRT/ A66-12075

LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME A66-12076

VISUAL SYSTEM
HEARING, VISUAL, AND GASTROINTESTINAL DISORDERS IN GROUNDCREW MECHANICS REVEALED IN ROUTINE PHYSICAL EXAMINATION A66-80050

LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT A66-80070

ADAPTATION EFFECT ON SQUIRREL MONKEY LATERAL GENICULATE NUCLEUS RESPONSE TO LIGHT INCREMENT AND DECREMENT A66-80121

VISUAL TASK
BLOOD EPINEPHRINE AND NOREPINEPHRINE RELATED TO PERFORMANCE IN VISUAL VIGILANCE TASK A66-80125

VITAMIN
HEMATOPOIETIC EFFECT WITH VARIOUS VITAMINS IN TREATING CHRONIC BENZENE POISONING A66-80087

VOICE COMMUNICATION
VOICE COMMUNICATION CHANNELS EXPANSION, USING MANS BINAURAL LISTENING CAPABILITY A66-11828

VOSKHOD MANNED SPACECRAFT
PHYSIOLOGICAL TEST RESULTS ON COSMONAUTS DURING VOSKHOD I AND II FLIGHTS INCLUDING ELECTROCARDIOGRAMS, ELECTROENCEPHALOGRAMS, PNEUMOGRAMS, BLOOD TESTS, SPACESUIT PARAMETERS, ETC A66-10416

W

WAKEFULNESS
ALTERATIONS OF INTERHIPPOCAMPAL IMPULSES IN MAN DURING SLEEP, REM STATE, AND WAKEFULNESS A66-80143

WALL FLOW
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS N66-10369

WARNING SYSTEM
COMPARATIVE MERITS OF VISUAL, AUDIBLE AND COMPOSITE AIRCRAFT WARNING SYSTEMS FOR OPTIMUM HUMAN RESPONSE TO CAUSAL CONDITION A66-10939

WASTE DISPOSAL
RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

WASTE UTILIZATION
THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

WATER
CHEMISM OF ACUTE WEIGHT LOSSES - RELATION BETWEEN WATER AND SALTS IN ORGANISMS
NASA-TT-F-9740 N66-11613

WATER INTAKE
WATER REQUIREMENTS OF HUMANS - PROBLEMS OF DEHYDRATION AND SURVIVAL A66-80088

WEIGHT
FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY
ARL-TR-65-10 N66-10478

WEIGHT ANALYSIS
CHEMISM OF ACUTE WEIGHT LOSSES - RELATION BETWEEN WATER AND SALTS IN ORGANISMS
NASA-TT-F-9740 N66-11613

WEIGHTLESSNESS
PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

WEIGHTLESSNESS SIMULATION
HUMAN MOTOR PERFORMANCE ACTIVITIES IN SIMULATED WEIGHTLESS ENVIRONMENT A66-11626

PHYSIOLOGICAL TESTING UNDER SIMULATED REDUCED GRAVITY CONDITIONS WITH SUBJECT SUSPENDED AND PERFORMING EXERCISES ON INCLINED TREADMILL A66-11644

WORK CAPACITY
EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

X

X-RAY
ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

Corporate Source Index

Listing of Reports by Source

A Notation of Content, rather than the title of the document, appears under each corporate source. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one corporate source, the accession numbers are arranged in sequence.

A

AEROSPACE MEDICAL DIV. AEROSPACE MEDICAL RESEARCH LABS. /6570TH/, WRIGHT-PATTERSON AFB, OHIO.
HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS N66-10057

REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS N66-10060

CONSTRUCTION, PLUMBING, CAPABILITY, AND OPERATION OF LIFE SUPPORT SYSTEMS EVALUATOR - BIOASTRONAUTICS
AMRL-TDR-63-43 N66-10918

AEROSPACE RESEARCH LABS., WRIGHT-PATTERSON AFB, OHIO.
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

ANGULAR MOTION EFFECTS ON VESTIBULAR APPARATUS - NYSTAGMUS - AEROSPACE MEDICINE
FTD-TT-65-216/1&2 N66-11356

EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

PHENOMENA OCCURRING IN HUMAN ORGANISM WITH ABRUPT PRESSURE DROP AT ALTITUDES ABOVE 20 KILOMETERS
FTD-TT-65-603/1&4 N66-11523

APPLIED SCIENCE ASSOCIATES, INC., VALENCIA, PA.
HANDBOOK FOR TRAINING SITUATION ANALYSIS - FAMILIARIZATION, TASK ANALYSIS, AND PROCEDURES
NAVTRADEVCEN-1218-4 N66-12122

ARMY MEDICAL RESEARCH LAB., FORT KNOX, KY.
ANALYSIS OF PAIRWISE AGREEMENTS AND DISAGREEMENTS INTO WITHIN AND BETWEEN COMPONENTS
REPT.-625 N66-11972

ATOMIC ENERGY COMMISSION, WASHINGTON, D. C.
DESIGN, CONTROL, AND MANUFACTURING CONCEPTS FOR REMOTE HANDLING DEVICES, MANIPULATORS, REMOTELY CONTROLLED TOOLS, AND PROSTHETIC EQUIPMENT N66-10066

RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

B

BATTELLE MEMORIAL INST., COLUMBUS, OHIO.
METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES N66-10052

BIOTECHNOLOGY, INC., ARLINGTON, VA.
TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

C

CALIFORNIA UNIV., BERKELEY. LAWRENCE RADIATION LAB.
CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

COMPUTER CODE FOR DEPTH-DOSE IN TISSUE IRRADIATED BY PROTONS
UCRL-16154 N66-11656

CALIFORNIA UNIV., DAVIS.
COMBINED EFFECTS OF WHOLE BODY IRRADIATION ON RATS SUBJECTED TO PROLONGED INCREASED ACCELERATIVE FORCES
AD-620403 N66-11336

CHICAGO UNIV., ILL.
ANIMAL STUDY - EFFECTS OF IONIZING RADIATIONS ON RATS, PROTECTIVE OR THERAPEUTIC AGENTS AGAINST RADIATION INJURY IN MICE, AND OXYGEN EXPOSURE AND RADIATION MORTALITY IN ANIMALS
QPR-55 N66-10160

ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES

OF COBALT 60 GAMMA RADIATION N66-10163

ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE N66-10164

ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS N66-10167

MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY
ARL-TR-65-10 N66-10478

COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

COMITATO NAZIONALE PER L ENERGIA NUCLEARE, LA SPEZIA /ITALY/.
RADIOACTIVE CONTAMINATION OF SEA
RT/BIO /65/18 N66-11655

CORNELL AERONAUTICAL LAB., INC., BUFFALO, N. Y.
SERVOCONTROLLED-WEARABLE EXOSKELETAL DEVICE WORN BY MAN TO AMPLIFY MUSCULAR STRENGTH N66-10056

D

DEUTSCHE VERSUCHSANSTALT FUR LUFT- UND RAUMFAHRT, BAD GODESBERG /WEST GERMANY/.
DECOMPRESSION DISEASES - THEORY, THERAPY, AND PROBLEMS OF UNDERGROUND ENGINEERING, WORKING HYGIENE, AND OCCUPATIONAL MEDICINE
DLR-FB-65-35 N66-11758

E

EDINBURGH UNIV. /SCOTLAND/.
PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

F

FRANKLIN INST., PHILADELPHIA, PA.
METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

G

GENERAL ELECTRIC CO., PHILADELPHIA, PA.
THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

H

HAMILTON STANDARD DIV., UNITED AIRCRAFT CORP., BROAD BROOK, CONN.
MARS LANDING AND RECONNAISSANCE MISSION - ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM - SUBSYSTEM STUDY
NASA-CR-67935 N66-10938

ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM FOR LANDING AND RECONNAISSANCE MISSION MARS
NASA-CR-68000 N66-11759

I

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

J

JEFFERSON MEDICAL COLL., PHILADELPHIA, PA.
POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

JOINT PUBLICATIONS RESEARCH SERVICE, WASHINGTON, D. C.
AIR POLLUTION, AND INDUSTRIAL HYGIENE AND OCCUPATIONAL DISEASES IN U.S.S.R.
JPRS-32565 N66-10199

NEW TECHNIQUES IN PHYSIOLOGY TO AID MEDICAL SCIENCE
JPRS-32585 N66-10201

BIOLOGIC MEMORY AND NUCLEIC ACIDS
JPRS-32266 N66-10203

CONSTRUCTION, AND APPLICATION OF BIONIC MODELS
JPRS-32502 N66-10370

GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

ACCLIMATIZATION AND TRAINING OF ATHLETES IN MOUNTAINOUS AREA
JPRS-32290 N66-10517

PHYSICAL PHENOMENA ORIGINATING UPON PROPAGATION OF ULTRASOUND VIBRATIONS OF HIGH INTENSITY WITHIN FLUID
JPRS-32532 N66-10518

PHILOSOPHICAL IMPLICATIONS OF MODERN BIOLOGICAL AND CHEMICAL SCIENCES ON CONCEPT OF LIFE
JPRS-32457 N66-10559

INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

ELECTROENCEPHALOGRAPHIC CHANGES IN ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER EFFECT OF TRANQUILIZERS
JPRS-32810 N66-11657

EFFECT OF EXPERIMENTAL HYPOXIC HYPOXIA ON BLOOD CLEARING FACTOR
JPRS-32781 N66-11658

TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

PROTECTIVE MEASURES FOR HUMANS WORKING WITH RADIO-FREQUENCY OSCILLATORS
JPRS-32735 N66-11812

AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039 N66-11937

K

KANSAS UNIV., LAWRENCE.
APPLICATION OF HUMAN OPERATOR PERFORMANCE FOR VARIED PARAMETERS TO DESIGN OF MAN-MACHINE SYSTEM
NASA-CR-67625 N66-10758

L

LOVELACE FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH, ALBUQUERQUE, N. MEX.
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
CEX-65.4 N66-10963

M

MARTIN CO., BALTIMORE, MD.
EXTRATERRESTRIAL LIFE DETECTION FROM ENZYME CATALYSIS OF OXYGEN-18 EXCHANGE REACTIONS
NASA-CR-67924 N66-10939

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
EVOKED VOCAL RESPONSE OF BULLFROG - COMMUNICATION BY SOUND
NASA-CR-67962 N66-11774

MISSISSIPPI STATE UNIV., STATE COLLEGE.
EFFECTS OF AMINO ACIDS ON GROWTH OF HYDROGENOMONAS EUTROPHA
NASA-CR-67927 N66-10956

MOUNT HOLYOKE COLL., SOUTH HADLEY, MASS.
EXPERIMENTS IN HUMAN VISUAL SEARCH ACUITY
ESD-TDR-65-169 N66-12015

N

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MANNED SPACECRAFT CENTER, HOUSTON, TEX.
INTERFACE TESTS FOR EVALUATING ABILITY OF PRESSURE FOR SUBJECTS TO PERFORM LUNAR SCIENTIFIC TASKS
NASA-TM-X-1170 N66-10319

RESEARCHES IN AEROSPACE MEDICINE DEALING WITH PHYSIOLOGICAL RESPONSES TO BED REST, DRUGS, HEAT STRESS, PROTON IRRADIATION, AND WATER IMMERSION
NASA-CR-67948 N66-11753

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
ANNOTATED BIBLIOGRAPHY OF AEROSPACE MEDICINE AND BIOLOGY
NASA-SP-7011/16/ N66-10316

CHEMISM OF ACUTE WEIGHT LOSSES - RELATION BETWEEN WATER AND SALTS IN ORGANISMS
NASA-TT-F-9740 N66-11613

COMPARATIVE ARTERIAL OSCILLOGRAPHIC INVESTIGATIONS OF FOREARM AND LEG IN YOUNGER AND OLDER PERSONS
NASA-TT-F-9759 N66-11614

FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION
NASA-TT-F-9760 N66-11615

PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNATREMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

NATIONAL RESEARCH COUNCIL OF CANADA, OTTAWA /ONTARIO/.
COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION
N66-11483

NAVAL AIR DEVELOPMENT CENTER, JOHNSVILLE, PA.
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

NAVAL PERSONNEL RESEARCH ACTIVITY, SAN DIEGO, CALIF
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

NAVAL SCHOOL OF AVIATION MEDICINE, PENSACOLA, FLA.
DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

PROLONGED HUMAN EXPOSURE TO MAGNETIC FIELD OF 8 GAMMA GRADIENT N66-11286

PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

O

OAK RIDGE NATIONAL LAB., TENN.
RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

OREGON STATE UNIV., CORVALLIS.
DESCRIPTIVE CHARTS AND CULTURAL CHARACTERISTICS OF SOIL DIPTHEROIDS - CORNEBACTERIUM
NASA-CR-67686 N66-10773

P

PASADENA FOUNDATION FOR MEDICAL RESEARCH, CALIF.
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

PHILCO CORP., BLUE BELL, PA.
UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

PHILCO CORP., PHILADELPHIA, PA.
CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

PRODUCTION GROUP, UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ANNON /SCOTLAND/.
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

R

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N. Y.
COLOR PERCEPTION OF ADDITIVE COLOR GROUP DISPLAYS - HUMAN PERFORMANCE
RADC-TR-65-278 N66-10831

ROYAL CANADIAN AIR FORCE, TORONTO /ONTARIO/.
EFFECT OF ACCELERATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW
REPT.-64-RD-8 N66-10736

S

SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.
STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

OBSERVER ELEVATION EFFECT ON MOON ILLUSION - VISUAL SPACE PERCEPTION
SAM-TR-65-46 N66-10566

ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

THRESHOLD OF VESTIBULAR CORIOLIS EFFECT - SIGNIFICANCE TO AIRCREW
SAM-TR-65-55 N66-10569

PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

EFFECT OF SALIVA UPON STANNOUS FLUORIDE TREATED ENAMEL SURFACES
SAM-TR-65-28 N66-10848

WATER AND SOLUTE FLUXES BETWEEN BLOOD AND INTRAPERITONEAL GLUCOSE INFUSATE OF DOG
SAM-TR-65-5 N66-10849

DISEASE COMMUNICATION THROUGH AIR TRANSPORTATION - AEROSPACE MEDICINE
AD-470689 N66-11850

EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

EFFECT OF WHOLE SALIVA ON PERFORMANCE OF STANNOUS FLUORIDE MOUTHWASH
SAM-TR-65-50 N66-11872

ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

SOCIETA RICERCHE IMPIANTI NUCLEARI, SALUGGIA /ITALY/.
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

SOCIETE BERTIN ET CIE, LA GARENNE-COLOMBES /FRANCE/.
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS N66-10369

STANFORD RESEARCH INST., MENLO PARK, CALIF.
TRAINING PATTERN-CLASSIFYING SYSTEMS BY MODE-SEEKING AND ERROR-CORRECTION METHODS USING 2-, 10-, AND 100-DIMENSIONAL PATTERNS
RADC-TR-65-257 N66-10905

SYLVANIA ELECTRIC PRODUCTS, INC., WALTHAM, MASS.
INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
ESD-TR-65-461 N66-11058

SYRACUSE UNIV., N. Y.
SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS
TR-16 N66-10820

T

TECHNISCHE HOGESCHOOL, EINDHOVEN /NETHERLANDS/.
STEADY STATE AND FLASH REACTIONS OF PUPIL WITH REGARD TO RECEPTOR PROPERTIES AND ORGANIZATION OF RECEPTIVE FIELD N66-10438

TEXAS A&M UNIV., COLLEGE STATION.
GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

TEXAS UNIV., AUSTIN.
EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

TURIN UNIV. /ITALY/.
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

U

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, HARWELL /ENGLAND/.
AEROSOL AND RADIATION PHYSICS, BODY RADIOACTIVITY MEASUREMENTS, AND RADIATION MEDICINE RESEARCH
AERE-PR/HPM-7/U/ N66-10190

NEUTRON DOSE EQUIVALENT RATE MEASUREMENTS AROUND PULSED NEUTRON GENERATORS BY BORON TRIFLUORIDE PULSE COUNTER OR ION CHAMBER
AERE-R-4883 N66-10192

UNITED KINGDOM PROTECTION CODES FOR IONIZING RADIATION AND RADIOACTIVE MATERIALS
AHSB-/RP/-M-35 N66-10496

V

VETERANS ADMINISTRATION, NEW YORK.
MOTIONS, GRIPPING, AND CONTROL REQUIREMENTS FOR PROSTHETIC EQUIPMENT, MANIPULATORS, AND ARTIFICIAL LIMBS AND HANDS N66-10067

W

WESTINGHOUSE ELECTRIC CORP., BALTIMORE, MD.
ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

Personal Author Index

Listing of Personal Authors of Reports

A Notation of Content, rather than the title of the document, appears under each author's name. The accession number is located beneath and to the right of the Notation of Content, e.g., N66-12345. Under any one author's name, the accession numbers are arranged in sequence.

A

ABRAMS, A. J.
EFFECTS OF EARLY TRAINING WITH AMBIGUOUS SHAPE ON LATER ACCURACY IN DISCRIMINATION OF SONAR PIP SHAPES A66-80132

ADAMS, C. R.
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

ADAMS, J. J.
HUMAN TRANSFER FUNCTION FOR PILOT RESPONSE FOR MULTIAXIS AND MULTILOOP PROBLEMS A66-11633

ADES, H. W.
DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

AKASHI, H.
APPLICATION OF HUMAN OPERATOR PERFORMANCE FOR VARIED PARAMETERS TO DESIGN OF MAN-MACHINE SYSTEM
NASA-CR-67625 N66-10758

AKULINICHEV, I. T.
MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT A66-80112

ALBERS, C.
BLOOD OXYGEN CONTENT MEASURED RELIABLY BY MEANS OF GAS CHROMATOGRAPHY A66-80068

ALBRING, W.
RELATIVE SPECIFIC ENERGY CAPABILITIES OF FISH AND BIRDS AND BODY STRUCTURE RELATIVE TO ENVIRONMENT A66-10200

ALEKSANDROV, I. D.
RADIATION DAMAGE OF BONE MARROW CELLS DURING INTERPHASE IN MICE WHO RECEIVED PRELIMINARY INJECTIONS OF MECAMYLAMINE A66-80117

ALMOYNER, Y.
PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS A66-80110

AMMONS, C. H.
SELECTED LIST OF REFERENCES ON MOTOR SKILLS A66-80140

AMMONS, R. B.
SELECTED LIST OF REFERENCES ON MOTOR SKILLS A66-80140

ANDERSON, B.
RETINAL RESPONSE TO ISCHEMIA AND HYPEROXIA IN MAN AND CAT A66-80072

CASE HISTORIES OF MIGRAINE LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT A66-80075

ANDREWS, T. G.
TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

ANGELIDES, A. P.
HELP PROJECT - HELICOPTER EMERGENCY LIFESAVING PATROL - A CIVILIAN PROJECT A66-80083

ANICHIN, V. F.
EFFECT OF CONTINUOUS SOUND OF HIGH INTENSITY AND FREQUENCY ON SIZE OF NUCLEI IN HAIR CELLS AND LOCATION OF NUCLEIC ACIDS IN ORGAN OF CORTI OF RATS AND GUINEA PIGS A66-80118

ANSELL, S. D.
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

ANTIPOV, V. V.
RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

ARSENEVA, M. A.
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE A66-11665

ARTUSIO, J. F.
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS A66-80084

AUFFRET, R.
CENTRIFUGAL SIMULATION WITH PILOT OF MIRAGE III AIRCRAFT TAILSPIN A66-80047

ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

AYOUB, M. M.
LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME A66-12076

B

BAEVSKII, R. M.
MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT A66-80112

BAILY, N. A.
MEASUREMENT AND EVALUATION OF RADIATION EXPOSURE IN SPACE FLIGHT, NOTING TISSUE EQUIVALENT SYSTEM

FOR IONIZATION RECORDING A66-11647

BANSI, H. W.
HEAT STRESS AND ACUTE CARDIAC DEATH IN YOUNG SOLDIERS AFTER PHYSICAL EXERTION
A66-80064

BARRETT, G. V.
JUDGING WITH WHICH EYE ONE IS VIEWING THREE-DIMENSIONAL SCENE A66-80137

BARTON, M. I.
DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS A66-80135

BATES, H.
SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS
TR-16 N66-10820

BATES, T. H.
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION
N66-11149

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

BATTERTON, R. L.
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

BAUER, G. C. H.
RADIOACTIVE CALCIUM ISOTOPES USED AS TRACERS FOR STUDYING KINETICS OF BONE TISSUE - TITRATION OF CALCIUM AND MAGNESIUM WITH ETHYLENE DIAMINE TETRAACETIC ACID / EDTA/
NYO-3234-1 N66-11933

BEARD, S. E.
PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

BEARMAN, J. E.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

BEISCHER, D. E.
PROLONGED HUMAN EXPOSURE TO MAGNETIC FIELD OF 8 GAMMA GRADIENT N66-11286

BELIAEVA, L. A.
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE
A66-11665

BENNELLICK, E. J.
UNITED KINGDOM PROTECTION CODES FOR IONIZING RADIATION AND RADIOACTIVE MATERIALS
AHSB-/RP/-M-35 N66-10496

BERGHAGE, T. E.
DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

BERGQUIST, T.
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS
A66-80011

BERNARDELLI, R.
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

BERNHARD, M.
RADIOACTIVE CONTAMINATION OF SEA
RT/BIO /65/18 N66-11655

BERNOTAT, R.
PREDICTION DISPLAY BASED ON COMPUTER EXTRAPOLATED DATA IN AIRCRAFT PILOTING A66-11985

BERNSHTEYN, A. D.
ACCLIMATIZATION AND TRAINING OF ATHLETES IN MOUNTAINOUS AREA
JPRS-32290 N66-10517

BLAKE, E. E.
EFFECTS OF AMINO ACIDS ON GROWTH OF HYDROGENOMONAS EUTROPHA
NASA-CR-67927 N66-10956

BOLLEN, W. B.
DESCRIPTIVE CHARTS AND CULTURAL CHARACTERISTICS OF SOIL DIPTHEROIDS - CORNEBACTERIUM
NASA-CR-67686 N66-10773

BONURA, M. S.
TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

BOOHER, J.
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

BORNSCHEIN, H.
LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT
A66-80070

BOUMA, H.
STEADY STATE AND FLASH REACTIONS OF PUPIL WITH REGARD TO RECEPTOR PROPERTIES AND ORGANIZATION OF RECEPTIVE FIELD N66-10438

BOURDINAUD, J.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

BOWEN, I. G.
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
CEX-65.4 N66-10963

BRAREN, M.
EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY IN MAN A66-80048

BRAUER, H. P.
PREVENTION OF BAROTITIS IN FLIERS, CAISSON WORKERS, AND DIVERS THROUGH DECONGESTANTS
A66-80065

BRAUNSTEIN, H. M.
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

BREDBERG, G.
DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

BRICE, R.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

BRIGGS, M. H.
EXOBIOLOGICAL TREND AND PROBLEMS INDICATING TYPES OF ORGANIC MATTER ON PLANET AND ORIGIN AND TRANSFER OF ORGANISMS IN SOLAR SYSTEM
A66-11611

BROWNING, E.
HEMATOPOIETIC EFFECT WITH VARIOUS VITAMINS IN TREATING CHRONIC BENZENE POISONING
A66-80087

BRYAN, A. C.
EFFECT OF ACCELERATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW
REPT.-64-RD-8 N66-10736

BUDDECKE, C. L.
DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

BURCH, G. E.
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS
A66-80079

BURKHART, K.
THREE INDICES OF PHYSICAL FUNCTION COMPARED FOR ASSESSMENT OF PHYSICAL CAPACITY
A66-80066

BURLAKOVA, E. B.
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

BUROV, YU. V.
ELECTROENCEPHALOGRAPHIC CHANGES IN ORIENTATION AND CONDITIONED DEFENSE REFLEXES UNDER EFFECT OF TRANQUILIZERS
JPRS-32810 N66-11657

BURTON, D. R.
PERSONAL THERMAL CONDITIONING SYSTEM EMPHASIZING HEAT EXCHANGE BETWEEN BODY AND ENVIRONMENT TO PROVIDE COMFORT WITH WATER-COOLED PROTECTIVE CLOTHING A66-12012

BUSNENGO, E.
BEHAVIOR OF RIGHT INTRAVENTRICULAR CONDUCTION IN 148 FLYING CADETS UNDER NORMAL SEA-LEVEL CONDITIONS AND ACUTE ANOXIC ANOXIA
A66-10608

BUTLER, R. A.
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

C

CAILLER, B.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

CANNER, P. L.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

CANTERBURY, J. B.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

CAPRANICA, R. R.
EVOKED VOCAL RESPONSE OF BULLFROG - COMMUNICATION BY SOUND
NASA-CR-67962 N66-11774

CARBALLAR PRADO, J. M.
HUMAN PILOT BEHAVIOR COMPARED WITH AUTOMATIC PILOTS IN TERMS OF ADAPTABILITY, RESPONSE TIME AND RELIABILITY A66-11866

CARLSTEN, A.
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN
A66-80014

CARPENTER, R. B., JR.
AVAILABILITY CONCEPT IN ATTITUDE CONTROL SYSTEM FOR MANNED MARS EXPEDITION A66-10084

CARRE, R.
STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

CARVES, H.
EFFECT OF ANTHOCYANIN GLUCOSIDE ON SCOTOPIC VISION AND MESOPIC VISUAL ACUITY OF NORMAL SUBJECTS
A66-80041

CASEY, H. W.
COMBINED EFFECTS OF WHOLE BODY IRRADIATION ON RATS SUBJECTED TO PROLONGED INCREASED ACCELERATIVE FORCES
AD-620403 N66-11336

CHAPMAN, I. V.
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION
N66-11149

CHASE, W. P.
SYSTEM ENGINEERING METHODOLOGIES TO SHOW HOW PREDICTION OF HUMAN ERROR LEADS TO HIGHER SYSTEM PERFORMANCE RELIABILITIES A66-10117

CHATELIER, G.
ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

CHENZOFF, A. P.
HANDBOOK FOR TRAINING SITUATION ANALYSIS - FAMILIARIZATION, TASK ANALYSIS, AND PROCEDURES
NAVTRADEVCEN-1218-4 N66-12122

CHESLER, D. J.
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

CHUBB, G. P.
REMOTE-HANDLING DEVICES AND TELECHIRIC EQUIPMENT FOR ASSEMBLY AND MAINTENANCE TASKS IN SPACE - HUMAN FACTORS IN REMOTE-HANDLING SYSTEMS
N66-10060

CLARK, H. J.
TRAJECTORY VS LINE-OF-SIGHT SPACE RENDEZVOUS, USING DIRECT VISUAL CUES ONLY A66-11830

CLARK, J. W.
METHODOLOGICAL CLASSIFICATION SCHEME FOR EQUIPMENT AND DEVICES USED TO PERFORM WORK IN HAZARDOUS AND INACCESSIBLE ENVIRONMENTS - TELECHIRICS, PROTECTIVE CLOTHING, AND REMOTE CONTROL DEVICES
N66-10052

CLEMEDSON, C.-J.
CYBERNETICS METHODS SUITED TO COMPLEX SYSTEMS ASSOCIATED WITH BIOASTRONAUTICS
A66-10807

CMELIC, S.
PERSONALITY PROBLEMS AND ACCIDENT PRONENESS IN PILOTS AS RELATED TO PERSONNEL SELECTION TESTING
A66-80052

COBET, H.
ACCLIMATIZATION PROBLEMS AND PHYSICAL TRAINING AT ALTITUDE A66-80069

COBLENTZ, A.
ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

COLIN, J.
ENVIRONMENTAL TEMPERATURE OF SUPERSONIC AIRCRAFT

A66-80037

PHYSIOLOGICAL PROBLEMS CAUSED BY ENVIRONMENTAL TEMPERATURE OF MIRAGE III AIRCRAFT COCKPIT SIMULATOR A66-80039

TOLERANCE OF MAN TO IMMERSION IN COLD WATER AND HIS PROTECTIVE CLOTHING A66-80044

COOPER, L.
HEAT REJECTION FROM SPACE RADIATOR OF POWER SYSTEM USED AS ENERGY SOURCE WHEN INTEGRATED WITH LIFE SUPPORT SYSTEM A66-11642

CORBIN, H. H.
EXPERIMENTS IN HUMAN VISUAL SEARCH ACUITY
ESD-TDR-65-169 N66-12015

CORBIN, J. C., JR.
SKIN EFFECT EQUATIONS FOR CURRENT CARRYING CYLINDRICAL CONDUCTORS AND SEMI-INFINITE SHEETS INCLUDING HYSTERESIS EFFECTS - NUMERICAL SOLUTIONS TO NONLINEAR EQUATION
ARL-65-167 N66-11982

CORDING, C. R.
HUMAN MOTOR PERFORMANCE ACTIVITIES IN SIMULATED WEIGHTLESS ENVIRONMENT A66-11626

CORTEEL, A. G.
APPARATUS FOR MEASURING ACCOMMODATION OF IRIS TO LIGHT A66-80035

COUDERT, G.
OXYGEN CONSUMPTION AND LIVER GLUCOSE, SUCCINATE, AND PYRUVATE LEVELS IN HYPEROXIC RATS A66-80038

CRAMER, K.
COMPARISON OF LABORATORY TESTS IN LEAD POISONING A66-80076

CRAMER, R. L.
EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

CRONHOLM, J. N.
ANALYSIS OF PAIRWISE AGREEMENTS AND DISAGREEMENTS INTO WITHIN AND BETWEEN COMPONENTS
REPT.-625 N66-11972

CURTIS, J. C.
INJURY IN MOUSE LIVERS FROM INTENSE ULTRASOUND A66-80098

CZECH, V.
HEARING LOSS DUE TO REPEATED EXPOSURE TO SUDDEN LOUD NOISE DURING SERVICE IN ARMED FORCES A66-80062

D

DALY, O.
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

DARENSKAIA, N. G.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS A66-10803

DAUDIN, G.
UNBALANCED DIET EFFECTS ON GLUCOSE METABOLISM IN RATS A66-80108

DAVIDOVIC, J.
PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

DAVIDOVIC, V.
RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

DAVIS, G.
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

DAVISON, F. C.
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

DAVYDOV, B. I.
RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

DAWSON, W. J., JR.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

DE KRETSER, A. J.
EFFECT OF LEAD ON RED BLOOD CELL FRAGILITY IN LEAD POISONING A66-80077

DEBIJADI, R.
PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

DEKLEVA, N.
CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

DELAHAYE, R. P.
SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

DEMANGE, J.
PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

USE OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASUREMENT OF VENTILATORY MECHANICS A66-80045

PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS A66-80110

DEMENT, W.
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION A66-80006

DEMIN, IU. S.
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE A66-11665

DEPASQUALE, N. P.
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS A66-80079

DEUTSCH, S.
PROBLEM AREAS IN LONG DURATION MANNED SPACE FLIGHT NOTING VEHICLE MAINTENANCE, EXTRAVEHICULAR ACTIVITIES, VISUAL SKILL PERFORMANCE, SPACECRAFT CONTROL, ETC
SAE PAPER 650809 A66-10818

DEVOE, D. B.
INTEGRATION OF CONCURRENT VISUAL AND AUDITORY MESSAGES FOR DECISION MAKING - COMMAND AND

CONTROL SYSTEMS - HUMAN ENGINEERING
ESD-TR-65-461 N66-11058

DHRYMIOTIS, A.
VASODILATION BY CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN IN HYPERVENTILATION IN ELECTROENCEPHALOGRAM OF HUMANS A66-80078

DILLON, R. F.
TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

DINKLOH, H.
CHEMICAL THERAPY AND PROTECTION WITH CYSTEINE AIMED AT REDUCING BIOLOGICAL EFFECTS OF RADIATION A66-80063

DISHMON, G.
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS A66-80060

DOKOVIC, V.
CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

DOMASHLAK, M. P.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS A66-10803

DONATO, L.
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

DORDEVIC, Z.
HEARING, VISUAL, AND GASTROINTESTINAL DISORDERS IN GROUNDCREW MECHANICS REVEALED IN ROUTINE PHYSICAL EXAMINATION A66-80050

DOULL, J.
ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE N66-10164

ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS N66-10167

DOWD, P. J.
EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

DOZORTSEVA, R. L.
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

DRAKULIC, K.
SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

DU BOIS, K. P.
ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS N66-10161

INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

DUDA, P. D.
AUDITORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION A66-80092

DUNLAP, R. D.
PROGRAM FOR ENGINEERING DEVELOPMENT OF INTEGRATED SPACECRAFT ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEMS AND SOLUTION OF MAN-MACHINE INTEGRATION PROBLEMS
SAE PAPER 650813 A66-10820

DUNN, F.
ENERGY ABSORPTION BY BIOLOGICAL MATERIAL OF ULTRASOUND A66-80096

DYMOND, B.
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

E

EDSTROM, J.-E.
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION A66-80030

EDWARDS, W. E.
MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

FACTORS IN SUPERIORITY OF CHIMPANZEE OVER HUMAN MUSCULAR STRENGTH-TO-WEIGHT RATIO - ANIMAL STUDY
ARL-TR-65-10 N66-10478

EISENLOHR, H. H.
RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

ELCIC, S.
RESISTANCE TO ACUTE HYPOXIA AND CATECHOLAMINE LEVEL IN RAT EXPOSED TO NOISE A66-80059

ELLIS, J. P., JR.
ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

ELPINER, I. YE.
PHYSICAL PHENOMENA ORIGINATING UPON PROPAGATION OF ULTRASOUND VIBRATIONS OF HIGH INTENSITY WITHIN FLUID
JPRS-32532 N66-10518

EMANUEL, N. M.
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

ENGSTROM, H.
DEVELOPMENT OF CELLULAR PATTERN AND NERVE SUPPLY IN HUMAN ORGAN OF CORTI IN RELATION TO HEARING DEFECTS A66-80128

ERMAKOVA, V. M.
CLINICAL DIAGNOSIS AND PROPHYLACTIC MEASURES IN INDUSTRIAL LEAD POISONING A66-80124

F

FABRE, J.
OXYGEN CONSUMPTION AND LIVER GLUCOSE, SUCCINATE, AND PYRUVATE LEVELS IN HYPEROXIC RATS A66-80038

HYPOGLYCEMIA AS POSSIBLE CAUSE OF AIRCRAFT ACCIDENTS A66-80043

HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

UNBALANCED DIET EFFECTS ON GLUCOSE METABOLISM IN RATS A66-80108

FARHI, L. E.
BLOOD OXYGEN CONTENT MEASURED RELIABLY BY MEANS OF GAS CHROMATOGRAPHY A66-80068

FARROW, B. J.
INTRAINDIVIDUAL DIFFERENCES AND SIMILARITIES IN STYLE AND CONSISTENCY OF AUTOKINETIC MOVEMENT A66-80142

FERNANDEZ-MORAN, H.
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

FERNANDEZ, C.
VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

FIALKOW, H.
CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS A66-80146

FIFE, W. P.
DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

FINLEY, T. N.
CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS A66-80146

FITCH, F.
ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

FITZGIBBON, G. M.
ELECTROCARDIOGRAPHY AS RELATED TO FLYING PERSONNEL INCLUDING CASE HISTORIES A66-10605

FLEISHMAN, E. A.
TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

FLISBERG, K.
PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS. A66-80022

FOGG-AMED, E.
MUSCULAR SYSTEM OF FEMALE SQUIRREL MONKEY, SAIMIRI - ANATOMY OF ANTEBRACHIUM
ARL-TR-65-9 N66-10477

FOLLEY, J. D., JR.
HANDBOOK FOR TRAINING SITUATION ANALYSIS - FAMILIARIZATION, TASK ANALYSIS, AND PROCEDURES
NAVTRADEVCEN-1218-4 N66-12122

FORD, J. D., JR.
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

FOSTER, W. B.
GEMINI AND APOLLO EARTH-ORBITAL PROGRAMS A66-11615

FREEMAN, J. A.
ELECTROENCEPHALOGRAM RESPONSES EVOKED FROM HUMAN SUBJECTS USING SPECIAL PURPOSE DIGITAL COMPUTER - MONITORING PSYCHOMOTOR RESPONSE TO STRESS
SAM-TR-65-42 N66-11873

FRENCH, R. S.
INTERIOR DESIGN PROBLEMS IN ARTIFICIAL G SPACECRAFT SIMULATOR A66-11624

FRETER, R.
POSTIRRADIATION INFECTION REDUCTION IN MICE BY IMMUNIZATION AND BY REPLACEMENT OF NORMAL FLORA - E. COLI - RADIOBIOLOGY AND MICROBIOLOGY
NYO-2628-1 N66-11696

FRIED, M.
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS A66-80060

FRIEL, C. M.
GESTALT STUDY OF TIME ESTIMATION A66-80144

FRUMKES, T. E.
SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION A66-80091

FRY, F. J.
HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

FRY, W. J.
HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

FUCHS, A.
HAZARDS OF LOW OXYGEN ATMOSPHERE IN INDUSTRIAL PLANTS A66-80081

FUJINO, T.
ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION A66-80127

G

GAINTSEVA, V. D.
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

GALBAN, P.
STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

GARRETA,
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS A66-80101

GASS, A. E., JR.
GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

GAVOSTO, F.
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

GAVRILINA, L. I.
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE A66-11665

GAZENKO, O. G.
PHYSIOLOGICAL TEST RESULTS ON COSMONAUTS DURING VOSKHOD I AND II FLIGHTS INCLUDING ELECTROCARDIOGRAMS, ELECTROENCEPHALOGRAMS, PNEUMOGRAMS, BLOOD TESTS, SPACESUIT PARAMETERS, ETC A66-10416

MEDICAL MONITORING AND RESEARCH AND COLLECTING BIOLOGICAL DATA DURING SPACE FLIGHT A66-80112

GAZIVODA, N.
ANALYSIS OF CRANIOCEREBRAL INJURIES IN FLIGHT PERSONNEL AS RELATED TO SUBSEQUENT CAPABILITY TO PERFORM DUTIES A66-80049

GEIGER, P. J.
ACCIDENTAL BIOLOGICAL CONTAMINATION OF PLANETS DURING SPACE EXPLORATION, NOTING DIFFERENT PHYSICAL AND CHEMICAL STERILIZATION METHODS
A66-11609

GELLER, R. E.
LOW FRICTION ENVIRONMENT EFFECTS ON MAINTENANCE OPERATIONS IN SIMULATOR NOTING TORQUING-FORCE CAPABILITY, HAND-EYE COORDINATION, ETC
A66-11645

GICQUEL, J. P.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

GILLINGHAM, K. K.
THRESHOLD OF VESTIBULAR CORIOLIS EFFECT - SIGNIFICANCE TO AIRCREW
SAM-TR-65-55 N66-10569

GILVARRY, J. J.
LUNAR ATMOSPHERE AND HYDROSPHERE, PREDICTING DIMENSIONAL CORRELATION FOR CRATERS AND MARIA OF PRIMORDIAL LUNAR LIFE, NOTING DARK AND SMOOTH APPEARANCE A66-11606

GINDIN, L. G.
U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

GINET, J.
ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

GIUMARRO, C.
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS
A66-11605

GIURDZHIAN, A. A.
PHYSIOLOGICAL TEST RESULTS ON COSMONAUTS DURING VOSKHOD I AND II FLIGHTS INCLUDING ELECTROCARDIOGRAMS, ELECTROENCEPHALOGRAMS, PNEUMOGRAMS, BLOOD TESTS, SPACESUIT PARAMETERS, ETC A66-10416

GLAZUNOV, I. S.
AUTONOMIC DYSTONIAS IN RADIATION INJURIES AND TREATMENT - NEW DISEASE IN PRIMORSKIY KRAY CALLED SCARLATINIFORM FEVER
JPRS-33039 N66-11937

GOLDSTEIN, A.
EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE A66-80073

GOLDSTEIN, M.
COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION INVOLVING CONTINGENT IDENTITY AND CONTINGENT POSITION A66-80139

GOLOVKINA, A. V.
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE
A66-11665

GOODGLASS, H.
DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS A66-80135

GOULD, J. D.
EYE-MOVEMENT PATTERNS DURING VISUAL INFORMATION PROCESSING A66-80089

GRANDPIERRE, R.
ELECTRICAL ACTIVITY OF CEREBRAL CORTEX AND SOMESTHETIC RESPONSE INDUCED IN CAT DURING ROCKET FLIGHT A66-80033

TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

GRANOTIER, E.
STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

GRAYBIEL, A.
PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

GREEN, J. W.
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

GREGG, D. E.
EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

GRIGOREV, Y. G.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

GRIGOREV, YU. G.
CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

GROGNOT, P.
MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

GUEDRY, F. E., JR.
NYSTAGMUS IN NORMAL AND LABYRINTHINE DEFECTIVES AS RELATED TO ORIENTATION OF ROTATION AXIS RELATIVE TO GRAVITY A66-80023

HABITUATION TO COMPLEX VESTIBULAR STIMULATION IN MAN - TRANSFER AND RETENTION OF EFFECTS FROM EXTENDED PERIOD OF ROTATION A66-80138

GUEFFIER, G.
SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

GUERRERO-FIGUEROA, R.
ALTERATIONS OF INTERHIPPOCAMPAL IMPULSES IN MAN DURING SLEEP, REM STATE, AND WAKEFULNESS
A66-80143

GULYAYEV, P.
CONSTRUCTION, AND APPLICATION OF BIONIC MODELS
JPRS-32502 N66-10370

GUSKOVA, A. K.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

H

HABER, M. M.
NEED FOR STIMULATION AS SOURCE OF STRESS RESPONSE TO PERCEPTUAL ISOLATION A66-80074

HAGGENDAL, J.
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN
A66-80014

HAINES, J. R.
INTRAINDIVIDUAL DIFFERENCES AND SIMILARITIES IN STYLE AND CONSISTENCY OF AUTOKINETIC MOVEMENT
A66-80142

HALE, H. B.
ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

HALLEN, O.
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION
A66-80030

HALLGREN, B.
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN
A66-80014

HALPERN, L.
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS
A66-11605

HAMASAKI, D. I.
ELECTRORETINOGRAM OF MONKEY DURING OCCLUSION OF RETINAL AND CHOROIDAL CIRCULATION
A66-80127

HAMBERGER, A.
CELL VOLUME, DRY WEIGHT, RIBONUCLEIC ACID CONTENT, PURINE AND PYRIMIDINE BASES, AND CYTOCHROME OXIDASE ACTIVITY IN SPIRAL GANGLION CELLS OF GUINEA PIG IN RESPONSE TO WHITE NOISE STIMULATION
A66-80030

HAMILTON, J. E.
OBSERVER ELEVATION EFFECT ON MOON ILLUSION - VISUAL SPACE PERCEPTION
SAM-TR-65-46 N66-10566

HANSON, K. L.
THERMAL INTEGRATION OF LIFE SUPPORT AND ELECTRICAL POWER SYSTEMS OF SIX-MAN SPACE STATION TO OBTAIN MAXIMUM UTILIZATION OF WASTE ENERGY FROM POWER GENERATING SYSTEM
NASA-CR-316 N66-11249

HARBERT, F.
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS
A66-80024

HARRISON, G. W., JR.
EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

HARRISON, L.
UTILIZING ELECTRICAL POTENTIALS ON SURFACE OF SKIN TO GENERATE CONTROL INPUTS FOR ACTUATORS AND DEVICES - COMPUTER PROGRAMMING OF MYOGRAPHIC SIGNAL DATA N66-10055

HARSTAD, K.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

HARTMANN, H.
PREVENTION OF BAROTITIS IN FLIERS, CAISSON WORKERS, AND DIVERS THROUGH DECONGESTANTS
A66-80065

HASEGAWA, A. T.
ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

HAUPT, G. J.
HELP PROJECT - HELICOPTER EMERGENCY LIFESAVING PATROL - A CIVILIAN PROJECT A66-80083

HAZARD, A. B.
PHYSIOLOGICAL TESTING UNDER SIMULATED REDUCED GRAVITY CONDITIONS WITH SUBJECT SUSPENDED AND PERFORMING EXERCISES ON INCLINED TREADMILL
A66-11644

HEATH, R. G.
ALTERATIONS OF INTERHIPPOCAMPAL IMPULSES IN MAN DURING SLEEP, REM STATE, AND WAKEFULNESS
A66-80143

HEIMBERG, M.
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS
A66-80060

HEISS, W.-D.
LIGHT, ISCHEMIA, STRYCHNINE, AND BARBITURATE ON ACTIVITY OF SINGLE FIBERS OF OPTICAL NERVE IN CAT
A66-80070

HELVEY, W. M.
AMERICAN AND SOVIET EXPERIENCE CONSIDERING WEIGHTLESSNESS, IONIZING RADIATION, DYNAMIC AND BIOLOGICAL FACTORS, ETC
SAE PAPER 650812 A66-10819

HENRY, J. P.
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

HEYMAN, A.
CASE HISTORIES OF MIGRAINE LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT
A66-80075

HIEBERT, T. G.
VESTIBULAR DIETERSIAN RESPONSE PATTERNS TO TILT OF ANESTHETIZED CAT A66-80032

HIGDON, J. P.
GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

HOBBY, G. L.
MARTIAN LIFE-DETECTION INSTRUMENTS AND EXPERIMENTS, EXAMINING BIOLOGICAL CRITERIA AND VISUAL, ORGANIC, CHEMICAL AND METABOLIC TESTS
A66-11608

HOLOSWORTH, L. D.
WATER REQUIREMENTS OF HUMANS - PROBLEMS OF DEHYDRATION AND SURVIVAL A66-80088

HONRUBIA, V.
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

HOUDAS, Y.
ENVIRONMENTAL TEMPERATURE OF SUPERSONIC AIRCRAFT
A66-80037

PHYSIOLOGICAL PROBLEMS CAUSED BY ENVIRONMENTAL TEMPERATURE OF MIRAGE III AIRCRAFT COCKPIT SIMULATOR A66-80039

TOLERANCE OF MAN TO IMMERSION IN COLD WATER AND HIS PROTECTIVE CLOTHING A66-80044

HRYEKEWICZ, B. W.
THERMAL CONTROL IN ADVANCED INTEGRATED LIFE SUPPORT SYSTEM DESIGN TO ACCOMMODATE FOUR-MAN CREW ON ONE-YEAR EARTH ORBIT MISSION
A66-11631

HUBER, G. L.
CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS
A66-80146

HUGHES, D. E.
EFFECT OF WEAK ULTTRASOUND ON BIOLOGICAL CELL
A66-80095

HUNT, S. R.
HUMAN MOTOR PERFORMANCE ACTIVITIES IN SIMULATED WEIGHTLESS ENVIRONMENT A66-11626

HYMAN, A. L.
PULMONARY VENOUS RESPONSES TO IMMERSION HYPERTHERMIA AND HYPOTHERMIA IN DOGS
A66-80079

I

IATSENKO, M. I.
EFFECT OF MICROWAVES ON ABSORPTIVE CAPACITY OF SYNOVIAL MEMBRANE OF KNEE JOINT AFTER SECTION OF SPINAL CORD IN RABBITS A66-80122

IGARASHI, M.
PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

IKELS, K. G.
DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

J

JACKSON, F.
MARTIAN LIFE POSSIBILITIES DISCUSSING ITS ATMOSPHERE, CLOUDS, VIOLET LAYER, TEMPERATURE AND BIOLOGICAL INTERPRETATION OF DARK AREAS
A66-11607

JACOBS, G. H.
ADAPTATION EFFECT ON SQUIRREL MONKEY LATERAL GENICULATE NUCLEUS RESPONSE TO LIGHT INCREMENT AND DECREMENT A66-80121

JACQUEMIN, C.
PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

USE OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASUREMENT OF VENTILATORY MECHANICS
A66-80045

JACQUEMIN, CH.
PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS
A66-80110

JAEGER, R. G.
RADIATION DOSE AND RBE OF IONIZING RADIATION - DOSIMETRY UNITS FOR RADIOBIOLOGY
AEC-TR-6593 N66-11420

JAFFE, L. D.
ACCIDENTAL BIOLOGICAL CONTAMINATION OF PLANETS DURING SPACE EXPLORATION, NOTING DIFFERENT PHYSICAL AND CHEMICAL STERILIZATION METHODS
A66-11609

JAGENBURG, R.
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN
A66-80014

JAOUEN, P.
SYNCOPE AND EXTRASYSTOLES INCURRED DURING AIRPLANE FLIGHT AT 1500 TO 2000 METER ALTITUDE
A66-80103

JENNEY, L.
HUMAN FACTORS IN DESIGN CRITERIA FOR MAINTAINABILITY AND RELIABILITY
A66-10077

JERISON, H. J.
HUMAN AND ANIMAL VIGILANCE A66-80141

JOHN, E. R.
EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY IN MAN A66-80048

JOHNSON, L. C.
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION
A66-80006

JOHNSTONE, B. M.
MAINTENANCE OF COCHLEAR POTENTIALS INDUCED BY TONE BURSTS IN GUINEA PIG DURING ASPHYXIA PERFUSATES VARYING IN OXYGEN AND POTASSIUM ION CONCENTRATIONS
A66-80028

ENDOLYMPH SODIUM POTASSIUM RATIO AND ENDOCOCHLEAR POTENTIAL OF GUINEA PIG DURING ANOXIA
A66-80029

JONES, G. M.
BASIC PHYSIOLOGICAL OCULOMOTOR MECHANISMS THAT MAKE HUMAN IMAGE STABILIZATION POSSIBLE, EXAMINING FLIGHT DISTURBANCE EFFECT ON SYSTEM STABILITY
A66-10607

OCULOMOTOR RESPONSES TO VESTIBULAR AND OPTOKINETIC STIMULI DURING EIGHT-TURN SPINS IN JET TRAINER AIRCRAFT A66-10612

JONES, J. M.
METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

JOUFFRAY, L.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

JUKES, T. H.
INTERACTION OF MESSENGER RNA AND RIBOSOMES STUDIED, USING F-2 BACTERIOPHAGE RNA AS MODEL MESSENGER IN CELL-FREE ESCHERICHIA
A66-11807

JUNAS, R. K.
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

K

KADOSCH, M.
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS
N66-10369

KAIZER, S.
EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE A66-80073

KALIMIN, B. YU.
INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

KAMA, W. N.
HUMAN FACTORS RELATING TO DESIGN AND USE OF REMOTE HANDLING EQUIPMENT AND MANIPULATORS IN GROUND SUPPORT OF NUCLEAR POWERED SYSTEMS AND EXTRAVEHICULAR SPACE OPERATIONS
N66-10057

KASVAND, T.
COMPUTER SIMULATION OF PATTERN RECOGNITION BY USING CELL ASSEMBLIES AND CONTOUR PROJECTION
N66-11483

KATSUKI, Y.
INFORMATION PROCESSING IN AUDITORY NEURAL MECHANISM, EXAMINING SYNTHESIS OPERATION OF CORTEX NEURONS AND FUNCTION OF CENTRIFUGAL NERVE PATHS
A66-11365

KELLY, E.
SYMPOSIUM ON PHYSICAL ACTION AND BIOLOGICAL EFFECTS OF ULTRASOUND A66-80093

HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

KENNEDY, R. S.
DARK ADAPTATION, NIGHT VISION, AND PILOT PERFORMANCE - ACCIDENT PREVENTION METHODS FOR AIRCRAFT CARRIER NIGHT LANDINGS
AD-620016 N66-10782

KHEYFETS, M. G.
METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

KHOURI, E. M.
EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

KHRAPOVA, N. G.
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

KING, C. D.
THERMAL CONTROL IN ADVANCED INTEGRATED LIFE SUPPORT SYSTEM DESIGN TO ACCOMMODATE FOUR-MAN CREW ON ONE-YEAR EARTH ORBIT MISSION A66-11631

KINOSHITA, F.
INHIBITORY EFFECTS OF X-IRRADIATION ON SYNTHESIS OF ENZYMES IN LIVER MICROSOMES OF MALE RATS - ANIMAL STUDY N66-10162

KIRCHHOFF, H. W.
THREE INDICES OF PHYSICAL FUNCTION COMPARED FOR ASSESSMENT OF PHYSICAL CAPACITY A66-80066

KITAYEV-SMYK, A.
EFFECT OF WEIGHTLESSNESS ON HUMANS - PSYCHOLOGICAL EFFECT, VISION, MOVEMENT, AND CAPACITY TO PERFORM WORK
FTD-TT-65-146/1&2 N66-11520

KLAUS, T.
HUMAN MOTOR PERFORMANCE ACTIVITIES IN SIMULATED WEIGHTLESS ENVIRONMENT A66-11626

KLEMAN, B.
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS A66-80011

KLIMT, F.
NORMAL VALUES FOR HEART RATE DURING DIFFERENT PHASES OF VALSALVA EXPERIMENT A66-80071

KLIPPLE, A. G.
EFFECTS OF EARLY TRAINING WITH AMBIGUOUS SHAPE ON LATER ACCURACY IN DISCRIMINATION OF SONAR PIP SHAPES A66-80132

KOBRICK, J. L.
EFFECTS OF PHYSICAL LOCATION OF VISUAL STIMULI ON INTENTIONAL RESPONSE TIME / IRT/ A66-12075

KOK, B.
EXTRATERRESTRIAL LIFE DETECTION FROM ENZYME CATALYSIS OF OXYGEN-18 EXCHANGE REACTIONS
NASA-CR-67924 N66-10939

KOMOROVA, E. H.
INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

KONNOVA, N. I.
RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

KOROTYAYEV, A. I.
PHILOSOPHICAL IMPLICATIONS OF MODERN BIOLOGICAL AND CHEMICAL SCIENCES ON CONCEPT OF LIFE
JPRS-32457 N66-10559

KOTTKE, F. J.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

KOVALEV, E. E.
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC A66-11663

CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

KRATZING, C. C.
HEPATIC LIPID AND CHOLESTEROL VALUES OF RAT ON CHOLINE-ADEQUATE AND INADEQUATE DIET AS RELATED SWIMMING OR STANDING IN WATER A66-80061

KRICHAGIN, V.
SPACE CLOTHING FOR EXPLORATION OF AIRLESS OUTER SPACE - HIGH ALTITUDE PHYSIOLOGY AND ENGINEERING DESIGN
FTD-TT-65-604/1&4 N66-10788

KRUGLIAKOVA, K. E.
U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

KRUMINS, R.
HIGH INTENSITY ULTRASONIC INJURY OF CELL STRUCTURE OF ANTERIOR PITUITARY IN CATS A66-80097

KUBICEK, W. G.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

KURLYANDSKII, B. A.
INDUSTRIAL TOXICOLOGY IN U.S.S.R. - TOXICITY OF VOLATILE PRODUCTS OF PLASTICS
JPRS-32451 N66-10586

L

LA FEVERS, E. V.
INTERFACE TESTS FOR EVALUATING ABILITY OF PRESSURE FOR SUBJECTS TO PERFORM LUNAR SCIENTIFIC TASKS
NASA-TM-X-1170 N66-10319

LANDAHL, H. D.
ANIMAL STUDY - OXYGEN TENSION MEASUREMENTS IN SPLEEN OF MICE, AND PROTECTION AGAINST RADIATION LETHALITY AFTER ADMINISTRATION OF P-AMINOPROPIOPHENONE N66-10166

LANDIS, D.
METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

LATHROP, R. G.
ERROR CORRELATIONS IN TWO - DIMENSIONAL COMPENSATORY TRACKING TASK A66-80145

LEAKE, J. W.
NEUTRON DOSE EQUIVALENT RATE MEASUREMENTS AROUND PULSED NEUTRON GENERATORS BY BORON TRIFLUORIDE PULSE COUNTER OR ION CHAMBER
AERE-R-4883 N66-10192

LEBEDEV, F. M.
METHOD FOR SIMULTANEOUS STUDY OF NICTITATING CONDITIONED REFLEXES AND FUNCTIONAL STATE OF HUMAN CARDIOVASCULAR SYSTEM
FTD-TT-65-60/1&2 N66-11341

LEBENDINSKII, A. V.
CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

LEBLANC, M.
HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

LEGUAY, G.
ASPECTS OF VOMITING DURING MOTION SICKNESS IN FLIGHT - CASE HISTORIES OF FLYING PERSONNEL A66-80046

LEVIN, E.
HUMAN FACTORS IN DESIGN CRITERIA FOR MAINTAINABILITY AND RELIABILITY A66-10077

LEVIN, G. V.
EXTRATERRESTRIAL LIFE OR EXOBIOLOGY NOTING LIFE POSSIBILITY ON MARS, MOON AS POSSIBLE INFORMATION SOURCE, CONTINUOUS GENERATION OF MATTER IN UNIVERSE, ETC A66-10401

LHAMON, W. T.
GESTALT STUDY OF TIME ESTIMATION A66-80144

LINDE, H.
PREVENTION OF BAROTITIS IN FLIERS, CAISSON WORKERS, AND DIVERS THROUGH DECONGESTANTS
A66-80065

LIPTON, E. L.
PROBLEMS OF MEASUREMENT ENGENDERED BY INDIVIDUAL DIFFERENCES IN AUTONOMIC RESPONSIBILITY
A66-80007

LOCKHEAD, G. R.
REPETITION REDUNDANCY AND VISUAL FORM DISCRIMINATION A66-80090

LOMONACO, T.
PHYSICAL EXERCISE AND ENERGY EXPENDITURE OF HUMAN SUBJECTS DURING SIMULATED WEIGHTLESSNESS
A66-80001

LOUBIERE, R.
MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

LOUDON, W. L.
SERVO-RESTRAINT SYSTEM TO ASSIST PILOT IN CONTROLLING AEROSPACE VEHICLE UNDER SEVERE G FORCES N66-10058

LUNDIN, G.
DETERMINATION OF MIXED VENOUS CO2 PRESSURE WITH A REBREATHING METHOD IN MAN A66-80013

M

MAC NAMARA, W. D.
EFFECT OF ACCELERATION ON DISTRIBUTION OF PULMONARY BLOOD FLOW
REPT.-64-RD-8 N66-10736

MACKLIN, M.
CARBON DIOXIDE REDUCTION SYSTEMS USING CHEMICAL, ELECTROCHEMICAL AND THERMAL ENERGY
A66-11641

MACKWORTH, J. F.
DECISION INTERVAL EFFECT ON SIGNAL DETECTABILITY IN VIGILANCE TASK INVOLVING CLOCK
A66-10614

EFFECT OF AMPHETAMINE ON SIGNAL DETECTABILITY IN VIGILANCE TASK A66-10616

MAHMOOD, S.
APPLICATION OF HUMAN OPERATOR PERFORMANCE FOR VARIED PARAMETERS TO DESIGN OF MAN-MACHINE SYSTEM
NASA-CR-67625 N66-10758

MALMO, R. B.
PHYSIOLOGICAL GRADIENTS IN SKELETAL-MOTOR AND AUTONOMIC RECORDINGS, MENTAL ACTIVITY, AND BEHAVIOR
A66-80004

MAMIKUNIAN, G.
ACCIDENTAL BIOLOGICAL CONTAMINATION OF PLANETS DURING SPACE EXPLORATION, NOTING DIFFERENT PHYSICAL AND CHEMICAL STERILIZATION METHODS
A66-11609

EXOBIOLOGICAL TREND AND PROBLEMS INDICATING TYPES OF ORGANIC MATTER ON PLANET AND ORIGIN AND TRANSFER OF ORGANISMS IN SOLAR SYSTEM
A66-11611

MANDELL, A. J.
BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT STATE
A66-80116

MANDELL, M. P.
BIOCHEMICAL ASPECTS OF RAPID EYE MOVEMENT STATE
A66-80116

MANGIALARDI, J.
HEAT REJECTION FROM SPACE RADIATOR OF POWER SYSTEM USED AS ENERGY SOURCE WHEN INTEGRATED WITH LIFE SUPPORT SYSTEM A66-11642

MANGIN, H.
SPINAL INJURIES AND CONGENITAL ANOMALIES RELATED TO HIGH SPEED FLYING A66-80107

MARIANI, G.
SYNCOPE AND EXTRASYSTOLES INCURRED DURING AIRPLANE FLIGHT AT 1500 TO 2000 METER ALTITUDE
A66-80103

MARKELOV, B. A.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

MARKS, E. L.
ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

MARSHALL, D. R.
CLINICAL AND PATHOLOGICAL EFFECTS OF PROLONGED SOLAR EXPOSURE OF SKIN ASSOCIATED WITH AGING IN MAN A66-80008

MARTINSON, J.
VAGAL RELAXATION OF STOMACH - EXPERIMENTAL INVESTIGATION OF CONCEPT OF TRANSMISSION MECHANISM IN CATS A66-80012

MARTON, T.
HUMAN MOTOR PERFORMANCE ACTIVITIES IN SIMULATED WEIGHTLESS ENVIRONMENT A66-11626

MASON, C. C.
INTERFACE TESTS FOR EVALUATING ABILITY OF PRESSURE FOR SUBJECTS TO PERFORM LUNAR SCIENTIFIC TASKS
NASA-TM-X-1170 N66-10319

MASSAGLIA, A.
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

MASSRY, S.
PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNATREMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

MATELES, R. I.
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE
A66-12016

MATHE, G.
TRANSPLANTATION OF HEMOPOIETIC CELLS, TISSUE, AND ORGANS - WHOLE BODY RADIATION AND BONE MARROW TRANSPLANTS
JPRS-32559 N66-11800

MAYO, A. M.
DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

MAZZELLA, G.
HYPOXIA PROTECTION ON TAKING OF SECOND GRAFT OF HOMOLOGOUS BONE MARROW IN PREVIOUSLY IRRADIATED AND GRAFTED MICE A66-10609

MC IVER, R. G.
DECOMPRESSION SICKNESS OF DOGS FROM NITROUS OXIDE ANESTHESIA
SAM-TR-65-47 N66-10568

MC LEOD, M. E.
PATHOLOGICAL EFFECTS OF STREPTOMYCIN SULFATE ON SEMICIRCULAR CANAL FUNCTIONS IN SQUIRREL MONKEYS - AEROSPACE MEDICINE
NASA-CR-68007 N66-11768

MCLOUTH, M. E.
EFFECTIVE PLANNING AND OPERATIONS REQUIRED FOR CONTROL OF AIR POLLUTION DUE TO INCREASED USE OF TOXIC PROPELLANTS IN LARGER MISSILES
A66-11491

MEDEIROS, R. R.
LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND

BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME
A66-12076

MEINERI, G.
BEHAVIOR OF RIGHT INTRAVENTRICULAR CONDUCTION IN 148 FLYING CADETS UNDER NORMAL SEA-LEVEL CONDITIONS AND ACUTE ANOXIC ANOXIA
A66-10608

PHYSICAL EXERCISE AND ENERGY EXPENDITURE OF HUMAN SUBJECTS DURING SIMULATED WEIGHTLESSNESS
A66-80001

MEIRY, J. L.
MATHEMATICAL MODEL FOR OTOLITHIC ORGANS USED TO ANALYZE HUMAN SPATIAL ORIENTATION
A66-10785

MELNIK, A. D.
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC
A66-11663

MELVILLE, G. S., JR.
EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

MERCIER, A.
EFFECT OF ANTHOCYANIN GLUCOSIDE ON SCOTOPIC VISION AND MESOPIC VISUAL ACUITY OF NORMAL SUBJECTS
A66-80041

MICHON, J. A.
TIME PERCEPTION THEORIES REVIEWED
A66-80003

MICKELSON, W. F.
CONSTRUCTION, PLUMBING, CAPABILITY, AND OPERATION OF LIFE SUPPORT SYSTEMS EVALUATOR - BIOASTRONAUTICS
AMRL-TDR-63-43 N66-10918

MIDDLETON, V.
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS
A66-80084

MIHAJLOVIC, R.
SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

MILAKOVIC, I.
DEPTH PSYCHOLOGICAL ASPECTS OF MOTIVATION FOR FLYING - TESTING AND PERSONALITY ASSESSMENT
A66-80053

MILLER, H. G.
MISSION SIMULATION TECHNIQUES FOR TRAINING GEMINI FLIGHT CONTROLLERS A66-11802

MILLIGAN, J. R.
INTERIOR DESIGN PROBLEMS IN ARTIFICIAL G SPACECRAFT SIMULATOR A66-11624

MIRO, L.
ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

MISKOLCZY, W.
GASOLINE POISONING - OCCURRENCE, PHYSIOLOGICAL EFFECTS, SYMPTOMS, AND THERAPY A66-80002

MITCHELL, R. E.
MEDICAL HISTORY OF 1056 AVIATORS OVER 24-YEAR PERIOD A66-10610

MIZEN, N. J.
SERVOCONTROLLED-WEARABLE EXOSKELETAL DEVICE WORN BY MAN TO AMPLIFY MUSCULAR STRENGTH
N66-10056

MOLLER, A. R.
ACOUSTIC IMPEDANCE AT EARDRUM AND COCHLEAR MICROPHONIC POTENTIAL OF CAT AND RABBIT DURING CONSTANT SOUND PRESSURE AND MIDDLE EAR TRANSMISSION PROPERTIES A66-80031

MOORE, E. W.
EFFECTS OF MOTION SICKNESS ON DYNAMIC CHARACTERISTICS OF RESPONSE TO CORIOLIS STIMULATION
SAM-TR-65-67 N66-11871

MOORE, P.
MARTIAN LIFE POSSIBILITIES DISCUSSING ITS ATMOSPHERE, CLOUDS, VIOLET LAYER, TEMPERATURE AND BIOLOGICAL INTERPRETATION OF DARK AREAS
A66-11607

MORGAN, T. E.
CHANGES IN PULMONARY SURFACE TENSION WITH INCREASED OXYGEN TENSION AND ALTERATION INACTIVITY AND COMPOSITION OF LIPID SURFACTANT IN DOGS
A66-80146

MURPHY, E. F.
MOTIONS, GRIPPING, AND CONTROL REQUIREMENTS FOR PROSTHETIC EQUIPMENT, MANIPULATORS, AND ARTIFICIAL LIMBS AND HANDS N66-10067

MURRAY, F. S.
MANIFEST ANXIETY EFFECT ON TRAVEL AND MANIPULATION COMPONENTS OF HUMAN MOTION A66-80021

MURRAY, R. H.
HEMATOLOGICAL CHANGES IN SEVEN HEALTHY YOUNG MALES SUBJECTED TO INTENSE HEATING TRANSIENTS
A66-10611

MURRAY, R. W.
HEAT REJECTION FROM SPACE RADIATOR OF POWER SYSTEM USED AS ENERGY SOURCE WHEN INTEGRATED WITH LIFE SUPPORT SYSTEM A66-11642

MYERS, R. N.
HELP PROJECT - HELICOPTER EMERGENCY LIFESAVING PATROL - A CIVILIAN PROJECT A66-80083

N

NAJFELD, A.
PILOT ERROR AND HUMAN FACTORS IN AIRCRAFT ACCIDENTS MAKE PSYCHOLOGICAL OBSERVATION AND EXAMINATION OF FLYING PERSONNEL MANDATORY
A66-80051

NEFEDOV, YU. G.
CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

NEW, A. E.
WATER AND SOLUTE FLUXES BETWEEN BLOOD AND INTRAPERITONEAL GLUCOSE INFUSATE OF DOG
SAM-TR-65-5 N66-10849

NEWSOM, B. D.
INTERIOR DESIGN PROBLEMS IN ARTIFICIAL G SPACECRAFT SIMULATOR A66-11624

NEWSOME, L. R.
JUDGMENT OF SIZE WITH VARYING CONDITIONS OF STIMULUS DURATION AND ILLUMINATION
A66-80136

NIELSEN, B.
EFFECT OF PASSIVE HEATING BY DIATHERMY AND ACTIVE HEATING BY PHYSICAL EXERCISE ON TEMPERATURE REGULATION IN MAN A66-80015

REGULATION OF SWEAT SECRETION DURING EXERCISE IN MAN - CORRELATION OF SWEATING TO BODY TEMPERATURE
A66-80016

NIELSEN, M.
EFFECT OF PASSIVE HEATING BY DIATHERMY AND ACTIVE HEATING BY PHYSICAL EXERCISE ON TEMPERATURE REGULATION IN MAN A66-80015

REGULATION OF SWEAT SECRETION DURING EXERCISE IN MAN - CORRELATION OF SWEATING TO BODY TEMPERATURE
A66-80016

NIKOLAYEV, A.
PHENOMENA OCCURRING IN HUMAN ORGANISM WITH ABRUPT PRESSURE DROP AT ALTITUDES ABOVE 20 KILOMETERS
FTD-TT-65-603/1&4 N66-11523

NILSSON, N. J.
TRAINING PATTERN-CLASSIFYING SYSTEMS BY MODE-SEEKING AND ERROR-CORRECTION METHODS USING 2-, 10-, AND 100-DIMENSIONAL PATTERNS
RADC-TR-65-257 N66-10905

NOLAN, J. M.
PILOT-TRAINEE SELECTION PROCEDURES FOR SCHOOL-LEAVING POPULATION, USING INTERVIEWS AND TESTINGS
A66-10606

NUNGESSER, W. C.
PROLONGED SPACE FLIGHT WEIGHTLESSNESS EFFECTS ON GENERAL METABOLISM AND CALCIUM REGULATION - AEROSPACE MEDICINE N66-10579

NUZHDIN, N. I.
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

NYBORG, W. L.
PHYSICAL PRINCIPLES INVOLVED IN ACTION OF WEAK ULTRASOUND ON BIOLOGICAL CELLS A66-80094

O

OHANLON, J. F., JR.
BLOOD EPINEPHRINE AND NOREPINEPHRINE RELATED TO PERFORMANCE IN VISUAL VIGILANCE TASK
A66-80125

OHTSUKI, M.
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

OLSON, M. E.
EVALUATION OF CARDIAC OUTPUT AND WORK AND METABOLIC RATE DURING HYDROTHERAPY AND EXERCISE IN NORMAL SUBJECTS A66-80082

OLSON, R. S.
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

ORLOV, I. V.
ANGULAR MOTION EFFECTS ON VESTIBULAR APPARATUS - NYSTAGMUS - AEROSPACE MEDICINE
FTD-TT-65-216/1&2 N66-11356

ORO, J.
BACTERIAL CONTAMINATION OF MURRAY, ORGUEIL AND MOKOIA CARBONACEOUS METEORITES A66-80126

ORO, J. J.
ASTROPHYSICAL OBSERVATION AND EXPERIMENTAL RESULTS OF ORGANIC SYNTHESIS BEARING ON ABIOGENIC FORMATION OF BIOCHEMICAL COMPOUNDS FORMED FROM SIMPLE PRECURSOR IN AQUEOUS OR AQUEOUS AMMONIA SYSTEM A66-11603

OSANOV, D. P.
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC
A66-11663

OSIPOV, YU. A.
PROTECTIVE MEASURES FOR HUMANS WORKING WITH RADIO-FREQUENCY OSCILLATORS
JPRS-32735 N66-11812

OZKAPTAN, H.
HUMAN FACTORS IN DESIGN CRITERIA FOR MAINTAINABILITY AND RELIABILITY
A66-10077

P

PAGES, M. R.
LOW BAROMETRIC PRESSURE EFFECTS ON COLON IN RATS
A66-80100

PANNIER, R.
ASPECTS OF VOMITING DURING MOTION SICKNESS IN FLIGHT - CASE HISTORIES OF FLYING PERSONNEL
A66-80046

PARIN, V. V.
NEW TECHNIQUES IN PHYSIOLOGY TO AID MEDICAL SCIENCE
JPRS-32585 N66-10201

PARKER, F. L.
RADIOACTIVE WASTE DISPOSAL, RADIATION ECOLOGY, RADIATION PHYSICS, INTERNAL DOSIMETRY, RADIATION DOSIMETRY, AND HEALTH PHYSICS TECHNOLOGY
ORNL-3849 N66-10129

PARKER, J. F., JR.
PROTECTION DEVICES AGAINST VISION IMPAIRMENT OCCURRING DURING EXPOSURE OF AIRMEN AND MILITARY PERSONNEL TO INTENSE VISIBLE RADIATION
A66-10481

TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

PASTUSHENKO-STRELETS, N. A.
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

PAVLIN, C.
MECHANICAL PROPERTIES OF FLUID SWITCHING FOR ARTIFICIAL RESPIRATOR WITH CURVED WALLS
N66-10369

PEGORARO, L.
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

PENNISI, F.
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

PERDRIEL, G.
EFFECT OF ANTHOCYANIN GLUCOSIDE ON SCOTOPIC VISION AND MESOPIC VISUAL ACUITY OF NORMAL SUBJECTS
A66-80041

HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY A66-80102

PERNOW, B.
OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN A66-80017

PESQUIES, P.
SYNCOPE AND EXTRASYSTOLES INCURRED DURING AIRPLANE FLIGHT AT 1500 TO 2000 METER ALTITUDE
A66-80103

PETROVIC, S.
AVIATION PERSONNEL USE OF DRUGS DURING FLIGHT DUTY AS RELATED TO INSTRUCTIONS FROM FLIGHT SURGEON
A66-80054

PFISTER, A.
MECHANICAL VIBRATION EFFECTS ON MITOSIS IN TUMOR CELLS OF MICE A66-80104

ULTRA SHORT WAVE RADIATION EFFECTS ON GONADS AND REPRODUCTION IN MICE AND RATS A66-80109

PHILIPS, A. J.
RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS

WEARING NIGHT DRIVING GLASSES A66-80120

PICKERING, J. E.
EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

PICKFORD, L. M.
PHYSIOLOGICAL FUNCTION OF OXYTOCIN IN MAN, MONKEYS, RATS, AND DOGS, AND EFFECT OF OXYTOCIN ON RESPONSE OF SMOOTH MUSCLE IN BLOOD VESSELS AT DIFFERENT PHASES OF GONADIAL ACTIVITY
AFOSR-65-0664 N66-11268

PIERCE, J. A.
MEASUREMENT OF TENSILE STRENGTH OF HUMAN LUNG TISSUE OBTAINED AT NECROPSY A66-80019

PIERSON, W. R.
LOW FRICTION ENVIRONMENT EFFECTS ON MAINTENANCE OPERATIONS IN SIMULATOR NOTING TORQUING-FORCE CAPABILITY, HAND-EYE COORDINATION, ETC
A66-11645

PIGGINS, D. J.
AUTOKINESIS IN DARK ADAPTED SUBJECTS EXPOSED TO LIGHT AND AFTERIMAGE PRESENTED ALONE AND TOGETHER
A66-80119

PILERI, A.
DEOXRIBONUCLEIC ACID SYNTHESIS IN CHROMOSOMES OF HUMAN, ACUTE LEUKEMIA CELLS
EUR-2451.E N66-10594

PINET, C.
INTERNATIONAL FOUNDATION FOR FLIGHT SAFETY AND ACCIDENT PREVENTION A66-80042

PINGANNAUD, M.
HYPOGLYCEMIA AS POSSIBLE CAUSE OF AIRCRAFT ACCIDENTS A66-80043

PINGANNAUD, P. M.
UNBALANCED DIET EFFECTS ON GLUCOSE METABOLISM IN RATS A66-80108

PLAS, F.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

PLZAK, V. J.
ANIMAL STUDY - DOSE REDUCTION FACTORS FOR RADIOPROTECTIVE AGENTS IN MALE MICE
N66-10164

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS
N66-10167

POE, R. H.
LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

POKROVSKAIA, G. L.
VIBRATION, ACCELERATION AND RADIATION EFFECTS ON CELL DIVISION, CHROMOSOME BEHAVIOR AND MITOTIC ACTIVITY OF BONE MARROW AND SPLEEN CELLS IN MICE
A66-11665

PONTECORVO, A. B.
RELIABILITY ESTIMATION PROCEDURE COMBINES TASK RATINGS WITH EMPIRICALLY BASED DATA IN DERIVATION OF REGRESSION EQUATION A66-10076

POPOVIC, R.
VALIDITY OF PSYCHOLOGICAL TESTING IN SELECTING PILOTS FOR PISTON ENGINE AND JET AIRCRAFT
A66-80055

POZNAK, A. V.
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS
A66-80084

PRYOR, W. H., JR.
GAMMA RADIATION EFFECTS ON ABSORPTION OF INJECTED HORSE GAMMA GLOBULIN IN RABBITS - ANIMAL STUDY
AD-620438 N66-11503

PSENICKOVA, V.
EVALUATION OF DEVICES FOR INDIVIDUAL PROTECTION OF HEARING AGAINST NOISE WITH REGARD TO THEIR FUNCTIONAL EFFICIENCY IN MAN A66-80080

Q

QUIST-HANSSEN, S.
NOISE INDUCED HEARING LOSS AMONG ENGINE ROOM PERSONNEL ON NORWEGIAN MERCHANT SHIP
A66-80009

R

RADOVIC, A.
PULSE RATE, HEART RATE, AND PRESSURE TOLERANCE OF PILOT IN PRESSURE SUITS AS RELATED TO PHYSICAL CONDITION A66-80056

CEREBRAL EDEMA OF DOGS IN RESPONSE TO SIMULATED ALTITUDE EXPOSURE A66-80058

RADZIEVSKII, G. B.
RADIATION HAZARD FOR COSMONAUT INSIDE OR OUTSIDE SPACESHIP FROM EARTH RADIATION BELT, CONSIDERING ELECTRON RADIATIVE EFFECT, TISSUE SENSITIVITY, ETC
A66-11663

RAEVSKAIA, S. A.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

RAPPAPORT, M.
VOICE COMMUNICATION CHANNELS EXPANSION, USING MANS BINAURAL LISTENING CAPABILITY A66-11828

RAYFORD, C. R.
EFFECT OF PHYSICAL EXERCISE ON CARDIAC OUTPUT, LEFT CORONARY FLOW AND MYOCARDIAL METABOLISM IN DOGS A66-80131

REECE, W. O.
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

REILLY, R. E.
TESTS FOR MEASURING PRIMARY PERCEPTUAL-MOTOR PERFORMANCE FOR ASSESSING SPACE ENVIRONMENT EFFECTS ON HUMAN PERFORMANCE
NASA-CR-335 N66-12127

RENWICK, G.
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS
A66-11605

RICE, E. A.
PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

RICHMOND, D. R.
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
CEX-65.4 N66-10963

RICHTER, C. P.
BIOLOGICAL AND BEHAVIORAL ASPECTS OF BIOLOGICAL CLOCKS IN ANIMALS A66-80099

RIFF, J.
TEST OF FATIGUE AND TRAINING USING CARDIOTACHOMETRIC INTEGRATION INDEX
A66-80036

RISAVI, A.
SPEECH AUDIOMETRY IN EXAMINING HEARING LOSS IN FLIGHT PERSONNEL A66-80057

RITZINGER, F. R.
DISEASE COMMUNICATION THROUGH AIR TRANSPORTATION - AEROSPACE MEDICINE
AD-470689 N66-11850

RIZY, E. F.
COLOR PERCEPTION OF ADDITIVE COLOR GROUP DISPLAYS - HUMAN PERFORMANCE
RADC-TR-65-278 N66-10831

ROBERT, C.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

ROBERTS, E.
STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

ROBINSON, D. A.
HUMAN SMOOTH PURSUIT EYE MOVEMENT AND EYE MUSCLE TENSION A66-80018

ROBION, J.
STATISTICAL STUDY ON CAUSES OF UNFITNESS OF PILOT CANDIDATES IN CIVIL AVIATION A66-80105

RODDA, M.
RECOVERY FROM TEMPORARY SHIFT AS FUNCTION OF STIMULUS AND TEST TONE VARIABLES.
A66-80027

ROEHRIG, W. C.
ADDITION OF CONTROLLED DISTORTION TO DELAY OF AUDITORY FEEDBACK A66-80134

ROHWER, W. D., JR.
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

ROSA, U.
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

ROSENFELD, J. B.
PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNATREMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

ROUNDS, D. E.
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

RUNDQUIST, E. A.
PREPARATION FOR PROBLEM SOLVING BY ANALYSIS OF MATERIALS INTO THEIR STRUCTURAL COMPONENTS OR BY APPLICATION OF STRATEGY, AND ASSESSMENT OF LATER PERFORMANCE ON VARIOUS CONCEPTUAL TASKS
STB-66-1 N66-10910

RUTSTEIN, A.
RECOVERY TIME FOLLOWING GLARE EXPOSURE IN SUBJECTS WEARING NIGHT DRIVING GLASSES A66-80120

RYU, D. Y.
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE
A66-12016

RYZHKOV, V. L.
BIOLOGIC MEMORY AND NUCLEIC ACIDS
JPRS-32266 N66-10203

S

SAKSONOV, P. P.
RADIOBIOLOGICAL EFFECTS CAUSED BY IONIZING RADIATION IN MICE PRE-EXPOSED TO EFFECT OF ACCELERATION A66-11664

SALA, O.
ELECTROPHYSIOLOGICAL RESEARCH IN EFFERENT VESTIBULAR SYSTEM IN CAT A66-80010

SALTZMAN, H. A.
CASE HISTORIES OF MIGRAINE LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT
A66-80075

SAMOKHVALOVA, N. S.
GAMMA AND COSMIC RADIATION EFFECTS ON EUROPEAN SPINDLE TREE SEEDS - EUONYMUS EUROPAEA - GENETICS
JPRS-32265 N66-10499

SANTOS, J. F.
INTRAINDIVIDUAL DIFFERENCES AND SIMILARITIES IN STYLE AND CONSISTENCY OF AUTOKINETIC MOVEMENT
A66-80142

SATTLER, J. M.
TIME ESTIMATION AS FUNCTION OF KNOWLEDGE AND ACHIEVEMENT A66-80020

SAWYER, D. C.
PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

SCANO, A.
PHYSICAL EXERCISE AND ENERGY EXPENDITURE OF HUMAN SUBJECTS DURING SIMULATED WEIGHTLESSNESS
A66-80001

SCASSELLATI, G.
RADIOIODIDE LABELLING OF HUMAN SERUM, ALBUMIN, AND INSULIN USING ELECTROLYTIC LABELLING METHOD
EUR-2476.I N66-10441

SCHAFFER, A.
EYE-MOVEMENT PATTERNS DURING VISUAL INFORMATION PROCESSING A66-80089

SCHIRATZKI, H.
ORAL AND LARYNGEAL COMPONENTS OF UPPER AIRWAY RESISTANCE DURING MOUTH BREATHING
A66-80026

SCHNEID, H.
ELECTRODE FOR MEASURING BIOPOTENTIALS AT SURFACE OF HUMAN SKIN
NASA-CR-67798 N66-10608

SCHNEIDER, M.
ANIMAL AND HUMAN TEST OF MANNED SPACECRAFT LIFE SUPPORT SYSTEM CONSISTING OF CLOSED SYSTEM WITH RECIRCULATING AIR LOOP, EXAMINING POTASSIUM SUPEROXIDE-POTASSIUM HYDROXIDE CHEMISTRY
A66-11492

SCHOHAN, B.
TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT
A66-11829

SCHROER, R.
HEARING LOSS DUE TO REPEATED EXPOSURE TO SUDDEN LOUD NOISE DURING SERVICE IN ARMED FORCES
A66-80062

SECORD, T. C.
TESTS OF ADVANCED LIFE SUPPORT AND ENVIRONMENTAL CONTROL SYSTEMS IN MANNED SPACE LABORATORY SIMULATOR A66-11646

SELANDER, S.
COMPARISON OF LABORATORY TESTS IN LEAD POISONING
A66-80076

SEMINARA, J. L.
COMPARATIVE MERITS OF VISUAL, AUDIBLE AND COMPOSITE AIRCRAFT WARNING SYSTEMS FOR OPTIMUM HUMAN RESPONSE TO CAUSAL CONDITION
A66-10939

SERIS, H.
CENTRIFUGAL SIMULATION WITH PILOT OF MIRAGE III AIRCRAFT TAILSPIN A66-80047

SERIS, M. H.
ANTHROPOMETRIC MEASUREMENTS OF CRANIUM OF FLYING PERSONNEL FOR HELMET FITTINGS A66-80106

SHAI, A.
DIFFERENTIAL RECOGNITION OF TACHISTOSCOPICALLY

PRESENTED ENGLISH AND HEBREW WORDS IN RIGHT AND LEFT VISUAL FIELDS A66-80135

SHANNON, I. L.
EFFECT OF SALIVA UPON STANNOUS FLUORIDE TREATED ENAMEL SURFACES
SAM-TR-65-28 N66-10848

EFFECT OF WHOLE SALIVA ON PERFORMANCE OF STANNOUS FLUORIDE MOUTHWASH
SAM-TR-65-50 N66-11872

SHARPE, B. L.
MISSION SIMULATION TECHNIQUES FOR TRAINING GEMINI FLIGHT CONTROLLERS A66-11802

SHEPELEV, E. IA.
PHYSIOLOGICAL-ECOLOGICAL INVESTIGATIONS OF CHLORELLA CULTURES AS LINK IN CLOSED ECOLOGICAL SYSTEM A66-10981

SIEBERT, W. M.
STOCHASTIC BEHAVIOR OF PRIMARY AUDITORY NEURONS ILLUSTRATED BY FUNCTIONAL MODEL SUBJECTED TO STEADY HF SINUSOIDAL TONE BURSTS A66-10400

SIEGEL, S. M.
SURVIVAL OF EARTH ORGANISMS UNDER ENVIRONMENT SIMULATED LOW PRESSURE, LOW OXYGEN, LOW TEMPERATURE AND LOW EXTRATERRESTRIAL CONDITIONS A66-11605

SILVER, C. A.
METRIC OF DISPLAY QUALITY FOR EVALUATION OF LARGE SCREEN DISPLAYS - STATISTICAL ANALYSES OF COMMAND AND CONTROL SYSTEMS - HUMAN ENGINEERING
TR-1-052 N66-11059

SIMMONS, E. L.
ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE N66-10165

ANIMAL STUDY - HYPERBARIC OXYGEN EXPOSURE AND RADIATION MORTALITY IN MICE, RATS, AND RABBITS N66-10167

SIMONSEN, D. G.
STRUCTURAL REQUIREMENTS OF NITROGENOUS SUBSTANCES WITH PROTECTIVE EFFECT AGAINST ACUTE HYDRAZINE TOXICITY IN MICE
SAM-TR-65-10 N66-10564

SLEPUKHINA, L. V.
CORRELATION OF RADIATION PROTECTION EFFECT AND CARCINOLYTIC ACTIVITY OF CERTAIN ANTIOXIDANT INHIBITORS IN MICE A66-80123

SLYE, E. S.
ELECTROENCEPHALOGRAPHIC AND AUTONOMIC ACTIVITY DURING AND AFTER PROLONGED SLEEP DEPRIVATION A66-80006

SMITH, H.
ANIMAL STUDY ON METABOLISM OF RADIOACTIVE STRONTIUM IN RATS - COUNTING TECHNIQUES, PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION, AND EXCRETION
PG-662/CC/ N66-11148

USE OF RADIOACTIVE ISOTOPE SR-85 AS TRACER TO ENHANCE EXCRETION OF RADIOACTIVE STRONTIUM FROM RATS - COUNTING TECHNIQUES AND PHYSIOLOGICAL VARIABLES INFLUENCING RETENTION N66-11149

ANIMAL STUDY - TEST TREATMENTS OF RATS GIVEN SINGLE DOSE OF STRONTIUM 85, AND ATTEMPTS TO INFLUENCE ELIMINATION BY PHYSIOLOGICAL PROCEDURES N66-11150

SMITH, K. U.
EFFECT OF DELAYED FEEDBACK IN RESPIRATORY DISEASE ANALYZED FOR BEHAVIORAL CYBERNETIC THEORY, USING COMPUTER-CONTROLLED DELAY A66-11648

SMITH, L. E.
EFFECT OF STRENGTH EXERCISES ON SPEED OF ARM MOVEMENT A66-80130

SMITH, S. M.
CARBON MONOXIDE ACCUMULATION IN CLOSED CIRCLE ANESTHESIA SYSTEMS IN SURGICAL PATIENTS A66-80084

SOHMER, H.
CONTRALATERAL OLIVO-COCHLEAR BUNDLE STIMULATION INFLUENCE ON COCHLEAR POTENTIALS OF CAT EVOKED BY ACOUSTIC STIMULI OF VARIOUS FREQUENCIES AND INTENSITIES A66-80025

SOLIDAY, S. M.
TASK LOADING EFFECT ON PILOT PERFORMANCE IN COMPUTER SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT A66-11829

SONDHAUS, C. A.
MEASUREMENT AND EVALUATION OF RADIATION EXPOSURE IN SPACE FLIGHT, NOTING TISSUE EQUIVALENT SYSTEM FOR IONIZATION RECORDING A66-11647

SPANGLER, E. R.
BIOLOGICAL PROBLEMS IN EXTENDED MANNED MISSIONS CAUSED BY LOW G, ARTIFICIAL ATMOSPHERE AND ABSENCE OF TERRESTRIAL PERIODICITIES A66-11622

SPRINCE, R.
CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS N66-10059

STANOJLOVIC, B. R.
INTERNATIONAL FOUNDATION FOR FLIGHT SAFETY AND ACCIDENT PREVENTION A66-80042

STASIAK, E. A.
MONOCULAR STEREOSCOPIC PERCEPTION OF DISPARATE IMAGES. A66-80133

STEINBUCH, K.
MAN OR AUTOMATION IN SPACE EXPLORATION IN RELATION TO DEVELOPMENT OF MECHANICAL SYSTEM WITH PERCEPTION CAPABILITIES A66-80114

STEINSCHNEIDER, A.
PROBLEMS OF MEASUREMENT ENGENDERED BY INDIVIDUAL DIFFERENCES IN AUTONOMIC RESPONSIBILITY A66-80007

STEWARD, P. G.
COMPUTER CODE FOR DEPTH-DOSE IN TISSUE IRRADIATED BY PROTONS
UCRL-16154 N66-11656

STIKAR, J.
EVALUATION OF DEVICES FOR INDIVIDUAL PROTECTION OF HEARING AGAINST NOISE WITH REGARD TO THEIR FUNCTIONAL EFFICIENCY IN MAN A66-80080

STILL, E. T.
PHYSIOLOGIC CHANGES FOLLOWING MIXED DOSES OF GAMMA-NEUTRON RADIATION IN RHESUS PRIMATES
SAM-TR-65-31 N66-11928

STRASSER, F. F.
EFFECT OF RUBY LASER ENERGY ON GAMMA RADIATED HUMAN ADENOCARCINOMA CELLS
SAM-TR-65-41 N66-11874

STRUMZA-PUTON-NET, J. M.
LOW BAROMETRIC PRESSURE EFFECTS ON COLON IN RATS A66-80100

STRUMZA, M. V.
LOW BAROMETRIC PRESSURE EFFECTS ON COLON IN RATS A66-80100

STRYDOM, N. B.
WATER REQUIREMENTS OF HUMANS - PROBLEMS OF DEHYDRATION AND SURVIVAL A66-80088

STURR, J. F.
SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION A66-80091

SUEDFELD, P.
VERBAL ORIGINALITY MEASURE AND DEGREE OF STRESS EXPERIENCED IN SENSORY DEPRIVATION
A66-80086

SUTTON, S.
EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY IN MAN
A66-80048

SVANBORG, A.
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN
A66-80014

T

TABUSSE, L.
ASPECTS OF VOMITING DURING MOTION SICKNESS IN FLIGHT - CASE HISTORIES OF FLYING PERSONNEL
A66-80046

TAKANAMI, M.
INTERACTION OF MESSENGER RNA AND RIBOSOMES STUDIED, USING F-2 BACTERIOPHAGE RNA AS MODEL MESSENGER IN CELL-FREE ESCHERICHIA
A66-11807

TALBOT, R. B.
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

TARDIFF, R.
ANIMAL STUDY - EXPOSURE OF FEMALE RATS TO DOSES OF COBALT 60 GAMMA RADIATION N66-10163

TAYLOR, M. M.
TIME SHARING AND VIGILANCE STUDY BY WIENER REANALYZED FROM SIGNAL DETECTION THEORY VIEWPOINT
A66-10613

TENERY, G. R.
DATA SENSORS AND INFORMATION ACQUISITION FOR SPACE EXPLORATION AND TRANSFORMATION FOR IMPROVING INTELLIGIBILITY A66-80115

TENGROTH, B.
LASER IRRADIANCE LEVELS FOR RETINAL LESIONS
A66-80011

TERRY, J. P.
EFFECTIVE PLANNING AND OPERATIONS REQUIRED FOR CONTROL OF AIR POLLUTION DUE TO INCREASED USE OF TOXIC PROPELLANTS IN LARGER MISSILES
A66-11491

THACKRAY, R. I.
BEHAVIOR AND PHYSIOLOGICAL CORRELATES OF HUMAN RESPONSE TIME TO HIGH INTENSITY AUDITORY STIMULI
A66-11832

THERRIAULT, D. G.
LIVER AND MUSCLE TISSUE LIPIDS OF RAT DURING ACUTE AND CHRONIC COLD EXPOSURE A66-80111

THOMSON, D.
DETERMINATION OF MIXED VENOUS CO2 PRESSURE WITH A REBREATHING METHOD IN MAN A66-80013

TIMBAL, J.
PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

USE OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASUREMENT OF VENTILATORY MECHANICS
A66-80045

PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS
A66-80110

TOBEY, S.
ANIMAL AND HUMAN TEST OF MANNED SPACECRAFT LIFE SUPPORT SYSTEM CONSISTING OF CLOSED SYSTEM WITH RECIRCULATING AIR LOOP, EXAMINING POTASSIUM SUPEROXIDE-POTASSIUM HYDROXIDE CHEMISTRY
A66-11492

TOBLER, L.
CHEMISM OF ACUTE WEIGHT LOSSES - RELATION BETWEEN WATER AND SALTS IN ORGANISMS
NASA-TT-F-9740 N66-11613

TOOR, M.
PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNATREMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

TORNABENE, T.
BACTERIAL CONTAMINATION OF MURRAY, ORGUEIL AND MOKOIA CARBONACEOUS METEORITES A66-80126

TRUAX, C. B.
MANIFEST ANXIETY EFFECT ON TRAVEL AND MANIPULATION COMPONENTS OF HUMAN MOTION A66-80021

TURPIN, W. B.
COMPLEX DISCRIMINATION WITH TWO STAGES OF SOLUTION INVOLVING CONTINGENT IDENTITY AND CONTINGENT POSITION A66-80139

U

ULANOV, B. P.
U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

USPENSKIY, V. I.
EFFECT OF EXPERIMENTAL HYPOXIC HYPOXIA ON BLOOD CLEARING FACTOR
JPRS-32781 N66-11658

V

VACQUIE, F.
TELEMETRIC MEASUREMENTS OF CARDIOVASCULAR FUNCTIONS DURING PARACHUTE JUMPS
A66-80101

VALLENTYNE, J. R.
EXOBIOLOGY CONCEPTS SUGGEST THAT APPARENT INHERENT LIMITATIONS ON TEMPERATURE, PRESSURE OR CHEMICAL ENVIRONMENT FOR LIVING MATTER ARE GEOCENTRIC MYTHS
A66-11602

VAN BRUGGEN, E. F. J.
COMPARATIVE HIGH RESOLUTION ELECTRON MICROSCOPIC STUDIES OF STRUCTURAL ORGANIZATION OF HEMOCYANINS AND APOHEMOCYANINS FROM MOLLUSCA AND ARTHROPODA
NASA-CR-67942 N66-11770

VAN GELDER, G.
EFFECTS OF SUBCUTANEOUS IMPLANTATION OF RARE EARTH METALS
COO-1170-1 N66-11479

VAN GRAAN, C. H.
WATER REQUIREMENTS OF HUMANS - PROBLEMS OF DEHYDRATION AND SURVIVAL A66-80088

VARENE, P.
PLETHYSMOGRAPHIC STUDY OF OXYGEN MASKS AND HELMETS OF PRESSURIZED SUITS A66-80034

USE OF RESPIRATORY FUNCTION TESTS IN AVIATION PHYSIOLOGY A66-80040

USE OF EXPLOSIVE DECOMPRESSION TECHNIQUES IN MEASUREMENT OF VENTILATORY MECHANICS
A66-80045

PLETHYSMOGRAPHIC MEASUREMENTS OF RESPIRATORY RESISTANCE AT MEDIUM ALTITUDES IN HUMANS
A66-80110

VENERUSO, D. M.
SPATIAL DETERMINANTS OF VISUAL MASKING - EFFECTS OF MASK SIZE AND RETINAL POSITION
A66-80091

VENIAR, F. A.
INDIVIDUAL MASKING LEVELS IN PURE TONE AUDIOMETRY
A66-80129

VERNON, J.
VERBAL ORIGINALITY MEASURE AND DEGREE OF STRESS EXPERIENCED IN SENSORY DEPRIVATION
A66-80086

VESSELINOVITCH, D.
ANIMAL STUDY - MICROSCOPIC FINDINGS IN SPLEENS OF MICE GIVEN CHEMICAL RADIOPROTECTIVE AGENTS PRIOR TO X-RAY EXPOSURE
N66-10165

VIDEBECK, R.
SPEECH CONDITIONED RESPONSE TO SIMULATOR STIMULUS
TR-16 N66-10820

VIOLETTE, C.
HYPEROXIA EFFECTS ON VISION OF RABBIT DETERMINED BY ELECTRORETINOGRAPHY
A66-80102

VOLKMANN, J.
EXPERIMENTS IN HUMAN VISUAL SEARCH ACUITY
ESD-TDR-65-169 N66-12015

VYSOTSKII, V. G.
IONIZING RADIATION DOSIMETRY FOR SPACE PILOTS ON SHORT- AND LONG-TERM SPACE FLIGHTS
A66-10803

CRITERIA FOR COSMIC RADIATION SAFETY IN LONG DURATION SPACE FLIGHTS
UCRL-TRANS-1225 N66-11419

W

WAGNER, K.
ELECTROCARDIOGRAPH SERIAL EXAMINATION DEVELOPED FOR FIELD CONDITIONS
A66-80067

WAHREN, J.
OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN
A66-80017

WALDRON, H. A.
EFFECT OF LEAD ON RED BLOOD CELL FRAGILITY IN LEAD POISONING
A66-80077

WARBANOV, W.
COMPARATIVE ARTERIAL OSCILLOGRAPHIC INVESTIGATIONS OF FOREARM AND LEG IN YOUNGER AND OLDER PERSONS
NASA-TT-F-9759 N66-11614

FUNCTIONAL EVALUATION OF PULSE RATE CHANGES IN UPPER AND LOWER LIMBS CAUSED BY AGE AND OCCUPATION
NASA-TT-F-9760 N66-11615

WARD, H. L.
ANNOTATED BIBLIOGRAPHY ON USE OF RADIOISOTOPES IN MEDICAL DIAGNOSIS, THERAPY, AND RESEARCH
TID-3077, SUPPL. 1 N66-11914

WARREN, R.
EFFECTS OF CAFFEINE - AROUSAL, PSYCHOMOTOR PERFORMANCE, AND MOOD VARIANCE
A66-80073

WEINSTEIN, I.
LIPOPROTEIN LIPID TRANSPORT BY LIVER FROM NORMAL AND CARBON TETRACHLORIDE POISONED RATS
A66-80060

WERKO, L.
EFFECTS OF GANGLIONIC BLOCKING DRUGS ON BLOOD GLUCOSE, AMINO ACIDS, FREE FATTY ACIDS, AND CATECHOLAMINES DURING EXERCISE IN MAN
A66-80014

WERTHEIMER, E.
PRODUCTION AND CORRECTION OF SODIUM IN BLOOD, HYPERNATREMIA, DURING TWO HOUR HIKE AT EXTREME ELEVATED TEMPERATURES IN ARID REGION
NASA-TT-F-9716 N66-11618

WHALEN, R. E.
CASE HISTORIES OF MIGRAINE LIKE PHENOMENA AFTER DECOMPRESSION FROM HYPERBARIC ENVIRONMENT
A66-80075

WHITE, C. S.
BIOLOGICAL TOLERANCE TO AIR BLAST AND RELATED BIOMEDICAL CRITERIA
CEX-65.4 N66-10963

WHITE, R. K.
LIGHT AND NOISE LEVEL, STIMULUS INTENSITY AND BACKGROUND SHADE VARIATION EFFECT ON REACTION TIME
A66-12076

WHITE, S. C.
BIOMEDICAL DATA COLLECTION FOR ANIMAL STUDY AND MANNED SPACE FLIGHT PROGRAMS.
A66-80113

WHITLEY, J. D.
EFFECT OF STRENGTH EXERCISES ON SPEED OF ARM MOVEMENT
A66-80130

WHITTIER, J. R.
VASODILATION BY CYCLANDELATE, ISOXSUPRINE AND NYLIDRIN IN HYPERVENTILATION IN ELECTROENCEPHALOGRAM OF HUMANS
A66-80078

WILLIAMS, B.
ARTERIAL PULSE WAVE VELOCITY AS PSYCHOPHYSIOLOGICAL MEASURE
A66-80005

WILLIAMS, E. W.
ENDOCRINE AND METABOLIC CHANGES DURING 12-HOUR SIMULATED FLIGHT
SAM-TR-65-35 N66-10567

WILLIAMS, J. G. L.
ARTERIAL PULSE WAVE VELOCITY AS PSYCHOPHYSIOLOGICAL MEASURE
A66-80005

WILLIAMSON, T. R.
JUDGING WITH WHICH EYE ONE IS VIEWING THREE-DIMENSIONAL SCENE
A66-80137

WINSTEAD, J. A.
GAMMA RADIATION EFFECTS ON RABBIT MUSCLE ENZYMES IN AQUEOUS SOLUTION
SAM-TR-65-20 N66-10565

WIRTA, R.
CONTROL FACTORS IN SERVO-MANIPULATORS, REMOTE HANDLING DEVICES, AND MAN-MACHINE INTEGRATION SYSTEMS
N66-10059

WRIGHT, J. F.
EXPOSURE OF MACACA MULATTA PRIMATES TO MIXED IONIZING RADIATIONS FROM NUCLEAR REACTOR - LONGEVITY, OPHTHALMOLOGY, HEMATOLOGY, AND PATHOLOGY OBSERVED - RADIATION EFFECTS ON BLOOD
SAM-TR-65-49 N66-11927

WUNSCHE, O.
DECOMPRESSION DISEASES - THEORY, THERAPY, AND PROBLEMS OF UNDERGROUND ENGINEERING, WORKING HYGIENE, AND OCCUPATIONAL MEDICINE
DLR-FB-65-35 N66-11758

WUSCHECH, H.
ACCLIMATIZATION PROBLEMS AND PHYSICAL TRAINING AT ALTITUDE
A66-80069

Y

YAM, K.-M.
ANIMAL STUDY - REDUCTION OF ACUTE TOXICITY OF 2-MERCAPTOETHYLAMINE TO ADULT FEMALE RATS BY USING VARIOUS CHEMICAL COMPOUNDS
N66-10161

YAN, Y.
INTERACTION OF MESSENGER RNA AND RIBOSOMES STUDIED, USING F-2 BACTERIOPHAGE RNA AS MODEL MESSENGER IN CELL-FREE ESCHERICHIA
A66-11807

YASUDA, T.
GROWTH RATE OF MICROORGANISMS WHEN RATE CHANGES WITH TIME, USING CONTINUOUS CULTURE TECHNIQUE
A66-12016

YOUNG, I. M.
SPREAD OF MASKING IN EARS SHOWING ABNORMAL ADAPTATION AND CONDUCTIVE DEAFNESS
A66-80024

Z

ZARET, M. M.
OVERALL PROFILE OF OPHTHALMIC INJURY ASSOCIATED WITH IONIZING AND NONIONIZING ELECTROMAGNETIC RADIATION FIELDS BASED ON HUMAN RESPONSE TO RADIATION EXPOSURE A66-10793

ZERMENO, A.
WATER AND SOLUTE FLUXES BETWEEN BLOOD AND INTRAPERITONEAL GLUCOSE INFUSATE OF DOG
SAM-TR-65-5 N66-10849

ZETTERQUIST, S.
OXYGEN UTILIZATION AND LACTATE FORMATION IN LEGS OF HEALTHY YOUNG MEN DURING STRENUOUS EXERCISE, AS PHASE OF STUDIES OF PERIPHERAL CIRCULATION AND METABOLISM IN MAN A66-80017

ZHILTSOVA, V. M.
U V RADIATION EFFECT ON VISCOSITY AND OPTICAL DENSITY OF DNA SOLUTIONS FROM CALF THYMUS AND RAT SPLEEN A66-11193

ZSIGMOND, M.
PLANIMETRIC AND DIRECT DETERMINATION OF MASTOID AIR CELL SYSTEM SIZE IN HEALTHY AND DISEASED EARS.
A66-80022

ZUBEK, J. P.
AUDITORY SENSITIVITY AFTER PROLONGED VISUAL DEPRIVATION A66-80092

ZUBIN, J.
EVOKED POTENTIAL CORRELATES OF STIMULUS UNCERTAINTY IN MAN A66-80048

ZUCKERMAN, M.
NEED FOR STIMULATION AS SOURCE OF STRESS RESPONSE TO PERCEPTUAL ISOLATION A66-80074