



Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

NASA SP-7011 (191)  
March 1979

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National Aeronautics and  
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Aerospace Medicine and Biology  
A Continuing Bibliography with Indexes

Pages 35-59

March 1979

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## ACCESSION NUMBER RANGES

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

STAR (N-10000 Series)    N79-11995 – N79-13996

IAA (A-10000 Series)    A79-12977 – A79-16980

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# **AEROSPACE MEDICINE AND BIOLOGY**

## **A CONTINUING BIBLIOGRAPHY WITH INDEXES**

### **(Supplement 191)**

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 February 1979 in

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



Scientific and Technical Information Branch

1979

**National Aeronautics and Space Administration**

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 182 reports, articles and other documents announced during February 1979 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 1979 Supplements.

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## TYPICAL CITATION AND ABSTRACT FROM STAR

NASA SPONSORED DOCUMENT		AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER	N79-10741*#	
TITLE	McDonnell-Douglas Astronautics Co Huntington Beach Calif	CORPORATE SOURCE
AUTHOR	GENERALIZED ENVIRONMENTAL CONTROL AND LIFE SUPPORT SYSTEM COMPUTER PROGRAM (G1894), PHASE 3 Final Report	
REPORT NUMBER	R E McEnulty Sep 1978 23 p refs	PUBLICATION DATE
COSATI CODE	(Contract NAS9-14877)	
	(NASA-CR-151836 MDC-G7699) Avail NTIS	CONTRACT OR GRANT
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<p>The work performed during Phase 3 of the Generalized Environmental Control Life Support System (ECLSS) Computer Program is reported Phase 3 of this program covered the period from December 1977 to September 1978 The computerized simulation of the Shuttle Orbiter ECLSS was upgraded in the following areas (1) the payload loop of the Shuttle simulation was completely recoded and checked out (2) the Shuttle simulation water and freon loop initialization logic was simplified to permit easier program input for the user (3) the computerized simulation was modified to accept the WASP subroutine, which is a subroutine to evaluate thermal properties of water and freon (4) the 1108 operating system was upgraded by LEC (5) the Shuttle simulation was modified to permit failure cases which simulate zero component flow values and (6) the Shuttle SEPS version was modified and secure files were setup on the 1108 and 1110 systems to permit simulation runs to be made from remote terminals</p>		

## TYPICAL CITATION AND ABSTRACT FROM /AA

NASA SPONSORED DOCUMENT		
AIAA ACCESSION NUMBER	A79-12869 *	TITLE
AUTHOR'S AFFILIATION	Studies on the erythron and the ferrokinetic responses in beagles adapted to hypergravity D A Beckman, J W Evans (California, University, Davis, Calif ), and J Oyama (NASA, Ames Research Center, Biomedical Research Div , Moffett Field California, University, Davis, Calif )	AUTHORS
PUBLICATION DATE	Aviation, Space, and Environmental Medicine, vol 49, Nov 1978, p 1331 1336 23 refs Grant No NCA2 OR180-505	TITLE OF PERIODICAL
	Red cell survival, ferrokinetics, and hematologic parameters were investigated in beagle dogs exposed to chronic hypergravity (2.6 Gx) Ineffective erythropoiesis, red cell mass, plasma volume, and Cr-51 elution were significantly increased, maximum Fe 59 incorporation was decreased, and there was no change in the mean erythrocyte life span following autologous injection of Cr 51 labeled red cells and Fe 59 labeled transferrin Red cell count, F(cells), total body hemoglobin (Hb), susceptibility to osmotic lysis, and differential reticulocyte count were increased White blood cell count, venous blood %Hb, mean cell volume, mean cell Hb, mean cell Hb concentration, and serum iron were decreased No changes were observed for body mass, mg Fe per g Hb, iron binding capacity, percent saturation of iron carrying capacity, or the electrophoretic mobility of purified Hb This study indicated that chronic exposure to hypergravity induced changes in red cell size, volume, total mass, and membrane permeability	CONTRACT, GRANT OR SPONSORSHIP
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# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 191)*

MARCH 1979

## IAA ENTRIES

**A79-13075**      **Saccadic eye movements and visual stability**  
P Lennie and A Sidwell (Sussex, University, Brighton, England)  
*Nature*, vol 275, Oct 26, 1978, p 766 768 8 refs 'Research supported by the Medical Research Council'

Accurate information about eye position, even during a saccade, seems to be available to the oculomotor system, but it is not clear that this information finds its way to mechanisms underlying perceptual stability. The following type of experiment was carried out. The observer views a bright fixation spot on an oscilloscope screen in a dark room. The spot is fixed for 2.4 sec, after which it moves instantaneously a fixed distance right or left where it remains for 100 msec. A saccade is made in the dark as the observer tries to refixate the spot. After the saccade, a probe spot appears for 0.5 sec and the observer tries to determine whether the spot lies to the left or right of the target. It was found that errors in localization after saccades were matched closely by errors in the size of the saccades. It is inferred from this that the perceptual system does not monitor the extent of a saccade but merely assumes that an intended eye movement was made correctly. P T H

**A79-13181**      **Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings** Edited by A S Neal and R F Palasek. Santa Monica, Calif., Human Factors Society, Inc., 1977. 579 p. Members, \$15; nonmembers, \$20.

The proceedings deal with various aspects of human factors as a discipline contributing to the technology of tomorrow. Human factors are discussed relative to task design, human performance and related subjects. Attention is given to computer applications to instructional technology, human information processing, human performance modeling, equipment design, visual performance, psychomotor performance, environmental stress, display systems, and applications in diagnostic and therapeutic clinical electrophysiology. S D

**A79-13182**      **Models for automated motor skills training.** B H Williges, R C Williges, and R E Savage (Virginia Polytechnic Institute and State University, Blacksburg, Va.) In *Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings*. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 18-22. 11 refs. Grant No. AF-AFOSR-77-3161.

The relative effectiveness of a closed-loop linear adaptive model, a quasi-closed-loop learner-centered model, and an open-loop shifting-difficulty model for motor skills learning is evaluated in two studies in which a two-dimensional pursuit tracking task is learned. The first study compared the learner-centered model with the

adaptive model, while the second study compared the shifting-difficulty model with the adaptive model. It is shown that a closed-loop training model is preferable to an open-loop model in terms of subject variability in training and in terms of subsequent level of tracking performance in transfer. Future research work should be concerned with optimizing a closed-loop model for teaching motor skills rather than with comparison of models. S D

**A79-13183**      **Perceptual delay - A consequence of metacontrast and apparent motion.** R S Didner (Bell Telephone Laboratories, Inc., Piscataway, N.J., New York University, New York, N.Y.) In *Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings*. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 33-37. 13 refs.

Metacontrast is the phenomenal suppression of a visual stimulus (the target) by a subsequent stimulus (the mask) which spatially surrounds or bilaterally flanks the target. Perceptual delay occurs when the onset of visual activity corresponds in some way to the subjective onset of the mask rather than to the onset of the target. The study uses a task in which the subject has to make a two-alternative forced-choice judgment as to whether a click occurred before or after the onset of any visual activity. This temporal-order judgment is followed by a confidence judgment. The objective is to determine whether such a task can demonstrate the existence of perceptual delay in metacontrast and/or apparent motion, if indeed perceptual delay does exist. It is shown that perceptual delay, as revealed by temporal-order judgment, is a byproduct of both metacontrast and apparent motion. S D

**A79-13184**      **Development and transfer of timesharing skills.** D Damos (Illinois, University, Urbana, Ill.) In *Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings*. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 53-57. 10 refs.

An experimental study was conducted to determine whether improvements in multiple task performance on two task combinations could be attributed to the development of identifiable timesharing skills. A discrete task combination and a continuous task combination were selected for examination. The generality of timesharing skills was determined by examining transfer from the discrete to the continuous task combination. Timesharing skills were identified by using a measurement technique that partitioned improvement in multiple-task performance into a component due to improved single-task skills and a component due to improved timesharing skills. It is shown that identifiable timesharing skills develop with practice and contribute significantly to performance on both task combinations. Transfer of timesharing skills is established. S D

**A79-13185**      **Effects of vibration on humans - Performance decrements and limits.** S J Morrissey and A C Bittner, Jr (Texas Tech University, Lubbock, Tex.) In *Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings*. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 68-72. 20 refs.

The standards for vibration in MIL-STD-1472B, Human Engineering Design Criteria for Systems, Equipment, and Facilities, were compared to data from the literature and were found to be inadequate. Families of isodecrement performance curves for tracking performance with various combinations of acceleration and frequency were derived for vertical (z axis) vibrations. A similar family of isodecrement performance curves was derived for percentage decreases in number-reading accuracy for vertical (z axis) vibrations. These findings were used to make recommendations for changes to MIL-STD 1472B for predicting and identifying excessive work station environments. Comments on literature and recommendations for future research are included. (Author)

**A79-13186** A composite view of task performance in hot environments J D Ramsey and S J Morrissey (Texas Tech University, Lubbock, Tex.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 73-77. 23 refs. Navy supported research.

This paper proposes a set of isodecrement curves for performance of perceptual motor tasks as a function of temperature and exposure time. Tasks studied include reaction time, mental tasks, vigilance and tracking. (Author)

**A79-13187** Human factors design criteria for transilluminated displays R J Hall, J C Sanderlin (Mission Research Corp., Santa Barbara, Calif.), and R Cole (Nevada University, Las Vegas, Nev.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 78-82. Contract No. N00123-75-C-0943.

This paper reviews recent studies of human factors design criteria for transilluminated displays and the development of a computerized data base and modeling tools to supplement human engineering design criteria for visual displays. The inherent limitations of present military standards for dealing with a wide range of variables in a variety of operational environments and the need to include changes in the state-of-the-art are addressed. Data base design and computer modeling are suggested as an intermediate approach between out of date standards and costly physical simulation. (Author)

**A79-13188** Seating, console and workplace design - Seated operator reach profiles J T Roth, M M Ayoub, and C G Halcomb (Texas Tech University, Lubbock, Tex.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 83-87. 12 refs.

**A79-13189** Seating, console, and workplace design - Integration of literature and accommodation model D M Dannhaus, A C Bittner, Jr., M M Ayoub, and C G Halcomb (Texas Tech University, Lubbock, Tex.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 88-91. 13 refs.

In this paper, a procedure for determining the percentage excluded from a seat-console design, given the percentage excluded on individual dimensions is described. Seven critical anthropometric variables for seat console design were identified. A 'computerized accommodated percentage evaluation (CAPE)' model was used to determine the percentage excluded on the total design of a seat console as critical limits were imposed on each individual anthropometric dimension. Results of this paper are applicable to meeting MIL-STD-1472B criteria for accommodating 90 percent of the potential user population. (Author)

**A79-13190** The application of computer aided evaluative techniques to system test and evaluation W R Helm (U S Navy, Pacific Missile Test Center, Point Mugu, Calif.) In Human Factors

Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 92-94.

The paper explores the feasibility of applying computer-aided evaluative techniques to the test and evaluation phase of the single-pilot fighter version of the F-18 currently in the prototype development stage. The search for a procedure for more rapid communication of deficiencies to decision makers in positions to implement corrective action has resulted in the development of a hierarchical pilot task structure for the fighter version of the F-18. Multiattribute utility analysis (MAUA) techniques are used whenever possible. These techniques provide a mechanism not only for rating the aircraft with respect to different pilot tasks but also for aggregating the ratings across tasks and mission phases. An aggregate measure of the quality of the system at any particular level desired can be obtained from the hierarchical value structure that results from the MAUA analysis. Such an approach facilitates decisions about system operability and acceptability. S D

**A79-13191** Imagery interpreter performance in the comparison of subjective estimates of photographic image quality E L Gliatti (USAF, Avionics Laboratory, Wright-Patterson AFB, Ohio), W L Martin (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), and G G Kuperman (Systems Research Laboratories, Inc., Dayton, Ohio). In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 108-112. 18 refs.

State-of-the-art research in image quality assessment has been oriented toward objective measures of image quality, requiring microdensitometers and computers. Cost and time constraints in the operational situation, however, place emphasis on man dependent methods. This paper describes the performance of the image interpreter in a study comparing two of the more widely accepted Air Force subjective measures of image quality: tri-bar target resolution reading and visual edge matching. These techniques are described, interpreter certification is discussed, data derived from the application of each technique to a common imagery set are presented, and a comparison of the two methods reported. (Author)

**A79-13192** Discrimination of density and clustering on four versions of a stochastic display R A Newman (U S Navy, Personnel Research and Development Center, San Diego, Calif.) and P B Tiffany (San Diego State University, San Diego, Calif.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 113-117. 14 refs.

The study examines display parameters and generating performance data on a pattern perception task for operational performance measurement. The stimuli are generated using a Markov paradigm, and the technique for generating these stimuli permits control of many display variables while maintaining precise control of the stochastic properties involved. The first display parameter studied is the presence of an edge in the pattern as presented to the observer. A second display parameter is the evaluation of positive and negative images. The possibility that the more complex discrimination of small differences in stochastic parameter values can be affected by choice of presentation is assessed. The finding that the different forms of the display are not equivalent is important both to the study of texture and to the design of displays. The differences in density and clustering are consistent with earlier studies. S D

**A79-13193** Tracking in two dimensions as a function of dimension priorities and tracking difficulty D Gopher, N Chillag (Technion - Israel Institute of Technology, Haifa, Israel), and D Navon (Haifa University, Haifa, Israel). In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 118-122. 6 refs. Grant No. AF AFOSR 77-3131.



Results are presented for an experimental study in which each of the dimensions in a two-dimensional pursuit tracking task is manipulated and controlled separately. Single- and dual task conditions are produced by presentation of one or two dimensions. An experimental session is performed in which tracking difficulty and dimensions priorities are manipulated. Regression equations and performance functions are derived which describe the joint effects of the experimental variables. The results lend support to the argument that multidimensional tracking tasks should be treated as timesharing cases, where the subjects can clearly separate and differentially respond to each dimension. S D

**A79-13194 Lateral orientation and cerebral activation**  
**Considerations for information display** S M Casey (North Carolina State University, Raleigh, N C) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 127-131 16 refs

The study investigated the hypothesis that a lateral shift in the direction of an operator's orientation (looking to the left or looking to the right) will facilitate processing in the cerebral hemisphere which is contralateral to the direction of the orientation shift. In view of the specialized functions of each hemisphere it was hypothesized that displays with 'verbal' content would be best located 20 deg to the right of center, and that displays with 'spatial' content would be best located 20 deg to the left of center. A laboratory study was conducted to test this theory. The results support the idea that lateral eye-gaze orientation shifts influence hemispheric processing, implying that this phenomenon may be a consideration for selectively locating complex visual displays. (Author)

**A79-13195 A prediction model of arm push strength in the transverse plane** R S Lower (US Military Academy, West Point, N Y), R K Schutz, and T L Sadosky (Georgia Institute of Technology, Atlanta, Ga) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 132-136 6 refs

**A79-13196 Computer simulation of thermoregulatory responses to heat stress - A future work design and training tool** J R Duncan (Texas A & M University, College Station, Tex) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings (A79-13181 03-54) Santa Monica, Calif, Human Factors Society, Inc, 1977, p 142-146 15 refs NSF Grant No ENG 7303676

**A79-13197 Simulation study on time series of heart responses** K Takata, Y Watanabe, and M Tanaka (Toyota Technical College, Toyota, Japan) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 147-151 10 refs

The paper examines the problem concerning the analysis of the time series for the RR intervals of the EKG. Data on the RR interval of the heart pulse are treated as a stochastic process for EKGs recorded during quiet rest and quasi rest after exercise. Autoregressive modeling of heart pulses is discussed relative to the steady-state nature of the time series, modeling for quiet rest and quasi rest, spectrum estimation, and digital filtering. Evidence is presented to show that respiration has a strong effect on the heart pulse interval. It is concluded that autoregressive modeling of heart pulses is a valuable tool for a better understanding of work physiology and for better prognosis of cardiac disorders. S D

**A79-13198 Visual acuity of the aging hyperopic eye in the intermediate range** P G Rasmussen, K W Welsh, and J A Vaughan (FAA, Civil Aeromedical Institute, Oklahoma City, Okla) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif,

October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 184-187 19 refs

Corrective lenses are prescribed to correct the refractive errors of the eyes to provide good visual acuity at distances on the order of 6 m. When presbyopia is present, a convective lens (bifocal power) may be added as part of the near correction to move the near focusing point back into the normal reading range (36 to 46 cm). The advantage which accrues from these corrections may be minimal, or even detrimental, to visual acuity in the intermediate range. The present paper deals with a study conducted to determine the functional visual acuity of presbyopic individuals at the intermediate visual range with and without the best near and the best distant vision corrections. V P

**A79-13199 Contrast enhancement using local area brightness and gain control** L A Scanlan, M L Hershberger, and J A Herman (Hughes Aircraft Co, Culver City, Calif) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 231-234

Owing to the limited dynamic range of cathode ray tubes, sensor information may not be optimally displayed for use by pilots. Brightness differences between targets and their background, or brightness modulations within targets, may be too small to aid an observer in assessing the scene content. Local Area Brightness and Gain Control (LABGC) is an image processing algorithm designed to increase contrast in local areas of the display, thereby providing greater display detail. In the present study, 60 LABGC processed TV images were subjectively compared with their digitized but unprocessed counterparts to evaluate the performance of such operational tasks as target search and detection, recognition, and classification. It was found that improvement in performance resulting from LABGC did not meet the expectations. The results suggest that merely improving the dynamic range of the display will not guarantee an improvement in performance. V P

**A79-13202 Synthetic aperture radar operator tactical target acquisition research** D W Craig and M L Hershberger (Hughes Aircraft Co, Culver City, Calif) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 244-248 6 refs Contract No F33615 76 C 1209

A radar target acquisition research study was conducted to assess the effects of two levels of 13 radar sensor, display, and mission parameters on operator tactical target acquisition. A saturated fractional factorial screening design was employed to examine these parameters. Data analysis computed ETA squared values for main and second-order effects for the variables tested. Ranking of the research parameters in terms of importance to system design revealed four variables (radar coverage, radar resolution/multiple looks, display resolution, and display size) accounted for 50 percent of the target acquisition probability variance. (Author)

**A79-13203 Target acquisition in realistic terrain** L A Scanlan (Hughes Aircraft Co, Culver City, Calif) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc, 1977, p 249-253 7 refs Grant No DAAG53 75 C-0266

None of the existing mathematical models of target acquisition developed to predict the performance of electrooptical sensor systems provides an adequate treatment of the influence of the background scene on operator tactical target detection and recognition. Failure to include the influence of backgrounds of varying complexity may result in erroneous (optimistic) predictions of performance. The experiments described in the present paper were carried out to study the influence of high and low background complexity on the time required to detect a tactical vehicle in a realistic scene. The results provide drastic evidence of the importance

of the background scene as a determinant of tactical target detection performance. It is shown that a two component conceptualization of target search and detection offers such advantages as the ability to separate a complex task into behavioral meaningful parts, each of which can be evaluated separately. V P

**A79-13204** The effects of ambient illumination, aircraft velocity and feedback on absolute distance judgments during simulated night nap-of-the-earth flight. M L Fineberg and J D Dressel (US Army, Research Institute for the Behavioral and Social Sciences, Alexandria, Va.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 254-258 7 refs

A study was conducted to determine the effects of illumination, velocity and knowledge of results on distance judgment accuracy in simulated night NOE flight. Twenty subjects were randomly divided into KOR and NK groups and then shown a part task, video tape simulation of NOE flight which contained 45 target presentations. The subject's task was to approach the obstacle on a collision course until he reached his minimum safe breakaway distance, then make an avoidance response with his simulated control stick. Illumination, velocity and feedback conditions were varied while measuring the accuracy of response in terms of mean error distances from the analytically determined breakaway point. The results indicated that reductions in illumination, given that the object is visible at all, had no significant effect on distance judgment while both feedback and reduced velocity produced improved accuracy. The results were interpreted in terms of their interactions and then translated to operational suggestions concerning training for NOE pilots. (Author)

**A79-13205** Investigation of arrangement of multipurpose displays and use of tailored control logic in a fighter aircraft cockpit. R P Bateman (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 259-261. USAF-supported research

With computer driven CRT displays a pilot can vary the location of flight information displays in order to improve performance and reduce workload. The study described in the present paper was conducted to measure the changes in performance as a function of display arrangement during cruising. While flying, the pilot interacts with the computer to control such aircraft subsystems as radios and navigation aids. Multipurpose keyboards are used to accomplish a great variety of tasks through use of a rather lengthy logic tree. To avoid repeated use of a long sequence of key activations, selected functions, tailored to a phase of flight, were made accessible at the first logic level. A second objective was to obtain a quantitative evaluation of the benefits of tailoring multipurpose switch functions to the phase of flight, as compared with the standard method of controlling a great number of functions with multifunction switches. The study has confirmed the utility of tailored mode operation. Further investigation is required to quantify the possibility of pilot errors caused by nonstandard arrangements. V P

**A79-13206** Visual workload of the copilot/navigator during terrain flight. M G Sanders, R R Simmons, M A Hofmann, and J N DeBonis (US Army, Aeromedical Research Laboratory, Fort Rucker, Ala.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 262-266 8 refs

A study is made of the visual workload of the navigator/copilot during terrain flights (nap-of-the-earth, contour, and low level flights). Ten recent graduates of the U S Army Initial Entry Rotary Wing flight training program, each with at least 115 hours of helicopter flight time, were used as test subjects. Oculomotor performance was recorded by a modified NAC recorder and a 16-mm high-speed motion picture camera. The data show that visual free

time is generally no more than 3% of the total flight time. Navigation requires 92-2% of the copilot's total visual time and the engine and flight instruments are used 4% of the time. S C S

**A79-13207** Depth perception and manual control. G L Gentzler, Jr (Bell Telephone Laboratories, Inc., Holmdel, N.J.) and T M Khalil (Miami, University, Coral Gables, Fla.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 267-271 10 refs

A pursuit tracking task in three-dimensional space was studied in order to assess the impact of depth perception on human operator performance in manual control. Performance scores and frequency response data were collected and analyzed for three modes of display as defined by the angular relationship between the human operator's line-of-sight and the line segment representing the tracking error. When depth perception had to be completely relied upon, a significant decrement in performance occurred and was accompanied by the introduction of phase lags in the human operator's response. (Author)

**A79-13208** The event related cortical potential as an index of task workload. C D Wickens, J Isreal, and E Donchin (Illinois, University, Champaign, Ill.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 282-286 7 refs. Contract No N00014-76-C-0002

This paper describes an investigation which assessed the feasibility of the event related brain potential (ERP) to provide an index of operator workload in adaptive man-machine systems. The characteristics and requirements of such systems are described and some limitations of secondary task workload measures enumerated. The results of an experiment are then presented in which ERPs were recorded from 10 subjects, while the difficulty of a concurrent tracking task was varied. Subjects performed either a one or a two dimensional compensatory tracking task, while ERP's were elicited by presenting discrete auditory stimuli. The amplitude of the P300 complex, a component of the ERP, elicited by the stimuli, decreased from the control condition (no tracking) to the tracking conditions. An ERP based measure of sequential processing of the stimuli was further affected as tracking difficulty was increased from 1 to 2 dimensions. An algorithm for obtaining an on line ERP based measure of workload is then described. (Author)

**A79-13209** Refinement of a computer simulation model for evaluating DAIS display concepts. G G Kuperman, K M Berisford (Systems Research Laboratories, Inc., Dayton, Ohio), and R L Hann (USAF, Aerospace Medical Research Laboratories, Wright Patterson AFB, Ohio.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings. Santa Monica, Calif., Human Factors Society, Inc., 1977, p 305-310 13 refs

Previous reported application of Systems Analysis of Integrated Networks of Tasks (SAINT) to the Digital Avionics Information System (DAIS) was based on a relatively small data set. Further, these data were restricted to flight control task performance, and provided little insight into the modeling of the multifunction keyboard (MFK) switching task or the interaction between these two tasks. In the present paper, the analysis of the DAIS MFK experiment is reported, concentrating on those portions relevant to the development of the SAINT/DAIS model. It is shown how the SAINT model was refined on the basis of the complete empirical data set. The process of abstracting task characteristics from human performance data is demonstrated. Emphasis is shown to be required in the areas of organization of the data, task representation, and threshold levels. Four specific experimental conditions, representative of a dual task study, are discussed, along with the corresponding SAINT simulation performance predictions. V P

**A79-13210** Four years of color research for visual displays R E Christ (New Mexico State University, Las Cruces, N Mex ) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 319-321 5 refs Contract No N00014 76-0306

A research program initiated in 1973 to evaluate the empirical basis of possible design recommendations for or against the use of color in aircraft displays is summarized The effects of human task performance of color coding in visual displays relative to coding by achromatic letters, digits, and geometric shapes are studied The results provide no basis for concluding that color has any particular advantage or disadvantage to task performance that makes it different from the achromatic codes used for comparison The notion of color coding and efforts directed at finding ways to take advantage of color as a code is a misleading approach to display design The question in any specific case should be one of how best to encode a display The best way may or may not involve color

V P

**A79-13211** Response surface methodology as a manipulator of complex task difficulty D B Beringer (Illinois, University, Urbana, Ill ) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 335-338 15 refs

Applications of Central-Composite Designs (CCD) in human factors research are reviewed briefly A recent application of the CCD to the manipulation of task variables is discussed The use of this approach in the evaluation of a computer-generated aircraft area navigation control display system is outlined, showing how this approach can be used to evaluate system/operator performance systematically and economically across a wide range of task and environmental variables (Author)

**A79-13212** Task taxonomy - Two ignored issues M A Companion and G M Corso (New Mexico State University, Las Cruces, N Mex ) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 358-361 7 refs

The development of task taxonomies is outlined with reference to the work of Fleishman (1967) Criteria are established for the evaluation of task taxonomies noting that the taxonomies must (1) simplify the tasks of a system, (2) be complete and internally consistent, (3) predict operator performance, and (4) be cost effective Several major existing task taxonomies are evaluated on the basis of these criteria Three relations between taxonomies and empirical data are described In the first, the taxonomy is developed without regard for empirical relations, in the second, a model is derived on the basis of initial relations, and in the third, the taxonomy encompasses empirical relations used to formulate a comprehensive theory SCS

**A79-13213** Multifunction keyboard configurations for single-seat, air-to-ground fighter cockpits J M Reising (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 363-366 USAF supported research

A simulation study was conducted for four multifunction keyboard configurations for cockpit use (1) a cathode ray tube keyboard located on the forward instrument panel, (2) a projection switch keyboard located on the left side of the front instrumentation panel, (3) a projection switch keyboard on the right side console, and (4) a projection switch keyboard where the switch legends appear on a cathode ray tube on the right side of the front instrument panel It is found that the preferred configuration for cockpit use is one in

which the legends appear on the switches and where the legends relative to the intermediate steps appear on the same key whenever possible SCS

**A79-13214** Task functional demands as factors in dual-task performance R A North (US Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla ) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 367-371

Thirty two subjects were used to evaluate the mutual interference of tasks performed simultaneously Two performance phases were used (1) single-task testing on each task using adaptive techniques to increase the difficulty with advancing skill, and (2) dual-task testing with continuous presentation of performance feedback The results show that functionally dissimilar tasks may be performed simultaneously with less decrement than functionally identical tasks SCS

**A79-13215** A computer-based simulator S R Trollip (Illinois, University, Urbana, Ill ) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 372-376 7 refs Contract No F44620-76-C-0009

A computer-assisted instruction (CAI) program was used to help teach the flying of holding patterns, and traditional methods were compared with the CAI method Fifty-two private pilots with between 50 and 170 hours of flight time were divided into four groups Two control groups were given prior ground school classroom instruction on holding patterns, and the two experimental groups were taught by CAI One control group and one experimental group were taught to fly holding patterns and were then tested on a procedure turn The other two groups were tested on the procedure turn and were then taught to fly holding patterns It was found that the students who received CAI performed better on all measures M L

**A79-13216** Transfer of a computer-assisted instrument procedures trainer to flight J P Finnegan (Illinois, University, Urbana, Ill ) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 377-381 Contract No F44620-76-C-0009

A simple, comparatively inexpensive instrument flight trainer based on computer assisted instruction (CAI) technology was compared with more traditional devices in training 48 private pilots to fly a standard instrument procedure Groups of students were trained using either (a) CAI and aircraft training, (b) ground school, ground based trainer and aircraft training, or (c) ground school and aircraft training Both the CAI system and the general aviation flight trainer were found to provide similar magnitude of transfer to the aircraft The results suggest that substantial cost benefit could be derived by substituting such CAI training for more costly higher fidelity training in the flight training curriculum (Author)

**A79-13217** Observer performance using a video display W S Beamon (Bell Northern Research, Ottawa, Canada) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif , October 17-20, 1977, Proceedings Santa Monica, Calif , Human Factors Society, Inc , 1977, p 406-410 7 refs

An experiment was conducted to assess observer performance in a simulated air-to-ground target acquisition task Terrain films depicting targets imbedded in rural scenery were presented by a closed-circuit video system which employed two methods of varying the image quality of the display The effects produced by these methods, spot wobble and random or 'white' noise added to the video signal, were independently manipulated, photometrically measured, and included in the Modulation Transfer Function Area metric of image quality Correlation with observer target acquisition data

suggest that the predictive validity of the Modulation Transfer Function Area (MTFA) concept may be improved by the addition of a third function incorporating some portion of the power spectrum of the imaged scene. The facilitory effects produced by spot wobble and the deleterious effects of white noise on observer performance were also demonstrated (Author)

**A79-13218 \*** **NASA flight management research** J I Laveson (NASA, Washington, D C) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17 20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 411-415 6 refs

The NASA Flight Management Research Program is committed to better understanding the aircrew role and human system interface requirements within the air transportation system. Tradition pilot roles have been supplemented by the flight management concept where crew members become decision makers and monitors of aircraft status. The aircrew is viewed as skilled human operators in a complex environment. In a systems context, work is under way to better understand the theoretical basis for human performance. Applied efforts are aimed at investigating current and future problems which crews face as flight managers. Research areas include control display development and evaluation procedures for effective crew system interface, and alternative, nonvisual communication techniques. These areas are investigated in laboratory, part task simulation and full mission simulation studies (Author)

**A79-13219 \*** **Coordinated crew performance in commercial aircraft operations** M R Murphy (NASA, Ames Research Center, Moffett Field, Calif) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17 20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 416-420 22 refs

A specific methodology is proposed for an improved system of coding and analyzing crew member interaction. The complexity and lack of precision of many crew and task variables suggest the usefulness of fuzzy linguistic techniques for modeling and computer simulation of the crew performance process. Other research methodologies and concepts that have promise for increasing the effectiveness of research on crew performance are identified B J

**A79-13221** **The assessment of rotary wing aviator precision performance during extended helicopter flights** M A Lees, K A Kimball, and L W Stone (U S Army, Aeromedical Research Laboratory, Fort Rucker, Ala) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17 20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 426-430 5 refs

A description is presented of changes in aviators' precision hovering skills observed during the extended flight operations conducted in connection with a large scale field investigation of the effects of fatigue and extended flight on rotary wing flight performance. Subjects for this investigation were six rotary wing aviators in excellent health, between the ages of 21 and 26. Each pilot had approximately 200 flight hours prior to his participation in the investigation. In-flight performance data was obtained through the use of a monitoring system which provides for the real time acquisition of all major aircraft motion, and pilot control parameters. The results of the analysis on pilot control variables are presented in a table. It was found that there were significant differences across flight days and within the days of flight. The effect of fatigue and extended flight, on pilot control, was found to be consistent throughout the days of in-flight testing G R

**A79-13222** **An Air Combat Effectiveness Study /ACES/ program** E W Youngling, S H Levine, J B Mocharnuk, and L M Weston (McDonnell Douglas Astronautics Co., St Louis, Mo) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17 20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 431-434

In World War II and in the Korean War it was found that a small group (about 5%) of all fighter pilots accounted for the greatest number of destroyed enemy aircraft. It appears, therefore, that the performance of fighter aircraft with respect to air-to-air kills could be considerably improved by selecting for air-to-air combat a larger percentage of men qualified to become aces. A study for developing an improved selection procedure for doing this is discussed. The development of a selection program of this nature requires several discrete operations, including a job analysis of the fighter pilot task, the generation of testable trait hypotheses, the development of predictor variables, validation, and cross validation. On the basis of the results of the study it is concluded that a program can be instituted which could select men at entry into the military who would prove to be effective air to air combat pilots G R

**A79-13223** **Development of automated performance measures for introductory air combat maneuvers** V E Carter (Northrop Corp., Hawthorne, Calif) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17 20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 435-439 5 refs Contract No J62269-74-C-0314

One of the basic problems associated with military as well as other types of flight training is that student performance measurement is almost entirely subjective. This problem is probably most severe in air combat training. An obvious approach to the above problem is to make student performance measurement as objective as possible. However, a completely automated system is probably neither possible nor desirable at this time. An approach for making the measurement of a pilot's performance more objective is considered. The approach involves the development of a set of objective measures which could be used in a first generation automated performance measures system for the measurement of student performance in the simulator training of introductory air combat maneuvers. Attention is given to an ideal flightpath concept, maneuver selection, the development of specific behavioral objectives, the development of augmented instructor evaluation techniques, measure analysis, measure definition, and aspects of data collection G R

**A79-13224** **Vibration, performance, and personality** B Hunt (Texas A & M University, College Station, Tex) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17 20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 448-452 7 refs

A series of studies have been conducted to evaluate the current limits of vibration exposure established by the International Organization for Standardization. The reported investigation is a part of that entire series. Its purpose is to compare human capability to perform cognitive, subjective, and psychomotor tasks during whole body vibration and to establish the relationships of these capabilities to personality characteristics as well as to compare these results across two different test facilities. The study involved comparisons between essentially two parallel experiments observing human responses to 8 Hz, whole-body, z axis vibration. The 16 subjects used in the tests were medically qualified University of Dayton students and/or Dayton firefighters G R

**A79-13225** **Experimental designs for investigating complex human operator/machine systems** R C Williges (Virginia Polytechnic Institute and State University, Blacksburg, Va) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif, October 17-20, 1977, Proceedings Santa Monica, Calif, Human Factors Society, Inc., 1977, p 462-466 12 refs Contract No N00123-77-C-1081

A number of data reduction design alternatives are discussed, taking into account single observation factorial designs, hierarchical designs, blocking designs, fractional factorial designs, and central composite designs. A description of an economical research strategy is also provided. It is recommended that in any human factors

research enterprise, the researcher in designing his research should develop an efficient strategy for collecting his data in stages, complete a thorough and careful pretesting, determine the real-world constraints dictated by the research problem, and select the necessary design modifications based on these real-world constraints  
G R

**A79-13226**      **Communications management by the remote system - An adaptive approach** R Steeb and D Purcell (Perceptronics, Inc., Woodland Hills, Calif.) In Human Factors Society, Annual Meeting, 21st, San Francisco, Calif., October 17-20, 1977, Proceedings Santa Monica, Calif., Human Factors Society, Inc., 1977, p 495-500 6 refs Contract No F44620-76-0094

A variety of factors have to be considered in connection with the efficient management of communications between a remote system and a supervisory human operator. Besides noise, channel capacity, and time considerations, there may be problems regarding energy consumption, operator attention demands, and even hazards of detection. It is proposed to optimize the communications by placing much of the responsibility for communications evaluation and management with the remote element. Evaluation and management of communications by an onboard computer has a number of advantages over human supervision of communications. An approach for implementing such a system is discussed. Attention is given to modeling approaches, the communications decision structure, the schematic representation of an adaptive decision model, the decision aiding process, and simulation tests  
G R

**A79-13283**      **Recurrent training/supernumerary system** S Prushik and M Shapiro (American Airlines, Inc., New York, N.Y.) In Airline Group, International Federation of Operational Research Societies, Symposium, 17th, Bad Kissingen, West Germany, October 14-19, 1977, Proceedings Miami, Fla., Eastern Air Lines, Inc., 1978, p 242, 244, 246-272

The paper describes a computerized system of scheduling airline crewmen for recurrent training and constructing supernumerary selections. The crewman's pay depends on whether he is relieved of flying a trip or sent on his days off. The program determines, system wide, what the least-cost recurrent training schedule should be. Significant cost savings attained are demonstrated by comparing projected costs of schedules developed by both the manual system and the automated one  
P T H

**A79-13573**      **Detection of bubbles in decompression sickness** T W Beck, S Daniels, W D M Paton, and E B Smith (Oxford University, Oxford, England) *Nature*, vol 276, Nov 9, 1978, p 173, 174 16 refs

In connection with amateur diving and industrial demands, decompression sickness has become a health risk for many thousands of people. It is now generally accepted that the condition arises from supersaturated gas separating in the tissues. Separation precedes overt symptoms and may remain symptomless. Methods are required applicable to man which can detect separated gas as such, and not by the physiological effect it produces, as early as possible. A description is presented of a method using ultrasonic imaging that will make it possible to detect moving or static bubbles down to the required limits, in a chosen plane in the body. The method can, therefore, be used to study at the earliest stages the location, development, and movement of bubbles in a variety of tissues after subjection to decompression procedures  
G R

**A79-13612** #      **Heat transfer and temperature distribution in the human body** D S Chitore, S C Saxena, and A K Gupta (Roorkee, University, Roorkee, India) In National Heat and Mass Transfer Conference, 4th, Roorkee, India, November 21-23, 1977, Proceedings Meerut, India, Sarita Prakashan, 1978, p 845-852 10 refs

In this communication heat transfer mechanism and thermoregulation of human body has been considered. Noting the two lines

of defences against heat stress functions of blood circulation, sweat and shivering in thermoregulation has been discussed. Formulae for knowing sweat rate and corresponding skin temperature under variety of conditions are given. Human thermoregulatory system has been synthesized by an analog simulation diagram. This is obtained after writing heat transfer equations in heat generation, and heat loss. Factors which must be considered for any realistic mathematical model have been enlisted. From the above studies useful conclusions can be drawn in order to avoid disorders in body temperature regulation  
(Author)

**A79-13613** #      **Simulation and control of a human temperature regulation system** A K Gupta, P Mukhopadhyay, J Sharma, and D S Chitore (Roorkee, University, Roorkee, India) In National Heat and Mass Transfer Conference, 4th, Roorkee, India, November 21-23, 1977, Proceedings Meerut, India, Sarita Prakashan, 1978, p 853-861 17 refs

Temperature regulation in human body is described as a close loop control system. The mathematical model of the human thermal system along with an external thermal regulation device using individual cooling is formulated. The model equations are simulated on a digital computer for different values of control variables. The simulation results indicate that thermoneutrality can be achieved by properly regulating the operating variables of the cooling device. A possible objective function for the system optimization is formulated  
(Author)

**A79-13998** #      **Experimental and psychological investigations in aviation and astronautics** (Eksperimental'no-psikhologicheskoe issledovanie v aviatsii i kosmonavtike) G T Beregovoi, N D Zavalova, B F Lomov, and V A Ponomarenko. Moscow, Izdatel'stvo Nauka, 1978 304 p 413 refs In Russian

The book deals with some psychological aspects of man-machine interaction with particular reference to flight control. The human factor in the development of man-machine systems, aircraft accidents, flight training, and organization of flight safety is examined. Some theoretical aspects of human-operator performance under normal and various stress conditions are discussed, along with the problem of recognition and decision making under stress conditions. Factors contributing to pilot errors in operating aircraft controls are examined, and research techniques in human engineering are analyzed  
V P

**A79-14081** #      **Spacelab and beyond - Bioscience problems in the use of space** (Spacelab - und danach Biowissenschaftliche Aufgaben bei der Nutzung des Weltraums) K E Klein (Deutsche Forschungen und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany) *Deutsche Gesellschaft für Luft- und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft- und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-129* 23 p 21 refs In German

The paper defines some of the new goals for bioscience research in view of man's entering upon a stage of utilization of space. There is need for studies on the mechanisms of disturbance factors in space, development of protective and auxiliary equipment for long stays in space and readjustment to terrestrial conditions, and research into techniques for production of biological material in space. The new type of astronaut will be the payload expert, performing medical and psychological experiments in space  
P T H

**A79-14082** #      **Medical characteristics of the Spacelab life support system** (Medizinische Aspekte des Spacelab-Lebenserhaltungssystems) H Eckert and H Preiss (Dornier System GmbH, Friedrichshafen, West Germany) *Deutsche Gesellschaft für Luft- und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft- und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-130* 11 p In German

The paper discusses Spacelab life support system features such as atmosphere, air temperature, moisture, waste control, air speed,

noise, and safety Data on partial oxygen pressure variation, heat leakage, the temperature gradient with respect to height, the dependence of humidity on the size of the crew, the CO<sub>2</sub> partial pressure, and the frequency distribution of noise are presented M L

**A79-14083 # Space Sled - A multipurpose apparatus for vestibular research aboard Spacelab (Space Sled - Eine Mehrzweckapparatur zur Vestibularforschung im Spacelab)** P Junk (ERNO Raumfahrttechnik GmbH, Bremen, West Germany) *Deutsche Gesellschaft für Luft- und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft- und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-132* 16 p In German Research supported by the European Space Agency

The paper describes the design of the Space Sled, an experimental facility for use aboard Spacelab for studying the sensitivity of the otolith system, the temporal behavior of weightlessness adaptation, the interaction between the semicircular canal and the otolith system, visuo-vestibular coordination during small accelerations, and the causes, prediction, and prevention of space sickness The Sled Experiment Package includes instruments for optokinetic and caloric stimulation and for measuring physiological parameters The main part of the sled is a seat on a gimbal suspension mounted on rails P T H

**A79-14084 # Results of tests of the equilibrium organ of candidates for payload expert for the first Spacelab mission (Ergebnisse der Untersuchung des Gleichgewichtsorgans bei Nutzlastexperten-Bewerbern für die erste Spacelab-Mission)** G Aust (Deutsche Forschungs und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany) *Deutsche Gesellschaft für Luft- und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft- und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-134* 15 p 17 refs In German

The paper describes the series of tests performed on Spacelab payload expert candidates to determine their proneness to motion sickness and to discover pathological changes in the equilibrium system Standard tests included spontaneous, position-independent and position-dependent eye movements, caloric test at water temperatures of 30 and 44 C, rotation test with trapezoidal acceleration and deceleration model, cupulometry with graded stimuli, optokinetic test, and roller coaster flight test The methods are based on the observation of the eye movements in response to stimulation of the equilibrium organ and the visual apparatus Widely varying results were obtained from a group who had passed a pre-examination Certain limiting symptoms of an equilibrium disturbance could be found but no prediction of space sickness could be made P T H

**A79-14094 # Arrangement of aircraft flight indicators with the help of optimal theoretical models for man as the controller (Auslegung von Flugführungsanzeigen mit Hilfe des optimaltheoretischen Modells für den Menschen als Regler)** G Johannsen (Forschungsinstitut für Anthropotechnik, Meckenheim, West Germany) *Deutsche Gesellschaft für Luft- und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft- und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-149* 20 p 19 refs In German

Aircraft indicator arrangement and human perceptual processes are represented in a model by consideration of an observation matrix, observation noise, and perceptual thresholds The results concerning indicators include effective values of condition, control, and position parameters and data on the division of attention between individual indicated parameters and overall operation Derivation of the human control model and some applications of its use are described M L

**A79-14096 # Anthropology in Spacelab - Control and display system in Spacelab** P W Sharp (ERNO Raumfahrttechnik GmbH, Bremen, West Germany) *Deutsche Gesellschaft für Luft und*

*Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-151* 18 p

The concept of the manned Spacelab is briefly described Due to the vast differences which exist in the size and strength of individuals who will man the Spacelab, both in the one G and zero G environments, the discussion focuses on the anthropological aspects of the Spacelab control and display system Attention is directed at the interior arrangement of the Spacelab relative to display-control consoles, control operation, securing the instruments, color scheme, nomenclature, display media, etc The development of a well-integrated man/machine system meeting the required specifications is highlighted S D

**A79-14097 # Increasing pilot's performance capacity during flight through use of a control element serving as information carrier (Steigerung der Leistungsfähigkeit des Menschen bei der Führung von Flugzeugen durch den Einsatz des Bedienelements als Informations-träger)** W Roger (Braunschweig, Technische Universität, Braunschweig, West Germany) *Deutsche Gesellschaft für Luft und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft- und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-152* 21 p 5 refs In German

The concept of a pilot's control element serving both as means of deflecting the rudder and providing the pilot with information on the displacement of the zero force position is described The support point of the control system is movable, and can be displaced without a force on the part of pilot The shift in the support point is the zero force position displacement Two ways of supporting the pilot are open (1) prescribing to the pilot the necessary rudder deflections through the displacement of the support point, and (2) stimulating the pilot, through a displacement of the support point, to a certain action in a certain direction The concept was tested in a single loop manual control problem P T H

**A79-14099 # Overview of the use of robots in space missions (Übersicht über die Anwendung von Robotern bei Raumfahrtmissionen)** H H von Muldau (Privates Forschungsinstitut für Androidenteknik, Rossdorf, West Germany) *Deutsche Gesellschaft für Luft und Raumfahrt und Hermann-Oberth-Gesellschaft, Deutscher Luft und Raumfahrtkongress, Darmstadt, West Germany, Sept 19-23, 1978, DGLR Paper 78-154* 7 p In German

Under the assumption that in the future highly sophisticated robots will be developed, the author discusses some of the essential features of robots (i.e., automata with grasping arms and able to move about in their environment) to be considered during design of a space mission Problems mentioned in this connection are the increased energy demands of robots over humans, the reduced ability of robots to react to emergency situations as compared with humans, the nonnecessity of preserving the robot at any cost, and the differences in the aging processes of man and robot In deciding whether on a given mission men or robots should be used, one should consider the costs in each case, including development costs In this respect, it emerges that the robot will be more cost-effective as the mission duration is longer, the distance covered by the mission is greater, and as the number of instruments of the same kind is higher P T H

**A79-14369 The sensory systems (Sensornye sistemy)** Edited by G V Gershuni Leningrad, Izdatel'stvo Nauka, 1978, 175 p In Russian

This book is a collection of review articles that consider recent experimental data on the physiology of the visual, auditory, thermal, vestibular, and chemical sensory system Theories and hypotheses on the primary mechanisms of the perception of stimuli of various modalities and on central mechanisms of processing sensory information are formulated Individual topics studied include the participation of the frontal associative region of the cortex in the activity of the auditory and visual sensory systems, the problem of intrinsic noise and threshold sensitivity in the adaptation of the retina, neural physiology of thermal reception, and the structural and functional organization of the taste receptors in vertebrates P T H



**A79-14370 #** The relationship between classical centers of the auditory tract and certain 'nonspecific' brain structures in the organization of the auditory function in animals (O sootnoshenii klassicheskikh tsentrov slukhovogo puti i nekotorykh 'nespetsificheskikh' struktur mozga v organizatsii slukhovoii funktsii zhivotnykh) Ia A Al'tman (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In The sensory systems Leningrad, Izdatel'stvo Nauka, 1978, p 3-17 39 refs In Russian

**A79-14371 #** Role of the frontal associative region of the cortex in the activity of the auditory and visual sensory systems (Uchastie frontal'noi assotsiativnoi oblasti kory v deiatel'nosti slukhovoii i zritel'noi sensornykh sistem). A S Batuev, G A Kulikov, L V Cherenkova, and V G Kamenskaia (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR) In The sensory systems Leningrad, Izdatel'stvo Nauka, 1978, p 17-34 119 refs In Russian

A review of investigations on the structural and functional organization of the auditory and visual entrances to the frontal associative region of the brain of animals of prey is presented. Data are examined, which constitute evidence that there is a connection between this region of the cortex and specific formations of the sensor systems via both direct and intermediate paths. The characteristics of electrical reactions of the frontal cortex region to acoustic and visual stimuli are studied. The reflection of biological significance of an acoustic stimulus in the electrical activity of the frontal brain cortex of the cat was studied, and it was concluded that there is participation of the frontal associative cortex in the activity of the mechanisms of isolating and estimating the significance of a sensor stimulus P T H

**A79-14372 #** Significance of motor activity for spatial hearing (Znachenie dvigatel'noi aktivnosti dlia prostranstvennogo slukha) N Iu Alekseenko (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) In The sensory system Leningrad, Izdatel'stvo Nauka, 1978, p 46-60 93 refs In Russian

The literature on experimental and theoretical investigations of the role of motion in the mechanisms of spatial perception of sound is surveyed. The studies concerned the effects of motor responses of different structural and functional levels and varying degrees of complexity on spatial hearing. Electrophysiological and morphological data on the interaction between the proprioceptive and auditory sensory systems are discussed P T H

**A79-14373 #** Intrinsic noise, threshold sensitivity, and adaptation of the retina (Sobstvennyi shum, porogovaia chuvstvitel'nost' i adaptatsiia setchatki) V I Govardovskii (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) In The sensory systems Leningrad, Izdatel'stvo Nauka, 1978, p 61-81 81 refs In Russian

Neurophysiological and psychophysical data on the magnitude and sources of 'intrinsic light' in the retina are studied, and theoretical approaches to estimating the effect of intrinsic light on detection of near threshold signals are taken. Even a low estimate of membrane noise of the photoreceptors presents a serious difficulty for detection of a signal. Current experimental data do not enable one to make a choice between the various psychophysical theories of detection, since in the retina there may exist systems of signal separation that effectively remove the noise P T H

**A79-14374 #** Neurophysiology of thermal reception (Neurofiziologiya termicheskoi retseptsii) O P Minut-Sorokhtina (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR) In The sensory systems Leningrad, Izdatel'stvo Nauka, 1978, p 82-101 120 refs In Russian

Literature data and some original data describing the functional properties of the thermoreceptors located in the skin and in the cutaneous and subcutaneous vessels are adduced and discussed. A

comparative description of these thermoreceptors is given. The responses of neurons in the cores of the anterior and posterior hypothalamus to direct thermal influences and peripheral stimuli are described, making possible a distinction between central thermoreceptors and neurons performing an integrative function. Data on thermal sensitivity of the spinal chord and extracerebral deep thermoreceptors of the internal organs are given. The conclusion contains a critical analysis of current theoretical positions on the nature of thermal reception P T H

**A79-14375 #** Current conceptions of the mechanism of the effect of chemical stimulus on taste receptors (Sovremennye predstavleniia o mekhanizme deistviia khimicheskogo stimula na vkusovye retseptory) T N Bratus', M V Kozlova, and V A Lebedeva (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) In The sensory systems Leningrad, Izdatel'stvo Nauka, 1978, p 138-153 126 refs In Russian

**A79-14402** USAF life support equipment costs R A Manns and W Kearns (USAF, San Antonio Air Logistics Center, Kelly AFB, Tex.) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings (A79-14401 03-03) Canoga Park, Calif., SAFE Association, 1977, p 4-7

A brief overview of some basic United States Air Force life support equipment is presented. The cost of a typical flight ensemble which includes personnel protective clothing and devices and survival kit items is compared with costs of a high altitude protective ensemble. Ejection system modification programs and the most recent ejection seat development are discussed. The cost of life support equipment and systems is used as an indicator of USAF concern for aircrew survivability (Author)

**A79-14405** Heat transfer principles in personal protection applications A M Stoll, M A Chianta, and J R Piergallini (U S Naval Material Command, Naval Air Development Center, Warminster, Pa.) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings Canoga Park, Calif., SAFE Association, 1977, p 28-31 8 refs

The considered topics are related to thermally 'safe' materials, the thermal penetration of the cockpit canopy, and rocket plume flames encountered in multiple-seat ejections. In all three areas of heat transfer applications investigated, there exists the fundamental need for a biophysical data base. Any system designed for protection of the person must be based upon a knowledge of the effect of the agent on the person. In the instance of heat transfer, an unusually wide range of data is involved because of the diversity and complexity of the discipline and the variability and complexity of the thermal aspects of the living organism. The Navy is concerned with providing safe materials for aircraft cockpit consoles. In a general testing procedure each specimen is heated to various levels of temperature and the time to pain sensation at each level is measured G R

**A79-14407** Design considerations for inflatable head/neck restraint systems T J Zenobi (U S Naval Material Command, Naval Air Development Center, Warminster, Pa.) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings Canoga Park, Calif., SAFE Association, 1977, p 45-48

It is pointed out that approximately 8 percent of all Navy ejections in the past 10 years resulted in some type of neck injury attributed to ejection or parachute opening forces. It can be speculated that some downed airmen may have been lost at sea because they could not deploy life support equipment due to incapacitation from head rotation injuries. The primary objective of an operational head restraint is to limit forward head and neck rotation of the crew member caused by the ejection thrust force. A secondary benefit of the head restraint may be the reduction of head rotation during the parachute opening shock. By limiting head rotation and angular acceleration with the aid of an inflatable head/neck restraint, it is expected that injuries due to hyperextension

sion of neck muscles, hyperflexion of the cervical vertebrae, and concussion of the brain will be reduced or eliminated. Attention is given to the inflatable bladder design, the inflation technique, and aspects of cost effectiveness. G R

**A79-14408** An inflatable restraint system. J R McElheney (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.) In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings.

Canoga Park, Calif., SAFE Association, 1977, p. 49-53. Navy-supported research.

The considered system has been designed with the objective to prevent fatalities and reduce occupant injuries during a potentially survivable helicopter crash. A description is presented of an investigation which shows that an automatically inflatable restraint is feasible and provides increased crash protection over the conventional restraint. The inflatable restraint system is composed of three major subsystems, including the bladder/restraint, the inflator, and the crash sensor. The inflator is initiated by an electrical pulse to a squib which ignites a charge of ignition powder that generates heat and glowing particles to ignite the surrounding gas generant. The gas generant is composed of a nitrogen producing compound based on sodium azide. Attention is given to static preinflated testing, preinflated dynamic tests, automatically inflated dynamic tests, and an experimental crash drop. G R

**A79-14415** Development of integrated tubing fabric for liquid conditioning undergarments. S M Reeps and J Z Lewycky (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.) In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings.

Canoga Park, Calif., SAFE Association, 1977, p. 80-83.

A program for the development of integrated tubing fabrics for use in liquid conditioning undergarments has been completed by the Naval Air Development Center. Construction techniques, including both knitting and weaving of tubing into fabric structures, are discussed along with their potential impact on the production of low cost liquid conditioning garments for heating or cooling. Further development plans are discussed which are aimed at making the use of such fabrics practical for large production quantities of reliable, maintainable garments for aircrew personnel. (Author)

**A79-14421** Oxygen systems for Army helicopters. S R Budig (U.S. Army, Supply Management Office, Fort Carson, Colo.) In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p. 136-139.

The paper deals with the design requirements for oxygen systems in tactical helicopters, noting that supplemental oxygen is required for missions over 10,000 ft, for night vision in altitudes over 4,000 ft, and during nap-of-the-earth flights. The requirements are discussed with reference to Fort Carson, Colorado where four types of helicopters need oxygen systems: the OH-58 'Kiowa', UH-1 'Huey', AH-1G 'Cobra', and CH-47 'Chinook' models. The selection of components for these aircraft was made on the basis of the combat environment. A gaseous oxygen system was chosen along with a diluter demand system, high pressure bottles and low pressure lines. The MBU 5/P mask will be the standard mask. S C S

**A79-14428** High 'Q' escape protection. C C Woodward and M Schwartz (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.) In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p. 220-224.

The paper demonstrates the need to provide pilot protection during ejections from 400 to 600 kts. A protection system is described, whose concept includes a design study program to establish requirements, fabrication of a prototype design based on a

completely passive seat mounted type of system, and a test and evaluation phase to prove system feasibility. The proposed limb retention system concept consists primarily of continuous restraint straps running from shoulder mounts or epaulets, mounted to each riser just behind the parachute release fitting, down across the torso, around the inside of the knees, through knee grippers around the calf and entering restraint ratchets installed in the corners of the seat bucket. An arm restraint net is deployed, encircling the shoulders and arms. An upper leg restraint anchors and restrains the lower portion of the arm restraint net. Inflatable or other type of knee grippers are deployed. A mockup of the system is shown both in the stowed and the deployed conditions, and details of operation are described. S D

**A79-14429** The helmet protects the aviator's head - Or does it. G L Johnson and J J Treanor (U.S. Army, Aeromedical Research Laboratory, Fort Rucker, Ala.) In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p. 225, 226.

This paper examines the need for trained life support equipment specialists to maintain the protective capability of Army aviator's helmets (SPH 4). One hundred helmets selected at random from the user population were evaluated for ability to attenuate impact forces, attenuate noise, and afford eye protection to the Army aviator. The evaluation revealed that protection was compromised in the majority of helmets in all three functional areas. The individual airman is responsible for maintaining his own equipment, no trained equipment personnel are available to inspect or maintain the helmets. The applicability of such a survey is suggested in the case of motorcycle and construction helmets. (Author)

**A79-14432** An assessment of the RAE Type 'B' full pressure suit automatic head enclosure. M A Tays (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) and T R Morgan. In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p. 236-238.

This paper reviews the feasibility of automatic head enclosure for providing high altitude protection in new generation fighter aircraft. The Royal Aircraft Establishment (RAE) Type 'B' full pressure suit includes such a facility and was used in the present study. Manned chamber flights to 35,000 feet (10,668 m) and unmanned rapid decompressions from 25,000 feet (6,400 m) to 80,000 feet (24,384 m) were conducted to measure visor closure time and minimum pressure within the suit thereby indirectly assessing the protection afforded by the suit. Results of the study indicate that an automatic, relative nonencumbering head enclosing device when built to state of the art should provide an attractive alternative to present encumbering high-altitude helmet designs. (Author)

**A79-14433** Development of the Air Force S-1030 full pressure suit assembly. L Hatcher (USAF, Hospital, Beale AFB, Calif.) In: SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p. 239, 240.

This paper is a brief discussion of the U.S. Air Force S-1030 Full Pressure Suit assembly. This suit is currently being flown by the crews supporting the Air Force high altitude reconnaissance mission. A discussion of some of the improvements, problems encountered, and current ongoing improvements are presented. The S-1030 Pressure Suit is a replacement for the S901J and is basically an improvement of the S901J. The improvements came about primarily from the crewmembers that flew in the S901J and the support personnel. A discussion of their inputs and desires is presented along with some comments on items yet to be accomplished. (Author)

**A79-14434** Joint testing of the RAF high altitude protective ensemble. T Smougur, T Morgan, W Sears, W Dana, E Enevoldson, J Melvin, and M Tays (USAF, Aerospace Medical Div.,

Holloman AFB, N Mex) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings

Canoga Park, Calif., SAFE Association, 1977, p

243 245

The 'get me-down' capability from flight above 50,000 ft for the unencumbering RAF partial pressure clothing for use in F-104 and F-15 aircraft is tested. The equipment assembly tested includes a sleeveless Jerkin pressure vest, a G-suit and an RAF P/Q oronasal mask. The test program consists of six coordinated efforts: laboratory evaluation, orientation/training of NASA test pilots, quantification of aerodynamic suction effects on cockpit altitude, definition of protective envelope, suit/aircraft integration, and in flight test and evaluation. It is suggested that the RAF ensemble or equivalent would be the only currently available item that would be acceptable to tactical crews. The Jerkin ensemble appears to meet both the pilot's physiological and functional requirements. S D

**A79-14435** A Canadian approach to high altitude protection. G K Stewart, W J McArthur, and K N Ackles (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p 246-250. 8 refs

In connection with the initiation of the formal process for obtaining a New Fighter Aircraft (NFA) for the Canadian Armed Forces, the Defence and Civil Institute of Environmental Medicine was asked to investigate the state-of-the-art with respect to Aerospace Life Support Equipment, identify life support packages compatible within escape equipment offered in the contending aircraft, state the feasibility of equipment development and procurement, and assist in the evaluation of proposals. A description is presented of the investigation which was conducted in response to this request. The investigation was largely concerned with an evaluation of the high altitude protection provided by forms of partial pressure garmentry and a high pressure mask. The obtained knowledge can now be used in more stringently analyzing the proposals to be submitted to the Canadian Government by Feb. 1, 1978, by major contractors competing for the NFA contract. G R

**A79 14437** Development of a specialized head/face protective device for test parachuting operations. D W Call, R W Moynihan, and D Griffin (U.S. Navy, National Parachute Test Range, El Centro, Calif.) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p

258-261. 5 refs

Current research at the National Parachute Test Range (NAT-PARACHUTETESTRAN), El Centro, California is designed to measure the accelerative response of a test parachutist's head and neck during parachute opening shock. To obtain these measurements, Naval test parachutist volunteers have been fitted with anatomical mounts to accommodate accelerometers at the head (mouth) and at the first thoracic vertebra (neck). This report describes this ongoing research effort and gives details on how a specialized helmet and rigid face shield were designed and developed to protect the parachutist's face and head during these instrumented jumps. (Author)

**A79 14438** Human factors considerations in establishing aircraft collision avoidance system alert thresholds. A L McFarland (Mitre Corp., McLean, Va.) In SAFE Association, Annual Symposium, 15th, Las Vegas, Nev., December 5-8, 1977, Proceedings. Canoga Park, Calif., SAFE Association, 1977, p

262 266. 8 refs

At present, there are two major automatic collision avoidance systems (CAS) under development. The first is the Automatic Traffic Advisory and Resolution Service (ATARS) which is a ground based system that uses ground surveillance data and transmits collision avoidance commands to aircraft via data link. The second is the Beacon Collision Avoidance System (BCAS) which is an airborne system that makes use of the transponder equipage of other aircraft.

Some of the human factors considerations in establishing alert thresholds for a CAS such as ATARS or BCAS are discussed. The problem of studying the human subject is compounded by the fact that the hazardous mid air encounter is a very rare event. Attention is given to the challenge related to the selection of the positive command thresholds for a CAS, the conduction of a hypothetical experiment, past experience with hazard warning systems, the establishment of reasonable and achievable goals, the cockpit simulator and laboratory flight tests, and operational flight tests.

G R

**A79-14595** Biological implications of the Viking mission to Mars. P Mazur (Oak Ridge National Laboratory, Oak Ridge, Tenn.), E S Barghoorn (Harvard University, Cambridge, Mass.), H O Halvorson (Brandeis University, Waltham, Mass.), T H Jukes (California, University, Berkeley, Calif.), I R Kaplan (California, University, Los Angeles, Calif.), and L Margulis (Boston University, Boston, Mass.) *Space Science Reviews*, vol 22, June 1978, p 3-34. 77 refs

Viking mission studies of the Martian environment are described, and it is concluded that the conditions now known to exist at and below the Martian surface are such that no known terrestrial organism could grow and function. Concentrations of water vapor, ice, liquid water, reduced carbon, and organics are estimated, biological experiments are discussed, and possible nonbiological explanations for the results of the biological experiments are considered. The studies show that elements essential to terrestrial biology are present although no organic compounds or liquid water were detected. It is suggested that powerful oxidants at the surface are responsible for the release of oxygen by soil moistened with water vapor and also for the decarboxylation of organic nutrients. The mechanism of organic synthesis by soil samples is not known. It is thought that the Martian environment in the past might have permitted the origin and transient establishment of a biota. M L

**A79-14602** A continuous wave, frequency modulated, ultrasonic device with auditory output for observing the heart. J L Mason, J T Boys, and L Kay (Canterbury, University, Christchurch, New Zealand) In *Ultrasonics International 1977*, Proceedings of the Conference, Brighton, England, June 28-30, 1977.

Guildford, Surrey, England, IPC Science and Technology Press, Ltd., 1977, p 68-74.

**A79-14774** Thresholds for Na<sup>+</sup>/ and Ca<sup>++</sup>/ effects on thermoregulation. J E Greenleaf. In *Effectors of thermogenesis*. Basel, Birkhauser Verlag, 1978, p 33-43. 25 refs.

The evidence for threshold concentrations of Na<sup>+</sup> and Ca<sup>++</sup> that alter body temperature when introduced (1) into the hypothalamus and cerebral ventricles and (2) intravenously and by oral ingestion is examined. For hypothalamic and ventricular perfusion the threshold for any increase in core temperature (T<sub>c</sub>) at rest with excess Na<sup>+</sup> is about 10 mM, while there is a linear relationship between the level of excess Ca<sup>++</sup> and the decrease in T<sub>c</sub>, with a correlation coefficient of 0.85. With intravenous and oral ingestion the resting threshold plasma concentration for an excess Na<sup>+</sup> effect is about 5 mEq/liter per 0.1°C rise in T<sub>c</sub>, and the excess Ca<sup>++</sup> level is about 1 mEq/liter per 0.1°C decrease in T<sub>c</sub>. With exercise, there is a dose dependent attenuation of the rise in core temperature that is also about 0.1°C per mM excess Ca<sup>++</sup>. (Author)

**A79-14795 #** The multiloop concept of the pilot work load as a basis of future experiments and studies. J-C Wanner (ONERA, Châtillon sous-Bagneux, Hauts-de-Seine, France) *ONERA, TP* no 1978-10, 1978. 17 p. 14 refs.

The perceptual and behavioral components of a pilot's performance are examined, a multiloop mathematical model of pilot behavior is presented, an approach to analyzing flight conditions and pilot tasks is indicated, and differences in feedback and loop characteristics for servomechanisms and for human pilots are noted. A multiloop workload is more than the sum of the component loops (involving control of or response to a single parameter or variable).

since the multiloop workload includes the switching task, which is the transition from one loop to another. Short term safety loops, immediate safety loops, and control forces loops are distinguished, and accidents are analyzed with relation to the workload. M L

**A79-14961**      **How does the saccadic eye movement controller adapt for pathological states** A T Bahill (Carnegie-Mellon University, Pittsburgh, Pa.) In Conference on Decision and Control, and Symposium on Adaptive Processes, 16th, and Special Symposium on Fuzzy Set Theory and Applications, New Orleans, La., December 7-9, 1977, Proceedings Volume 1. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1977, p 90-97. 18 refs. NSF Grant No ENG 75 00515.

Normal saccadic eye movements are time optimal. When a subject becomes fatigued he changes his control strategy and the eye movements are no longer time optimal. The cerebellum is the adaptive gain controller for the saccadic system. Patients with cerebellar disease have saccadic oscillations. Multiple sclerosis, lesions, and myasthenia gravis attenuate the transmission of the saccadic controller signals. This produces abnormal eye movements. The CNS compensates for this deficit by increasing the duration of the high-frequency motoneuronal saccadic pulse. (Author)

**A79-14969**      **Effects of target motion and image on AAA tracking** D L Kleinman and A R Ephrath (Connecticut, University, Storrs, Conn.) In Conference on Decision and Control, and Symposium on Adaptive Processes, 16th, and Special Symposium on Fuzzy Set Theory and Applications, New Orleans, La., December 7-9, 1977, Proceedings Volume 1. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1977, p 230-234. 7 refs. Grant No AF-AFOSR-77-3126.

The optimal control model of human response is applied to study target tracking performance in an AAA (anti aircraft artillery) system. The effects on tracking error of different target motions, i.e., acceleration profiles, are studied via a covariance propagation modeling approach and via experiment. Different assumptions relative to the adaptive tracking behavior of the human are explored as well as different schemes for inter-axis attention allocation. The effects of visual information inherent in a moving target image (e.g., size, aspect angle, etc.) are explored via comparison of results with a moving image vs image of fixed size and shape. Experimental tracking results are compared with those predicted by the model. (Author)

**A79-14972**      **Application of control theory to the investigation of roll motion effects on pilot control behavior** A M Junker (USAF, Aerospace Medical Research Laboratories, Wright Patterson AFB, Ohio) and W H Levison (Bolt Beranek and Newman, Inc., Cambridge, Mass.) In Conference on Decision and Control, and Symposium on Adaptive Processes, 16th, and Special Symposium on Fuzzy Set Theory and Applications, New Orleans, La., December 7-9, 1977, Proceedings Volume 1. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1977, p 247-254. 19 refs.

The application of manual control theory to the investigation of the effects of motion cues on pilot control behavior is presented. Experiments and modeling approaches which have led to the development of a predictive motion sensitive optimal control pilot vehicle model for roll axis motion cues are described. (Author)

**A79-14987 \***      **Adaptive supervisory control of remote manipulation** W R Ferrell (Arizona, University, Tucson, Ariz.) In Conference on Decision and Control, and Symposium on Adaptive Processes, 16th, and Special Symposium on Fuzzy Set Theory and Applications, New Orleans, La., December 7-9, 1977, Proceedings Volume 1. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1977, p 549-552. Contract No JPL-954260.

The command language by which an operator exerts supervisory control over a general purpose remote manipulator should be designed to accommodate certain characteristics of human performance if there is to be effective communication between the

operator and the machine. Some of the ways in which people formulate tasks, use language, learn and make errors are discussed and design implications are drawn. A general approach to command language design is suggested, based on the notion matching the operator's current task schema or context by appropriate program structures or 'frames' in the machine. (Author)

**A79-15001 \***      **Adaptive control of a robotic manipulator** R A Lewis (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) In Conference on Decision and Control, and Symposium on Adaptive Processes, 16th, and Special Symposium on Fuzzy Set Theory and Applications, New Orleans, La., December 7-9, 1977, Proceedings Volume 1. Piscataway, N.J., Institute of Electrical and Electronics Engineers, Inc., 1977, p 743-748. 17 refs. Contract No NAS7-100.

A control hierarchy for a robotic manipulator is described. The hierarchy includes perception and robot/environment interaction, the latter consisting of planning, path control, and terminal guidance loops. Environment sensitive features include the provision of control governed by proximity, tactile, and visual sensors as well as the usual kinematic sensors. The manipulator is considered as part of an overall robot system. 'Adaptive control' in the present context refers to both the hierarchical nature of the control system and to its environment-responsive nature. (Author)

**A79-15177**      **Light weight solid state helmet symbol display and position system** C J G Lewis (E-A Industrial Corp., Atlanta, Ga.) In Electro-Optics/Laser Conference and Exposition, Anaheim, Calif., October 25-27, 1977, Proceedings. Chicago, Industrial and Scientific Conference Management, Inc., 1977, p 366-373.

The design objectives of helmet-mounted display systems are identified and the implementation of an LED array is noted along with helmet array performance data. Attention is given to helmet optics and the helmet position sensing system. The V-slit camera, yielding high reliability and accuracy, low cost, and compactness is described. The electronics unit is reviewed. S C S

**A79-15398**      **Subjective data in human reliability estimates** D Meister (U.S. Navy, Personnel Research and Development Center, San Diego, Calif.) In Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 17-19, 1978, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1978, p 380-384. 27 refs.

Past methods of developing data banks for estimating Human Performance Reliability (HPR) indices are reviewed, together with the difficulties each method has encountered. Suggestions are made for the development of a HPR data bank based on estimates gathered from experts. (Author)

**A79-15399**      **Computer-graphic design for human performance** D A Topmiller and N M Aume (USAF, Aerospace Medical Research Laboratory, Wright Patterson AFB, Ohio) In Annual Reliability and Maintainability Symposium, Los Angeles, Calif., January 17-19, 1978, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1978, p 385-388. 5 refs.

The paper discusses a computer graphic design technique called HECAD, which stands for human engineering computer-aided design. The purpose of the technique is to aid a crew/work station designer to (1) lay out various configurations of controls and displays, (2) compute operator performance predictions based on candidate mission tasks, and (3) modify the work station according to these predictions. The software package is composed of a computer-graphic geometry segment and an analytical segment. Algorithms for computing probability of operator performance in terms of success or error and transfer or action times are provided. Limitations of HECAD are revealed by an attempt to apply the technique to the B-52 bombardment/navigation station redesign. M L

**A79-15400** Man-machine reliability - A practical engineering tool K P LaSala (US Naval Material Command, Washington, D C), A I Siegel (Applied Psychological Services, Inc, Wayne, Pa), and C Sontz (Tracor, Inc, Arlington, Va) In Annual Reliability and Maintainability Symposium, Los Angeles, Calif, January 17-19, 1978, Proceedings New York, Institute of Electrical and Electronics Engineers, Inc, 1978, p 389-394

Approaches to the prediction and evaluation of man-machine reliability are discussed. Attention is directed to a life cycle oriented approach developed by the US Navy. Empirical models are also described, these models, which make use of a parameter called maintenance power, relate repair time, maintenance man hours, and maintenance man experience. Other topics considered include the engineering development process, man-machine reliability definitions, and the use of human reliability as an engineering tool. M L

**A79-15488** Psychological selection of payload astronauts (La sélection psychologique des cosmonautes de charge utile) J Bremond (Centre d'Etudes et de Recherches Psychologiques Air, Saint Cyr l'Ecole, Yvelines, France) and R Gelly (Armée de l'Air, Centre Medical de Psychologie Clinique, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 17-21. In French

The battery of tests for psychological selection of payload astronauts is briefly described. The tests include a test of skill in determining the law governing a series (a test of factor G and nonverbal numerical factor), a word-analogy test, a test of sentence comprehension, a spatial factor test, a test detecting psychopathological tendencies, and a general personality test. The tests were followed by a clinical interview with a psychiatrist. P T H

**A79-15489** Selection of astronaut candidates - Contribution of the exercise ECG and spirometry (Sélection des candidats cosmonautes - Apport de l'ECG d'effort et de la spirométrie) G Leguay and A Seigneux (Hôpital d'Instruction des Armées Dominique Larrey, Versailles, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 22, 23. In French

In selecting astronauts, the exercise ECG was administered for the prime purpose of detecting coronary insufficiency. The test, carried out on an ergometric bicycle, consists of expending an effort of nearly linear increase in intensity in order to attain the maximum cardiac frequency. Various criteria indicating coronary insufficiency are identified and classified under ischemia lesion aspect, junctional aspect, and intermediate aspects. The cases of several candidates presenting these signs are briefly discussed. The respiratory function was tested by classical spirometry and the acetyl choline provocation test. P T H

**A79-15490** Special tests for astronaut selection - Study of cardiovascular reactions by the orthostatism test (Tests spéciaux de sélection des cosmonautes - Etude des réactions cardiovasculaires au test d'orthostatisme) J L Poirier and C Boutelier (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Bretigny sur Orge, Essonne, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 24-27. In French

A procedure for carrying out the orthostatism test is described, in which only the upper part of the body is subjected to an overpressure. Cardiovascular responses were studied by ECG, measurement of systolic and diastolic pressure, strain gage measurement of the change in calf circumference, and electric plethysmographic measurement of the change in calf volume. Typical and extreme variations of the recorded parameters are presented and discussed. The results on 13 subjects, especially the leg volume increase data, were parallel to results obtained during Skylab crew selection tests by the classical 'body box' method. The present method is simpler in that it does not have the problems connected with air-tightness in the body box method. P T H

**A79 15491** Special test for astronaut selection - Tests of tolerance in the centrifuge and in flight (Tests spéciaux de sélection des cosmonautes - Tests de tolérance en centrifugeuse et en vol) B Vettes, R Eckert (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Bretigny-sur-Orge, Essonne, France), and H Marotte (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Bretigny-sur-Orge, Essonne, Service de Santé des Armées, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 28-33. In French

The centrifuge tests were conducted in a nacelle with a Martin Baker seat. The measurements included the ECG, cardiac rate, arterial pressure, and central and peripheral vision. The subject was tested in both the X and Z configurations. In the X configuration, the acceleration profile is complex, with a maximum acceleration of 3g. In Z configuration, the subject is subjected to 1.5g attained in 1.5 min and held for 20 min, and to 3g attained in 1.5 min and held for 10 min. Average and extreme variations of the measured responses are presented and discussed. The flight tests consist of a series of parabolic path flights with a total of about 150 seconds of weightlessness. The correlation of the heart rate variation with the acceleration is good. In all tests, the same subject displayed excessive tachycardia. P T H

**A79 15492** Special tests for astronaut selection - Muscular exercise test (Tests spéciaux de sélection des cosmonautes - Test à l'exercice musculaire) H Viellefond and H Marotte (Centre d'Essais en Vol, Laboratoire de Médecine Aéronautique, Bretigny-sur-Orge, Essonne, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 34-36. In French

The normalness of cardiovascular and respiratory responses during maximal muscular exertion was tested on the treadmill in order to determine the aerobic metabolism potential of the subject. Cardiovascular response was monitored by clinical surveillance of the subject, continuous recording of an ECG derivation, and measurement of arterial pressure. Anaerobic metabolism was studied by the open circuit method consisting of measuring the pulmonary ventilation and the oxygen and CO<sub>2</sub> fractions in expired gases. The treadmill was run at five stages, the most intense being at 8 km/hr on a slope of 18 deg. The subjects tested performed below the average for persons in training. P T H

**A79-15493** Study of specific effects of hyperfrequencies on the central nervous system II - Exploratory research on rat Wistar/behaviour (Etude des effets spécifiques des hyperfréquences sur le système nerveux central II - Recherches exploratoires sur le comportement du rat Wistar) C L Milhaud and M J Klein (Centre de Recherches de Médecine Aéronautique, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 37-43. 9 refs. In French. Direction des Recherches et Moyens d'Essais Contracts No 74/1147, No 77/1001

This experiment studies the effects of irradiation (2450 MHz CW, 3.5 mW/sq cm, 160-200 hours) on the behavior of rats of the Wistar strain. It consists of three tests: 'open field' (48 rats), avoidance behavior in the shuttle-box (48 rats), 'run way' (14 rats). No significant change is demonstrated. If this negative result was confirmed, it would indirectly prove two hypothetical characteristics of microwave physiopathology: importance of the irradiation time, and partially limited disturbances in the CNS of the rodents.

(Author)

**A79-15494** Selection and techniques for analysis of indices of visual data reception II (Choix et techniques d'analyse d'indices de la prise d'informations visuelles II) M Neboit (Organisation National de Sécurité Routière, Laboratoire de Psychologie Autodrome, Montlhéry, Essonne, France), J P Papin, A Pottier, J P Puimean-Chieze, and D Viard (Centre de Recherches de Médecine Aéronautique, Paris, France) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 44-51. In French

The eye movements of pilots during actual flight and in simulated flight were recorded by TV and studied with the purpose

of determining whether the pilot's strategy is reproducible for a given situation, and whether a change in situation is accompanied by a change in strategy. The data were analyzed for the influence of flight phase, type of flight (actual or simulated), and pilot oculomotor stability and personal experience. P T H

**A79-15495** Value and limits of the electrocardiogram in aviation medicine evaluations (La valeur et les limites de l'électrocardiogramme dans l'expertise médicale aeronautique) P A T Costin, P Loan, and U Florin (Centre de Medecine Aeronautique, Bucharest, Rumania) *Médecine Aéronautique et Spatiale, Médecine Subaquatique et Hyperbare*, vol 17, 2nd Quarter, 1978, p 52, 53. In French

**A79-15977 #** Human psychophysiology in extremal conditions (Psikhofiziologiya cheloveka v ekstremal'nykh usloviyakh) Ts P Korolenko. Leningrad, Izdatel'stvo Meditsina, 1978. 272 p. 297 refs. In Russian

The work reviews data on aspects of human adaptation to polar environments, particularly the Arctic. Attention is given to the problem of psychophysiological stress as a syndrome arising in the initial stages of adaptation. This syndrome is analyzed in its clinical, psychological, and neurophysiological aspects. The roles of psychological functions (e.g., emotions and imagination) as well as personality factors in the adaptation process are considered. Pathological states arising as a result of maladaptation are discussed, including neuroses, neurotic states, psychosomatic sickness, and some forms of alcoholism. The prevention and treatment of such states are discussed. B J

**A79-16099 #** Developmental and hematological responses to low level exposure of carbon monoxide in mice. J Singh (Stillman College, Tuscaloosa, Ala.) In Combined environments. Technology interrelations, Proceedings of the Twenty-fourth Annual Technical Meeting, Fort Worth, Tex., April 18-20, 1978. Mount Prospect, Ill., Institute of Environmental Sciences, 1978, p 223-228. 30 refs. Grant No. NIH-MBS-08021

An experimental study is conducted to assess the effects of low-level continuous exposure to CO on the postnatal development and hematology in the mouse under specified experimental conditions. The parameters measured are WBC, RBC, HGB, HCT, MCH, MCV, MCHC, and weight. It is found that exposure to CO reduces the average weight of the body, kidney, liver, heart, and lungs, probably due to the oxygen deficiency in the air. There is no significant increase in the RBC count, but HGB, HCT, MCH, and MCHC are increased, probably due to an adaptive compensatory mechanism. The rise in HGB and HCT is supposed to be of an erythropoietic nature. S D

**A79-16138** Medical technology transfer. J N Brown, F T Wooten (Research Triangle Institute, Research Triangle Park, N C.), and W A Fischer (North Carolina, University, Chapel Hill, N C.) In Space Congress, 15th, Cocoa Beach, Fla., April 26-28, 1978, Proceedings. Cape Canaveral, Fla., Canaveral Council of Technical Societies, 1978, p 5-1 to 5-8. 16 refs.

The Biomedical Applications Team program sponsored by the National Aeronautics and Space Administration is an effective means for transferring aerospace technology to applications in medicine. A conceptual framework for medical technology transfer is presented to describe the transfer process in medicine and to supply a rationale for the Biomedical Applications Team methodology. Examples illustrate medical technology transfer at the material, design, and capacity levels. The roles of donor, recipient, and transfer agent are illustrated and factors essential to the success of medical technology transfer are summarized. (Author)

**A79-16235 #** Helicopter night operations - Feasibility and impact on the overall system (Nachteinsatz von Hubschraubern - Realisierbarkeit und Auswirkungen auf das Gesamtsystem) U Walther (Messerschmitt Bolkow-Blohm GmbH, Ottobrunn, West Germany) In International Helicopter Forum, 12th, Buckeburg, West Germany, May 8, 9, 1978, Proceedings. Buckeburg, West Germany, Heeresflieger-Waffenschule, 1978. 18 p. In German

Certain night vision devices which will allow helicopter pilots to carry out night nap-of-the-earth (particularly antitank) operations are described. Two basic types of devices are considered: (1) forward looking infrared (FLIR) with helmet mounted sight and display (HMSD), and (2) image intensifier goggles with head up display. A mini-FLIR with the POISE pointing and stabilization element is considered as a particular example of the first type of device. Specific device characteristics are presented along with examples of data presentation. B J

**A79-16500 #** Voice communication in artificial atmospheres (Rechevaia sviaz' v iskusstvennykh atmosferakh) B I Petlenko and L S Butyrskii. Moscow, Izdatel'stvo Sviaz', 1978. 144 p. 192 refs. In Russian

The book deals with some aspects of communication and sound transmission in helium and other gases at reduced pressures and in deep-submergence environments. The limitations of speech at high pressures in helium-rich environments are examined, along with the effect of increased atmospheric pressures upon intelligibility of spoken words. Helium speech translation methods are described, and the characteristics of helium underwater speech translating equipment are noted. The effect of frequency passband on the intelligibility of helium speech in a noise environment is discussed. V P



## STAR ENTRIES

**N79-12681** Wisconsin Univ - Madison  
**METABOLIC RESPONSES OF PONIES TO TREADMILL EXERCISE IN HYPEROXIA** Ph D Thesis

Karen Ann Stanek 1978 116 p  
 Avail Univ Microfilms Order No 7815434

The true oxygen consumption (VO<sub>2</sub>) of the pony in exercise in hyperoxic conditions is determined. These studies were performed on seven ponies at rest and during treadmill exercise under two conditions: normoxia and a 60% O<sub>2</sub> - 40% N<sub>2</sub> mixture (hyperoxia). During the exercise the ponies trotted on a treadmill at 5mph (115m/min) 10% grade for ten minutes. Anaerobic blood samples were obtained from the pulmonary artery and aorta during the 10th minute of exercise. Simultaneous collections of the expired gases were also made. Cardiac output (CO) was determined by the dye dilution technique. Blood gas contents were determined by the Van Slyke method and the inspired and expired gas fractions were measured on a micro-Scholander analyzer. Dissert Abstr

**N79-12682** Vanderbilt Univ Nashville, Tenn  
**CARDIOVASCULAR STUDIES OF REDUCING AND OXIDIZING AGENTS** Ph D Thesis

Richard Dean Olson 1978 150 p  
 Avail Univ Microfilms Order No 7823464

Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) in 5% glucose infused at the aortic valve attenuated the precipitous fall in mean blood pressure and heart rate and significantly increased survival time (time from beginning of occlusion to zero pulse pressure) following left main coronary artery occlusion in rabbits. The beneficial effect of H<sub>2</sub>O<sub>2</sub> in 5% glucose on the hemodynamic parameters following occlusion was dependent on the infusion site. Infusion of hydrogen peroxide in 5% glucose in the aortic arch descending aorta and jugular vein was less efficacious in attenuating the changes in hemodynamic parameters following left main coronary artery occlusion than infusion at the aortic valve. The main action of hydrogen peroxide in 5% glucose was on the heart and not in the peripheral carotid or cerebral circulation. Dissert Abstr

**N79-12683** Hahnemann Medical Coll and Hospital Philadelphia Pa

**THE EFFECT OF MODERATE HYPOTHERMIA ON THE CIRCULATORY AND MYOCARDIAL CONSEQUENCES OF ACUTE CORONARY LIGATION IN DOGS** Ph D Thesis

Steven R Bergmann 1978 295 p  
 Avail Univ Microfilms Order No 7822684

Male mongrel dogs were anesthetized with pentobarbital and underwent thoracotomy and dissection of the proximal left anterior descending coronary artery. Thirty minutes after ligation of the artery dogs were randomized into one of two groups. Fifteen dogs were maintained at normothermic levels for 9 hours after ligation and 14 dogs were surface-cooled to 27 C, maintained at this temperature for two hours, rewarmed to normothermic levels and observed for an additional hour. Various myocardial and circulatory measurements were made. Just prior to sacrifice, lissamine green was injected intracardially to delineate perfused versus non-perfused myocardium. Non-perfused sections were further incubated in Nitro-BT for the detection of dehydrogenase activity. Dissert Abstr

**N79-12684\*** National Aeronautics and Space Administration Washington D C  
**ROLE OF GRAVITY IN EARLY DEVELOPMENT**

Nov 1978 74 p refs. Transl into ENGLISH from the book Problemy Biologii Razvitiya Vneshnaya Sreda i Razvityayushysya Organizm Moscow Nauka Press, 1977 p 140-173. Transl by Kanner (Leo) Associates Redwood City Calif (Contract NASw-3199) (NASA-TM-75590) Avail NTIS HC A04/MF A01 CSCL 06C  
 Centrifuging and clinostat experiments designed to determine the effect of gravity on the development of embryos are reviewed. It appears that the effect of zero gravity on development is negligible. G G

**N79-12685\*** National Aeronautics and Space Administration, Washington D C

**THE ORGANISM AND THE HABITATION ATMOSPHERE**

N A Agadzhanyan Aug 1978 250 p refs. Transl into ENGLISH of the book Organizm i Gazovaya Sreda Obitalnaya Moscow Meditsina Press 1972 p 1-248. Transl by Linguistics Systems Inc Cambridge, Mass (Contract NASw-2482) (NASA-TM-75536) Avail NTIS HC A11/MF A01 CSCL 06C

Experimental data is examined on the study of the influence of the different parameters of the atmosphere on the organism for the purpose of making a physiological determination of the permissible oxygen concentrations in inhabited airtight compartments. The application of high oxygen concentrations for respiration and for medical purposes are considered. Data is presented on the evolution of the atmosphere and of the role of O<sub>2</sub> in the process of the evolutionary development of living beings, the influence of an organism of an artificial high and low oxygen concentration atmospheres, the laws of oxygen permeation into fluid media of the organism, the biological role of inert gases, etc. The relationship between the gas medium of habitation and reactivity of the organism is determined. G Y

**N79-12686\*** California Univ Riverside Statewide Air Pollution Research Center

**THE IMPACT OF SULFUR DIOXIDE ON VEGETATION. A SULFUR DIOXIDE-OZONE RESPONSE MODEL** Final Report

R J Oshima 15 Mar 1978 94 p refs. Sponsored by Air Resources Board Sacramento Calif (PB-283604/7, ARB-R-A6-162-30-78-79 Rept-5-111200-20832-0) Avail NTIS HC A05/MF A01 CSCL 02D

The effect of oxidant alone and in combination with 10 ppm sulfur dioxide upon the kidney bean was determined. Red kidney beans were grown in exposure chambers with 0% 25% 50%, 75% and 100% carbon filtered air alone and in combination with 10 ppm SO<sub>2</sub>. Additionally 2 ambient plots were utilized. An interaction with ozone and SO<sub>2</sub> was documented in the 50% carbon filtered treatment and produced a significant reduction in yield and plant biomass. No reductions in yield or plant biomass were detected on red kidney beans exposed in equivalent doses of ambient ozone alone. Ambient ozone alone produced significant reduction in yield only at doses exceeding 5144 ppm-hrs GRA.

**N79-12687** California Univ Riverside  
**THE EFFECTS OF OZONE ON HUMAN ERYTHROCYTES AND PHOSPHOLIPID VESICLES** Ph D Thesis

Bruce Alan Freeman 1978 122 p  
 Avail Univ Microfilms Order No 7821347

Ozone is the major oxidant in photochemical air pollution. This gas is extremely toxic to lung cells and is seen to affect circulating erythrocytes. Phospholipid vesicles and liposomes made from egg phosphatidylcholine reacted similarly with ozone producing hydrogen peroxide and malonaldehyde via an ozonolysis mechanism. The reactivity of the egg phosphatidylcholine membranes was a function of exposed membrane surface area. Erythrocyte osmotic fragility decreased after low dosages of ozone and increased after higher dosages. Large amounts of ozone caused no change in erythrocyte phospholipid fatty acid or cholesterol composition even though these lipids were oxidizable by ozone when not in a biological membrane. Dissert Abstr

**N79-12688** Purdue Univ. Lafayette, Ind  
**AN ILLNESS-INJURY SEVERITY INDEX** Ph D Thesis

David Lowell Bever 1978 107 p  
 Avail Univ Microfilms Order No 7821417

Eight easily observable diagnostic criteria were identified to enable nonphysician emergency personnel to evaluate a patient's major body systems. Rating scales were developed for each of the criteria. When each of the criteria had been measured, the eight severity scores were summed to yield an estimate of overall patient condition. A maximum conditional relative frequency principle was used to develop scales for determining the accuracy of the in evaluating the severity of patient condition. Prediction scales developed from the data show that the Index correctly identified the level of severity of 64 percent of the illness patients, 65 percent of the injury patients and 50 percent of the patients when illness and injury scores were combined. The instrument tended to be less accurate in identifying patients with non-life-threatening emergencies, while it was highly accurate in identifying patients with life-threatening emergency problems. Dissert Abstr

**N79-12689** Toledo Univ. Ohio  
**CARBOHYDRATE METABOLISM OF THE STIMULATED DIAPHRAGM MUSCLE** Ph D Thesis

Raymond Nadon 1978 116 p  
 Avail Univ Microfilms Order No 7824528

An in vitro diaphragm preparation was used for studying carbohydrate metabolism of contracting muscle tissue. The diaphragm muscle from 150-200 gram male rats fed ad libitum, was used. ASD-5 Grass polygraph and stimulator were used to record the amplitude of contraction and to stimulate the muscle respectively. The nonstimulated and stimulated muscle preparations were incubated at 37°C in vertical tubes containing approximately 8 ml of Gey and Gey incubation medium saturated with 95% O<sub>2</sub>-5%CO<sub>2</sub>. Glucose was varied from 0 to 2.5 mg/ml. When the muscle was stimulated in the absence of glucose, the amplitude of contraction decreased constantly with time. There was significantly less reduction in the amplitude of contraction when glucose was included at 1 mg/ml, but was not further affected when glucose was increased to 2.5 mg/ml. In the medium without glucose, glycogen was only half depleted when the muscle became fatigued. When glucose was included at 2.5 mg/ml, the muscle was fatiguing even though there was a sparing of glycogen, this preferential utilization of glucose occurred without the presence of added insulin.

Dissert Abstr

**N79-12690** Utah Univ., Salt Lake City  
**CLINICAL COMPARISONS OF PRESSURE PULSE AND INDICATOR DILUTION METHODS OF DETERMINING CARDIAC OUTPUT** Ph D Thesis

Robert Milton Cundick, Jr 1978 186 p  
 Avail Univ Microfilms Order No 7822823

The Warner pressure pulse method to calculate cardiac output is compared with dye and thermodilution cardiac output measurement techniques. A clinical study comparing both the Warner and Bourgeois pressure pulse methods with thermodilution is also included. Results of the correlations are presented with correlation coefficients. The data presented show that use of the Warner and Bourgeois pressure pulse methods in their present forms for monitoring the cardiac output of critically-ill patients with widely varying mean arterial pressures does not provide data of sufficient reliability for use in clinical decisions on patient management.

Dissert Abstr

**N79-12691** Marquette Univ. Milwaukee, Wis  
**DENSITY DEPENDENCE OF MAXIMUM EXPIRATORY FLOW** Ph D Thesis

Ricardo Javier Soto 1978 186 p  
 Avail Univ Microfilms Order No 7824345

A mathematical model of pulmonary fluid mechanics was used to gain increased understanding of the influence of changes in pulmonary mechanics on maximum expiratory flow (MEF). MEF was simulated as a succession of steady flows (quasi-steady flow) which are dependent on the instantaneous pressure based distribution and airway lengths and diameters at any lung volume. The mechanical energy balance and diameter

versus trans-mural pressure relations for each generation were solved numerically. Model simulations were used to assist in interpretation of results. MEF versus volume (MEFV) curves were obtained on anesthetized intact, tracheotomized dogs breathing air, 80% 20% helium-oxygen and 80% 20% SF<sub>6</sub>O<sub>2</sub> mixtures. Thoracic gas flow and volume were measured. Functional residual capacity, recoil pressure, tracheal pressure and pleural pressure were also measured.

Dissert Abstr

**N79-12692** California Univ., Santa Barbara  
**MODELING OF VISUAL-VESTIBULAR INTERACTION AND THE FAST COMPONENTS OF NYSTAGMUS** Ph D Thesis

Clifford Gee Yau Lau 1978 190 p  
 Avail Univ Microfilms Order No 7824181

During head rotation in the light both the vestibular and the optokinetic systems are stimulated. The eye movement response is the result of the combined responses of both systems. An engineering model is proposed for the evaluation of these eye movement responses during simultaneous optokinetic and vestibular stimulation. The main hypothesis is that there is a linear summation of the visual signal and the vestibular signal during visual-vestibular interaction tests. The model accounts for the dominance of the visual system at low frequencies and the dominance of the vestibular system at high frequencies. The model also accounts for a large number of observations concerning the effect of vision on vestibular nystagmus, and accounts for the inability of subjects with impaired smooth pursuit to suppress the vestibular nystagmus. The existence of a threshold for the production of the fast components of nystagmus has been demonstrated in the rabbit for all types of physiological nystagmus reactions.

Dissert Abstr

**N79-12693** Stanford Univ., Calif  
**A DIRECTIONAL PULSED-DOPPLER ULTRASONIC BLOOD FLOWMETER** Ph D Thesis

Wayne Carr Haase 1978 141 p  
 Avail Univ Microfilms Order No 7822511

A type of directional pulsed Doppler ultrasonic blood flowmeter was developed and used percutaneously to measure canine blood flow and intraoperatively to measure human and canine blood flow. The unit utilizes an offset frequency technique to measure flow direction and realizes a ratiometric measurement of the velocity profile across a blood vessel. The system offers the following advantages over conventional flowmeters: (1) it is calibrated and drift free, requiring no user calibration of the baseline (flow zero) or scale factor; (2) affords greater accuracy in the measurement of low velocities; and (3) is of significant value when a large forward flow is accompanied by a small reverse flow, as in the ascending aorta. An optimization procedure was developed to determine the various system parameters based on physiological factors to maximize flowmeter resolution.

Dissert Abstr

**N79-12694\*** National Aeronautics and Space Administration  
 Pasadena Office, Calif

**AUTOMATED CLINICAL SYSTEM FOR CHROMOSOME ANALYSIS** Patent

Kenneth R. Castleman (JPL), Howard J. Friedan (JPL), Elbert T. Johnson (JPL), Paul A. Rennie (JPL) and Raymond J. Wall, inventors (to NASA) (JPL) Issued 24 Oct 1978 141 p Filed 17 May 1976 Supersedes N77-19750 (15 - 10, p 1357) Sponsored by NASA

(NASA-Case-NPO-13913-1 US-Patent-4 122,518  
 US-Patent-Appl-SN-687251 US-Patent-Class-364-300,  
 US-Patent-Class-128-2R, US-Patent-Class-364-120,  
 US-Patent-Class-364-415, US-Patent-Class-364-900) Avail US Patent and Trademark Office CSCL 06B

An automatic chromosome analysis system is provided wherein a suitably prepared slide with chromosome spreads thereon is placed on the stage of an automated microscope. The automated microscope stage is computer operated to move the slide to enable detection of chromosome spreads on the slide. The X and Y location of each chromosome spread that is detected is stored. The computer measures the chromosomes in a spread, classifies them by group or by type and also prepares a digital karyotype image. The computer system can also prepare

a patient report summarizing the result of the analysis and listing suspected abnormalities

Official Gazette of the U S Patent and Trademark Office

**N79-12695\*#** Harding Coll Searcy Ark  
**ISOKINETIC EXERCISE A REVIEW OF THE LITERATURE**  
**Final Report, 1 May - 31 Oct 1978**

Harry D Olree Bob Corbin and Carroll Smith 31 Oct 1978  
 10 p refs

(Contract NAS9-15596)

(NASA-CR-151841) Avail NTIS HC A02/MF A01 CSCL 06P

Isokinetic muscle training has all the advantages of isometrics and isotonic while minimizing their deficiencies. By holding the speed of movement constant throughout the full range of motion, isokinetic training devices respond with increased resistance rather than acceleration when the power output of the muscle is increased. Isokinetic training is superior to isometric and isotonic training with respect to increases in strength, specificity of training, desirable changes in motor performance, tasks, lack of muscle soreness, and decreases in relative body fat. A R H

**N79-12696#** Civil Aeromedical Inst., Oklahoma City, Okla  
**THE MORBIDITY EXPERIENCE OF AIR TRAFFIC CONTROL PERSONNEL, 1967-1977**

Charles F Booze Apr 1978 33 p refs

(AD-A056053 FAA-AM-78-21) Avail NTIS  
 HC A03/MF A01 CSCL 06/5

The morbidity experience of 28 086 air traffic controllers has been examined from 1967-77 with particular emphasis given the potential effects of job demands on ATC Health. The morbidity experience of air traffic controllers does not appear excessive when compared with the experience of other outside groups studied, except for psychoneurotic disorders. Additionally, a lack of association between disease occurrence and occupation is observed in the data correlating disease occurrence with length of service and age. While some isolated trends found in these data are supportive of an occupation-disease relationship, they are neither impressive nor consistent as would be expected if the association were a strong one. Although anticipated empirically, one of the more interesting results of the study was quantification of the substantial differences found to exist in the incidence of disease before and after the second-career legislation. Author

**N79-12697\*#** Pennsylvania State Univ University Park  
 Department of Biochemistry and Biophysics  
**PURIFICATION AND CULTIVATION OF HUMAN PITUITARY GROWTH HORMONE SECRETING CELLS Mid-term Report**

W C Hymer 1 Nov 1978 63 p Original contains color illustrations

(Contract NAS9-15566)

(NASA-CR-151853) Avail NTIS HC A04/MF A01 CSCL 06M

The maintenance of actively secreting human pituitary growth hormone cells (somatotrophs) in vitro was studied. The primary approach was the testing of agents which may be expected to increase the release of the human growth hormone (hGH). A procedure for tissue procurement is described along with the methodologies used to dissociate human pituitary tissue (obtained either at autopsy or surgery) into single cell suspensions. The validity of the Biogel cell column perfusion system for studying the dynamics of GH release was developed and documented using a rat pituitary cell system. S B S

**N79-12698#** Civil Aeromedical Inst., Oklahoma City, Okla  
**REACTIONS OF METHAMIDOPHOS WITH MAMMALIAN CHOLINESTERASES**

Casey P Robinson (Oklahoma Univ., Oklahoma City) Donald Beiergrohlslein (Oklahoma Univ., Oklahoma City) Paul W Smith, and Charles R Crane Jul 1978 9 p refs

(AD-A058683/4 FAA-AM-78-26) Avail NTIS  
 HC A02/MF A01 CSCL 06/15

The lethality of methamidophos, a phosphoramidothioate, to rats is similar to that of such potent organophosphate

compounds as parathion and paraoxon. Certain distinctive features of its chemical structure, and reported failure of cholinesterase inhibited with methamidophos to reactivate spontaneously in insects, prompted this study of its reactions with mammalian cholinesterase to determine if the treatment of poisoning requires modification. Atropine (10 mg/kg) or pralidoxime (60 mg/kg) afforded significant protection against lethality from methamidophos (LD50's 60 + or - 0.4 and 52 + or - 9 mg/kg, respectively). Partial spontaneous recovery of inhibited cholinesterase activity was observed. However, a single dose of pralidoxime given essentially simultaneously with methamidophos, did not hasten the recovery of cholinesterase activity. G G

**N79-12699#** Rasor Associates, Inc Sunnyvale, Calif  
**NONINVASIVE ASSESSMENT OF PULMONARY HYPERTENSION USING BUBBLE ULTRASONIC RINGING (BURP) METHOD, PART 2 Annual Report, Apr 1977 - May 1978**

E Glenn Tickner Jun 1978 58 p refs

(Contract N01-HR-62917)

(PB-283935/5 NIH-N01-HR-62917-2A) Avail NTIS  
 HC A04/MF A01 CSCL 06L

The second year effort of a program to design, develop, and evaluate a device for the noninvasive measurement of pulmonary artery blood pressure utilizing a bubble ultrasonic ringing pressure (BURP) sensing technique is described. The basic approach involves injection into a peripheral vein of microbubbles of carbon dioxide under pressure, which are encapsulated in fused sugar particles. At some critical point within the pulmonary artery the bubbles suddenly expanded into the blood stream. This sudden expansion causes the bubble to oscillate and the oscillation (ringing) frequency signal determines the pulmonary artery pressure. GRA

**N79-12700#** National Bureau of Standards Washington, D C  
 Consumer Sciences Div

**AROUSAL FROM SLEEP BY EMERGENCY ALARMS IMPLICATIONS FROM THE SCIENTIFIC LITERATURE Final Report**

V J Pezoldt and Harold P VanCott Jun 1978 38 p refs

Sponsored by HEW

(PB-284044/5, NBSIR-78-1484(HEW)) Avail NTIS  
 HC A03/MF A01 CSCL 06P

A review of the sleep research and other scientific literature pertaining to the arousal of sleeping individuals by external stimuli is reported. This effort was undertaken to provide information about the characteristics of emergency alarms which will reliably awaken a sleeping population, especially nursing home residents, in the event of fire. Data are discussed as is the problem of performance following abrupt arousal. Recommendations regarding stimulus characteristics, measures of arousal and the experimental environment for future studies of arousal by emergency alarms are presented. GRA

**N79-12701#** SRI International Corp., Menlo Park, Calif  
**ASSESSMENT OF HUMAN EXPOSURES TO ATMOSPHERIC BENZENE Final Report**

Susan J Mara and Shonh S Lee Jun 1978 213 p refs

(Contracts EPA-68-01-4314 EPA-68-02-2835)

(PB-284203/7, EPA-450/3-78-031) Avail NTIS  
 HC A10/MF A01 CSCL 06T

The environmental exposure of the U.S. population to atmospheric benzene emissions from specific sources was estimated. It was assumed that individuals residing in the vicinity of benzene sources spend 24 hours of each day in the same location. To estimate more representative exposures, a second objective was added to make rough estimates of individuals' total exposures by defining total exposure as the sum of exposures to all benzene sources, including those in nonresidential areas within a designated period. GRA

**N79-12702#** Transportation Systems Center, Cambridge, Mass  
**REVIEW OF CHEST DEFLECTION MEASUREMENT TECHNIQUES AND TRANSDUCERS Final Report, Sep 1976 - May 1977**

Gordon R Plank Jun 1978 38 p refs

(PB-283654/2 DOT-TSC-NHTSA-78-33 DOT-HS-803350)  
 Avail NTIS HC A03/MF A01 CSCL 13L

A summary is presented of various techniques and transducers for their potential use with dummies, cadavers, infra-human primates and living humans. Those techniques and transducers found to have high potential for use with living humans are discussed in detail. Measurement requirements are summarized, inherent problems are pointed out and recommendations for the solution of some of these problems are given. GRA

**N79-12703#** Mayo Foundation, Rochester, Minn  
**DEVELOPMENT OF HIGH-RESOLUTION ULTRASONIC IMAGING TECHNIQUES FOR DETECTION AND CLINICAL ASSESSMENT OF CARDIOVASCULAR DISEASE** Final Annual Report, Oct 1976 - Oct 1977  
 Titus C Evans Jr Philip S Green and James F Greenleaf  
 May 1978 112 p refs Prepared in cooperation with SRI Intern Menlo Park Calif  
 (Contract N01-HV-4-2904)  
 (PB-284686/3 NIH/NHLBI-N01-HV-4-2904-4) Avail NTIS HC A06/MF A01 CSCL 06C

Ultrasound instrumentation and methods are reported for the detection and assessment of atherosclerosis in carotid and femoral arteries of living patients, thereby avoiding the pain, risk, and associated drawbacks of angiography. Preliminary comparisons of ultrasound B-scans and angiograms of carotid atherosclerotic lesions were extremely encouraging, yet sometimes significant discrepancies in interpretation occurred. Significant improvement in the ease of using the clinical instrument, in B-scan resolution and in the signal-to-noise ratio of the Doppler system were achieved. The potential advantages of combined B-scan and Doppler images in evaluating a given lesion were demonstrated. GRA

**N79-12704#** Calspan Corp Buffalo N Y  
**RETENTION AND TRANSFER OF TRAINING ON A PROCEDURAL TASK INTERACTION OF TRAINING STRATEGY AND COGNITIVE STYLE** Final Scientific Report, 1 Oct 1976 - 30 Sep 1977  
 Steven Lee Johnson 30 Jan 1978 123 p refs  
 (Contract F49620-77-C-0019)  
 (AD-A058966, CALSPAN-DJ-6032-M-1, AFOSR-78-1161TR)  
 Avail NTIS HC A06/MF A01 CSCL 05/9

This study investigated the effectiveness of three different training strategies with respect to initial training retention and transfer of training. In addition to investigating the relative merits of the three strategies, the possibility of matching the instructional strategy and the trainee's cognitive style was evaluated. There is growing research support for the contention that different individuals utilize different means of encoding and/or storing information. The effect of these differences with respect to initial training retention and transfer of training was addressed in the context of a realistic task. The particular task used was representative of the many sequential procedures performed which range from operating master control panels in industrial plants to normal and emergency procedures in air vehicles. The results of the study indicate that (1) vividness of imagery does interact with training strategy, (2) training devices do not need high fidelity to be effective in training procedural tasks, and (3) the use of training strategy that requires the trainee to provide his own cueing and feedback from memory is effective in increasing the retention of procedure-following skills independent of cognitive style. These results have important implications for both the dollar cost and logistics of initial and refresher training as well as for the retention efficiency of an important aspect of the human's present job description. GRA

**N79-12705#** Columbia Univ New York Psychophysics Lab  
**APPLICATIONS OF TWO-PARAMETER DECISION THEORIES IN PSYCHOLOGY**  
 Eugene Galanter 1 Aug 1978 117 p refs  
 (Contract N00014-67-A-0108 NR Proj 197-016)  
 (AD-A059010, PLR-39) Avail NTIS HC A06/MF A01 CSCL 05/10

This report describes a general two-parameter decision theory as developed in experimental psychology as the theory of signal detectability. The report abstracts published research in seven areas in which the theory has been applied. The general theory is explicated in a technically precise but non-quantitative form.

Each of the substantive areas that contain abstracts from the literature are prefaced by introductory and explanatory remarks. Experimental and theoretical work that is critical of the decision theoretic approach within the substantive areas are included among the abstracts. Sufficient technical information and tabular material is contained to make it possible for the non-specialist to calculate the decision theoretic statistics from appropriately collected data. Author (GRA)

**N79-12706#** Technology Inc San Antonio Tex Life Sciences Div  
**ENGINEERING TEST AND EVALUATION DURING HIGH G VOLUME 3 ANTI-G SUITS** Final Report, 1 Feb 1975 - 30 Sep 1976  
 Roy W Thompson Larry J Meeker Gary I Wilson Arnold G Krueger and Paul E Love Jun 1978 155 p refs  
 (Contract F41609-75-C-0026 AF Proj 7930)  
 (AD-A059122 SAM-TR-78-12-Vol-3) Avail NTIS HC A08/MF A01 CSCL 06/17

In this final volume of a three-volume study report a protocol for testing anti-G suits is described and the test results from 6 test items are reported. These items are 3 inservice units from USAF and USN, an RAF unit and 2 experimental units (lower body full pressure and capstan). The study of the capstan suit is extended to investigate the man-suit interface. Field-test protocols for anti-G suits and anti-G valves are also proposed. Author (GRA)

**N79-12707#** Science Applications Inc Englewood Colo  
**A CRITICALLY ANNOTATED BIBLIOGRAPHY OF THE LITERATURE ON HUMAN FACTORS IN COMPUTER SYSTEMS** Final Report, 1 Jun 1976 - 31 May 1978  
 H Rudy Ramsey Michael E Atwood and Priscilla J Kirshbaum 31 May 1978 402 p  
 (Contract N00014-76-C-0866)  
 (AD-A058081 SAI-78-070-DEN) Avail NTIS HC A18/MF A01 CSCL 05/8

A very broad survey of the literature dealing with human factors in computer systems was performed. Included in the survey were books, journal articles, proceedings, papers and institutional publications from the literatures of psychology, human factors, and computer science. From the resulting list 564 references were selected for inclusion in this bibliography. The references selected deal primarily with the human factors aspects of interactive computer systems including hardware, software and procedures. The selection of references emphasizes experimental studies but the bibliography also includes relevant descriptions of dialogue techniques, user requirements analysis methods, guidelines, and a variety of other relevant topics. For each reference a citation is provided including sufficient information to allow the reader to obtain a copy together with a descriptive abstract and a critical annotation. An extensive subject index as well as an author index and browsing aids allow the users to locate those articles in which they are interested. GRA

**N79-12708#** Army Electronics Command Fort Monmouth N J  
 Electronics Technology/Devices Lab  
**THE EFFECT OF ACTIVE AREA ON THE LEGIBILITY OF DOT MATRIX DISPLAYS**  
 Isidore H Stein Jun 1978 17 p refs  
 (AD-A058014, DELET-TR-78-11) Avail NTIS HC A02/MF A01 CSCL 14/2

The dependence of legibility on active area for dot matrix displays was studied in an experimental program with human subjects. Under normal conditions such dependence appears to be minimal. Under stressed conditions there is a threshold at the 30 percent active area region above which dependence again appears to be minimal. Author (GRA)

**N79-12709#** Army Aeromedical Research Lab Fort Rucker Ala  
**AN EVALUATION OF PERCEPTUAL-MOTOR WORKLOAD DURING A HELICOPTER HOVER MANEUVER** Final Report

Michael G Sanders Raymond T Burden Jr R R Simmons  
M A Lees and K A Kimball May 1978 23 p refs  
(AD-A058016 USAARL-78-14) Avail NTIS  
HC A02/MF A01 CSCL 01/2

Stability augmentation systems are purported to reduce pilot workload during hover, nap-of-the-earth and IFR maneuvers. The current research project examines a method of aiding the MEDEVAC pilot in performing a hover maneuver while perhaps reducing workload. A modular four-axes stability augmentation system (Ministab) with integrated rate attitude and heading retention was installed on the USAARL JUH-1H helicopter. Participating personnel for the project were nine US Army aviators with a total average of 1172 flight hours. The aviators hovered at 30 feet above ground level for five minutes under each of the three following flight control conditions: unaided-normal hover with visual flight rules conditions, using Force Trim and using the Ministab. Continuous information from twenty pilot and aircraft monitoring points was recorded on an incremental digital recorder for all flights. Multivariate analyses were performed on both aircraft status variables and control input workload/activity measures. Under the conditions tested, the stability augmentation system evaluated did not provide a clearcut improvement in flight performance and workload across all flight parameters.

Author (GRA)

**N79-12710#** School of Aerospace Medicine Brooks AFB Tex  
**HUMAN COMPATIBILITY TESTING OF A 2-MAN MOLECULAR SIEVE OXYGEN GENERATOR** Interim Report, 1 Oct - 31 Dec 1977

Roger L Stork Clarence F Theis, Kenneth G Ikels, and Richard L Miller May 1978 23 p refs  
(AD-A058248 SAM-TR-78-18) Avail NTIS  
HC A02/MF A01 CSCL 06/11

This report describes a series of human compatibility tests conducted to man-rate a 2-man molecular sieve oxygen generating system prior to aircraft flight test in the US Navy EA-6B aircraft. The protocol included ground-level evaluations and chamber flights up to 13.4 km (44,000 ft) altitude simulating the operating envelope of the EA-6B. It was concluded that the molecular sieve generating unit provided adequate oxygen under all anticipated flight conditions. It was recommended however that the flight test program incorporate an improved oxygen regulator to enhance system performance.

Author (GRA)

**N79-12711#** Naval Air Test Center Patuxent River, Md  
**AIRCREW PERSONNEL RESTRAINT SUBSYSTEMS**  
**DEFINITION OF DEFICIENCIES AND REQUIREMENTS**  
Final Report

R Bason and J Etaeredge 24 Aug 1978 216 p refs  
(AD-A058995 NATC-SY-28R-78) Avail NTIS  
HC A10/MF A01 CSCL 01/3

NAVAIRTESTCEN was tasked to examine reported problems with aircrew torso restraint garments. Five sources of information were used for the investigation into the reported problems. Development of a logic tree for analysis of reported inadequate restraint of aircrews. Examination of Medical Officers Reports from 1969 through 1976 pertaining to ejections from aircraft in which the MA-2 Integrated Torso Harness was a part of the restraint system. Examination of Unsatisfactory Reports for the same period solicitation of an Aircrew Personnel Restraint Questionnaire from aircrew assigned to high performance tactical aircraft and a laboratory study of the biomechanics of -Gz restraint. The MA-2 Integrated Torso Harness was found to be inadequate in all respects for -Gz restraint and ineffective as a restraint garment for -Gx and lateral (Gy) accelerative forces. Data were developed defining the effects of negative Gz upon the body suggesting that it produces two separate components: off-seat travel and body stretch, each of which requires specific treatment by any proposed restraint system. Recommendations are made for immediate improvement of deficiencies in the design of the restraint harness and its related subsystems, and emphasis is placed on the need for reevaluation of restraint needs, mobility needs and the comfort of the crewmember in future design efforts. Further research development and testing of a variety of harnesses is urged.

Author (GRA)

**N79-12712#** Naval Weapons Center, China Lake Calif  
**SAFETY EVALUATION TESTS OF PERSONAL PROTECTIVE EQUIPMENT FOR ORDNANCE OPERATIONS**

Glenn C Pritchard Aug 1978 43 p  
(AD-A058987, NWC-TP-6008) Avail NTIS HC A03/MF A01 CSCL 19/1

This report presents and summarizes the results of tests conducted at the Naval Weapons Center to study the effectiveness of personal protective equipment used in operations involving propellants, explosives, pyrotechnics and other high-energy materials. Criteria used to evaluate the equipment and the limitations of each type of equipment are discussed. Variables to be controlled or included in future tests are also discussed.

Author (GRA)

**N79-12713#** Dynamic Science Phoenix Ariz  
**EVALUATION OF OCCUPANT PROTECTION DEVICES AND RESTRAINT SYSTEMS** Final Test Report, Aug - Oct 1977

Richard W Carr Dec 1977 133 p  
(Contract DOT-HS-7-01542)  
(PB-284299/5 DOT-HS-803420 Rept-3994-77-189) Avail NTIS HC A07/MF A01 CSCL 13F

The results of four full-scale crash tests are presented. The object of these tests was to gather data for evaluating Volvo air cushion restraint (ACR) systems and conventional Volvo three-point belt restraint systems during a high speed frontal car-to-car collision.

gra

**N79-12714#** Man Factors, Inc San Diego, Calif  
**DEVELOPMENT OF RECOMMENDATIONS TO IMPROVE CONTROLS OPERABILITY** Final Report, Jul 1976 - Nov. 1977

T L Black W E Woodson, and P H Selby Nov 1977 209 p refs  
(Contract DOT-HS-6-01445)  
(PB-284433/0, MFI-77-108(F) DOT-HS-803456) Avail NTIS HC A10/MF A01 CSCL 13F

Automobile driver control locations and operational modes and expectancies were studied in order to develop recommendations for modifying Federal Motor Vehicle Safety Standard No 101. Study phases included: (1) a field investigation of driver controls operation expectancies, (2) derivation and review of proposed rule-making recommendations, (3) analysis of current control option provisions in domestic and foreign vehicles and (4) preparation of recommendations for modification/improvement of FMVSS No 101 and future research standards. Results include the analysis of control operation expectancy data to support specific recommendations for improved driver-controls interface, and the identification of several areas for rule-making in which current information is inadequate.

GRA

**N79-13676#** National Aeronautics and Space Administration Washington, D C

**THE EFFECTS OF STRONG SHOCK WAVES ON MORTALITY RATES AND PERCENTAGES OF PULMONARY LESIONS IN RATS AS A FUNCTION OF THE NUMBER OF EXPOSURES**

Patrick Vassout and Georges Parmentier Dec 1978 13 p refs. Transl into ENGLISH of Etude des Effets des Ondes de Choc Fortes sur les Taux de Letalite et les pourcentages de Lesions Pulmonaires chez le Rat en Fonction du Nombre d'Expositions. Inst Franco-Allemand de Rech., St Louis, France 1978 p 1-13. Transl by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)  
(NASA-TM-75598) Avail NTIS HC A02/MF A01 CSCL 06C

The results of the study reveal that with regard to the pulmonary lesions, twice the number of exposures is compensated for by quartering the overpressure of the wave crest. With regard to the mortality rates, it reveals that halving the overpressure of the wave crest is offset by a 20-fold increase in the number of exposures.

G Y

**N79-13677#** Battelle Pacific Northwest Labs., Richland, Wash  
**PACIFIC NORTHWEST LABORATORY REPORT FOR 1977 TO THE DOE ASSISTANT SECRETARY FOR ENVIRONMENT. PART 2: ECOLOGICAL SCIENCES**

B E Vaughan Feb 1978 162 p refs  
(Contract EY-76-C-06-1830)  
(PNL-2500-Pt-2) Avail NTIS HC A08/MF A01

An understanding of the behavior and fate of airborne pollutants following interception by plant foliage was developed. Submicron (less than 1 micrometers) particles intercepted by plant canopies behaved differently, with respect to retention time on foliage, than greater than 10 micrometers particles. Submicronic particles were shown (respiratory size range) to be effectively intercepted and retained on plant foliage. Even under rigorous leaching conditions, greater than 70 percent of the deposited Am is retained. The data also suggest that retention tends to increase with residence time on foliage. Transport studies showed a significant fraction of the foliar deposits to be transported to roots and seed. The quantity transported to these tissues tends to increase following leaching treatments (simulated rainfall). DOE

**N79-13678#** National Technical Information Service, Springfield, Va

**ECOSYSTEM MODELS, VOLUME 3 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Nov 1977 - Oct. 1978**

Elizabeth A Harrison Oct 1978 44 p Supersedes NTIS/PS-77/1011 NTIS/PS-76/0904, NTIS/PS-75/846  
(NTIS/PS-78/1146/6, NTIS/PS-77/1011, NTIS/PS-76/0904, NTIS/PS-75/846) Avail NTIS HC \$28 00/MF \$28 00 CSCL 06F

The preparation and use of ecosystem models are covered in this bibliography of Federally-funded research. Models for marine biology, wildlife, plants, water pollution, microorganisms, food chains, radioactive substances, limnology, and diseases as related to ecosystems are included. This updated bibliography contains 38 abstracts, all of which are new entries to the previous edition. GRA

**N79-13679#** National Technical Information Service, Springfield, Va

**ECOSYSTEM MODELS, VOLUME 2 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Nov 1975 - Nov. 1977**

Elizabeth A Harrison Oct 1978 187 p  
(NTIS/PS-78/1145/8) Avail NTIS HC \$28 00/MF \$28 00 CSCL 06F

The preparation and use of ecosystem models are covered in this bibliography of Federally-funded research. Models for marine biology, wildlife, plants, water pollution, microorganisms, food chains, radioactive substances, limnology, and diseases as related to ecosystems are included. This bibliography contains 181 abstracts, none of which are new entries to the previous edition. GRA

**N79-13680** California Univ., Davis  
**NONSHIVERING THERMOGENESIS IN NORMAL AND DYSTROPHIC MUSCLE Ph D Thesis**

Nancy Jane Tesky 1978 99 p  
Avail Univ Microfilms Order No 7822678

Experiments were performed using normal and dystrophic hamsters. In vivo recordings of membrane potential and resistance were made in hindlimb muscles to determine the effects of norepinephrine (experimental) and saline (control) iv injections. In vitro studies to determine the rate constants of Na-22 efflux from normal and dystrophic muscle with and without ouabain addition were performed. In vivo studies of the effects of alpha- and beta-adrenergic agonists on membrane potentials of normal hamsters were conducted. These experiments demonstrate that iv NE administration to anesthetized hamsters is followed by a significant depolarization of the cell membranes of skeletal muscles in normal and dystrophic hamsters accompanied by a decrease in membrane resistance in both types of animals. Results of the rate constant study show that normal and dystrophic muscles extrude sodium at identical rates with and without ouabain inhibition of the sodium pump. The results are interpreted as indicating that both adrenergic pathways are involved in the adrenergic-induced responses of the muscle membrane nonshivering thermogenesis. Dissert Abstr

**N79-13683** Rochester Univ., N Y  
**DIFFRACTION-BASED CHARACTERIZATION OF BIOLOGICAL TISSUE WITH ULTRASOUND Ph D Thesis**  
Robert Marc Lerner 1978 147 p  
Avail Univ Microfilms Order No 7818272

A model for inferring tissue structure from ultrasonic scattering measurements was developed by considering tissue to be a relatively homogeneous weak scattering medium which redirects only a fraction of the incident sound power from the beam. Mathematical analysis shows that the scattered sound wave may be interpreted in terms of the Fourier transform of the acoustic refractive index variations in tissue. Three types of targets were illuminated with ultrasound and the scattered signals were measured as a function of frequency or angle. Both swept-frequency and angle scan data on crosslinked dextran particles show trends in which smaller particles scatter acoustic power at greater angles off axis. Preliminary swept-frequency and angle scan data from human liver tissue demonstrates that the technique is sensitive to the tissue structure and hence, pathology. Dissert Abstr

**N79-13684** Duke Univ., Durham, N C  
**NONINVASIVE ESTIMATION OF BILIRUBIN AND HEMOGLOBIN OXYGEN SATURATION IN THE SKIN-BY REFLECTION SPECTROPHOTOMETRY Ph D Thesis**

Robert Alan Bruce 1978 202 p  
Avail Univ Microfilms Order No 7821295

A method is presented here for the estimation of serum bilirubin in infants from the spectral reflectance of the skin. Measurements were made with a specially designed reflectance spectrophotometer which allowed reflectance to be measured at many wavelengths with high speed. Reflectance measurements were obtained for the skin of a group of jaundiced Gunn rats whose serum bilirubin levels had been controlled with the drug cholestyramine. Skin reflectance data were also obtained for a group of jaundiced infants with a wide range of skin melanin pigmentation. These measurements were related to serum bilirubin values obtained by analysis of blood samples. Dissert Abstr

**N79-13685#** Federal Aviation Administration, Washington D C  
Office of Aviation Medicine

**PSYCHOPHYSIOLOGICAL EFFECTS OF AGING DEVELOPING A FUNCTIONAL AGE INDEX FOR PILOTS 2 TAXONOMY OF PSYCHOLOGICAL FACTORS**

Siegfried G Gerathewohl Mar 1978 76 p refs  
(FAA-AM-78-16) Avail NTIS HC A05/MF A01

Three methodological approaches are used to determine the psychological and psychophysiological factors which are thought to be representative of and essential to effective pilot performance. They consist of (1) the analysis of successful pilot behavior as displayed under simulated and operational conditions, (2) the analysis of unsuccessful pilot behavior (pilot error) as related to aircraft accidents, and (3) the evaluation of pilot performance during the selection and training procedures as reported in the literature. By means of factor analyses, logical deductions, and clinical interpretations of the results obtained by various investigators, 14 factors are identified and described, namely (1) perception, (2) attention, (3) reaction, (4) orientation, (5) sensorimotor, (6) stamina, (7) cognition/mentation, (8) interpersonal relations, (9) decision making, (10) experience, (11) learning, (12) personality, (13) mechanical ability, and (14) motivation. The relationship of these factors to age and the aging pilot is discussed. S B S

**N79-13686#** National Aeronautics and Space Administration  
Ames Research Center, Moffett Field, Calif  
**PHYSIOLOGICAL RESPONSES OF WOMEN TO SIMULATED WEIGHTLESSNESS A REVIEW OF THE FIRST FEMALE BED-REST STUDY**

Harold Sandler and David L Winter 1978 92 p refs  
(NASA-SP-430) Avail NTIS HC A05/MF A01 CSCL 06S

Subjects were exposed to centrifugation to lower body negative pressure (LBNP) and to exercise stress both before and after bed rest. Areas studied were centrifugation tolerance, fluid electrolyte changes and hematology, tolerance to LBNP, physical working capacity, biochemistries, blood fibrinolytic



activity, female metabolic and hormonal responses, circadian alterations, and gynecology Results were compared with the responses observed in similarly bed-rested male subjects The bed-rested females showed deconditioning responses similar to those of the males, although with some differences Results indicate that women are capable of coping with exposure to weightlessness and, moreover, that they may be more sensitive subjects for evaluating countermeasures to weightlessness and developing criteria for assessing applicants for shuttle voyages

G G

**N79-13687#** National Aeronautics and Space Administration, Washington, D C

**PAUL BERT**

J Colin Dec 1978 23 p Transl into ENGLISH from Science (France) no 12 Oct 1978 p 27-33 Transl by Kanner (Leo) Associates Redwood City, Calif  
(Contract NASw-3199)

(NASA-TM-75599) Avail NTIS HC A02/MF A01 CSCL 06P

This biographical article on Paul Bert highlights his studies on the physiology of respiration and barometric pressure and in particular his contributions to the understanding of hypoxia hyperoxia and anesthesia

Author

**N79-13688#** Virginia Polytechnic Inst and State Univ, Blacksburg Dept of Engineering Science and Mechanics

**AERODYNAMIC FORCES EXERTED ON AN ARTICULATED HUMAN BODY SUBJECTED TO WINDBLAST Final Technical Report, 1 Mar 1977 - 28 Feb 1978**

Daniel J Schneck 12 Jun 1978 21 p refs

(Grant AF-AFOSR-3296-77, AF Proj 2312)

(AD-A059023, AFOSR-78-1147TR)

Avail NTIS

HC A02/MF A01 CSCL 01/3

This report describes an extension of a mathematical model previously developed to study the forces to which an ejection seat occupant is exposed during high-speed ejections The forces which tend to dislodge two limbs from one another, or from a restraining surface are calculated to exceed 600 pounds for Mach numbers above 0.7 It is concluded that, for high angles of attack a pilot's musculo-skeletal system is not likely to withstand this tendency for dislodgement from a restraining surface and consequently windblast and flail injuries are probable

Author (GRA)

**N79-13689#** Franklin Inst Research Labs, Philadelphia, Pa Science Information Services Dept

**BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION VOLUME 2, NUMBER 4 A DIGEST OF CURRENT LITERATURE Quarterly Report, Mar - Jun 1978**

Bruce H Kleinstein and Elena P Saboe Jun 1978 94 p

(Contract TP-7AC024)

(AD-A055569, FRL-80G-C4735-01-Vol-2-4) Avail NTIS

HC A05/MF A01 CSCL 06/16

This quarterly digest presents current awareness information on the biological effects of nonionizing electromagnetic radiation (microwave and radiofrequency) in the range of 0 Hz to 100 GHz The effects of magnetic and electric fields (static and alternating) are also covered Each issue contains abstracts of English and foreign current literature, summaries of ongoing research investigations news items and a directory of meetings and conferences

Author (GRA)

**N79-13690#** Air Force Inst of Tech, Wright-Patterson AFB, Ohio School of Engineering

**AIRCREW INFIGHT PHYSIOLOGICAL DATA ACQUISITION SYSTEM 2 M S Thesis**

Joseph Gregory Jolda and Stephen John Wanzek Dec 1977 179 p refs

(AD-A055638, AFIT/GE/EE/77-21)

Avail NTIS

HC A09/MF A01 CSCL 06/16

This paper discusses a second generation microprocessor-based prototype system to acquire, analyze, and store selected environmental and physiological data from a pilot during flight The Aircrew Inflight Physiological Data Acquisition System (IFPDAS) II consists of an input multiplexer and analog-to-digital

converter, a heart rate detector, a microprocessor, and a permanent memory device The microprocessor's operating system monitors eight sensors, extracts desired information and stores these reduced in permanent memory After the flight these data are transferred to a land-based computer which completes the data processing and graphs the following environmental and physiological information versus flight time (1) cabin absolute pressure, (2) cabin altitude, (3) Z-G's, (4) heart rate, (5) breathing rate, (6) minute ventilation volume, (7) inspired oxygen quantity, and (8) expired oxygen quantity The completed IFPDAS II prototype provides the desired information well within the required accuracy

GRA

**N79-13691#** Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md

**NONIONIZING RADIATION PROTECTION SPECIAL STUDY: INFRARED RADIATION HAZARD EVALUATION OF THE ROTARY FORGE, WATERVLIET ARSENAL, WATERVLIET, NEW YORK, MARCH - APRIL 1978**

W J Marshall Jun 1978 15 p refs

(AD-A055643, USAEHA-42-0360-78)

Avail NTIS

HC A02/MF A01 CSCL 06/16

The rotary forge at Watervliet Arsenal was surveyed for infrared hazards on 9-10 March 1978 It was found that levels of infrared exceeding protection standards for 10-second exposures were present at distances less than approximately 3 meters from the radiation source This radiation would, however be easily detected by exposed personnel due to body heating and would not, therefore, present a serious health hazard due to whole-body heating However, eye protection against infrared was deemed necessary due to possible cataract formation from repeated exposures

Author (GRA)

**N79-13692#** Letterman Army Inst of Research, San Francisco, Calif

**HONEST 1- PERSONALITY, HEART RATE, URINARY CATECHOLAMINE, AND SUBJECTIVE FATIGUE MEASURES RELATED TO NIGHT NAP-OF-THE-EARTH FLYING Final Report, Sep - Nov, 1976**

David A Stamper, Bruce C Leibrecht, and Andree J Lloyd Jan 1978 45 p refs

(DA Proj 3M1-61102-BS-02)

(AD-A054888, LAIR-51) Avail NTIS HC A03/MF A01 CSCL 06/16

Personality, subjective fatigue, urine catecholamine, and heart rate measures of helicopter pilots that participated in a night nap-of-the-earth training exercise were evaluated These selected variables provided estimates of normal personality function, subjective feeling states, and biochemical and physiological changes According to the hypothesis, these variables are related to night nap-of-the-earth flying Scores on the Self-acceptance and Achievement via Independence scales of the California Psychological Inventory (CPI) were significantly above the mean for pilots rated as above average ability Additionally, the CPI scales of Self Control and Good Impression were significantly related to urine catecholamine levels Heart rate levels were significantly related to epinephrine, but not to norepinephrine Despite the significant increases in epinephrine within flights and norepinephrine across flights, there were no significant increases in perceived anxiety, as measured by the State-Trait Anxiety Inventory The lack of increase in perceived anxiety may be explained by the processes of dissociation and the general adaptation syndrome

Author (GRA)

**N79-13693#** Army Aeromedical Research Lab, Fort Rucker, Ala

**THE EFFECT OF NAP-OF-THE-EARTH (NOE) HELICOPTER FLYING ON PILOT BLOOD AND URINE BIOCHEMICALS Final Report**

David B Anderson, Rodenck J McNeil, Martha L Pitts, and Dorolyn A Perez-Poveda Jul 1977 23 p refs

(AD-A055204, USAARL-77-20)

Avail NTIS

HC A02/MF A01 CSCL 06/19

Selected blood and urine chemistries were compared in helicopter pilots flying alternately nap-of-the-earth (NOE) and routine flight profiles The NOE flights resulted in significantly

higher urinary catecholamine excretion (P less than 0.05), serum uric acid (P less than 0.05) and blood lactic acid (P less than 0.01). Preflight cortisol was significantly higher than post-flight (P less than 0.01), and post-flight catecholamine excretion rate was higher than during the three hour post-flight sample period (P less than 0.01). The biochemical results are consistent with the reports that NOE flight is physically more demanding in terms of muscular strain. The increased catecholamine excretion may indicate the perception of NOE flight as a more demanding and stressful activity than flight at higher altitudes. In light of previous work, the higher serum uric acid levels prior to NOE flight may provide a measure of the pilot's psychological preparation and possible performance during NOE flight.

Author (GRA)

**N79-13694#** Army Aeromedical Research Lab., Fort Rucker, Ala

**THE INTERACTION OF CARBON MONOXIDE AND ALTITUDE ON AVIATOR PERFORMANCE: PATHOPHYSIOLOGY OF EXPOSURE TO CARBON MONOXIDE**

Joseph C. Denniston, Frank S. Pettyjohn, James K. Boyter, John K. Kelliher, Bruce F. Hiott, and Charles F. Piper. Apr 1978. 46 p. refs.

(AD-A055212, USAARL-78-7) Avail NTIS HC A03/MF A01 CSCL 06/19

A reappraisal of the interaction of carbon monoxide and altitude is presented in light of current concepts of the pathophysiology of low level exposure to carbon monoxide. The review includes a discussion of (1) the potential sources of carbon monoxide, (2) the factors affecting the absorption, transport, and elimination of carbon monoxide, (3) the effects of carbon monoxide on human health and cognitive function, (4) the interaction of carbon monoxide and altitude, and resulting hypoxia, (5) the concept of equivalent physiological altitudes, (6) predictable effects of transient elevation in carbon monoxide, (7) limits of carbon monoxide exposure, and (8) the basic pathophysiological changes occurring with hypobaric hypoxia and/or carbon monoxide hypoxia.

Author (GRA)

**N79-13695#** Army Aeromedical Research Lab., Fort Rucker, Ala

**CONTRAST SENSITIVITY OF THE HUMAN EYE TO VARIOUS DISPLAY PHOSPHOR TYPES**

Robert W. Verona. Apr 1978. 8 p. refs.

(AD-A058383) Avail NTIS HC A02/MF A01 CSCL 17/2

Observer threshold performance data was obtained using sine wave and tactical vehicle imagery displayed on television monitors, each with a different phosphor screen. Display performance was measured using sine waves and in scanning spectroradiometer.

Author (GRA)

**N79-13696#** School of Aerospace Medicine, Brooks AFB, Tex. **MINUTEMAN MISSILE CREW FATIGUE AND 24-HOUR ALERTS. Final Report, May 1977 - Feb 1978**

William F. Storm and Stephen F. Gray. May 1978. 15 p.

(AF Proj 7930)

(AD-A056561, SAM-TR-78-19)

Avail NTIS

HC A02/MF A01 CSCL 06/19

A battery of psychobiological measures was used to evaluate the degree of fatigue experienced by missile crews performing 24-hour continuous duty alert tours at Minuteman launch control centers. Operationally significant findings relative to the duty schedule occurred for subjective fatigue scores, hours slept per day, and urinary outputs of 17-OHCS, sodium, and potassium. The moderate postalert fatigue and physiologic cost present at the end of the 24-hour alerts were ameliorated by one night of undisturbed sleep. Values indicative of severe crew fatigue or stress were never attained for any of the measures. A buildup of cumulative fatigue over several alerts could be avoided by scheduling a minimum of two consecutive nights sleep at home between alerts. The impact of the duty schedule on contingency and emergency situations was also considered.

Author (GRA)

**N79-13697#** Washington Univ., Seattle. **GAS EXCHANGE UNDER ENVIRONMENTAL STRESS. Final Report, 4 Nov. 1975 - 3 Feb. 1978**

Harold I. Modell and Michael P. Hlastala. Jul 1978. 72 p. refs.

(Contract F41609-76-C-0016)

(AD-A058242, SAM-TR-78-24)

Avail NTIS

HC A04/MF A01 CSCL 06/19

The purpose of this project was threefold: (1) to assemble available information concerning the effects of various environmental factors such as altitude, acceleration, and breathing gas composition on gas exchange, (2) to initiate a mathematical simulation of gas exchange between atmosphere and tissues that would predict the effects of these factors on gas exchange at rest and during exercise, and (3) to identify areas for future experimental investigation. A computer model which includes a multi-compartment lung and lumped tissue beds representing brain, heart, muscle, and the remaining tissues was developed. Inputs are barometric pressure, inspired oxygen and carbon dioxide concentrations, carboxyhemoglobin concentration, acceleration in the z vector, and oxygen consumption. Steady state values are calculated for gas exchange parameters in the lungs and in the four tissue compartments. The simulation is designed in a modular fashion to enhance the ability to modify it as additional experimental data become available. The model provides qualitatively accurate predictions of experimental data showing responses to a single stress. Extensive experimental data of responses to multiple stresses with which to compare model predictions are not available. Results with multiple stresses indicate that experimental work aimed at better definition of minute to minute control of ventilation is necessary.

GRA

**N79-13698#** Louisville Univ., Ky. Dept. of Ophthalmology. **MECHANISMS OF RETINAL DAMAGE FROM CHRONIC LASER RADIATION. THRESHOLDS AND MECHANISMS**

Theodore Lawwill, Steve Crockett, and Glenna Currier. Aug 1977. 43 p. refs.

(Contract DAMD17-74-C-4026, DA Proj 3E7-62772-A-813)

(AD-A058449, AR-4) Avail NTIS HC A03/MF A01 CSCL 20/5

The effect upon the retina of exposure to large fields of bright visible light has been evaluated. The thresholds for permanent retinal damage for four hour exposures in rhesus monkeys have been established for white light and laser lines of 514.5 nm, 488 nm, 457.9 nm, and 590 nm. The damage has been evaluated by ophthalmoscopy, electroretinography and light and electron microscopy. The shortest wavelength light (457.9 nm) is more effective in causing damage, particularly histological damage, which is spread throughout the fundus and throughout the retina layers. Functional damage shown by the electroretinogram follows a different action spectrum without the increased effect in the blue. There appears to be more than one mechanism for retinal damage in chronic light exposure and at least one mechanism is not dependent solely upon the visual pigment and the pigment epithelium. Thresholds of permanent damage appear to be within one or two log units of light levels encountered in the normal visual environment. Newer data suggest that this damage is additive. Daily one hour exposures for four days produce damage equivalent to a single four hour exposure at the same retinal irradiance.

Author (GRA)

**N79-13699#** School of Aerospace Medicine, Brooks AFB, Tex. **FIGHTER INDEX OF THERMAL STRESS: DEVELOPMENT OF INTERIM GUIDANCE FOR HOT-WEATHER USAF OPERATIONS. Interim Report, Jul - Sep 1977**

Richard F. Stribley and Sarah A. Nunneley. Feb 1978. 22 p. refs.

(AF Proj 7930)

(AD-A053471, SAM-TR-78-6) Avail NTIS HC A02/MF A01

CSCL 06/19

Operation of fighter and trainer aircraft in hot climates can impose significant heat strain on aircrew members. Until now, commanders have lacked practical guidance for aircrew thermal protection. A primary obstacle has been the paucity of data relating cockpit conditions to ground weather, but that gap is now being filled. A review of existing heat-stress indices revealed that none of them met the criteria for operational practicality. The Wet Bulb Globe Temperature (WBGT) Index was selected as a starting point because of the large data base already

available. A new scheme was then developed, the Fighter Index of Thermal Stress (FITS), which uses recently acquired cockpit data to generate predictive equations. The final product is a single table from which base personnel, using only conventional weather data (ambient air temperature and relative humidity) can read FITS values. Normal, Caution, and Danger Zones are designated on the chart, based upon estimates of aircrew physiological status and the need to avoid significant performance decrements. Appropriate protection procedures are recommended for each zone. Author (GRA)

**N79-13700#** Health Effects Research Lab. Research Triangle Park, N. C. Environmental Toxicology Div.  
**BIOMEDICAL DATA VALIDATION THROUGH AN ON-LINE COMPUTER SYSTEM**  
Larry Claxton May 1978 16 p. refs. Sponsored by EPA  
(PB-285249/9, EPA-600/1-78-038) Avail NTIS  
HC A02/MF A01 CSCL 06E

Since health and regulatory decisions are being based upon the results of many short term tests conducted in many laboratories, a computerized system for an assurance of quality control would be valuable. This paper presents how quality assurance controls were included within the computer programming for a short term test-the Salmonella suspension assay for mutagenesis. GRA

**N79-13701#** Colorado Univ., Denver Medical Center.  
**NONINVASIVE ASSESSMENT OF PULMONARY HYPERTENSION. Annual Report, Jun. 1977 - May 1978**  
John T. Reeves 27 Jul 1978 41 p. refs.  
(Contract N01-HR-62920)  
(PB-285121/0, NIH-N01-HR-62920-2A) Avail NTIS  
HC A03/MF A01 CSCL 06E

A long range Doppler and experience were utilized to visualize the pulmonary artery and its flow from an esophageal and a frontal approach. Importance was placed on measuring pulse wave velocity. An initial computer program was developed which indicates that it is possible to discriminate between two pulse waves narrowly separated in time. GRA

**N79-13702#** Transportation Systems Center, Cambridge, Mass.  
**EFFECTS OF DECELERATION AND RATE OF DECELERATION ON LIVE SEATED HUMAN SUBJECTS. Final Report**  
C. N. Abernethy, G. R. Plank, and E. D. Sussman Oct 1977 26 p. refs.  
(PB-284653/3, DOT-TSC-UMTA-77-44) Avail NTIS  
HC A03/MF A01 CSCL 13F

Seated human subjects were tested to determine the maximum deceleration and rate of change of deceleration (jerk) at which the majority of users of Automated Guideway Transportation Systems could remain securely in their seats. The study was designed to determine deceleration levels necessary to dislodge passengers under normal seating conditions and to determine optimum deceleration and jerk levels which maximizes the passenger flow rate while minimizing injuries to passengers. The tests support the use of forward-facing, back-tilted seating to permit high decelerations with a low incidence of passenger dislodgement. GRA

**N79-13703#** Southwest Research Inst., San Antonio, Tex.  
**THE DISTRIBUTION OF CADMIUM AND OTHER METALS IN HUMAN TISSUES**  
D. E. Johnson, R. J. Prevost, J. B. Tillery, and R. E. Thomas May 1978 250 p. refs.  
(Contract EPA-68-02-1725)  
(PB-285200/2, EPA-600/1-78-035) Avail NTIS  
HC A11/MF A01 CSCL 06T

The relationship between cadmium, lead, zinc and mercury burdens and age was studied in five different autopsy tissues. Approximately 30 autopsy cases in each of five age groups were evaluated. Autopsy cases were from sudden or accidental death victims. Histories were collected on all cases to ascertain that a non-exposed population - with regards to cadmium - was sampled. Information on cigarette smoking diseases, etc. was also collected. A concurrent epidemiological study was

constructed to investigate the cadmium concentrations in urine and feces of persons (six age groups) not exposed to cadmium. Statistical evaluation of the data was performed. Interrelationships between all autopsy tissues for each metal were examined. Total body burdens of cadmium were calculated for standard man. GRA

**N79-13704#** National Academy of Sciences - National Research Council, Washington, D. C. Committee on Medical and Biologic Effects of Environmental Pollutants

#### ZINC

May 1978 742 p. refs.  
(Contract EPA-68-02-1226)  
(PB-285130/1, EPA-600/1-78-034) Avail NTIS  
HC A99/MF A01 CSCL 06T

The available information on zinc as it relates to its effects on man and his environment is summarized. Trace amounts of zinc are essential for normal growth in plants, animals and humans, however, excessive levels can bring on zinc toxicosis. Zinc deficiency is known to have caused congenital malformations in pregnant rats. Severe liver disease is commonly associated with loss of total body zinc. Reports suggest humans may ingest 500 mg or 1 g or more daily without adverse effects. Ten or more g taken as a single oral dose may produce gastrointestinal distress, including nausea, vomiting and diarrhea. GRA

**N79-13705#** National Technical Information Service, Springfield, Va.

#### THE TOXICOLOGY OF OZONE. A BIBLIOGRAPHY WITH ABSTRACTS. Progress Report, 1984 - Oct. 1978

Edward J. Lehmann Oct 1978 89 p.  
(NTIS/PS-78/1120/1) Avail NTIS HC \$28.00/MF \$28.00  
CSCL 06T

The toxic effects of ozone on humans, animals, and plants are cited. The effects of ozone generated as a photochemical oxidant from air pollution and the basic biological effects of ozone are discussed. Ozone's effects on forests and agricultural crops, industrial exposure, maximum exposure levels, effects of microorganisms, and physiological effects are described. This bibliography contains 85 abstracts. GRA

**N79-13706#** Washington Univ., Seattle Dept. of Psychology  
**LIFE STRESS, ORGANIZATIONAL STRESS, AND JOB SATISFACTION**

Irwin G. Sarason and James H. Johnson Mar 1978 15 p. refs.  
(Contract N00014-75-C-0905)  
(AD-A055153 SCS-LS-004) Avail NTIS HC A02/MF A01  
CSCL 05/9

The present study was designed to investigate the relationship between changes, experienced both within the personal lives of individuals and within the work environment and job satisfaction. Results suggest that negative life changes experienced within one's personal life are related to lower levels of satisfaction while both positive and negative changes experienced within the work environment are correlated with satisfaction. Positive changes being related to higher levels and negative changes being related to lower levels of satisfaction. The implications of these findings for assessing organizational stress and for the prediction of attrition from organizations are discussed. Author (GRA)

**N79-13707#** Air Force Human Resources Lab., Brooks AFB, Tex.  
**METHODOLOGY TO ASSESS PSYCHOLOGICAL STRESS AND ITS IMPACT IN THE AIR COMBAT ENVIRONMENT. Final Report, 1 Sep - 31 Dec. 1977**  
Jeffrey E. Kantor, Lawrence Klinefister and Terry A. McFarlane Mar 1978 15 p. refs.  
(AD-A053474, AFHL-TR-78-3) Avail NTIS HC A02/MF A01  
CSCL 05/10

Operations within an air combat environment are typically associated with subjective feelings of strain, pressure, and tension. These feelings are referred to as stress and can impact on

performance within the combat setting. To identify which pilot operations commonly produce stress, to assess the level of stress generated by those operations and to evaluate the impact of stress on combat performance a Combat Stress Questionnaire was developed for administration to combat experienced fighter pilots. A trial administration was conducted using members of the San Antonio Chapter of the Red River Fighter Pilots' Association, and these preliminary findings are presented. Written comments were solicited from these respondents and combined with the preliminary findings. There appear to be indications that while combat per se generates the most severe stress, it is stress experienced prior to combat which is associated with performance. Plans for extended data collection and the usefulness of these data to scientific inquiry, training, and the operational environment are discussed. A copy of the Combat Stress Questionnaire is provided in the appendix. Author (GRA)

**N79-13706#** National Bureau of Standards, Washington D C Environmental Design Research Div  
**HUMAN RESPONSES TO FIRE THREE DESIGNS FOR RESEARCH Interim Report, Nov 1977 - Jan. 1978**  
Fred I Stahl Mar 1978 34 p refs  
(PB-284959/4, NBSIR-78-1508) Avail NTIS  
HC A03/MF A01 CSCL 13L

Three exemplary research design strategies are reported, each aimed at introducing a great degree of rigor into the study of human responses to fires. Both exploratory and experimental designs were considered in various problem contexts. GRA

**N79-13709#** National Technical Information Service, Springfield Va  
**INFORMATION PROCESSING IN HUMANS, VOLUME 2 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1974 - Nov 1977**  
Elizabeth A Harrison Oct 1978 212 p  
(NTIS/PS-78/1153/2) Copyright Avail NTIS  
HC \$28 00/MF \$28 00 CSCL 05J

Psychophysiology, memory, visual evoked responses, psychocoustics, neuroses decision making and learning, as related to information processing in humans, are the topics covered by the selected abstracts of research reports. This bibliography contains 206 abstracts. GRA

**N79-13710#** National Technical Information Service, Springfield, Va  
**INFORMATION PROCESSING IN HUMANS, VOLUME 3 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, Nov. 1977 - Oct. 1978**  
Elizabeth A Harrison Oct 1978 58 p Supersedes NTIS/PS-77/1042, NTIS/PS-76/0947, NTIS/PS-75/858, NTIS/PS-75/087 (NTIS/PS-78/1154/0, NTIS/PS-77/1042, NTIS/PS-76/0947, NTIS/PS-75/858, NTIS/PS-75/087) Copyright Avail NTIS  
HC \$28 00/MF \$28 00 CSCL 05J

Psychophysiology, memory, visual evoked responses, psychocoustics, neuroses decision making and learning, as related to information processing in humans, are topics covered by the selected abstracts of research reports. This updated bibliography contains 53 abstracts, all of which are new entries to the previous edition. GRA

**N79-13711\*#** Webb Associates, Yellow Springs, Ohio  
**ANTHROPOMETRIC SOURCE BOOK VOLUME 2 A HANDBOOK OF ANTHROPOMETRIC DATA**  
Jul 1978 428 p refs For Volume 1 see N79-11734  
(NASA-RP-1024-Vol-2, S-479-Vol-2) Avail NTIS  
HC A19/MF A01 CSCL 05H

Volume 2 contains data resulting from surveys of 61 military and civilian populations of both sexes from the U.S., Europe, and Asia. Some 295 measured variables are defined and illustrated. Author

**N79-13712\*#** Webb Associates, Yellow Springs, Ohio  
**ANTHROPOMETRIC SOURCE BOOK VOLUME 3 ANNOTATED BIBLIOGRAPHY OF ANTHROPOMETRY**  
Jul 1978 130 p refs For volume 1 see N79-11734  
(NASA-RP-1024-Vol-3, S-479-Vol-3) Avail NTIS  
HC A07/MF A01 CSCL 05H

Volume 3 is an annotated bibliography covering a broad spectrum of topics relevant to applied physical anthropology with emphasis on anthropometry and its applications in sizing and design. Author

**N79-13713#** Air Force Human Resources Lab Brooks AFB Tex  
**SURVEY OF HUMAN OPERATOR MODELING TECHNIQUES FOR MEASUREMENT APPLICATIONS Final Report, Apr 1978 - Dec. 1977**  
Patricia A Knoop Jul 1978 41 p refs  
(AF Proj 6114)  
(AD-A058327, AFHRL-TR-78-35) Avail NTIS  
HC A03/MF A01 CSCL 05/9

The purpose of this study was to review existing human operator modeling techniques and evaluate their potential utility for performance measurement applications. The major human operator characteristics that ought to be accounted for by a useful model were identified. Then existing models were categorized, surveyed, and summarized. Models in each category were evaluated based on the extent to which they represent the identified human operator characteristics as well as other aspects of their general validity for performance measurement applications. Results are that none of the models implement more than a few of the human operator characteristics, many are based on assumptions which are unacceptable for measurement applications, and others have not been developed far enough to justify their use as a point of departure for measurement. It is concluded that existing models are not sufficiently representative of known characteristics of human behavior to be useful for general applications in performance measurement. Author (GRA)

**N79-13714#** Pennsylvania Univ., Philadelphia Dept of Computer and Information Sciences  
**ANALYSIS AND VALIDATION OF HUMAN BIODYNAMIC MODELS Final Report, 1 Dec 1977 - 30 Jun 1978**  
N Badler 27 Aug 1978 33 p refs  
(Contract N00014-78-C-0102)  
(AD-A059013) Avail NTIS HC A03/MF A01 CSCL 09/2

A cockpit design program, a crash victim simulator, and a new model of a human body to provide a visual facility for examining and evaluating these models has been integrated. This research included transforming the motion simulator output to position the realistic body model, combining the body model and the cockpit data in a shaded graphics display and detecting collisions between the body and the cockpit. Each of these processes is described and illustrated. Author (GRA)

**N79-13715#** Florida International Univ Miami School of Technology  
**HUMAN FACTORS ASPECTS OF LOW LIGHT LEVEL TELEVISION AND FORWARD LOOKING INFRARED SENSOR DISPLAYS 1 A FEASIBILITY STUDY OF SCALED SUBJECTIVE COMPLEXITY OF STILL SCENES APPLIED TO COMPUTER IMAGE GENERATION Final Report, Feb 1977 - Jan. 1978**  
Sybil DeGroot 1 Jan 1978 90 p refs  
(Grant AF-AFOSR-3242-77, AF Proj 2313)  
(AD-A058938, AFOSR-78-1237TR) Avail NTIS  
HC A05/MF A01 CSCL 17/5

Initial research was conducted to investigate human responses to still E-O sensor displays so effects of simulated realism could be evaluated. Research objectives included identifying scenes at different levels of scene-complexity and relating major perceptual with physical factors amenable to computer image generation. Nine subjects were psychometrically scaled for scene-complexity photographic sets of Low Light Level Television (L3TV) and Forward Looking Infrared (FLIR) displays of 16 target-areas. After debriefing, subjects matched sensor displays with color photographs. Analysis included tests for significant complexity differences, correlation between scales, and content analyses. Results included synthesized physical measures to quantify sensor displays and contrasting subject responses. Scaling FLIR scenes was reported a different and more difficult task than scaling L3TV displays; however, matching FLIR displays with color photographs was faster with fewer errors, implying

FLIR perceptual cues comparable with the graphic detail displayed by L3TV Findings support a CIG simulation using an optical array of surfaces edges, and lines with trade-off parameters in the design of a Sensor Simulator determined empirically Additional evidence indicated that visual parameters of FLIR displays may be more modified by mission assignment and atmospheric variables  
Author (GRA)

**N79-13716#** Naval Air Development Center, Warminster, Pa Aircraft and Crew Systems Technology Directorate  
**DEVELOPMENT OF THE CWU-48/P HIGH TEMPERATURE RESISTANT ARAMID KNIT FLYER'S COVERALL Interim Report**

Julius Z Lewycky and Suzanne M Reeps 24 Feb 1978 25 p refs  
(AD-A059128, NADC-77290-60) Avail NTIS  
HC A02/MF A01 CSCL 06/17

Since 1974 a program has been underway at the NAVAIR-DEVCON to develop an improved high temperature resistant aramid knit flight coverall A double-knit fabric was used to manufacture two styles of coverall designs which were evaluated by both Navy and Air Force aviators Based on the results of the evaluation, a redesign effort of both the fabric and the garment were initiated A warp knit fabric was designed to correct the deficiencies identified during the operational evaluation The basic garment configuration of one of the double knit styles was retained with specific design improvements as suggested by the test report  
Author (GRA)

**N79-13717#** Ohio State Univ Research Foundation, Columbus  
**A FORMAL MODEL OF THE ADAPTIVE AND DISCRETE CONTROL BEHAVIORS OF HUMAN OPERATORS Final Report, 1 Jun 1976 - 30 Sep. 1977**

Richard A Miller May 1978 56 p refs  
(Grant AF-AFOSR-3003-78)  
(AD-A059039, AFOSR-78-1146TR) Avail NTIS  
HC A04/MF A01 CSCL 05/8

The focus of manual control research and the methods used for modelling and theorizing about manual control task performance are briefly reviewed It is concluded that manual control research activities have been overwhelmingly concerned with constructing human operator transfer functions for simple tracking tasks It is also concluded that the mathematical methods used in this type of research (typically difference or differential equations and their corresponding transfer function representations) constrain rather tightly the type of theories which can result Further generalization of these engineering theories beyond tracking is essentially impossible It is argued, however, that control oriented concepts can be utilized to guide research on human adaptive, supervisory and co-ordinative control activities A meta-theoretic analysis of control problems is made to identify the types of objects and relations which must be addressed in any theory of manual adaptive control A new formulation of adaptive control problems is then derived From the problem description, the type of objects upon which any representation of the adaptor (the system which accomplishes adaptation) are determined Following in part work by Gaines, the adaptor is defined in terms of behaviors on a sequence of tasks  
GRA

**N79-13718#** Human Engineering Labs, Aberdeen Proving Ground, Md  
**A SURVEY OF EXISTING COMPUTER PROGRAMS FOR AIRCREW WORKLOAD ASSESSMENT Final Report**

Alan M Poston May 1978 11 p  
(AD-A058518, HEL-TM-13-78) Avail NTIS  
HC A02/MF A01 CSCL 09/2

Due to increased concerns of crew workload in tactical nap-of-the-earth environments, increased importance has been placed on the need to utilize a computer simulation to serve as a predictor or estimator, of crew loading The US Army Human Engineering Laboratory conducted a survey of existing computer programs which can be used for workload assessment Each program was assessed in terms of input requirements, processing procedures, outputs available as well as any other pertinent information Conclusions are drawn and recommendations are made as to how the Army should approach the problem of obtaining a suitable computer program  
Author (GRA)

**N79-13719#** Futures Group, Glastonbury Conn  
**A TECHNOLOGY ASSESSMENT OF VEGETABLE SUBSTITUTES FOR ANIMAL PROTEIN IN HUMAN FOOD.**

#### VOLUME 1. THE STUDY

H S Becker, R Richmond, E W Lusas (Texas A and M Univ College Station), S P Clark (Texas A and M Univ, College Station), and R O P Farnish Mar 1978 136 p refs 2 Vol (Contract NSF C-ERS-77-19549)  
(PB-284681/4, Rept-352-46-21/01, NSF/RA-780070) Avail  
NTIS HC A07/MF A01 CSCL 06H

A detailed technology assessment of vegetable substitutes for animal protein in human food is presented Vegetable protein is being used in the United States as analogs, ingredients, and extenders of meat and dairy products Federal legislation will most likely be directed towards the technology and development of new vegetable protein products, rather than influencing consumer purchasing patterns Several factors are involved in substituting vegetable protein, one of the most important of which is the form the substitution should take A recommendation is made for a complete technology assessment, which should include all important technological and socio-economic factors  
GRA

**N79-13720#** Future Systems, Inc, Gaithersburg Md  
**A TECHNOLOGY ASSESSMENT OF VEGETABLE SUBSTITUTES FOR ANIMAL PROTEIN IN HUMAN FOOD VOLUME 2 APPENDICES**

H S Becker, R Richmond, E W Lusas (Texas A and M Univ, College Station), S P Clark (Texas A and M Univ, College Station), and R O P Farnish Mar 1978 72 p 2 Vol (PB-284682/2, Rept-352-46-21/02, NSF/RA-780071) Avail  
NTIS HC A04/MF A01 CSCL 06H

In Appendix A, human physiology and the need for protein is addressed in discussions of metabolism and daily protein requirements and the impact of changes in protein intake Appendix B includes the results of a mini technology assessment This assessment of vegetable substitutes for animal protein as human food addresses (1) factors important to food-consumption patterns, (2) historic food-consumption patterns (3) important future sources of vegetable protein, including the influence of technology, legislation, and other factors, (4) potential impacts of vegetable substitutes, and (5) potential policy implications  
GRA

**N79-13996#** Joint Publications Research Service, Arlington, Va

#### LIGHT AND COLOR ON A MANNED SPACECRAFT

L Melnikov and O Andreyeva In its Transl on USSR Sci and Technol Phys Sci and Technol, No 54 (JPRS-72282) 22 Nov 1978 p 65-67 Transl into ENGLISH from Aviat Kosmonavt (Moscow), no 9, 1978 p 32-33

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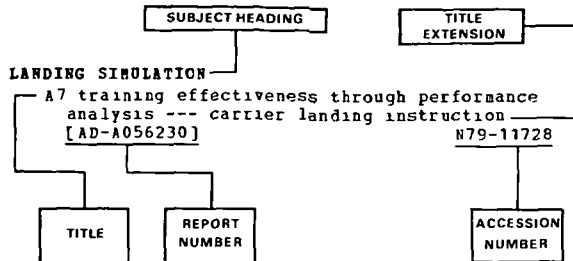
The difficulties of illumination aboard manned spacecraft and some possible solutions are discussed Problems include weight and energy restrictions, reflections, instrument crowding, level of illumination color effects and biorhythms Different illumination regimes were investigated in simulation experiments Results show that illumination on a spaceship should be dynamic and its level in case of necessity should be increased  
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MARCH 1979

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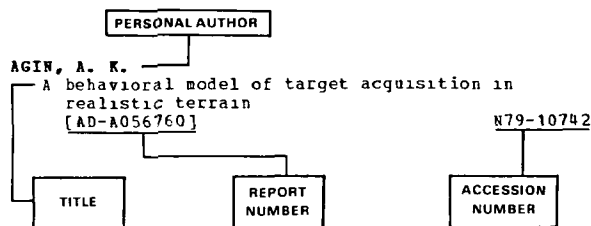
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