NASA SP-7011(177)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 177)

FEBRUARY 1978

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

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

STAR (N-10000 Series)	N78-10001—N78-11999
IAA (A-10000 Series)	A78-10001—A78-13111

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

NASA SP-7011(177)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 177)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in January 1978 in

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

Scientific and Technical Information Office
FEBRUARY 1978
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Washington, D.C.

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

This Supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, at the price code E02 ($4.75 domestic; $9.50 foreign).

INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 112 reports, articles and other documents announced during January 1978 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

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

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1978 Supplements.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A78-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche[1] are available at the rate of $1.50 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., (A78-10063), when requesting publications.

STAR ENTRIES (N78-10000 Series)

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

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code followed by the letters HC or MF in the *STAR* citation. Price codes are given in the tables on page vii of the current issue of *STAR*.

Microfiche[1] is available regardless of age for those accessions followed by a # symbol.

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

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.00 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: ERDA Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Energy Research and Development Administration reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the ERDA and its depositories are described in a booklet, *Science Information Available from the Energy Research and Development Administration* (TID-4550), which may be obtained without charge from the ERDA Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

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

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

Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

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

Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of 50 cents each, postage free.

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

SUBSCRIPTION AVAILABILITY

This publication is available on subscription from the National Technical Information Service (NTIS). The annual subscription rate for the monthly supplements, excluding the annual cumulative index, is $ 45.00 domestic; $ 75.00 foreign. All questions relating to the subscriptions should be referred to NTIS.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

Energy Research and Development
Administration
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Space Documentation Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

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

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (NST-6)
Washington, D.C. 20546

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

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

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

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

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

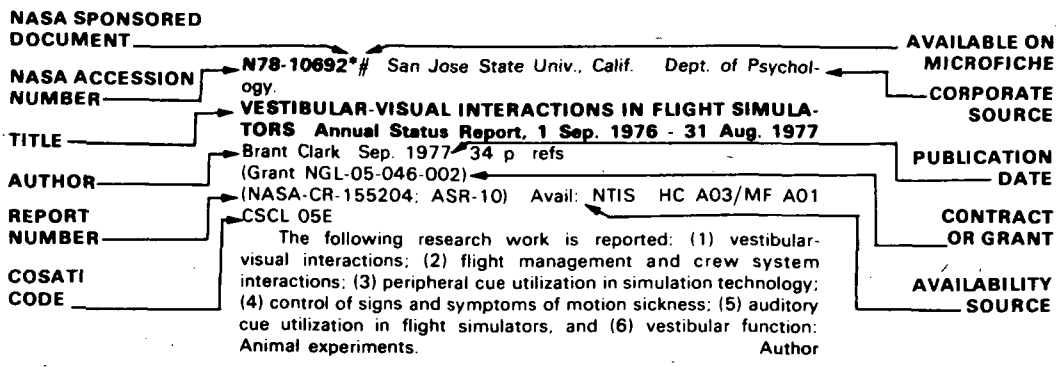
U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

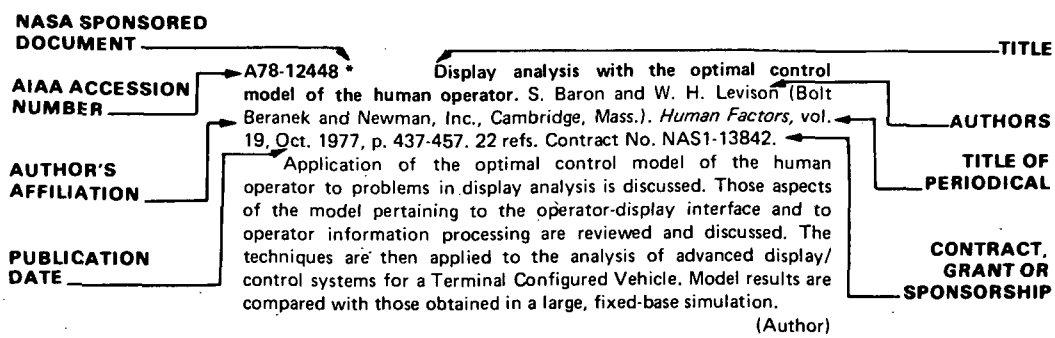
Zentralstelle für Luftfahrtdoku-
mentation und -Information
8 München 86
Postfach 880
Federal Republic of Germany

TABLE OF CONTENTS

TYPICAL CITATION AND ABSTRACT FROM *STAR*



TYPICAL CITATION AND ABSTRACT FROM *IAA*



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 177)

FEBRUARY 1978

IAA ENTRIES

A78-10063 **Evaluation of automated ECG monitoring - Theoretical model based upon point process techniques.** L. J. Haywood, V. K. Murthy, and G. A. Harvey (Southern California, University, Medical Center, Los Angeles, Calif.). *Applied Mathematics and Computation*, vol. 3, no. 4, 1977, p. 283-290. 15 refs.

Characterization of an automated ECG monitored system by a pair of point processes, or equivalent by a pair of renewal processes, is considered. Asymptotic normality of the point or of the equilibrium point process, and handling of false positives and false negatives by the system, are discussed. Standard normal tests on two systems under comparison and refinement of approximations are considered. R.D.V.

A78-10194 # **Trouble shooting pattern of emergency through instruments by jet-pilots.** I. Z. Katoh, T. Shimizu, and I. Kurosa (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 17, Dec. 1976, p. 113-128. In Japanese, with abstract in English.

Simulators with F-104J instruments were used to test emergency responses of pilots to emergency situations in flight. A Cramer chi-square test was executed to ascertain common modes of responses among the pilots tested. Highest preference was discerned for quick responses to instruments giving readings of rpm and exhaust gas temperature (EGT), with nozzle position indications and oil pressure readings following close behind. A few pilots showed preferential response to altimeter and airspeed readings. The most marked coincidence in responses pertains to 'flame-out,' followed by 'no afterburner light on takeoff.' Statistical data on percentage answers, percentage correct answers, and sequential order in taking note of abnormal instrument readings are presented and diagrammed. R.D.V.

A78-10195 # **Evaluating experiments of heat insulation of life raft by dummy and human body.** K. Tagami, W. Ogawa, K. Shimizu, T. Kitanosono, H. Tomita, S. Tokutome, S. Nishiumi, and I. Kuroda (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 17, Dec. 1976, p. 141-152. 8 refs. In Japanese, with abstract in English.

Loss of body heat by distressed pilots and heat insulation efficacy of pilots' antiexposure flight suits were tested by simulated experiments with a thermal dummy and by experiments using human subjects. Skin and rectal temperatures were taken of dummy and human subjects in a life raft (LRU-6/P, LRU-3/P, JC-2B suits) with exposures to +6 and -6 C, 1 m/sec wind velocity; the dummy was exposed with wet or dry flight suit and unclothed at 0 C. The LRU-6/P suit exhibited 40% less heat loss than JC-2B or LRU-3/P. Heat loss with the wet flight suit was twice that of a dry suit. Effective activity time and survival time were estimated from total heat loss data. R.D.V.

A78-10196 # **Human engineering data for aircraft design. II - Aircrew station controls and displays: Assignment, location, and actuation for fixed wing aircraft.** H. Hagihara (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 17, Dec. 1976, p. 153-171. In Japanese, with abstract in English.

A Japanese-language version of Military Standard-203 (Aircrew station controls and displays: assignment, location, and actuation for fixed wing aircraft) is announced. Ergonomically informed design of the flight deck or cockpit and requirements pertaining to assignment, arrangement, location, and actuation of flight controls and flight data displays are discussed. Single-pilot, tandem-pilot, and side-by-side pilot configurations are covered and illustrated. Applicable documents, flight and ground controls, power controls, firefighting controls, electrical and radio controls, instrument panels, armament controls, and miscellaneous controls and equipment are addressed in the document. R.D.V.

A78-10197 # **Application of factor analysis to electroencephalogram.** I. Saito, Y. Kurihara, Y. Handa, and C. Sekiguchi (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 17, Mar. 1977, p. 179-184. 24 refs. In Japanese, with abstract in English.

EEG traces from three pilots were subjected to factor analysis. The EEG were 298 sec traces taken with pilots resting, eyes open, and with sound and light stimulation. Nine variables were analyzed. Factor scores were calculated after factor loadings were obtained from the intercorrelation matrix (and Varimax criterion). A factor representative of activity and a factor representative of vigilance are tentatively identified. R.D.V.

A78-10199 # **Human engineering data for aircraft design. III - Aircrew station vision requirement for military aircraft.** K. Mizumoto (Japan Air Self-Defense Force, Aeromedical Laboratory, Tachikawa, Japan). *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol. 17, Mar. 1977, p. 195-210. In Japanese, with abstract in English.

Requirements for providing adequate vision outside from within the aircrew stations of military aircraft are set down in MIL-STD 8503. Topics covered in the standard include: definitions, requirements specifically for fighter/attack aircraft, bomber/transport aircraft, ASW and patrol aircraft, helicopters, V/STOL aircraft, trainer aircraft, and reconnaissance aircraft. Attention is given to flight deck vision problems for inflight refueling aircraft, and vision from noncockpit crew stations. R.D.V.

A78-10498 **Two-dimensional echocardiography with a wide angle /60 deg/ sector scanner.** A. B. Houston, N. L. Gregory, A. Shaw, D. J. Wheatley, and E. N. Coleman (Glasgow, University; Royal Hospital for Sick Children, Glasgow, Scotland). *British Heart*

Journal, vol. 39, Oct. 1977, p. 1071-1075. 10 refs. Research supported by the Scottish Home and Health Department.

A wide angle (60 deg) sector scanner producing a real-time two-dimensional echocardiogram has been used to examine healthy infants, children, and adults. Its method of use is described and findings from longitudinal and transverse scans are presented. The points of difference between the various types of electronic and mechanical two-dimensional scanning systems are discussed. This equipment minimises problems of chest contact and rib and lung interference and, by providing echocardiograms of high line density from a wide angle, is a suitable real-time two-dimensional scanning system for examining patients of all ages. (Author)

A78-10499 Aortic root and left atrial wall motion - An echocardiographic study. G. Akgun and C. Layton (London Hospital, London, England). *British Heart Journal,* vol. 39, Oct. 1977, p. 1082-1087. 14 refs.

The movement of the aortic root recorded by echocardiography was investigated based on an analysis of the relation between posterior aortic wall motion and other intracardiac events. In particular, the output ultrasound recorder was interfaced with a multichannel photographic recorder allowing simultaneous recording of the echocardiogram, lead-II electrocardiogram, and phonocardiogram at a paper speed of 100 mm/sec. The investigation was conducted on 12 normal subjects and 30 patients with heart disease comprising 10 patients with isolated mitral stenosis, 11 with pure mitral regurgitation, 7 with free aortic regurgitation, and 2 with atrioventricular block. The results obtained cast serious doubts on the validity of the concept that the aortic root movement is due to left ventricular systole and especially to the ejection phase. It is concluded that phasic changes in left atrial dimension play a major role in the movement of the aortic root observed by echocardiography. S.D.

A78-10547 The concept of cellular evolution. C. R. Woese and G. E. Fox (Illinois, University, Urbana, Ill.). *Journal of Molecular Evolution,* vol. 10, Sept. 20, 1977, p. 1-6. 21 refs.

A central evolutionary question is whether the eucaryotic cytoplasm represents a line of descent that is separate from the typical bacterial line. It is argued on the basis of differences between their respective translation mechanisms that the two lines do represent separate phylogenetic trees in the sense that each line of descent independently evolved to a level of organization that could be called procaryotic. The two lines of descent, nevertheless shared a common ancestor, that was far simpler than the procaryote. This primitive entity is called a progenote, to recognize the possibility that it had not yet completed evolving the link between genotype and phenotype. This concept changes considerably the view one takes toward cellular evolution. (Author)

A78-11437 * Lander imaging as a detector of life on Mars. E. C. Levinthal (Stanford University, Stanford, Calif.), K. L. Jones (Brown University, Providence, R.I.), P. Fox, and C. Sagan (Cornell University, Ithaca, N.Y.). *Journal of Geophysical Research,* vol. 82, Sept. 30, 1977, p. 4468-4478. 9 refs. Contracts No. NAS1-9682; No. NAS1-9680; No. NAS1-9683.

Biological goals were among the important science objectives of the Viking lander camera. The camera performance characteristics relevant to these goals are discussed. They include the ability to observe (1) morphological detail, (2) color and reflectance spectra, and (3) motion and change. The scenes obtained by the cameras were scrutinized in many ways: monoscopically, stereoscopically, in color, and by computerized differencing of camera events. At the lander sites and during the times that observations were carried out on the surface of Mars, no evidence, direct or indirect, has been obtained for macroscopic biology on Mars. No obvious examples of geometric distortion that might have been motion induced have been observed. Using the repeated line scanning mode of the camera has revealed no changes or motion suggesting life. These negative results may be due to limitations in sampling, in camera design, or in our understanding of Martian biology, but they are certainly consistent with the hypothesis that macroscopic life is absent on Mars. (Author)

A78-11451 * The Viking biological investigation - General aspects. H. P. Klein (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Geophysical Research,* vol. 82, Sept. 30, 1977, p. 4677-4680. 18 refs.

The Viking biological investigation has tested four different hypotheses regarding the possible nature of Martian organisms. While significant results were obtained for each of these, tests of three of the hypotheses appear to indicate the absence of biology in the samples used, while the fourth is consistent with a biological interpretation. The original assumptions for each experiment and the experimental procedures that were utilized to test these assumptions are reviewed. (Author)

A78-11590 Interstellar grains as possible cold seeds of life. V. I. Goldanskii (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Nature,* vol. 269, Oct. 13, 1977, p. 583, 584. 27 refs.

It has been suggested that the grains of interstellar dust clouds may serve as cold grains of life. This theory of prebiotic evolution in interstellar clouds is based on several main points, including: (1) the formation of complex molecules which occurs at very low (10-20 K) temperatures, (2) the ultraviolet-initiated integration of molecules in surface regions of clouds, (3) the integration of molecules in the depths of clouds initiated only by long-range cosmic protons, (4) the determination of the equilibrium chemical composition of cold interstellar dust, and (5) the flattened protoplanetary disk (formed from the remnants of a collapsed cloud) which continues to be cold. S.C.S.

A78-11786 # The formation of protobiological compounds during the eruption of the Tolbachik volcano (Iavlenie obrazovaniia predbiologicheskikh soedinenii pri izverzhenii vulkana Tolbachik). E. K. Markhinin and N. E. Podkletnov (Akademiia Nauk SSSR, Institut Vulkanologii, Petropavlovsk-Kamchatski, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 235, Aug. 11, 1977, p. 1203-1206. 6 refs. In Russian.

In an effort to study protobiological (abiogenetic) processes in erupting volcanoes, chemical analyses were performed on the ash and bombs of the Kamchatka volcano, Tolbachik, active during 1975 and 1976. The concentration of organic carbon in the ash was determined along with the concentrations of free and bonded amino acids in the bombs. A study of the heavy hydrocarbons in the volcanic material shows that normal paraffins abound along with a trace amount of isoparaffins. It is concluded that the evolution of protobiological systems has its source in volcanic processes. B.J.

A78-11957 Man at high altitude: The pathophysiology of acclimatization and adaptation. D. Heath and D. R. Williams (Liverpool, University, Liverpool, England). Edinburgh, Churchill Livingstone, 1977. 301 p. 696 refs. $22.60.

The importance of high altitude studies is considered along with the concept of 'high altitude', solar radiation and physical geography, ultraviolet radiation, the ionizing radiation, the influence of tissue hypoxia on the biological effects of ionizing radiation, radiation and genetic effects, bacteria at high altitude, natural resistance and immunity response to pathogens at high altitude, the physique of high altitude man, and ventilation and pulmonary diffusion. Attention is also given to the blood, tissue diffusion, the carotid bodies, pulmonary hypertension, the pulmonary trunk, the brisket disease, acute mountain sickness, high altitude pulmonary oedema, Monge's disease, disorders of blood coagulation, systemic circulation, coronary circulation and electrocardiography, myocardial metabolism, the skin, the alimentary system, endocrines, fertility and pregnancy, adaptation and acclimatization, the descent to sea level, athletic performance at moderate altitude, exposure to extreme altitudes, and effects on special senses and the psyche. G.R.

A78-12000 **Signal detection in psychoacoustics.** Iu. A. Indlin (Vsesoiuznyi Nauchno-Issledovatel'skii Kinofotoinstitut, Moscow, USSR). *(Akusticheskii Zhurnal,* vol. 23, Jan.-Feb. 1977, p. 50-63.) *Soviet Physics - Acoustics,* vol. 23, Jan.-Feb. 1977, p. 27-34. 33 refs. Translation.

The basic properties of auditory sensation and stimulus, which must be taken into consideration in the formalization of signal detection against a noise background in psychoacoustics, are formulated. It is shown that predictions of an energetic statistical model based on the concept of critical bands and sensor fluctuations correlate well with experimental data not amenable to intepretation within the framework of the theory of ideal observers. The importance of an experimental determination of the relationship between the dispersions of sensor and physical fluctuations to the further development of detection theory is pointed out. V.P.

A78-12123 * **New microbial growth factor.** S. H. Bok and L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Applied and Environmental Microbiology,* vol. 33, May 1977, p. 1085-1091. 16 refs. Grant No. NGR-39-009-180.

A screening procedure was used to isolate from soil a Penicillium sp., two bacterial isolates, and a Streptomyces sp. that produced a previously unknown microbial growth factor. This factor was an absolute growth requirement for three soil bacteria. The Penicillium sp. and one of the bacteria requiring the factor, an Arthrobacter sp., were selected for more extensive study concerning the production and characteristics of the growth factor. It did not seem to be related to the siderochromes. It was not present in soil extract, rumen fluid, or any other medium component tested. It appears to be a glycoprotein of high molecular weight and has high specific activity. When added to the diets for a meadow-vole mammalian test system, it caused an increased consumption of diet without a concurrent increase in rate of weight gain. (Author)

A78-12124 * **Release of microorganisms from soil with respect to transmission electron microscopy viewing and plate counts.** D. L. Balkwill, T. E. Rucinsky, and L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Antonie Van Leeuwenhoek Journal of Microbiology and Serology,* vol. 43, no. 1, 1977, p. 73-87. 23 refs. Grant No. NGR-39-009-180.

A study was conducted to obtain information concerning the fate of soil microorganisms during the procedures normally used in separating them from the soil in connection with various types of investigations. A silty clay loam (pH 6.0, moisture content 25%, organic content 3.5%) was used in the study. The results of the study indicate that many of the microbial cells naturally residing in soil remain attached to or, for some other reason, are not separated from the soil debris despite the use of various combinations of blending, sonication, and chemical dispersing agents. The method B used by Balkwill et al. (1975) provides a reasonable electron microscopy evaluation of the soil microflora. G.R.

A78-12418 **The search for life on Mars.** N. H. Horowitz (California Institute of Technology, Pasadena, Calif.). *Scientific American,* vol. 237, Nov. 1977, p. 52-61.

The two Viking spacecraft, launched in 1975, collected data from both Martian orbit and the Martian surface. Mass spectrometers, used to study the atmospheric composition, showed the presence of carbon dioxide (95%), nitrogen (2.5%) and argon (1.5%) with traces of oxygen, carbon monoxide, neon, krypton, and xenon. Atmospheric pressure was found to be 7.5 millibars. Very little water vapor was observed, although it is suggested that Mars may once have had running water on its surface. Instruments used in the search for evidences of life included cameras, a combined gas chromatograph and mass spectrometer, and three instruments for the detection of microorganisms present in the soil. Martian soil was examined for organic constituents, and the only organic compounds detected were

Institute of Electrical and Electronics Engineers, Inc.; Washington, D.C., Marine Technology Society, 1976, p. 25D-1 to 25D-3.

An electronic Ocean Dumping Surveillance System (ODSS) has been developed by the U.S. Coast Guard for installation on all vessels carrying out ocean dumping activities. The system employs a Loran-C for vessel position determination, a dump sensor for interlocking dump controls, a real time clock, and a digital cassette for recording data. In addition the system supplies navigational information to the vessel. S.C.S.

A78-12447 * **A design procedure for control/display systems.** R. E. Curry (NASA, Ames Research Center, Moffett Field, Calif.), D. L. Kleinman (Connecticut, University, Storrs, Conn.), and W. C. Hoffman (Aerospace Systems, Inc., Burlington, Mass.). *Human Factors,* vol. 19, Oct. 1977, p. 421-436. 11 refs. Contract No. NAS1-13653.

This paper proposes a design procedure for control and display systems in which levels of automation vary over a significant range. The elements of the primary analysis tool (the Optimal Control Model of the Human Operator) are briefly reviewed, and the use of the model at three levels of specification (information level, display-element level, and display-format level) is discussed. Based on observation and pilot commentary, it is assumed that the pilot allocates his attention to control the aircraft to the desired level of performance, and then, with remaining capacity, to monitor displays. This facet of behavior is incorporated into the design procedure so that regardless of the level of control automation, all systems are compared at the same level of control performance. The design procedure is applied to the longitudinal control of a CH-47 helicopter. The procedure points out the need for performance-workload relations for control, which are fairly well understood, and performance-workload relations for monitoring, about which little is known. (Author)

A78-12448 * **Display analysis with the optimal control model of the human operator.** S. Baron and W. H. Levison (Bolt Beranek and Newman, Inc., Cambridge, Mass.). *Human Factors,* vol. 19, Oct. 1977, p. 437-457. 22 refs. Contract No. NAS1-13842.

Application of the optimal control model of the human operator to problems in display analysis is discussed. Those aspects of the model pertaining to the operator-display interface and to operator information processing are reviewed and discussed. The techniques are then applied to the analysis of advanced display/control systems for a Terminal Configured Vehicle. Model results are compared with those obtained in a large, fixed-base simulation. (Author)

A78-12449 * **Prediction of pilot opinion ratings using an optimal pilot model.** R. A. Hess (NASA, Ames Research Center, Moffet Field, Calif.). *Human Factors,* vol. 19, Oct. 1977, p. 459-476. 28 refs.

A brief review of some of the more pertinent applications of analytical pilot models to the prediction of aircraft handling qualities is undertaken. The relative ease with which multiloop piloting tasks can be modeled via the optimal control formulation makes the use of optimal pilot models particularly attractive for handling qualities research. To this end, a rating hypothesis is introduced which relates the numerical pilot opinion rating assigned to a particular vehicle and task to the numerical value of the index of performance resulting from an optimal pilot modeling procedure as applied to that vehicle and task. This hypothesis is tested using data from piloted simulations and is shown to be reasonable. An example concerning a helicopter landing approach is introduced to outline the predictive capability of the rating hypothesis in multiaxis piloting tasks. (Author)

A78-12450 * **The effects of cockpit environment on long-term pilot performance.** A. M. Stave (United Technologies Corp., Sikorsky Aircraft Div., Stratford, Conn.). *Human Factors,* vol. 19, Oct. 1977, p. 503-514. 14 refs. Contract No. NAS1-11222.

A fixed-base helicopter simulator was used to examine pilot performance as influenced by noise, vibration, and fatigue. Subjects flew the simulator for periods ranging between three and eight hours while exposed to vibrations (at 17 Hz) ranging from 0.1 to 0.3 g, and noise stimuli varying between 74 (ambient) and 100 dB. Despite reports of extreme fatigue on these long flights, subject performance did not degrade. Within the limits of this study, performance tended

to improve as environmental stress increased. However, subjects did suffer from lapses resulting in abnormally poor performance. These lapses are probably of short duration (seconds) and occur at unpredictable times. If such lapses occur in actual flight, they could provide an explanation for many so-called 'pilot error' accidents. (Author)

A78-12475 P-R interval in relation to heart rate during exercise and the influence of posture and autonomic tone. J.-H. Atterhog and E. Loogna (Karolinska Sjukhuset, Stockholm, Sweden). *Journal of Electrocardiology,* vol. 10, Oct. 1977, p. 331-336. 13 refs. Research supported by the Karolinska Institutet.

PR interval in relation to heart rate (HR) during exercise was studied in healthy men. When subjects were in a recumbent position, mean PR between HR 90-140 beats/min (bpm) decreased linearly from 167 + or - 8 ms to 136 + or - 5 ms. PR did not decrease further at HR up to 180 bpm. When subjects were in a sitting position, a further decrease occurred after HR up to 150-160 bpm. The shortest PR observed during exercise was 100 ms. The decrease of PR between HR 90-140 bpm was affected by atropine but not by propranolol. Higher HR was not achieved after propranolol, and after atropine there was difference in PR in either exercise position compared to the two exercises without any drug. Thus, exercise induces a decrease in PR which is for the most part completed at HR 140-150 bpm and is mainly achieved by a withdrawal of the parasympathetic tone. PR at HR 90 bpm was correlated to body surface area, indicating that the PR duration is related to the body and heart dimensions. (Author)

A78-12524 Normal sodium balance in dogs and in man. W. J. O'Connor (Leeds University, Leeds, England). *Cardiovascular Research,* vol. 11, Sept. 1977, p. 375-408. 106 refs.

The paper discusses Na balance in normal dogs fed in a diet in which the only source of Na was Na naturally contained in the food without any addition of salt. Attention is directed to a review of the limited literature on normal Na excretion in man and to how far the concepts derived from observations on dogs apply also to man. The discussion concerns observation with the normal range of Na intake, Na excretion and plasma composition. It is concluded that, at the present time, plasma protein concentration, glomerular filtration rate and tubular reabsorption are the only factors determining Na balance and extracellular fluid volume. S.D.

A78-12525 Mechanisms of hypercapneic pulmonary hypertension. A. Susmano, R. A. Carleton (Rush-Presbyterian-St. Luke's Medical Center; Rush Medical College; Mount Sinai Hospital Medical Center, Chicago, Ill.), and M. Passovoy (Rush-Presbyterian-St. Luke's Medical Center; Rush Medical College, Chicago, Ill.). *Cardiovascular Research,* vol. 11, Sept. 1977, p. 440-445. 32 refs. Research supported by the McDonnell Foundation.

Experiments were conducted on 18 anesthetized hypercapnic mongrel dogs of both sexes weighing in the range 14.8-23 kg with a view toward evaluating the role of histamine, serotonin, and acidemia in pulmonary hypertension induced by hypercapnia. The results contrast with the hypothesis that hypercapnia produces pulmonary hypertension through vasoconstriction. The lack of demonstrable active pulmonary vasoconstriction is further suggested by the lack of effects by an antiserotonin or an antihistamine drug. Acidemia associated with hypercapnia can induce pulmonary vasoconstriction, but this effect is masked by changes related to alterations in pulmonary blood flow. Cardiac output data reveal that the pulmonary hypertensive effect of hypercapnia is mainly flow related. S.D.

A78-12601 Second-order correlation functions and bi-spectra in biological-rhythm research. M. Ten Hoopen and P. A. Zandt (Centrale Organisatie voor Toegepast-Natuurwetenschappelijk Onderzoek, Medisch-Fysisch Instituut, Utrecht, Netherlands). *Mathematical Biosciences,* vol. 33, 1977, p. 193-212. 11 refs.

Some properties of the second-order correlation function R (tan sub 1, tan sub 2) have been studied with the help of a model that is believed to mimic certain physiological time series containing more than one periodicity. The model consists of the superposition of two series of oscillatory wave packets, occurring randomly and more or less in synchrony, while the degree of coupling is variable. In contrast to the first-order correlation function R(tan), which is hardly able to differentiate between loose and tight coupling of the two components, R(tan sub 1, tan sub 2) is able to do so, at least within a limited range of parameter values. A similar conclusion holds if one compares power spectrum and bi-spectrum. (Author)

A78-12607 * Integration of semicircular canal and otolith information for multisensory orientation stimuli. C. C. Ormsby and L. R. Young (MIT, Cambridge, Mass.). *Mathematical Biosciences,* vol. 34, 1977, p. 1-21. 28 refs. Grant No. NGR-22-009-701.

This paper presents a model for the perception of dynamic orientation resulting from stimuli which involve both the otoliths and the semicircular canals. The model was applied to several multisensory stimuli and its predictions evaluated. In all cases, the model predictions were in substantial agreement with the known illusions or with the relevant experimental data. (Author)

STAR ENTRIES

N78-10683# Civil Aeromedical Inst., Oklahoma City, Okla.
A STUDY OF EFFECTS OF HYPERTHERMIA ON LARGE, SHORT-HAIRED MALE DOGS: A SIMULATED AIR TRANSPORT ENVIRONMENTAL STRESS
G. D. Hanneman, E. A. Higgins, G. T. Price, G. E. Funkhouser, P. M. Grape, and L. Snyder Mar. 1977 9 p refs
(AD-A040432/7; FAA-AM-77-8) Avail: NTIS HC A02/MF A01 CSCL 06/19

Temperature stresses on dogs shipped by air transport were studied. Since environmental temperatures can reach as high as 130.0 F during the summer months, to assess some aspects of the heat stress problem, 20 dogs were exposed to an ambient temperature of 130.0 F for 30 minutes 10 dogs at 15 percent relative humidity and 10 at 35 percent relative humidity. Transient and permanent changes were observed, however, no dogs died from exposure. All dogs exhibited increases in heart rate, rectal temperature, blood pH, hemoglobin, packed cell volume, and red blood cell count while body weight and blood carbon dioxide decreased. There were also differences between the two groups for blood pH, blood carbon dioxide, rectal temperature, and weight loss. The major histological tissue changes attributed to hyperthermia were fragmentation of the myocardium, acute cortical necrosis in the kidneys, and marked degenerative changes in the cerebellum and cerebral cortex that were considered severe and permanent. Author

N78-10684*# Pittsburgh Univ., Pa. Vestibular Function Research Lab.
FURTHER INVESTIGATION OF THE SPONTANEOUS AND EVOKED ACTIVITY OF THE PRIMARY NEURONS OF STATORECEPTORS (AND OTHER RECEPTORS) OF THE LABYRINTH OF THE BULLFROG BEFORE, DURING AND AFTER AN EXTENDED PERIOD OF WEIGHTLESSNESS, INCLUDING ALTERNATIVE INTERVALS OF ARTIFICIAL GRAVITY Final Report, 15 Dec. 1976 - 15 Oct. 1977
15 Oct. 1977 24 p ref
(Grant NsG-2197)
(NASA-CR-154507) Avail: NTIS HC A02/MF A01 CSCL 06C

Vestibular neuron activity was examined by studying nerve stimulation and evoked response. A cooling element, applied to the nerve consisted of a silver hook through which a coolant fluid flowed. Temperature changes were recorded via microtermistors on an eight channel brush recorder, together with response. Diffusion of the cooling effect was measured, recovery time was assessed, and the nerve was then studied hystologically and ultrastructurally. Problems in frog preparation were discussed along with problems in maintaining healthy specimens and bacteria controlled aquaria. Author

N78-10685# Michigan Univ., Ann Arbor. Dept. of Environmental and Industrial Health.
A CONTROLLED BIOASSAY SYSTEM FOR MEASURING TOXICITY OF HEAVY METALS Final Report
K. H. Mancy and H. E. Allen Apr. 1977 123 p refs
(Contract EPA-14-12-0591)
(PB-267973/6; EPA-600/3-77-037) Avail: NTIS HC A06/MF A01 CSCL 06T

Basic design criteria for fish bioassays which are capable of elucidating the dependency of toxicity on the type and concentration of various copper species were developed utilizing equilibrium chemical concepts and appropriate analytical techniques. In order to maintain a desired copper species in the bioassay medium, synthetic waters were used under well-defined physical and chemical conditions. An experimental system was developed which permitted large volumes of the bioassay waters to be maintained at the desired chemical equilibria for the duration of the experiment. GRA

N78-10686* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MECHANICAL ENERGY STORAGE DEVICE FOR HIP DISARTICULATION Patent
Wilbur C. Vallotton, inventor (to NASA) Issued 4 Oct. 1977 7 p Filed 30 Jun. 1976 Supersedes N76-26871 (14 - 17, p 2241)
(NASA-Case-ARC-10916-1; US-Patent-4,051,558; US-Patent-Appl-SN-701448; US-Patent-Class-3-1.2; US-Patent-Class-3-15; US-Patent-Class-3-29) Avail: US Patent Office CSCL 06B

An artificial leg including a trunk socket, a thigh section hingedly coupled to the trunk socket, a leg section hingedly coupled to the thigh section and a foot section hingedly coupled to the leg section is outlined. A mechanical energy storage device is operatively associated with the artificial leg for storage and release of energy during the normal walking stride of the user. Energy is stored in the mechanical energy storage device during a weight-bearing phase of the walking stride when the user's weight is on the artificial leg. Energy is released during a phase of the normal walking stride, when the user's weight is removed from the artificial leg. The stored energy is released from the energy storage device to pivot the thigh section forwardly about the hinged coupling to the trunk socket.
Official Gazette of the U.S. Patent Office

N78-10687 Columbia Univ., New York.
SWEATING RESPONSE: A MEANS OF EVALUATING THE SET-POINT THEORY DURING EXERCISE Ph.D. Thesis
Hak-Shing William Tam 1977 241 p
Avail: Univ. Microfilms Order No. 77-14851

The temperature regulation system of the human body had been recognized to behave like a feedback thermostatic system. The set-point can be changed in a fixed pattern by the environmental temperature, acclimatization, fever and circadian rhythm. During muscular exercise, different patterns of set-point shift are observed. It is shown that the reference temperature with which the sweating controller regulated its response was lowered during exercise. The gain of the response to core temperature change during exercise also decreased. The relationship of present findings with the pertinent theories is discussed and a body temperature control model during exercise is proposed. Dissert. Abstr.

N78-10688 Brown Univ., Providence, R. I.
GAS TRANSPORT IN ARTIFICIAL LUNGS: LIMITATIONS AND IMPROVEMENTS Ph.D. Thesis
Kazuo Tanishita 1976 219 p
Avail: Univ. Microfilms Order No. 77-14200

The oxygen and carbon dioxide transfer resistance through membrane oxygenators is analyzed for water (non-reactive system) and blood (reactive system) to find the limitations and possibilities of further improvement of gas transfer. The various contributions to overall gas transfer performance are thoroughly analyzed starting from simple membrane oxygenators and extending to sophisticated secondary flow devices. Analysis of the gas transfer performance in simple membrane oxygenators (capillary and parallel sheet type) demonstrates the basic idea of overall gas transfer resistance. Comparisons between experiments and theoretical predictions indicate well the transport limit of oxygen transfer and membrane limit of carbon dioxide transfer with blood. Dissert. Abstr.

N78-10689 George Washington Univ., Washington, D. C.
AN INVESTIGATION OF THE RELATIONSHIP OF THE EVOKED POTENTIAL TO VARIOUS MODES OF VISUAL STIMULATION Ph.D. Thesis
Joseph Robert Silverman 1977 136 p
Avail: Univ. Microfilms Order No. 77-15362

Various modes of visual stimulation for use in measurement of visual evoked potential (VEP) were explored. Techniques emphasized were those that offer inexpensive, flexible methods of providing diversified pattern formation, as well as the capability to be expanded to handle data in different spectral regions. The properties of devices useful as stimulators were investigated and an in depth experiment with a method for employing minimally modified video equipment as a flexible stimulation technique was accomplished. Tests were run using a black and white television receiver, a strobe and an episcotister using various time durations. The resultant visual evoked potential waveforms indicated that the validity of using a video system as a stimulation source is acceptable. Dissert. Abstr.

N78-10690 Brown Univ., Providence, R. I.
MONOCULAR AND BINOCULAR BRIGHTNESS OF MONOCHROMATIC LIGHTS Ph.D. Thesis
Eleanor Ha-Lin Leung-Hollins 1976 227 p
Avail: Univ. Microfilms Order No. 77-14155

The brightness of binocularly-viewed monochromatic lights was assessed by matching a monocular comparison light to them in brightness. Test and comparison lights were presented in the form of bipartite 1 deg field presented to the fovea, superimposed on and concentric with a 7 degree 58 second white background of 1.46 log trolands. This background was always seen by both eyes. In order to equate lights of different wavelengths for retinal illuminance, spectral luminosity curves were obtained on each subject using a cascade brightness matching procedure. These results were in reasonable agreement with spectral sensitivity curves obtained on the same subjects using a threshold method, and with the C.I.E. photopic luminous efficiency function for the standard observer. Dissert. Abstr.

N78-10691 Houston Univ., Tex.
PSYCHOPHYSIOLOGICAL ASPECTS OF TIME PERCEPTION (THE MEMORY OF SPEED) Ph.D. Thesis
George A. Vroulis 1976 209 p
Avail: Univ. Microfilms Order No. 77-13651

In order to test and measure visual temporal behavior, two rotating disks were built to simulate clocks with variable angular velocities. Subjects had to memorize the angular speed of the reference disk and be able to reproduce it later on the adjustable disk. The task of reproduction had to be accomplished under the following conditions: (a) while observing both disks at the same time, (b) 5 sec., 30 sec. later, 120 sec. later, (c) 5 sec. later but with an adjustable disk half the size of the reference disk, (d) after 120 sec. of physical exercise, (e) after 120 sec. of relaxation, (f) after 120 sec. of arithmetical exercises. Results included that: (a) Subjects can memorize angular speeds of 0.88 rpm and 3.16 rpm to at least within a 13% accuracy. (b) Subjects do not rely on the internal physiological clocks. (c) Subjects tend to overstimate the angular speed after relaxation, while they tent to understimate it after physical or arithmetical exercises. Dissert. Abstr.

N78-10692*# San Jose State Univ., Calif. Dept. of Psychology.
VESTIBULAR-VISUAL INTERACTIONS IN FLIGHT SIMULATORS Annual Status Report, 1 Sep. 1976 - 31 Aug. 1977
Brant Clark Sep. 1977 34 p refs
(Grant NGL-05-046-002)
(NASA-CR-155204; ASR-10) Avail: NTIS HC A03/MF A01 CSCL 05E

The following research work is reported: (1) vestibular-visual interactions; (2) flight management and crew system interactions; (3) peripheral cue utilization in simulation technology; (4) control of signs and symptoms of motion sickness; (5) auditory cue utilization in flight simulators, and (6) vestibular function: Animal experiments. Author

N78-10693*# System Development Corp., Edwards, Calif.
ANALYSIS OF RESPONSES OF COLD PRESSOR TESTS ON PILOTS AND EXECUTIVES
Ram Swaroop Nov. 1977 31 p
(Contract NAS4-2334)
(NASA-CR-143847) Avail: NTIS HC A03/MF A01 CSCL 06E

Statistical analyses were performed to study the relationship between cold pressor test responses and certain medical attributes of a group of 81 pilots and a group of 466 executives. The important results of this study were as follows: There was a significant relationship between a subject's cold pressor test response and his profession (that is, pilot or executive). The executives' diastolic cold pressor test responses were significantly related to their medical conditions, and their families' medical conditions. Significant relationships were observed between executives' diastolic and systolic cold pressor test responses and their history of tranquilizer and cardiac drug use. Author

N78-10694# Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.
PSYCHOPHYSIOLOGICAL EFFECTS OF AGING: DEVELOPING A FUNCTIONAL AGE INDEX FOR PILOTS. 1. A SURVEY OF THE PERTINENT LITERATURE
Siegfried J. Gerathewohl Apr. 1977 27 p refs
(AD-A040322/0; FAA-AM-77-6) Avail: NTIS HC A03/MF A01 CSCL 06/16

A functional age index for pilots is evaluated. Particular emphasis is given to studies on the effect of age differences as measured by standardized tests of sensory, perceptual, mental, cognitive and neurophysiological functions and processes, and the quantitative or objective assessment of personality traits and structure. A few examples of graphs, tables, curves, and mathematically expressed relationships between these parameters and age are given. The age-related changes of these variables and their implications to possible and actual pilot performance are discussed. Author

N78-10695# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
PILOT TRACKING PERFORMANCE AS A FUNCTION OF G STRESS AND SEAT BACK ANGLE
Kenneth W. McElreath and Michael D. Clader May 1977 17 p refs
(AD-A042950; AMRL-TR-76-107) Avail: NTIS HC A02/MF A01 CSCL 17/8

The results show degraded weapon tracking at elevated G levels. Improved subject tolerance and greater kill opportunity due to seat back angle are presented at 8G and above. The data were not sufficient to allow modeling of the tracking performance as a function of seat back angle but did show a threshold effect in the 6-8G region on pilot tracking capability. Author (GRA)

N78-10696# Michigan Univ., Ann Arbor. Highway Safety Research Inst.
A FOUNDATION FOR SYSTEMS ANTHROPOMETRY, PHASE 1 Interim Scientific Report, 1 Jun. 1976 - 30 Nov. 1976
Herbert M. Reynolds 31 Jan. 1977 133 p refs
(Contract F44620-76-C-0115)
(AD-A042890; UM-HSRI-77-7; AFOSR-77-0911TR) Avail: NTIS HC A07/MF A01 CSCL 06/14

The purpose of the present program is to conduct basic research into the properties and requirements of three-dimensional dynamic anthropometry. In essence, the research has the expressed goal of inductively describing the linkage of the whole body for predicting body motion in three-dimensional dynamic computer simulations. This effort may be divided into three subsidiary tasks dealing with (1) the identification, location, and relationship of externally and internally 'stable' landmarks; (2) the definition of whole body and segment anatomical axes systems; and (3) the quantitative description of body motion with probabilistic characteristics of each major joint center of mobility. Author (GRA)

N78-10697# Applied Science Labs., Waltham, Mass. Gulf and Western Research and Development Group.
DEVELOPMENT AND TESTING OF AN IMPLANTABLE OXYGEN SENSOR Annual Report, Jul. 1975 - Sep. 1976

S. Aisenberg and K. W. Chang Dec. 1976 141 p refs
(Contract N01-HR-3-3003-R)
(PB-269501/3; SSD-P-708-AR-3) Avail: NTIS HC A07/MF A01 CSCL 06B

A number of intravascular fuel cell oxygen sensors were built and tested. Causes of contamination of the catalytic electrodes were identified and eliminated. The sensor short circuit current was measured as a function of O2 partial pressure and was shown to be linear. Sensor response time was measured to be about 15 seconds, in agreement with theoretical values. The time constant for increases in oxygen was measured to be larger than for decreases. Flow dependence of the sensor sensitivity was measured and was found to be acceptably small. The functional form of the flow dependence data was in good agreement with a boundary layer model. GRA

N78-10398# Air Force Academy, Colo. Dept. of Life and Behavioral Sciences.
BEHAVIORAL AND PHYSIOLOGICAL CORRELATES OF VARYING NOISE ENVIRONMENTS: ANNOTATED BIBLIOGRAPHY Final Report
Lawrence F. Sharp, John F. Swiney, and Mickey R. Dansby Dec. 1976 213 p refs
(Contract EPA-IAG-D4-0537)
(PB-267565/0; EPA-600/1-76-038) Avail: NTIS HC A10/MF A01 CSCL 06S

The annotated bibliography contains 365 references related to the behavioral and physiological effects of noise. References to research articles, texts, other literature reviews and symposia are provided. The review covers the period 1968 thru 1974. Some foreign research published as early as 1966 is reported. The review is subdivided into approximately twenty relevant areas including personality differences, sleep, sonic boom, noise measurement, effects of noise on social relevant behavior, hearing loss, temporary threshold shift, physiological effects, motor skills, vigilance and perceptual processes. GRA

N78-10399 Brown Univ., Providence, R. I.
ADAPTATION TO DELAYED AUDITORY FEEDBACK IN TEMPORAL SYNCHRONIZATION TASKS AS EVIDENCE FOR A FEEDBACK CONTROL PROCESS IN HUMAN TIMING Ph.D. Thesis
Jill M. Steinbruegge 1976 109 p
Avail: Univ. Microfilms Order No. 77-14198

Evidence is presented for the existence of a control process in human timing capable of altering compensation for an external delay in order to establish and maintain synchronization. When the delay in response feedback was experimentally varied, subjects showed adaptation to the altered delay and regulation of timed responses toward a constant reference interval. The observed functions describing the course of adaptation to delayed feedback in an interval bisection task were well fit by functions predicted by a linear feedback control model. In an interval reproduction task, the compensation which was applied to a reproduced interval was shown to be independent of the stimulus interval to which adaption occured. When adaptation to an external delay was complete and timing performance was asymptotic, a synchronization error proportional to the feedback delay was found to persist. Dissert. Abstr.

N78-10700 Brown Univ., Providence, R. I.
STUDIES OF ORIENTATION-CONTINGENT COLOR AFTER EFFECTS Ph.D. Thesis
Keith David White 1976 132 p
Avail: Univ. Microfilms Order No. 77-14207

Orientation-contingent color afteraffects (CAEs) which are relatively longlasting changes in the appearance of certain patterns were studied. A technique for assessment which served to standardize and systematize the method of eliciting subjects' judgments of apparent coloration was utilized. The assessment technique systematized those measures by means of its more nearly objective nature. The subjects were required to judge certain chromatic lights, whose chromaticities were specified in physical units, and from which the apparent colorations could be inferred. Those units of chromaticity are an undetermined relationship to the strengths of the CAEs themselves, however, and it was the problem of devising quantitatively useful estimates from them that was emphasized. Dissert. Abstr.

N78-10701*# Computer Sciences Corp., Mountain View, Calif.
THE EFFECT OF A VISUAL/MOTION DISPLAY MISMATCH IN A SINGLE AXIS COMPENSATORY TRACKING TASK
Douglas K. Shirachi and Richard S. Shirley Washington NASA 1977 34 p refs
(Contract NAS2-7806)
(NASA-CR-2921) Avail: NTIS HC A03/MF A01 CSCL 05H

An experiment was performed to determine the effect of a performance mismatch between the visual and motion display systems on a real time piloted aircraft simulation. Pilots performed a compensatory roll tracking task with dynamics typical of medium jet transports. Between 0 and 10 rad/sec, visual and motion system responses were equivalent to either unity or a first order lag at 4.8 rad/sec. Pilot describing functions and error scores were calculated. Results show that the mismatch between visual and motion display systems has no significant effect. It is the absence of high frequency visual and/or motion cues which significantly affects pilot performance. Author

N78-10702# Stanford Univ., Calif. Information Systems Lab.
BIOCYBERNETIC FACTORS IN HUMAN PERCEPTION AND MEMORY Final Report, 1 Feb. 1976 - 30 Apr. 1977
James Anliker, Robert Floyd, Martin Morf, and Thomas Kailath Jul. 1977 133 p refs
(Contract N00014-76-C-0597; ARPA Order 3177)
(AD-A043773; ISL-BIOCYB-77) Avail: NTIS HC A07/MF A01 CSCL 06/2

This project was concerned with the development of biocybernetic concepts and methods which have potential value for enhancing visual perception of, and visual memory for, scenic materials. The essence of the biocybernetic idea is that feedback and control schemes implemented by various machines can be used to enhance or extend various aspects of human performance beyond unaided limits. To design effective closely-coupled man-machine systems it is desirable to have the perceptual and behavioral aspects of human performance formulated in terms of feedback and control principles. In this project the investigators concentrated on studying the feedback and control possibilities inherent in the coupling of visual stimuli to eye-direction and to the phase of the EEG alpha rhythm. They succeeded in developing state-of-the-art systems for real-time tracking of eye-direction and alpha-phase; these computerized tracking systems are capable of controlling visual stimuli so that their occurrence is conditional upon eye-direction and alpha-phase. Their computerized eye-tracker system, known as PERSEUS, incorporates the 2-dimensional double-Purkinje-image eye-tracker (DPIET) developed at the Stanford Research Institute. This non-contacting device tracks and compares the positions of the first and fourth Purkinje images formed by reflections of infrared light beamed at the subject's eye. By comparing the position of the fourth Purkinje image with respect to the first Purkinje image, one obtains a sensitive measure of eye-rotation which is uncontaminated by eye-translation. A computerized scheme was implemented for the phase-contingent analysis of the average visual evoked potential. GRA

N78-10703 Wisconsin Univ., Madison.
INTERACTIVE MODELING AND ANALYSIS OF DYNAMIC SYSTEMS WITH APPLICATIONS TO THE MUSCULOSKELETAL STRUCTURE Ph.D. Thesis
Robert John Williams 1976 402 p
Avail: Univ. Microfilms Order No. 77-8125

A computer based procedure for modeling and analyzing large displacement dynamic systems of the open or closed loop types is described. The procedure facilitates the construction of the model for such systems, automatically formulates the dynamic equations and provides the solution for any given input motion. The program is capable of analyzing complex systems with redundant force actuators utilizing a linear programming optimization scheme. It incorporates an interactive graphic capability which is invaluable in the construction, modification and visual checking

of the adequacy of a model. The interactive command language inputs for the musculoskeletal structure analysis is specially designed to allow users, without extensive training to utilize the system in many research areas. Dissert. Abstr.

N78-10704*# Lockheed Missiles and Space Co., Sunnyvale, Calif. Bioengineering Organization.
DEVELOPMENT OF A NON-CRYOGENIC NITROGEN/OXYGEN SUPPLY SYSTEM
Sep. 1977 138 p refs
(Contract NAS9-13720)
(NASA-CR-151542; LMSC-D564425) Avail: NTIS HC A07/MF A01 CSCL 06K

Modular components were refined or replaced to improve the performance of the electrolysis module in a system which generates both oxygen and hydrogen from hydrazine hydrate. Significant mechanical and electrical performance improvements were achieved in the cathode. Improvements were also made in the phase separation area but at considerable cost in time and money and to the detriment of other investigative areas. Only the pump/bubble separator failed in a manner necessitating redesign. Its failure was, however, due to its being operated above the temperature range for which it was designed. The basic electrolysis cell design was not changed. Author

N78-10705# Aerospace Systems, Inc., Burlington, Mass.
GENERAL AVIATION PILOT STALL AWARENESS TRAINING STUDY Final Report, Jun. 1975 - Aug. 1976
William C. Hoffman and Walter M. Hollister Sep. 1976 265 p refs
(Contract DOT-FA75WA-3716)
(AD-A041310/4; ASI-TR-76-37; FAA-RD-77-26) Avail: NTIS HC A12/MF A01 CSCL 05/9

Focus was placed on the potential of enhanced pilot training in the areas of stall/spin recognition, avoidance, and recovery. The objectives were to determine the weakness of present flight training syllabi, the methods of training used, and the flight instruction presently provided in the stall/spin area; conceive an experimental stall/spin increment to an established flight and ground training syllabus; and conduct flight and ground test evaluations of this syllabus change and the flight instruction techniques required. Volunteer student pilots were divided into four groups, each receiving different degrees of stall/spin training. Evaluation flight tests were conducted prior to and after the training period. Results indicate that additional ground training in the subject of stalls and spins, additional flight training on stall awareness, and/or intentional spin training would all have a positive influence toward reducing inadvertent stalls and spins. Author

N78-10706# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A MODEL FOR THE PILOT'S USE OF MOTION CUES IN ROLL-AXIS TRACKING TASKS Interim Scientific Report
William H. Levison and Andrew M. Junker (AMRL) Wright-Patterson AFB, Ohio AMRL Jun. 1977 80 p refs
(Contract F44620-75-C-0060)
(AD-A043690; BBN-3528; AMRL-TR-77-40) Avail: NTIS HC A05/MF A01 CSCL 17/8

An experimental and analytical study was undertaken to test a model for the pilot's use of motion cues in roll-axis tracking tasks. Simulated target-following and disturbance-regulations tasks were explored with subjects using visual-only and combined visual and motion cues. The effects of motion cues on task performance and pilot response behavior were appreciably different for the two task configurations and were consistent with data reported in earlier studies for similar task configurations. The 'optimal-control' model for pilot/vehicle systems provided a task-independent framework for accounting for the pilot's use of motion cues. Results were consistent with the hypothesis of attention-sharing between visual and motion variables. GRA

N78-10707# Systems Research Labs., Inc., Dayton, Ohio.
VISUALLY EVOKED BRAIN POTENTIALS AS AIDS IN DISPLAY DESIGN
Robert D. ODonnell and Ronald J. Spicuzza Aug. 1977 11 p refs
(Contract F33615-75-C-0127)
(AD-A043853; AMRL-TR-77-58) Avail: NTIS HC A02/MF A01 CSCL 05/5

The electrical activity of the brain in response to a visual scene is being used as an adjunct to measurement techniques in several human engineering and medical applications. Recorded from electrodes placed on the subject's scalp, this 'evoked potential' sensitively measures the way that the human responds to differing presentations of the outside world. It permits evaluation of the effects of changes in the sensory qualities of a displayed scene, as well as the cognitive demands and response requirements of a specific task. As such, the evoked potential provides a unified metric that allows the engineering psychologist to assess the total requirements placed on the subject, from sensory input to motor output. Several studies are reported using this technique to answer questions of display design and operator performance. GRA

N78-10708# Michigan Univ., Ann Arbor. Highway Safety Research Inst.
WHOLE BODY RESPONSE OF THE HYBRID 3 ANTHROPOMORPHIC TEST DEVICE Final Report, 1 Jan. - 28 Feb. 1977
Nabih M. Alem, Joseph B. Benson, and John W. Melvin 28 Feb. 1977 226 p Sponsored by General Motors Research Labs.
(PB-268702/8; UM-HSRI-77-10) Avail: NTIS HC A11/MF A01 CSCL 13F

Whole body kinematic response of the GM Hybrid-III anthropomorphic test device were obtained. Controlled test conditions which represent realistic automotive impact environments were utilized. Raw data and analysis results of 9 tests conducted at 3 impact severity levels are presented. GRA

N78-11662*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF WEIGHTLESSNESS CONDITIONS ON THE SOMATIC EMBRYOGENESIS IN THE CULTURE OF CARROT CELLS
R. G. Butenko, N. N. Dmitriyeva, V. Ongko, and L. V. Basyrova Aug. 1977 20 p refs Transl. into ENGLISH of "Vliyaniye Usloviy Nevesomosti na Somaticheskiy Embriogenez v Kul'ture Kletok Morkovi", Moscow, Acad. of Sci. of the USSR, 1977 p 7-18 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-2790)
(NASA-TM-75040) Avail: NTIS HC A02/MF A01 CSCL 06C

A carrot cell culture seeded in Petri dishes in the United States and transported to the USSR was subjected to weightlessness for 20 days during the flight of Kosmos 782. The controls were cultures placed on a centrifuge (1 g) inside the satellite and cultures left on ground in the U.S.S.R. and the United States. A count of structures in the dishes after the flight showed that the number of developing embryonic structures and the extent of their differentiation in weightlessness did not reliably differ from the number and extent of differentiation in structures developed on the ground. Structures with long roots developed in weightlessness. Analysis of the root zones showed that these roots differed by the increased size of the zone of differentiated cells. The increased size of the zones of differentiated cells can indicate earlier development of embryonic structures. Author

N78-11663*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE USE OF NONHUMAN PRIMATES IN SPACE
Richard C. Simmonds, ed. and Geoffrey H. Bourne, ed. (Emory Univ.) Sep. 1977 390 p refs Proc. held at Moffett Field, Calif., 2-4 Dec. 1974
(NASA-CP-005; A-6133) Avail: NTIS HC A17/MF A01 CSCL 06C

Space related biomedical research involving nonhuman primates is reviewed. The scientific assets of various species and the instruments used for monitoring physiological processes during long duration experimentations are described.

N78-11664*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A REVIEW OF ANIMAL FLIGHT EXPERIMENTS
Harold Sandler *In its* The Use of Nonhuman Primates in Space Sep. 1977 p 3-21 refs
Avail: NTIS HC A17/MF A01 CSCL 06C

Extensive experience with biologic systems was obtained with a variety of vertebrate species over the past 18 years. Subhuman primates were precursors to man in the American space flight program; dogs and mice were animals of choice for the Soviet program. Recent attempts to use heavily instrumented animals for observations of long-term physiological effects indicate problems which must be correctedd in future experiments for monitoring the effects of environmental stresses over the longer periods required for accomplishing meaningful habitation in near-Earth orbit or for travel to nearby planets.
Author

N78-11665*# California Univ., Berkeley.
PHYSIOLOGICAL STUDIES IN SPACE WITH NONHUMAN PRIMATES USING THE MONKEY POD
N. Pace, D. F. Rahlmann, A. M. Kodama, R. C. Mains, and B. W. Grunbaum *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 23-49 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

A completely enclosed module was constructed for continuously maintaining an unanesthetized adult 10-12 kg monkey in a physiologically stable state of comfortable restraint for periods of at least 10 days, either on the ground or in an orbiting spacecraft. Energy balance determinations made during three different tests using a giant rhesus (malaca nemestrina) are presented in charts and graphs.
Author

N78-11666*# Emory Univ., Atlanta, Ga. Yerkes Regional Primate Research Center.
THE ORBITING PRIMATE EXPERIMENT (OPE)
Geoffrey H. Bourne, M. Nelly Golarz DeBourne, and Harold M. McClure *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 51-82 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

Instrumentation and life support systems are described for an experiment to determine the physiological effects of long term space flight on unrestrained, minimally instrumented rhesus macaques flown in orbit for periods up to six months or one year. On return from orbit, vestibular, cardiovascular, and skeletal muscle function will be tested. Blood chemistry and hematological studies will be conducted as well as tests of the immunological competence of selected animals. Nasal, rectal, and throat swabs will be used for bacterial and viral studies, and histopathological and histochemical investigations will be be made of all organs using light and electron microscopy. The experiment is being considered as a payload for the biomedical experiment scientific satellite.
A.R.H.

N78-11667*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CARDIOVASCULAR STUDIES IN THE RHESUS MONKEY
H. L. Stone (Texas Univ., Galveston) and H. Sandler *In its* The Use of Nonhuman Primates in Space Sep. 1977 p 83-101 refs
Avail: NTIS HC A17/MF A01 CSCL 06C

Criteria are given for selecting the macaca mulatta as the analogue of the human in the study of cerebral circulation, particularly the control of the cerebral vascular bed during normal and stressful conditions. Topics discussed include surgical preparation of subject; responses to changes in arterial pressure, oxygen, and carbon dioxide; innervation of cerebral vessels; cerebral flow response to acceleration; and cerebral blood flow and cerebellar stimulation.
A.R.H.

N78-11668*# Mayo Foundation, Rochester, Minn.
SOME EFFECTS OF ACCELERATION IN MAN AND CHIMPANZEES
E. H. Wood, D. J. Sass, E. L. Ritman, J. F. Greenleaf, C. M. Coulam, D. Nathan, and E. C. Nolan *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 103-164 refs
(Grant NGR-24-003-001; Contract F44620-71-c-0069-Grants HL-04664)
Avail: NTIS HC A17/MF A01 CSCL 06C

Early physiologic experiments using dogs and humans in centrifuges are reviewed. Because of the close similarity between the shape and dimensions of the thoraces of chimpanzees and humans, the former were used to obtain roentgenograms and photokymographic recordings of multiple physiologic variables before and during exposure to +5.8 Gy to study the effects of changes in the gravitational-inertial force environment on the cardiovascular and pulmonary systems during long duration space flight. A computer-controlled sciscanning system was used to obtain a two dimensional map of the amount of radiation emanating from the dorsal and ventral surfaces after insertion of radioactive microspheres in the right ventricle. By using four different batches of microspheres tagged with isotopes of different energies, the spatial distribution of pulmonary blood flow under four conditions was determined.
A.R.H.

N78-11669*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIORHYTHMS AND SPACE EXPERIMENTS WITH NONHUMAN PRIMATES
C. M. Winget *In its* The Use of Nonhuman Primates in Space Sep. 1977 p 165-177 refs
02-51)
Avail: NTIS HC A17/MF A01 CSCL 06C

Man's response to exposure to spaceflight and weightlessness is expressed in physiological adjustments which involve his health and ability to function. The amplitude and periodicity of fluctuations in biological processes affect various functions and responses to provocative stimuli. Primates and other species are subjected to tests to determine the consequences of an altered biorhythm on work and performance, emotional stability, biomedical evaluation in space, the ability to cope with the unexpected, and susceptibility to infection, toxicity, radiation, drugs, and stress. Factors in the environment or operational setup which can change the physiological baseline must be determined and controlled. A.R.H.

N78-11670*# Emory Univ., Atlanta, Ga. Yerkes Regional Primate Research Center.
VESTIBULAR FUNCTIONS AND SLEEP IN SPACE EXPERIMENTS
Adrian A. Perachio *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 179-195 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

Physical indices of sleep were continuously monitored in an owl monkey living in a chamber continuously rotating at a constant angular velocity. The electrophysiological data obtained from chronically implanted electrodes was analyzed to determine the chronic effects of vestibular stimulation on sleep and wakefulness cycles. The interaction of linear and angular acceleration on the vestibulo-ocular reflex was investigated in three rhesus monkeys at various angular accelerations.
Author

N78-11671*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
VETERINARY MEDICAL CONSIDERATIONS FOR THE USE OF NONHUMAN PRIMATES IN SPACE RESEARCH
Richard C. Simmonds *In its* The Use of Nonhuman Primates in Space Sep. 1977 p 197-201 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

The validity of biomedical research using animal subjects is highly dependent on the use of 'normal' and healthy animals. The current costs of research programs dictate that a minimum number of animals and test replicates be used to obtain the desired data. The use of healthy and standardized animals increases the probability of obtaining valid data while also permitting greater economy by reducing the between-individual variation, thus allowing the use of fewer animals. Areas of concern

when planning animal payloads include constraints of the flight on candidate species selection, screening for physiological and psychological normalcy, procedures for routine care and quarantine of new animals and those returning from space, ground-based studies to determine experimental protocol, selection of instrumentation, stress during transportation for flight operations, housing and care facilities at launch and recovery sites, and the overall veterinary program. A.R.H.

N78-11672*# Howard Univ., Washington, D. C. Coll. of Medicine.
CARDIOVASCULAR STUDIES USING THE CHIMPANZEE (PAN TROGLODYTES)
Joseph E. Hinds, LaVal N. Cothran, and Edward W. Hawthorne *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 203-224 refs Prepared in cooperation with Emory Univ.
Avail: NTIS HC A17/MF A01 CSCL 06C

Despite the phylogenetic similarities between chimpanzees and man, there exists a paucity of reliable data on normal cardiovascular function and the physiological responses of the system to standard interventions. Totally implanted biotelemetry systems or hardwire analog techniques were used to examine the maximum number of cardiovascular variables which could be simultaneously monitored without significantly altering the system's performance. This was performed in order to acquire base-line data not previously obtained in this species, to determine cardiovascular response to specific forcing functions such as ventricular pacing, drug infusions, and lower body negative pressure. A cardiovascular function profile protocol was developed in order to adjust independently the three major factors which modify ventricular performance, namely, left ventricular performance, left ventricular preload, afterload, and contractility. Cardiac pacing at three levels above the ambient rate was used to adjust end diastolic volume (preload). Three concentrations of angiotensin were infused continuously to evaluate afterload in a stepwide fashion. A continuous infusion of dobutamine was administered to raise the manifest contractile state of the heart. Author

N78-11674*# Emory Univ., Atlanta, Ga. Yerkes Regional Primate Research Center.
THE RHESUS MONKEY (MACACA MULATTA) AS A FLIGHT CANDIDATE
M. Nelly Golarz DeBourne, Geoffrey H. Bourne, and Harold M. McClure *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 245-279 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

The intelligence and ruggedness of rhesus monkeys, as well as the abundance of normative data on their anatomy, physiology, and biochemistry, and the availability of captive bred animals qualify them for selection as candidates for orbital flight and weightlessness studies. Baseline data discussed include: physical characteristics, auditory thresholds, visual accuity, blood, serological taxomony, immunogenetics, cytogenics, circadian rhythms, respiration, cardiovascular values, corticosteroid response to charr restraint, microscopy of tissues, pathology, nutrition, and learning skills. Results from various tests used to establish the baseline data are presented in tables. A.R.H.

N78-11675*# Texas Univ., Bastrop. Cancer Center.
THE CHIMPANZEE AS A FLIGHT CANDIDATE
In NASA. Ames Res. Center The Use of Nonhumans in Space Sep. 1977 p 277-279 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

Some of the characteristics that make the chimpanzee an attractive animal model (anatomy, size, intelligence, and durability) also create some very unique problems. The universally recognized problems of availability and expensive maintenance, combined with the often underestimated problems associated with routine housing, husbandry, restraint, and medical management, severely limit the availabe avenues of approach. Problems involved in using implantable, multichannel radiotelemetry systems to monitor cardiodynamics in chimpanzees are discussed. Author

N78-11676*# Tulane Univ., New Orleans, La.
THE SQUIRREL MONKEY AS A CANDIDATE FOR SPACE FLIGHT
Kenneth R. Brizzee, J. Mark Ordy, and Bernice Kaack *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 281-327 refs

(*Contract* NCA2-800402; *Grant* RR0016413)
Avail: NTIS HC A17/MF A01 CSCL 06C

Because of its size and other unique diurnal-primate characteristics, the squirrel monkey is used in: (1) actual bioflight missions, (2) in laboratory tests designed to clarify the risks to man during launch and recovery as well as in hazardous spaceflight environments, and (3) in the acquisition of data on unknown risks encountered in long duration space exploration. Pertinent data concerning samiri sciureus as described in published and unpublished reports are summarized. Topics include: taxonomy, ethology, life history, sensory-learning-motor capabilities in primate perspective, anatomy and physiology (including homeostatic adaptation to stress), susceptibility to environmental hazards, reproduction, care and clinical management, and previous use in aerospace biomedical research. A.R.H.

N78-11677*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE CAPUCHIN MONKEY AS A FLIGHT CANDIDATE
C. M. Winget *In its* The Use of Nonhuman Primates in Space Sep. 1977 p 329-342 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

The highly evolved nervous system and associated complex behavioral capabilities of the nonhuman primates make them good candidates for certain studies in the space environment since deleterious changes in these more complex aspects of a biological status can only be demonstrated by species which share such highly evolved features with man. Important assets which urge the selection of the capuchin monkey for space experiments include his small size, high intelligence, relative disease resistance, nutritional requirements, and lower volume life support systems. The species is particularly suited for experiments on the nervous system or on process under neural control because of the similarity of capuchin and human blood chemistry profiles and endocrine systems involved in the maintenance of homeostasis and vasomotor tone. A.R.H.

N78-11678*# California Univ., Berkeley.
THE PIG-TAILED MONKEY (MACACA NEMESTRINA) AS A SPACE-FLIGHT CANDIDATE
N. Pace, D. F. Rahlmann, A. M. Kodama, B. W. Grunbaum, and R. C. Mains *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 343-356 refs

Avail: NTIS HC A17/MF A01 CSCL 06C

Scientific attributes which make the pig-tailed monkey an optimal candidate for studing the nature of cardiovascular and respiratory adaptations in man during exposure to high altitudes for long periods of time include: a calm, quiet, patient temperament; a short tail and the presence of ischial callosities permitting comfortable seated restraint during long duration experiments; and the close phylogenetic relationships and comparable body size to man. Author

N78-11679*# Emory Univ., Atlanta, Ga. Yerkes Regional Primate Research Center.
CONSIDERATION OF OTHER PRIMATE SPECIES AS FLIGHT ANIMALS
Geoffrey H. Bourne *In* NASA. Ames Res. Center The Use of Nonhuman Primates in Space Sep. 1977 p 357-378

Avail: NTIS HC A17/MF A01 CSCL 06C

The different types of primates which might be used as flight animals are surveyed, and the pros and cons of using them are discussed. Various factors suggest that the most desirable animals for space studies are the rhesus, pig-tailed, Java, and squirrel monkeys. The capuchin monkey has assets for certain types of space experimentation. Author

N78-11680*# School of Aerospace Medicine, Brooks AFB, Tex. Biodynamics Branch.
THE RHESUS (MACACA MULATTA) AND CRAB-EATING (MACACA FASCICULARIS) MONKEYS IN CARDIOVASCULAR AND AEROSPACE RESEARCH
H. H. Erickson and J. R. Ritzman *In* NASA. Ames Res. Center. The Use of Nonhumans in Space Sep. 1977 p 379-387 refs

(NASA Order A-94544)
Avail: NTIS HC A17/MF A01 CSCL 06C

Two nonhuman primate species were used to investigate the effects of gravitoinertial forces on pilot incapacitation and performance impairment, to define human physiologic tolerance and safe exposure limits to these environments, and to obtain data which can be used to evolve new methods to improve man's G tolerance to match the structural capability of new generation aircraft. The macaca fascicularis was used to study the effects of environmental stress and atherosclerosis on cerebral blood flow and function agents on myocardial and cardiovascular function were studied in the macaca mulatta. Author

N78-11681# Civil Aeromedical Inst., Oklahoma City, Okla.
INHALATION TOXICOLOGY: 1. DESIGN OF A SMALL-ANIMAL TEST SYSTEM. 2. DETERMINATION OF THE RELATIVE TOXIC HAZARDS OF 75 AIRCRAFT CABIN MATERIALS Progress Report, Oct. 1974 - Sep. 1976
Charles R. Crane, Donald C. Sanders, Boyd R. Endecott, John K. Abbott, and Paul W. Smith Mar. 1977 59 p refs
(AD-A043646; FAA-AM-77-9) Avail: NTIS HC A04/MF A01 CSCL 06/20

A laboratory test system is described that utilizes small animals to evaluate the relative toxic hazard of combustion products generated by the thermal decomposition of nonmetallic materials. It includes: A discussion of the concepts that led to the design; detailed instructions for conducting a test; an evaluation of the system's performance as determined by the testing of 75 aircraft cabin materials; the utilization of animal response time as a basis for expressing relative toxicity; and a discussion of the derivation of an inhalation dose concept that promises to be more useful than lethal concentrations. Author

N78-11682# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: BIOMEDICAL SCIENCES
14 Oct. 1977 67 p refs Transl. into ENGLISH from Russian Journals
(JPRS-69970) Avail: NTIS HC A04/MF A01

Information on aerospace medicine, agrotechnology, bionics and bioacoustics, biochemistry, biophysics, environmental and ecological problems, food technology, microbiology, epidemiology and immunology, marine biology, military medicine, physiology, public health, toxicology, radiobiology, veterinary medicine, behavioral science, human engineering, psychology, psychiatry and related fields, and scientists and scientific organizations in biomedical fields is presented. Author

N78-11683 California Univ., Berkeley.
ANALYSIS OF IRON CONTENT IN INDIVIDUAL HUMAN RED BLOOD CELLS BY ELECTRON MICROPROBE AND SCANNING ELECTRON MICROSCOPE Ph.D. Thesis
David Davis 1976 169 p
Avail: Univ. Microfilms Order No. 77-15652

The iron content of single human red blood cells was assessed using electron microprobe analysis and scanning electron microscopy. Two preparative procedures were tested: a whole blood smear preparation, and a fixed-washed cell preparation. Differences in Fe distribution among individual cells from both normal subjects and sickle cell anemia patients were measured. Iron K-irradiation distribution curves for both normal and sickle cell groups very closely approximated a normal probability curve; however, the sickle cell distribution contained a greater number of open classes than the normal group. Dissert. Abstr.

N78-11684 California Univ., Berkeley.
ACCUMULATED STRESS, RESERVE CAPACITY, AND DISEASE Ph.D. Thesis
Peter Alan Levine 1976 265 p
Avail: Univ. Microfilms Order No. 77-15760

The accumulation of stress on the reserve capacity of an organism was considered. Effects on the autonomic system, specifically the sympathetic and parasympathetic systems were studied. Relationships of these systems were described by the Catastrophe theory. Further studies were done surveying the blood pressure responses within a hospital population. Possibilities for presymptomatic diagnosis, whereby stress accumulation is detected before the development of debilitating symptoms and tissue pathologies, were investigated as well. Dissert. Abstr.

N78-11687*# National Aeronautics and Space Administration, Washington, D. C.
LIPID EXTRACTION FROM ISOLATED SINGLE NERVE CELLS
I. V. Krasnov Aug. 1977 13 p refs Transl. into ENGLISH from Tsitologiya (USSR), v. 15, no. 12, 1973 p 1535-1539 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by USSR Ministry of Public Health, Moscow.
(Contract NASw-2790)
(NASA-TM-75043) Avail: NTIS HC A02/MF A01 CSCL 06A

A method of extracting lipids from single neurons isolated from lyophilized tissue is described. The method permits the simultaneous extraction of lipids from 30-40 nerve cells and for each cell provides equal conditions of solvent removal at the conclusion of extraction. Author

N78-11688*# National Aeronautics and Space Administration, Washington, D. C.
TEMPERATURE DISTRIBUTION IN THE HUMAN BODY UNDER VARIOUS CONDITIONS OF INDUCED HYPERTHERMIA
O. V. Korobko, T. L. Perelman, and S. Z. Fradkin Aug. 1977 11 p refs Transl. into ENGLISH from Inzh.-Fiz. Zh. (USSR), v. 28, no. 1, 1975 p 113-118 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-2790)
(NASA-TM-75139) Avail: NTIS HC A02/MF A01 CSCL 06P

A mathematical model based on heat balance equations was developed for studying temperature distribution in the human body under deep hyperthermia which is often induced in the treatment of malignant tumors. The model yields results which are in satisfactory agreement with experimental data. The distribution of temperature under various conditions of induced hyperthermia, i.e. as a function of water temperature and supply rate, is examined on the basis of temperature distribution curves in various body zones. Author

N78-11689*# National Aeronautics and Space Administration, Washington, D. C.
CIRCADIAN RHYTHMS IN AEROSPACE MEDICINE
Angel Salinas Aracil Oct. 1977 18 p refs Transl. into ENGLISH from Rev. Aeron. y Astronautica, v. 37, no. 435, Feb. 1977 p 109-118 Original language document was announced as A77-27000 Transl. by Sci. Transl. Serv. Santa Barbara, Calif.
(Contract NASw-2791)
(NASA-TM-75165) Avail: NTIS HC A02/MF A01 CSCL 06P

The cyclical nature of bodily functions is reviewed, in particular those functions likely to affect pilot performance. Author

N78-11690*# National Aeronautics and Space Administration, Washington, D. C.
SUPRACHIASMATIC NUCLEI AND CIRCADIAN RHYTHMS. THE ROLE OF SUPRACHIASMATIC NUCLEI ON RHYTHMIC ACTIVITY OF NEURONS IN THE LATERAL HYPOTHALAMIC AREA, VENTROMEDIAN NUCLEI AND PINEAL GLAND
Hitoo Nishino Sep. 1977 29 p refs Transl. into ENGLISH from Folia Pharmacol. Japan., v. 72, no. 8, 1976 p 941-954 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Orignal doc. prep. by Wakayama Med. Coll. (Japan)
(Contract NASw-2790)
(NASA-TM-75155) Avail: NTIS HC A03/MF A01 CSCL 06P

Unit activity of lateral hypothalamic area (LHA) and Ventromedian nuclei (VMN) was recorded in urethane anesthetized male rats. A 5 to 10 sec. a 3-5 min and a circadian rhythmicity were observed. In about 15% of all neurons, spontaneous activity of LHA and VMN showed reciprocal relationships. Subthreshold stimuli applied at a slow rate in the septum and the suprachiasmatic nuclei (SCN) suppressed the rhythms without changing firing rates. On the other hand, stimulation of the optic nerve at a rate of 5 to 10/sec increased firing rates in 1/3 of neurons of SCN. Iontophoretically applied acetylcholine increased 80% of tested neurons of SCN, whereas norepinephrine, dopamine and 5 HT inhibited 64, 60 and 75% of SCN neurons respectively. These inhibitions were much stronger in neurons, the activity of which was increased by optic nerve stimulation. Stimulation of the SCN inhibited the tonic activity in cervical sympathetic nerves. Author

N78-11691*# Colorado State Univ., Fort Collins. Dept. of Physiology and Biophysics.

TRANSCUTANEOUS MEASUREMENT OF VOLUME BLOOD FLOW

R. E. Daigle, F. D. McLeod, C. W. Miller, M. B. Histand, and M. K. Wells 1 Aug. 1974 76 p refs

(NASA-CR-155233; Grant NsG-2009) Avail: NTIS HC A05/MF A01 CSCL 06P

Blood flow velocity measurements, using Doppler velocimeter, are described. The ability to measure blood velocity using ultrasound is derived from the Doppler effect; the change in frequency which occurs when sound is reflected or transmitted from a moving target. When ultrasound of the appropriate frequency is transmitted through a moving blood stream, the blood cells act as point scatterers of ultrasonic energy. If this scattered ultrasonic energy is detected, it is found to be shifted in frequency according to the velocity of the blood cells, nu, the frequency of the incident sound, f sub o, the speed of sound in the medium, c, and the angle between the sound beam and the velocity vector, o. The relation describing this effect is known as the Doppler equation. Delta f = 2 f sub o x nu x cos alpha/c. The theoretical and experimental methods are evaluated. Author

N78-11692*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

INDOMETHACIN-ANTIHISTAMINE COMBINATION FOR GASTRIC ULCERATION CONTROL Patent Application

Patricia A. Brown (San Jose State Univ., Calif.) and Joan Vernikos-Danellis, inventors (to NASA) Filed 10 Nov. 1977 18 p

(NASA-Case-ARC-11118-1; US-Patent-Appl-SN-850504) Avail: NTIS HC A02/MF A01 CSCL 06E

An anti-inflammatory and analgesic composition is disclosed. The agent contains indomethacin and an H1 or an H2 histamine receptor antagonist in an amount sufficient to reduce gastric distress caused by indomethacin. Usable antagonists include pyrilamine, promethazine, metiamide and cimetidine. NASA

N78-11693# Naval Civil Engineering Lab., Port Hueneme, Calif.

A FINITE ELEMENT HEAD INJURY MODEL. VOLUME 2: COMPUTER PROGRAM DOCUMENTATION Final Report, Jun. 1973 - Jun. 1977

T. A. Shugar Jul. 1977 161 p refs

(RR0230301)

(AD-A043582; CEL-R-854-2-Vol-2) Avail: NTIS MF A01 CSCL 06/2

Volume II contains necessary information and documentation for executing the HIM computer program. Documentation includes a user's manual, a flow chart, CDC 6600 control cards, sample input data, and a FORTRAN IV source code listing of the HIM program. In addition, listings are provided for a preprocessor (skull mesh generator), a bandwidth minimizer, and a subroutine for an improved finite element for simulating the load-deformation response of the skull. Author (GRA)

N78-11694# Naval Civil Engineering Lab., Port Hueneme, Calif. Construction Battalion Center.

A FINITE ELEMENT HEAD INJURY MODEL. VOLUME 1: THEORY, DEVELOPMENT, AND RESULTS Final Report, Jun. 1973 - Jun. 1977

T. A. Shugar Jul. 1977 216 p refs Sponsored in party by DOT

(RR0230301)

(AD-A043605; CEL-TR-854-1) Avail: NTIS HC A10/MF A01 CSCL 06/2

The results of a head injury model development program are presented, including a description of the resulting model's features and its capabilities for simulating direct and indirect impact forces. The model's validity is discussed in terms of level of confidence and verification. Skull bone response and brain response are presented for a variety of dynamic simulations. Over 75 dynamic and static computer runs have been executed in its development. The basic features of the model are described, including recognizable skull geometry, linear elastic and linear visco-elastic behavior, and a capability for specifying arbitrary impact loads and boundary conditions. A special modification of the isoparametric element is shown to be particularly suited to simulation of the dynamic response of nearly incompressible brain matter. A preprocessor enables automatic mesh generation of a skull model consistent with a prescribed set of geometrical data supplied by the user. Either complete three-dimensional skulls or skulls symmetrical with respect to the midsagittal plane can be specified in the mesh generation process. GRA

N78-11695# Massachusetts Inst. of Tech., Cambridge. Dept. of Psychology.

EXPERIMENTS IN TEXTURE PERCEPTION Annual Report, 1 Jun. 1976 - 31 May 1977

Whitman A. Richards Jul. 1977 31 p refs

(Contract F44620-74-C-0076; ARPA Order 2765)

(AD-A043402; AFOSR-77-0910TR) Avail: NTIS HC A03/MF A01 CSCL 06/16

Over the past year, our special graphics display has been used to examine several properties of texture perception. The most important result is the finding that most uniform textures can be simulated or 'matched' by a very small number of variables, provided that these variables contain the basic elemental tokens of the display. The number of these matching variables may be as small as three, and usually four is sufficient to produce excellent 'texture metamers'. Both linear, or one-dimensional luminance distributions and two-dimensional texture patterns are being studied. Additional work has also been completed that examined the discriminibility of different n-gram statistics for random-check textures. However, this approach does not appear to be so fruitful a method for studying texture perception as the method of 'Generalized Colorimetry', which is outlined briefly in the first section of this report. Our work to date indicates that the human observer is quite poor at discriminating textures. Hence, a considerable saving in communicating texture information can be achieved through the use of texture metamers. Author (GRA)

N78-11696*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

AN INVESTIGATION OF RIDE QUALITY RATING SCALES

Thomas K. Dempsey, Glynn D. Coates (Old Dominion Univ.), and Jack D. Leatherwood Nov. 1977 48 p refs

(NASA-TP-1064) Avail: NTIS HC A03/MF A01 CSCL 05J

An experimental investigation was conducted for the combined purposes of determining the relative merits of various category scales for the prediction of human discomfort response to vibration and for determining the mathematical relationships whereby subjective data are transformed from one scale to other scales. There were 16 category scales analyzed representing various parametric combinations of polarity, that is, unipolar and bipolar, scale type, and number of scalar points. Results indicated that unipolar continuous-type scales containing either seven or nine scalar points provide the greatest reliability and discriminability. Transformations of subjective data between category scales were found to be feasible with unipolar scales of a larger number of scalar points providing the greatest accuracy of transformation. The results contain coefficients for transformation of subjective data between the category scales investigated. A result of particular interest was that the comfort half of a bipolar scale

was seldom used by subjects to describe their subjective reaction to vibration. Author

N78-11697# New Mexico State Univ., University Park. Dept. of Psychology.
COLOR RESEARCH FOR VISUAL DISPLAYS Final Report
Warren H. Teichner and Richard E. Christ Jun. 1977 133 p refs
(Contract N00014-76-C-0306)
(AD-A043609; ONR-CR213-102-4F) Avail: NTIS HC A07/MF A01 CSCL 05/8

This report presents the results of three complex multiple task experiments intended to compare the effectiveness of color coding in visual displays against coding by achromatic letters, digits, and shapes. The results of these three experiments are then integrated with previously reported research to provide a comprehensive assessment of the potential advantages and disadvantages of color coding. Author (GRA)

N78-11698# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abt. Luftfahrtpsychologie.
ACTIVITIES OF THE DEPARTMENT OF AVIATION PSYCHOLOGY CONCERNING THE CONSULTANCY CONTRACT WITH THE DEUTSCHE LUFTHANSA AG Annual Report, 1974 [JAHRESBERICHT 1974 DER ABT. LUFTFAHRTPSYCHOLOGIE ZUM BERATUNGSAUFTRAG DER DEUTSCHEN LUFTHANSA AG]
K. Steininger, S. Fichtbauer, K. M. Goeters, and H. Kirsch 1976 27 p refs In GERMAN
(DLR-IB-355-75/01) Avail: NTIS HC A03/MF A01

Results of psychological aptitude tests for cockpit personnel selection for the Deutsche Lufthansa are reported for the period January through December 1974. An overall survey of these tests covering the past 20 years is also given. ESA

N78-11699# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abt. Luftfahrtpsychologie.
PSYCHOLOGICAL APTITUDE TEST OF AVIATION PERSONNEL FROM MALAWI [PSYCHOLOGISCHE EIGNUNGSPRUEFUNG VON LUFTFAHRTPERSONAL AUS MALAWI]
Klaus-Martin Goeters 1975 13 p refs In GERMAN
(DLR-IB-355-75/03) Avail: NTIS HC A02/MF A01

Results of a series of tests for selection of 8 flight crew personnel from 32 applicants are reported. The jobs to be filled were those of navigator and mechanic onboard a Dornier Skyservant aircraft. The test battery used consisted mainly of culture fair tests, not taking into account knowledge of language and previous education. ESA

N78-11700# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abt. Luftfahrtpsychologie.
RELATION BETWEEN PULSE RATE DURING THE COMPLEX COORDINATION TEST AND SEVERAL PSYCHOLOGICAL MEASURES OF EFFORT AND STRESS [DER ZUSAMMENHANG ZWISCHEN DER PULSFREQUENZ WAEHREND DER PRUEFUNG MIT DEM COMPLEX COORDINATION TEST UND MEHREREN PSYCHOLOGISCHEN MASSEN DES LEISTUNGSEINSATZES UND DER BEANSPRUCHUNG]
Klaus-Martin Goeters 1975 8 p refs In GERMAN
(DLR-IB-355-75/04) Avail: NTIS HC A02/MF A01

The connection between physiological activation in a test situation and psychological measures of effort and stress was investigated for 33 applicants for flight navigator training. The object of this work is to replace psychological measures with strong subjective components by objective physiological parameters. Physiological activation was related to pulse rate. It was found that no real correlation exists, and that pulse rate changes are always ambiguous. ESA

N78-11701*# National Aeronautics and Space Administration, Washington, D. C.
STUDIES OF PERCEPTION OF INFORMATION ON THE SPATIAL POSITION OF AN AIRCRAFT
M. Zebrowski Aug. 1977 10 p Transl. into ENGLISH from Tech. Lotnicza i Astronautyczna (Poland), v. 26, 1971 p 35-37, 39 Original language document was announced as A72-16180 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(NASA Order RA-35372)
(NASA-TM-75153) Avail: NTIS HC A02/MF A01 CSCL 05E

Problems of pilot visual perception were identified, specifically problems of identifiying the surface of the earth at moment of transition from flight-instrument observation. The percepted difficulties studied were: (1) the accuracy of defining the slope of the flight path during lack of visibility of the actual line of the horizon, (2) the accuracy of predicting the time remaining before landing under conditions of limited external visibility, and (3) the structure of the shape of the earth's surface necessary for the maximum accurate determination of flight-path slope and prediction of time remaining to landing. Author

N78-11702*# National Aeronautics and Space Administration, Washington, D. C.
PROVISIONAL STANDARDS OF RADIATION SAFETY OF FLIGHT PERSONNEL AND PASSENGERS IN AIR TRANSPORT OF THE CIVIL AVIATION
Oct. 1977 20 p Transl. into ENGLISH from Vremennyye Normy Radiatsionnoy Bezopasnosti Letnogo Personala i Passazhirov Vozdushnogo Transporta Grazhdanskoy Aviatsil, USSR Ministry of Health (Moscow), report NBRBGA-75, 1975 p 1-17 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-2790)
(NASA-TM-75052) Avail: NTIS HC A02/MF A01 CSCL 06K

Provisional standards for radiation affecting passenger aircraft are considered. Agencies responsible for seeing that the regulations are enforced are designated while radiation sources and types of radiation are defined. Standard levels of permissible radiation are given and conditions for radiation safety are discussed. Dosimetric equipment on board aircraft is delineated and regulation effective dates are given. Author

N78-11703# ILC Industries, Inc., Frederica, Del.
DEVELOPMENT OF A FIRE PROTECTIVE OVERGARMENT FOR USE BY AIR CARRIER FLIGHT ATTENDANTS Final Report, Jul. 1975 - Feb. 1977
John F. Rayfield Feb. 1977 99 p refs
(Contract DOT-FA75WA-3696)
(AD-A042329/3; FAA-RD-77-18) Avail: NTIS HC A05/MF A01 CSCL 06/17

A garment was developed to provide protection to flight attendants in proximity to cabin fires. Based on laboratory flames and heat flux tests, garment materials were chosen. A prototype garment was fabricated, including a breathing system and hood. The garment was tested for donning and mobility in an aircraft cabin, and was subjected to a simulated cabin fire exposure that approximated the contract design conditions. Author

N78-11704*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AUTOMATIC CONTROL OF HUMAN THERMAL COMFORT WITH A LIQUID-COOLED GARMENT
Lawrence H. Kuznetz Sep. 1977 42 p refs
(NASA-TM-58205; JSC-12955) Avail: NTIS HC A03/MF A01 CSCL 05H

Water cooling in a liquid-cooled garment is used to maintain the thermal comfort of crewmembers during extravehicular activity. The feasibility of a simple control that will operate automatically to maintain the thermal comfort is established. Data on three test subjects are included to support the conclusion that heat balance can be maintained well within allowable medical limits. The controller concept was also successfully demonstrated for ground-based applications and shows potential for any tasks involving the use of liquid-cooled garments. Author

N78-11705*# Transportation Systems Center, Cambridge, Mass.
SUMMARY REPORT: WORKSHOP ON VEHICLE RIDE QUALITY Final Report, 11-15 Aug. 1975

A. R. Kulthau, ed. (Virginia Univ.) and Anna W. Wichansky, ed. Jul. 1977 167 p refs Workshop held at Williamsburg, Va., 13-15 Aug. 1975
(Grant NGR-47-005-181)
(NASA-CP-2013; DOT-TSC-OST-77-44) Avail: NTIS HC A08/MF A01 CSCL 05H

Procedures are summarized to optimize urban transportation with emphasis on vehicle ride quality. For individual titles, see N78-11706 through N78-11711.

N78-11706*# Transportation Systems Center, Cambridge, Mass.
ACCOMPLISHMENTS IN RIDE QUALITY RESEARCH: PRESENT AND NEAR FUTURE
In its Summary Report: Workshop on Vehicle Ride Quality Jul. 1977 p 1-19 refs (For availability see N78-11705 02-54)
Avail: NTIS HC A08/MF A01 CSCL 05H

Areas of research in the field of ride quality were categorized into generic subdivisions. The following generic areas were identified: single degree of freedom simulations, multiple degrees of freedom simulations, field simulations, field experiments, surveys/reviews, and modeling techniques. From this review a consensus was reached on the projection of needs for future research efforts, including a prioritization, as well as time and cost estimates of ride quality studies. Author

N78-11707*# Transportation Systems Center, Cambridge, Mass.
NEEDS OF THE TRANSPORTATION COMMUNITY: PRESENT AND NEAR FUTURE
In its Summary Report: Workshop on Vehicle Ride Quality Jul. 1977 p 20-37 ref
Avail: NTIS HC A08/MF A01 CSCL 05H

The impact on the passenger of all aspects of the carrier vehicle physical environment that affect his acceptance of the ride was studied. While motion and vibration are recognized as prime factors affecting subjective reactions, ride quality includes other factors as well (e.g., noise, roominess, etc.) which also can be important. Variables (both subjective and objective) involved and of the interacting effects between variables are identified. Author

N78-11708*# Transportation Systems Center, Cambridge, Mass.
RIDE QUALITY RESEARCH TECHNIQUES: SECTION ON GENERAL TECHNIQUES
In its Summary Report: Workshop on Vehicle Ride Quality Jul. 1977 p 38-64 refs
Avail: NTIS HC A08/MF A01 CSCL 05H

Information is gathered about the methods currently used for the study of ride quality in a variety of transportation modes by a variety of research organizations, including universities, Federal agencies, contracting firms, and private industries. Detailed descriptions of these techniques and their strengths and weaknesses, and identifying the organizations using such methods are presented. The specific efforts of the Group's participants, as well as a variety of feasible approaches not currently in use, are presented as methodological alternatives under the three basic factors which must be considered in ride quality studies: research techniques, research environments, and choice of subjects. Author

N78-11709*# Transportation Systems Center, Cambridge, Mass.
RIDE QUALITY RESEARCH TECHNIQUES: SECTION ON SCALING TECHNIQUES
In its Summary Report: Workshop on Vehicle Ride Quality Jul. 1977 p 65-72 refs
Avail: NTIS HC A08/MF A01 CSCL 05H

Scaling techniques appropriate for the measurement of ride quality subjective responses are evaluated. The major focal points of interest are summarized in succeeding paragraphs as follow: (1) scope of scaling, (2) goal of scaling, (3) category scales; including polarity, scalar points, and whether the scale is discrete or continuous in nature; (4) need and use of adjectives and/or adverbs, (5) role and use of magnitude estimation, (6) multiple response measures; and (7) related topics. Author

N78-11710*# Transportation Systems Center, Cambridge, Mass.
RIDE CONTROL TECHNIQUES
In its Summary Report: Workshop on Vehicle Ride Quality Jul. 1977 p 73-143 refs

Avail: NTIS HC A08/MF A01 CSCL 05H

The state-of-the-art in ride quality control techniques for all the primary modes of transportation and the needs for the future are summarized. Author

N78-11711*# Transportation Systems Center, Cambridge, Mass.
ON SCALING TECHNIQUES
In its Summary Report: Workshop on Vehicle Ride Quality Jul. 1977 p 144-156 refs

Avail: NTIS HC A08/MF A01 CSCL 05H

An introductory review of the principles of scaling with emphasis on ride quality work is presented. It will be divided into six parts as follows: (1) definition of scaling, (2) scope and goals of scaling, (3) scaling techniques (with emphasis on rating scale, magnitude estimation procedures and cross-modality matching), (4) laboratory vs. field studies, (5) multivariate analysis; and (6) selected references. Author

N78-11712*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
ANALYTICAL EVALUATION OF TWO MOTION WASHOUT TECHNIQUES Final Report, 1 May - 31 Oct. 1977
Lawrence R. Young Oct. 1977 160 p refs
(Grant NsG-1416)
(NASA-CR-154582) Avail: NTIS HC A08/MF A01 CSCL 05E

Practical tools were developed which extend the state of the art of moving base flight simulation for research and training purposes. The use of visual and vestibular cues to minimize the actual motion of the simulator itself was a primary consideration. The investigation consisted of optimum programming of motion cues based on a physiological model of the vestibular system to yield 'ideal washout logic' for any given simulator constraints. Author

N78-11713*# Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Lab.
A COMPARISON OF WASHOUT FILTERS USING A HUMAN DYNAMIC ORIENTATION MODEL M.S. Thesis
Susan A. Riedel Sep. 1977 146 p refs
(Grant NsG-1416)
(NASA-CR-154581) Avail: NTIS HC A07/MF A01 CSCL 05E

The Ormsby model of human dynamic orientation, a discrete time computer program, was used to provide a vestibular explanation for observed differences between two washout schemes. These washout schemes, a linear washout and a nonlinear washout, were subjectively evaluated. It was found that the linear washout presented false rate cues, causing pilots to rate the simulation fidelity of the linear scheme much lower than the nonlinear scheme. By inputting these motion histories into the Ormsby model, it was shown that the linear filter causes discontinuities in the pilot's perceived angular velocity, resulting in the sensation of an anomalous rate cue. This phenomenon does not occur with the use of the nonlinear filter. Author

N78-11714# Boeing Commercial Airplane Co., Seattle, Wash. ATC/Electronics Technology-Crew Systems.
AIRCRAFT ALERTING SYSTEMS CRITERIA STUDY. VOLUME 2: HUMAN FACTORS GUIDELINES FOR AIRCRAFT ALERTING SYSTEMS Final Report, Jan. - Nov. 1976
G. P. Boucek, Jr. May 1977 139 p refs
(Contract DOT-FA73WA-3233)
(AD-A043383/9; FAA-RD-76-222-2-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 01/4

Human factors literature that describes pilot response characteristics when confronted with aircraft warning, caution, and advisory signals was reviewed. The review covered visual, aural (sounds and voice), tactile, and bimodal alerts. Data obtained therefrom were categorized into: (1) non-aircraft-related test results, (2) aircraft-related test results, and (3) military standards/

design guidelines so as to establish the applicability of the data and to identify technical areas in which more human factors data relevant to aircraft-alerting systems may be required. Summaries of the literature for (1) factors that affect signal detection, and (2) factors that affect time from detection to response are provided. The results of the review were used to establish preliminary design guidelines for alerting systems in future commerical transport aircraft. Author

N78-11715# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
ACCELERATION EFFECTS ON THE ABILITY TO ACTIVATE EMERGENCY DEVICES IN F-4 AIRCRAFT Final Report
Emma Fessenden 11 Jul. 1977 83 p refs
(AD-A042281; NADC-77105-40) Avail: NTIS HC A05/MF A01 CSCL 01/3

Experiments have been performed and are described in this report which measure the influence of environment on the time it takes to reach an emergency control activation device and which measure the change of physical position at the time of activation due to the environmental forces. Data are reported for both loose and tight torso harness straps. Minus Gx and minus Gz are identified as the components of various likely emergency environments which cause pilots the greatest difficulties. The contribution of combined individual anthropometric measures has been identified as having very pronounced influence on the reachability of certain control devices under specific environments. Improvements in existing seat harness systems and testing for future systems to be developed are recommended. Author (GRA)

N78-11716# Defense Systems Management School, Fort Belvoir, Va.
HUMAN FACTORS ENGINEERING IN AIR FORCE WEAPON SYSTEMS ACQUISITION
Bronislaw P. Prokuski, Jr. 1977 41 p refs
(AD-A043207) Avail: NTIS HC A03/MF A01 CSCL 05/5

This report examines the role that human factors engineering plays in Air Force systems acquisition. It focused upon the conceptual, validation and full-scale engineering development phases of the acquisition process since it is during these phases that the major benefits of human factors engineering can be derived. Based upon previous analyses, letter reports, and the author's personal experience, human factors engineering activities appropriate to these phases are discussed. A brief review of Department of Defense and Air Force systems acquisition policy pertaining to human factors engineering is also presented. Some applications to present weapon programs are identified and discussed. It was concluded that the success of human factors engineering efforts is directly related to the management emphasis and priority given to consideration of the man-machine interface. Recommendations include strengthening the human factors engineering focal point and improvement of the human factors engineering career field to provide the necessary emphasis and resources for human factors engineering implementation. Author (GRA)

N78-11717# Kentucky Univ. Research Foundation, Lexington.
THE DEVELOPMENT, MAINTENANCE, AND MATHEMATICAL DESCRIPTION OF TRACKING BEHAVIOR IN MAN AND THE RHESUS MONKEY
D. F. McCoy and P. K. Bhagat Jun. 1977 67 p refs
(Grant AF-AFOSR-2751-75)
(AD-A043225; AFOSR-77-0966TR) Avail: NTIS HC A04/MF A01 CSCL 05/8

Procedures are described wherein Rhesus monkeys are trained on pursuit and compensatory tracking tasks. Parameters of these procedures are explored. Mathematical analysis of these methods is also reported. Author (GRA)

N78-11718# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
STATE-OF-THE-ART IN ADAPTABLE-PROGRAMMABLE ASSEMBLY SYSTEMS
R. G. Abraham 31 May 1977 165 p refs
(Grant NSF ISP-76-24164)
(PB-270054/0; Rept-77-1G6-APAAS-R3; NSF/RA-770140) Avail: NTIS HC A08/MF A01 CSCL 06D

The state-of-the-art in the technologies related to adaptable-programmable automatic assembly is surveyed. Technology areas surveyed included manipulator arms, end effectors, force/tactile sensing, vision systems, computer hardware and software systems, and parts presentation and fixturing equipment. These areas are surveyed from the aspect of how well does the available technology, or technology that will be available in the near term, meet the requirements of applications in automated assembly in a batch manufacturing environment. It is concluded that, although there are some voids, a technology-base does exist which can be applied with suitable development in specified areas of an adaptable programmable assembly system. GRA

N78-11719# Army Natick Research and Development Command, Mass. Clothing Equipment and Materials Engineering Lab.
THE EFFECTS OF LAYERS OF COLD WEATHER CLOTHING AND TYPE OF LINER ON THE PSYCHOMOTOR PERFORMANCE OF MEN
John M. Lockhart and Carolyn K. Bensel Jun. 1977 117 p refs
(AD-A043835; CE/MEL-171; NATICK-TR-77/018) Avail: NTIS HC A06/MF A01 CSCL 06/17

This study was conducted to determine the differential effects on men's motor performance of wearing the clothing layers comprising the Army cold weather system, including both nylon polyester (Std. A) and mohair frieze (Std. B) liners. The dependent variables investigated were body flexibility, rate of movement, psychomotor coordination, manual dexterity, and effort exerted for task performance. Sixteen Army enlisted men, outfitted in winter underwear, performed the battery of 14 tasks under each of the following conditions: (1) wool shirt and trousers, (2) plus field jacket and trousers, (3) plus Std. A liners or Std. B liners in the field layer, (4) plus parka and arctic trousers, (5) plus Std. A or Std. B liners in the arctic layer. In general, Std. B liners impaired certain aspects of psychomotor performance, particularly body flexibility, to a greater extent than the Std. A liners did. In addition, the Std. A liners were rated more favorably by the users and resulted in a somewhat lower level of physical exertion, as represented by heart rate, than did the Std. B liners. Psychomotor performance level and user acceptance also decreased as the number of clothing layers was increased, but the layers were not equally deleterious in their effects on performance nor were all aspects of performance equally impaired by wearing a certain combination of layers. Interference with specific flexibility movements was attributed to such design characteristics as clothing weight, bulk, garment waist lengths, and garment waist dimensions. Author (GRA)

N78-11720# Army Command and General Staff Coll., Fort Leavenworth, Kansas.
A HUMAN FACTORS TAXONOMY Final Report M.S. Thesis
Noel J. Christman 10 Jun. 1977 69 p refs
(AD-A043723) Avail: NTIS HC A04/MF A01 CSCL 05/5

This paper surveys the topic of human factors in the form of a taxonomy. The taxonomy, a classification system based on the theory underlying the subject, is a valuable tool for surveying human factors. This taxonomy divided human factors into individual, small group, and large group categories as primary divisions. The sub-levels of each address information input, processing, and the attitudinal reactions which result. GRA

N78-11721# National Highway Traffic Safety Administration, Washington, D. C.
SEAT BELT PERFORMANCE IN 30 M.P.H. BARRIER IMPACTS
John B. Morris 27 Apr. 1977 66 p refs
(PB-269962/7; DOT-HS-802-480) Avail: NTIS HC A04/MF A01 CSCL 13F

Data relating to the seat belt performance of nine model year 1976 automobiles when subjected to the FMVSS No. 301 compliance test were obtained. A summary of the test data is

presented and the test results are discussed. A relationship appears to exist between upper torso belt force and ride-down benefit. In those vehicles that exhibit a short crash duration and whose belt systems produce excessive slack time, upper shoulder belt forces are severe. GRA

N78-11722# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abt. Luftfahrtpsychologie.

HUMAN FACTORS IN FLIGHT SAFETY [DER FAKTOR MENSCH IN DER FLUGSICHERHEIT]

K. Steininger 1975 22 p refs In GERMAN Sponsored by Bundesmin. fuer Forsch. u. Technol.

(DLR-IB-355-75/02) Avail: NTIS HC A02/MF A01

A model was developed for the causal layers of human error sources, and possible methodical measures for reducing error sources are discussed. These refer to the domains of personnel selection, training, man machine relation, and interpersonal communication and interaction. ESA

N78-11723# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abt. Luftfahrtpsychologie.

MOBILE SMALL SIMULATOR FOR TRACKING AND MULTITASKING TESTS [EIN MOBILER KLEINSIMULATOR FUER TRACKING- UND MEHRFACHARBEITSVERSUCHE]

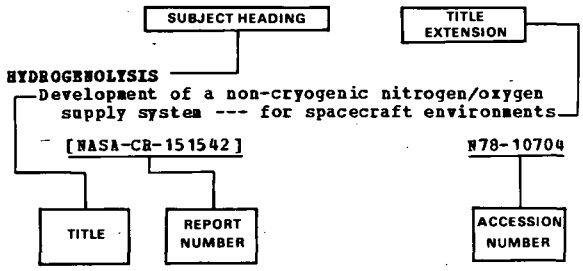
S. Fichtbauer 1975 16 p refs In GERMAN

(DLR-IB-355-75/06) Avail: NTIS HC A02/MF A01

The design and construction are described for a mobile small simulator for application in the investigation of control and reaction behavior of the human operator in man machine systems. The simulator is suitable for measurement of tracking and reaction performance as indicators of stress and fatigue in experimental psychophysiological tests, as well as testing of sensorimotor coordination capacity, attentiveness control, and the performance capacity for multiple tasking in aptitude tests for pilots. ESA

SUBJECT INDEX

Typical Subject Index Listing



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

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

Q

R

S

T

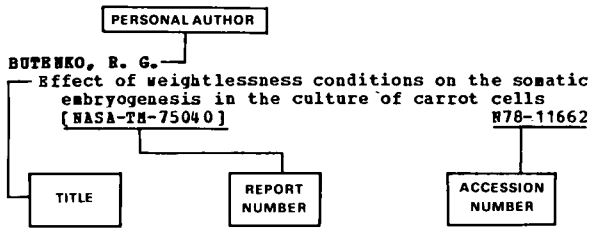
U

V

W

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



The title of the document is used to provide the user with a brief description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

A

B

C

D

E

F

G

H

N

O

P

R

S

T

V

W

Y

Z

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7011 (177)		

4. Title and Subtitle	5. Report Date
AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography (Supplement 177)	February 1978
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, D. C. 20546	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This bibliography lists 112 reports, articles, and other documents introduced into the NASA scientific and technical information system in January 1978.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerospace Medicine Bibliographies Biological Effects	Unclassified - Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	44	$4.75 HC

*For sale by the National Technical Information Service, Springfield, Virginia 22161

NASA-Langley, 1978

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to ten special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
OKLAHOMA
Oklahoma County Libraries, Oklahoma City
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York, 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy or microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESRO/ELDO Space Documentation Service, European Space Research Organization, 114, av. Charles de Gaulle, 92-Neuilly-sur-Seine, France.

NASA CONTINUING BIBLIOGRAPHY SERIES

NUMBER	TITLE	FREQUENCY
NASA SP--7011	AEROSPACE MEDICINE AND BIOLOGY Aviation medicine, space medicine, and space biology	Monthly
NASA SP--7037	AERONAUTICAL ENGINEERING Engineering, design, and operation of aircraft and aircraft components	Monthly
NASA SP-7039	NASA PATENT ABSTRACTS BIBLIOGRAPHY NASA patents and applications for patent	Semiannually
NASA SP--7041	EARTH RESOURCES Remote sensing of earth resources by aircraft and spacecraft	Quarterly
NASA SP-7043	ENERGY Energy sources, solar energy, energy conversion, transport, and storage	Quarterly
NASA SP--7500	MANAGEMENT Program, contract, and personnel management, and management techniques	Annually

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546