NASA SP-7011 (439)
May 19, 1997

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
7. Abstract
8. Abstract Author
9. Subject Terms

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 439)

MAY 19, 1997

51
LIFE SCIENCES (GENERAL)

19970013264 Hutchinson (Fred) Cancer Research Center, Seattle, WA USA
Structure and Function of the Ankyrin Repeats in the SW14/SW16 Transcription Complex of Budding Yeast ***Annual Report, 8 Jul. 1995 - 7 Jul. 1996***
Breeden, Linda, Hutchinson (Fred) Cancer Research Center, USA; Aug. 1996; 16p; In English
Contract(s)/Grant(s): DAMD17-94-J-4122
Report No.(s): AD-A316177; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Ankyrin repeats are motifs of thirty three amino acid residues, which are found in over 100 proteins. Several of these are of particular interest because they suggest roles for the ankyrin repeat in tumor development. ANK repeats were first identified in a pair of yeast transcription factors (Swi4 and Swi6), and this research is focused upon understanding the role of the ANK repeats within these proteins. We have generated libraries of PCR-generated mutants of the Swi6 ANK domain and analyzed them with respect their transcriptional activity and sequence changes. We also used site-directe d mutagenesis to systematically remove the core residues from each of the 4 ANK repeats, and found that the ANK core mutants as well as many of the random mutants are temperature sensitive for activity. This suggests that this region of the Swi6 protein is critical for the stability of the protein. We then isolated high copy suppressors of these mutants. Two gene products known to be involved in transcription and DNA interaction were identified (NHP6A and MSNl) as well as a novel protein (PIBi). The significance of these interactions is under investigation

DTIC
Deoxyribonucleic Acid; Amino Acids; Sensitivity; Stability; Proteins; Residues

19970013269 Cold Spring Harbor Lab., New York, NY USA
Abstract of Papers Presented at the 1995 Meeting on the Cytoskeleton and Cell Function ***Final Report***
Helfman, David, Cold Spring Harbor Lab., USA; Raff, Elizabeth, Indiana Univ., USA; Apr. 1995; 252p; In English, 26-30 Apr. 1995, Cold Spring Harbor, NY, USA; Sponsored by Office of Naval Research, USA
Contract(s)/Grant(s): N00014-95-1-0549
Report No.(s): AD-A311556; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

The Cytoskeleton and Cell Function meeting brought together scientists working on the cytoskeleton in invertebrate and vertegrate systems. Although much information is now available concerning the structural and molecular bases for the various cytoskeletal components, it is only recently that the function and regulation of these components in cellular processes is beginning to be understood. The meeting highlighted topics in actin filament assembly and dynamics, cell motility, microtubule assembly and dynamics cell division, intermediate filaments, molecular motors, intracellular trafficking, signal transduction, membrane-cytoskeleton interactions, and development and differentiation. Various experimental approaches were presented, including biochemistry, genetics, and molecular biology. The sessions encompassed the most recent advances in the field and made for an intense and stimulating exchange of information.

DTIC
Molecular Biology; Biochemistry; Cell Division; Cytology; Genetics

52
AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19970013141 Yale Univ., Dept. of Psychology, New Haven, CT USA
Neuronal Micronets as Nodal Elements ***Final Report***
Brown, Thomas H., Yale Univ., USA; Sep. 16, 1995; 6p; In English
Contract(s)/Grant(s): N00014-92-J-1923
Report No.(s): AD-A310107; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Author was working on developing a computationally efficient way to emulate neurons and to emulate circuits and networks of same. He made considerable progress in compressing 'realistic' representation of neuronal computations into what we consider functionally equivlent input/output devices, which are now being incorporated into dynamic network that learn associations and encode time.

Author (revised)
Neural Nets; Computerized Simulation; Machine Learning

19970013148 AUSA, Cupertino, CA USA
Human Exposure to Radiofrequency Radiation: A Review Pertinent to Air Force Operations ***Final Report, Jan. 1993 - Nov. 1995***
Heynick, Louis N., AUSA, USA; Polson, Peter, AUSA, USA; Jun. 1996; 176p; In English
Contract(s)/Grant(s): AF Proj. 7757
Report No.(s): AD-A309916; AL/OE-TR-1996-0035; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

This report presents analyses studies, research results, and other pertinent information related to investigations of human exposure to radiofrequency radiation (RFR). The topics discussed are the ANSI/IEEE RFR-exposure guidelines; environmental levels in 15 U.S. cities; and epidemiological/occupational studies, including positive and negative findings on general human health, congenital abnormalities, ocular effects, and reports of cancer incidence. Also discussed are studies in which human volunteers were exposed to RFR to investigate: the RFR-auditory effect, cutaneous perception of RFR, and RFR shock and burn. It is concluded that the human studies collectively provide no unequivocal scientific evidence that chronic exposure to RFR at intensities equal to or below those specified in the ANSI/IEEE exposure guidelines would be detrimental to human health.

DTIC
Radiation Dosage; Cancer; Exposure

19970013330 NASA Johnson Space Center, Houston, TX USA
Monoclonal Antibody Testing for Cancer Metastasis ***Final Report***
Dec. 1993; 17p; In English; Original contains color illustrations
Contract(s)/Grant(s): NAS9-18189
Report No.(s): NASA-CR-203949; NAS 1.26:203949; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Malignant cells are characterized by the ability to invade surrounding normal tissues. Tumor invasion is abetted by proteolytic enzymes that have been correlated with recurrent disease and metastasis. These enzymes are involved in a cascade of proteolytic interactions with other enzymes and inhibitors which allow cancer cells to dissolve surrounding extracellular matrix, thereby enabling the cells to rapidly invade adjacent tissues and migrate to metastatic sites distant from the primary tumor. Among these proteases are the plasminogen activators (PA), collagenase IV, faminase, and in some cases cathepsin D, which together mediate key steps in the invasion process of metastasis. Cells which have the selective advantage for invasion and metastasis are those capable of regulating their proteolytic activity and proliferation. Cells in the process of invasion would be probably down-regulated for proliferation, but subsequent to attachment and adhesion at a distant site, would then be in a proliferative mode, up-regulating DNA replication. Urokinase (uPA) can be present in the tissues in several molecular forms. The inactive proenzyme is a single chain protein (scuPA) that is cleaved at Lys. 158 to form the double chain, high molecular weight active form (HMW-uPA) of 54 kD. A low molecular weight form (LMW-uPA) can also be produced by cleavage of the HMW-U PA at Lys. 135 - Lys. 136 giving a 35 kD active enzyme. Recently, it has been shown that the HMW active form of urokinase, bound to the tumor cell membrane, is responsible for the local lysis of the extracellular matrix, hence the tissue invasion mechanism for metastasis (Andreasen et al, 19861. Receptor- (membrane) bound uPA is twice as efficient (catalytically) as free fluid-phase uPA. Tho unbound uPA and the LMW form is not responsible for most of the local dissolution of extracellular matrix in the immediate vicinity of the metastatic tumor cell. High levels of urokinase (greater than 3.49 ng/mg of total protein) extracted from breast tumor tissues have recently been shown, together with plasminogen activator inhibitor 1 (PAI-1), to be a good prognostic indicator for high risk of recurrence

and shorter patient survival times. In this project, we have attempted to develop immunocytochemical methodologies for the clinical assessment of the expression of urokinase plasminogen activator, which has been implicated to be important for initial steps in tumor invasion, and to relate it to cell proliferation and DNA replication at the single-cell level.
Derived from text
Antibodies; Cancer; Medical Science; Cells (Biology); Deoxyribonucleic Acid; Tumors

19970013381 AUSA, Cupertino, CA USA
Radiofrequency Radiation and Teratogenesis: A Comprehensive Review of the Literature Pertinent to Air Force Operations ***Interim Report, Jan. 1994 - Nov. 1995***
Heynick, Louis N., AUSA, USA; Polson, Peter, AUSA, USA; Jun. 1996; 121p; In English
Contract(s)/Grant(s): AF Proj. 7757
Report No.(s): AD-A309897; AL/OE-TR-1996-0036; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This report on analyses of various research investigations that sought teratogenetic effects of exposure to radiofrequency radiation (RFR) is one of a planned series of various topics dealing with actual or possible biological effects of RFR and their potential consequences regarding human health. In this report, critiques are presented of the research papers (in English) on the topic RFR-induced teratogenesis, selected predominantly from the peer-reviewed literature. with few exceptions. presentations at scientific symposia or abstracts thereof were excluded from consideration in expectation that more detailed, peer-reviewed accounts of such studies will appear subsequently. Endeavors were made to obtain and analyze virtually all of the peer-reviewed papers published to date, though some papers may have been missed. Most of the teratogenic studies with animals were done with RFR levels well in excess of current safety guidelines. Taken collectively, those studies indicate that teratogenic effects can occur in subjects from RFR exposure only at levels that produce significant bodily temperature increases. For mammals, increases in material body temperature that exceed specific thresholds (for each species) are necessary for inducing teratogenic effects. None of the epidemiologic studies of possible congenital anomalies provide credible evidence that chronic exposure of human mothers during pregnancy or of potential fathers to RFR a levels at or below the current maximum guidelines would cause any anomalies in their offspring.
DTIC
Congenital Anomalies; Biological Effects; Radiation Dosage; Radiation Effects; Radio Waves; Birth

19970013630 Armstrong Lab., Brooks AFB, TX USA
Effects of Melatonin on Diurnal Mood ***Final Report, Jan. 1992 - Jan. 1993***
Stoner, Paul S., Jr., Armstrong Lab., USA; French, Jonathan, Armstrong Lab., USA; Hughes, Rodney J., Armstrong Lab., USA; Whitmore, Jeffrey N., Armstrong Lab., USA; Mar. 1996; 26p; In English
Contract(s)/Grant(s): AF Proj. 7930
Report No.(s): AD-A308744; AL/CF-TP-1995-0028; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

As a substance produced nocturnally by the pineal gland, melatonin may have utility in promoting sleep during diurnal or other unusual sleep periods. Oral doses (100 mg and 10 mg) of melatonin were used to evaluate effects on diurnal mood and oral temperature. The six subjects in the experiment were male volunteers (range 20-42 years old). Oral temperature, plasma and salivary melatonin samples were obtained every 2 hours beginning at 0800 until 1700. A significant correlation (r = 0.74) occurred between plasma and salivary melatonin samples. Temperature effects, subjective fatigue and confusion scores were increased by the 100 mg dose within 3-4 hours after dosing. Salivary levels of melatonin may be used as a non-invasive measure of plasma melatonin. As a substance produced endogenously, melatonin may make useful non-addictive soporific devoid of typical sedative side effects. As a substance produced nocturnally by the pineal gland, melatonin may have utility in promoting sleep during diurnal or other unusual sleep periods. Oral doses (100 mg and 10 mg) of melatonin were used to evaluate effects on diurnal mood and oral temperature. The six subjects in the experiment were male volunteers (range 20A2 years old). Oral temperature, plasma and salivary melatonin samples were obtained every 2 hours beginning at 0800 until 1700. A significant correlation (r = 0.74) occurred between plasma and salivary melatonin samples. Temperature effects, subjective fatigue and confusion scores were increased by the 100 mg dose within 3-4 hours after dosing. Salivary levels of melatonin may be used as a non-invasive measure of plasma melatonin. As a substance produced endogenously, melatonin may make useful non-addictive soporific devoid of typical sedative side effects.
DTIC
Circadian Rhythms; Diurnal Variations; Hormones; Pineal Gland; Serotonin; Tryptophan

19970013670 Civil Aeromedical Inst., Oklahoma City, OK USA

Effects of Simulated General Aviation Altitude Hypoxia on Smokers and Nonsmokers ***Final Report***

Nesthus, Thomas E., Civil Aeromedical Inst., USA; Garner, Robert P., Civil Aeromedical Inst., USA; Mills, Scott H., Civil Aeromedical Inst., USA; Wise, Robert A., OMNI Corp., USA; Mar. 1997; 78p; In English

Report No.(s): DOT/FAA/AM-97/7; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

General aviation pilots are permitted to fly without the use of supplemental oxygen up to an altitude of 12,500 ft. However, hypoxia occurs at altitudes under 12,500 ft, Personal lifestyle, physical conditioning, and illness can interact with hypoxia to affect performance. This study evaluated physiological and cognitive performance of smokers and nonsmokers during sessions of mild hypoxia. Nine male smokers and 9 nonsmokers, after passing a Class 3 flight physical, performed the Multi-Attribute Task Battery (MATB) during separate 2-hr. sessions while breathing oxygen mixtures that simulated sea level, 5,000 ft., 8,000 ft., and 12,500 ft. altitude conditions. RESULTS: Four physiological measures: transcutaneous partial pressures of oxygen and carbon dioxide (P(sub tc)O2 and P(sub tc)CO2), heart rate (HR), and oxyhemoglobin saturation (SaO2), demonstrated significant trends across the simulated altitude conditions and for some measures, between groups. Significant effects were found for MATB monitoring task measures. Smoking group and group by altitude interaction effects were also found for the monitoring task measures. Significant smoking group differences were found in tracking performance. Results of the physiological measures obtained, confirmed the study's targeted levels of hypoxia. Smokers exhibited elevated HR and lower P(sub tc)CO2 values, compared with nonsmokers. Elevated HR is consistent with nicotine effects. Reduced P(sub tc)CO2 values may indicate greater hyperventilation among the smokers. Group differences in MATB performance involved tasks that were adjacent to the attention demanding fuel management task for which performance results were the same. Consistent with smoking research and studies of combined lowered oxygen tension and carbon monoxide, smokers may have experienced a reduction of peripheral vision and their ability to visually monitor several tasks simultaneously. The smoker group exhibited higher error rates and false alarms for the peripherally-located monitoring tasks, and showed significantly poorer tracking task performance, compared to the nonsmoker group.

Author (revised)

General Aviation Aircraft; Pilots (Personnel); Carbon Monoxide; Human Performance; Hyperventilation; Hypoxia; Oxygen Tension; Oxyhemoglobin

19970013672 Civil Aeromedical Inst., Oklahoma City, OK USA

Inflight Medical Care: An Update

DeJohn, Charles A., Civil Aeromedical Inst., USA; Veronneau, Stephen J. H., Civil Aeromedical Inst., USA; Hordinsky, Jerry R., Civil Aeromedical Inst., USA; Feb. 1997; 16p; In English

Report No.(s): DOT/FAA/AM-97/2; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A major concern in aviation medicine is the cabin inflight emergency that may result in the diversion of a flight. At the present time there is no convenient way to monitor the incidence of inflight medical emergencies because airline companies are not regularly required to report medical emergencies or resulting diversions. A survey of one major US airline revealed that one out of every one million passengers may be deplaned by an unscheduled landing because of a life-threatening medical emergency. During a two-year FAA survey of US domestic flights there were 2,322 inflight medical emergencies, averaging approximately three per day, which resulted in an annual diversion rate of approximately 9%. In a 1989 study, inflight emergencies among arriving passengers at the Los Angeles International airport were analyzed. During the six-month period of the investigation 0.003% of 8.5 million passengers developed symptoms in flight that required follow-up assistance on the ground, and 10% of these passengers required hospitalization. A survey of the status of inflight medical care aboard domestic US air carriers was undertaken to determine the impact of current changes in the airline industry. Information for the years 1990 to 1993 was obtained from two airlines and two inflight medical care delivery companies, representing a total of nine major US Part 121 air carriers. This sample accounted for approximately 65% of US domestic air carrier activity for the period 1990 to 1993. The information was reviewed to determine which category of inflight medical emergency occurred most frequently and which category accounted for the greatest number of diversions. The trend in the frequency of diversions for medical reasons was also assessed. The impact of inflight medical advice was then evaluated by comparing the number of diversions that resulted in hospitalizations to the number that did not. Our findings show that neurological, syncopal, and cardiac episodes respectively, were the most frequent categories of medical emergencies encountered inflight, while cardiac, neurological, and respiratory events, in that order, accounted for the most diversions. However, obstetrical-gynecological, cardiac, and neurological cases had the greatest probability of diverting. The diversion rate, expressed as a ratio of diversions to emergencies or diversions to enplanements, remained fairly constant. It appeared that flight crews complied with medical advice in 97% of cases, and diversions resulted in hospital admissions 86% of the time. Renewed interest in the problems of inflight medical care delivery from all segments of the air carrier industry and government has led to a great deal of research into the medical problems of patients flying with a variety of health problems. Several organizations are evaluating the inflight medical kit and its impact on medical care delivery inflight. Recently, the Air Transport Associa-

tion and the FAA's Office of Aviation Medicine have independently formed working groups to investigate this topic. This increased level of interest should result in greater cooperation within the aviation industry and a deeper understanding of all aspects of the problem.
Author
Emergencies; Medical Services; Air Transportation; Commercial Aircraft; Passengers; Aerospace Medicine

19970013677 Army Medical Research Inst. of Chemical Defense, Aberdeen Proving Ground, MD USA
The Chemistry of Perfluoroisobutylene (PFIB) with Nitrone and Nitroso Spin Traps: An EPR/Spin Trapping Study
Arroyo, Carmen M., Army Medical Research Inst. of Chemical Defense, USA; May 1996; 17p; In English
Contract(s)/Grant(s): DA Proj. 3M1-61102-BS-11
Report No.(s): AD-A311777; USAMRICD-TR-96-02; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Applying EPR/Spin Trapping techniques, several reactive intermediate species were identified in the reaction of perfluoroisobutylene (PFIB) with nitrone and nitroso spin trap agents: the carbon dioxide radical anion (CO2(-)), a carbonyl fluoride intermediate (COF), and vinyl carbanions of PFIB. The reaction of PFIB with N-t-butyl-alpha-phenylnitrone (PBN) forms a dipolar ion which undergoes electron transfer reactions generating stable nitrone spin adducts. Nitroso compounds reacted with carbanions derived from PFIB, which raises the possibility that electron transfer reactions of this type might account for the observed nitroxides. Our results suggest that PFIB undergoes some type of electron transfer reactions leading to several reactive intermediate species (RIS). The implications of these observations on pulmonary damage caused by inhalation of PFIB are discussed.
DTIC
Nitroso Compounds; Carbonyl Compounds; Organic Chemistry; Fluorine Compounds; Trapping; Chemical Analysis; Spectroscopy; Electron Paramagnetic Resonance

19970013696 Pittsburgh Univ., Pittsburgh, PA USA
Organization of the Human Circadian System ***Final Report, 1 Jun. 1993 - 31 May 1996***
Moore, Robert Y., Pittsburgh Univ., USA; May 31, 1996; 11p; In English
Contract(s)/Grant(s): F49620-93-1-0244; AF Proj. 2312
Report No.(s): AD-A311778; AFOSR-TR-96-0417; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The overall objective of this project is to provide a detailed description of the organization of the primate, including the human, circadian timing system. The specific objectives for this project period were as follows: (1) Analyze the organization of the human retinohypothalamic tract (RHT); (2) Analyze the organization of the human suprachiasmatic nucleus (SCN); (3) Analyze the organization of the macaque monkey SCN; (4) Analyze the distribution of retinal afferents to the macaque monkey intergeniculate leaflet (IGL) and the organization of its intrinsic neurons; (5) Analyze the organization of the human IGL; and (6) Determine whether there i s a human homologue of the rodent sexually dimorphic nucleus (SDN-POA).
DTIC
Circadian Rhythms; Neurons; Primates; Retina

53
BEHAVIORAL SCIENCES

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

19970013151 Brown Univ., Dept. of Cognitive and Linguistic Sciences, Providence, RI USA
Representations of Shape in Object Recognition and Long-Term Visual Memory ***Final Report, 15 Jan. 1992 - 14 Jan. 1996***
Tarr, Michael J., Brown Univ., USA; Jun. 1996; 28p; In English
Contract(s)/Grant(s): F49620-92-J-0169; AF Proj. 2313
Report No.(s): AD-A310172; AFOSR-TR-96-0303; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Our research has focused on the mechanisms used in visual object recognition. Recent psychophysical results suggest that human perceivers often rely on viewpoint-specific (view-based) representations in conjunction with normalization procedures. Over the past year we have explored the degree to which view-based representations ar e also appearance based. Specifically we have found that visual recognition across many tasks is sensitive to changes in image properties such as illumination, color, and material (texture). These results indicate that object representations are information rich and that abstract part-based structural-descriptions will not account for much of human recognition performance. Other work has focused on how view-based representations are organized and function across changes in viewpoint. Using 3D stimuli rotated in depth we have investigated the role of task, ranging from basic-level to subordinate-level discriminations, how view-based representations generalize from known

members of a class to unfamiliar members of that class, and how perceptual expertise is acquired and influences recognition strategies. We have also been investigating the mechanisms used for discriminating between highly similar objects, e.g., faces.
DTIC
Pattern Recognition; Visual Perception; Memory; Retention (Psychology)

19970013233 Army Aeromedical Research Lab., Fort Rucker, AL USA
Leaders Guide to Crew Endurance
Comperatore, Carlos A., Army Aeromedical Research Lab., USA; Caldwell, John A., Army Aeromedical Research Lab., USA; Caldwell, J. Lynn, Army Aeromedical Research Lab., USA; Jul. 1996; 53p; In English
Report No.(s): AD-A314781; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This leader's guide is about enabling soldiers to perform at their best by controlling Stress, fatigue, sleep deprivation, and problems resulting from jet lag and shift lag. It is also about controlling the hazards associated with these stressors when they cannot be completely eliminated. Key users including Mission planners who must design missions in ways that optimize soldier performance. Army and unit trainers who must teach leaders about the deleterious effects of these stressors on soldier performance and how to use risk management to prevent and control the hazards they cause. Safety managers who must design and maintain the programs. Crew endurance impacts everything soldiers do. In nearly every case, the stressor reduces the soldier's mental or physical performance. For aviators, this means a larger part of their mental resources must be committed to operating the aircraft, leaving less resources to fight the enemy. For the planner and maintainer, it means less resources available for dealing with the important details of their critical tasks. Controlling these decrements in performance is critical to mission effectiveness. Today's aviation equipment requires more alertness and concentration of aviators and maintainers than ever before. The demand on mental resources, coupled with the Army's 'We own the night' philosophy, increases the potential for crew endurance related problems.
DTIC
Aircraft Pilots; Alertness; Hazards; Mental Performance

19970013244 Uniformed Services Univ. of the Health Sciences, Dept. of Psychiatry, Bethesda, MD USA
Gender, Stress, and Coping in the U.S. Military. Volume 2. Historical Perspectives on Acculturation, Deployment, and Contingency Stresses *Final Report*
Ursano, Robert J., Uniformed Services Univ. of the Health Sciences, USA; Norwood, Ann E., Uniformed Services Univ. of the Health Sciences, USA; Fullerton, Carol S., Uniformed Services Univ. of the Health Sciences, USA; Sutton, Loree K., Uniformed Services Univ. of the Health Sciences, USA; Levinson, Catherine, Uniformed Services Univ. of the Health Sciences, USA; Oct. 1995; 171p; In English
Report No.(s): AD-A309982; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This volume derives from discussions with national and international experts to increase the understanding of gender, stress and coping in the U.S. military. It contains personal observations from a number of distinguished women who currently hold, or have held, senior leadership positions in both traditional and nontraditional fields for women. Insight is provided on deployment, contingency stresses and historical perspectives on acculturation.
DTIC
Shock (Physiology); Mental Health; Armed Forces

19970013249 Uniformed Services Univ. of the Health Sciences, Dept. of Psychiatry, Bethesda, MD USA
Gender, Stress, & Coping in the U.S. Military. Volume 4. Training, Deployment and Contingency Stressors *Final Report*
Ursano, Robert J., Uniformed Services Univ. of the Health Sciences, USA; Sutton, Loree K., Uniformed Services Univ. of the Health Sciences, USA; Fullerton, Carol S., Uniformed Services Univ. of the Health Sciences, USA; Norwood, Ann E., Uniformed Services Univ. of the Health Sciences, USA; Jackson, S. A., Uniformed Services Univ. of the Health Sciences, USA; Jan. 1996; 253p; In English
Report No.(s): AD-A309981; No Copyright; Avail: CASI; A12, Hardcopy; A03, Microfiche

This volume derives from discussions with national and international experts to increase the understanding of gender, stress, and coping in the U.S. military. It contains edited transcripts of round-table discussions with scientists from a broad range of backgrounds on topics pertaining to training, deployment, and contingency stressors. The presentations include observations and data from individuals with special expertise on the topic. Insight is provided into research hypotheses which have been explored already and questions which should be examined in the future.
DTIC
Physiological Effects; Shock (Physiology); Armed Forces

19970013251 Federal Aviation Administration, Cambridge, MA USA

A Human Subject Evaluation of Airport Surface Situational Awareness Using Prototypical Flight Deck Electronic Taxi Chart Displays ***Final Report, Aug. 1993 - 1995***

Amar, Marc J., Massachusetts Inst. of Tech., USA; Hansman, R. J., Jr., Massachusetts Inst. of Tech., USA; Hannon, Daniel J., Federal Aviation Administration, USA; Vaneck, Thomas W., Massachusetts Inst. of Tech., USA; Chaudhry, Atif I., Massachusetts Inst. of Tech., USA; Nov. 1995; 61p; In English

Contract(s)/Grant(s): FA5E2/A5007

Report No.(s): AD-A310026; DOT-VNTSC-FAA-95-36; DOT/FAA/AR-95/103; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

A study was conducted to test the effect on airport surface situational awareness of Global Positioning System (GPS) derived position information depicted on a prototypical electronic taxi chart display. The effect of position error and position uncertainty symbology were also tested. Situational awareness was assessed by asking 12 airline pilots a series of probe questions about their Location on the airport surface. The pilots used static 'snapshot' images of a north-up electronic taxi chart as well as a supporting out-the-window view and an aircraft heading display to answer the situational awareness probe questions. Four levels of GPS position error were tested ranging from 4.5 to 90 meters. Two types of position uncertainty symbology were also te sted. The variable radius uncertainty circle displayed an estimate of the current GPS position accuracy white the constant radius uncertainty circle displayed a worst-case system accuracy of 100 meters. Situational awareness, as indicated by probe question response accuracy, increased when aircraft position information was displayed on the electronic taxi chart. in addition, response time was also found to improve with the presence of aircraft position information. Response accuracy improved as position error decreased from 90 to 22.5 meters and stayed relatively constant from the 22.5 to 4.5 meter case. Pilots were faster at responding to the probe questions with the variable radius uncertainty symbology. in addition, pilots subjectivity preferred the variable radius uncertainty circle.

DTIC

Airline Operations; Safety Factors; Reaction Time; Errors

19970013320 Civil Aeromedical Inst., Federal Aviation Administration, Oklahoma City, OK USA

A Comparison of the Effects of Navigational Display Formats and Memory Aids on Pilot Performance ***Final Report***

Beringer, Dennis B., Civil Aeromedical Inst., USA; Harris, Howard C., Jr., Civil Aeromedical Inst., USA; May 1996; 11p; In English

Report No.(s): AD-A310021; DOT/FAA/AM96/16; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A great deal of effort has been invested in examining integrated instrumentation for advanced cockpits, but little comparable effort has been directed toward the greatest number of aircraft presently flying - those in the general aviation environment. This series of studies examined the benefits of a simple and widely available integrated instrument, the Horizontal Situation Indicator (HSI), in the performance of simple navigational and orientational tasks by private pilots and instructor pilots. Tested in the context of the multiple-processor Basic General Aviation Research Simulator (BGARS), the private pilots exhibited significantly fewer navigational reversals and orientational errors when using the HSI (in comparison with their performances when using the traditional VOR and directional gyro combination). These results were consistent with but even more definitive than those obtained for the instructor pilots. Similar benefits in procedural error reduction were also found when instrument index markers, or 'bugs,' were used as short-term memory aids.

DTIC

Comparison; Navigation Instruments; Memory

19970013335 Civil Aeromedical Inst., Oklahoma City, OK USA

The Effects of Video Game Experience on Computer-Based Air Traffic Controller Specialist, Air Traffic Scenario Test Scores ***Final Report***

Young, Willie C., Civil Aeromedical Inst., USA; Broach, Dana, Civil Aeromedical Inst., USA; Farmer, William L., Civil Aeromedical Inst., USA; Feb. 1997; 14p; In English

Report No.(s): DOT/FAA/AM-77/4; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The FAA is currently using the Air Traffic Scenario Test (ATST) as a major portion of its selection process. Because the ATST is a PC - based application with a strong resemblance to a video game, concern has been raised that prior video game experience might have a moderating effect on scores. Much of the previous research in this area is associated with topics such as the moderating effects of prior computer experience on scores earned on computerized versions of traditional achievement or power tests, and the effects of practice on video games on individual difference tests for constructs such as spatial ability. The effects of computer or video game experience on work sample scores have not been systematically investigated. The purpose of this study was to

evaluate the incremental validity of prior video game experience over that of general aptitude as a predictor of work sample test scores. The Computer Use Survey was administered to 404 air traffic control students who entered the FAA ATCS Nonradar Screen. The resultant responses from this survey related to video games were summed and averaged to create the predictor (VIDEO). Three criterion measures derived from the ATST, (ATSAFE, ARVDELAY, HNDDELAY) were regressed on the cognitive aptitude measure that serves as the initial selection screening test and the predictor (VIDEO). Self-reported experience on video games was found to be significantly related to ARVDELAY and HNDDELAY, accounting for an additional 3.6% of the variance in ARVDELAY, and accounting for an additional 9% of the variance in HNDDELAY. The results suggested that those persons with video game experience were more efficient at hand-offs and routing aircraft. Future research is recommended to investigate the effect of prior video game experience on learning curves and strategies used in the work sample test.
Author
Air Traffic Controllers (Personnel); Education; Psychological Tests; Learning Curves; Computer Techniques

19970013336 Oklahoma Univ., Norman, OK USA
A Laboratory Model of Readiness-to-Perform Testing. 1: Learning Rates and Reliability Analyses for Candidate Testing Measures *Final Report*
Gilliland, Kirby, Oklahoma Univ., USA; Schlegel, Robert E., Oklahoma Univ., USA; Feb. 1997; 78p; In English
Contract(s)/Grant(s): DTFA-02-93-D-93088
Report No.(s): DOT/FAA/AM-97/5; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The concept of Readiness to Perform (RTP) refers to that state in which a person is prepared and capable of performing a job for which that person is willingly disposed and is free of any transient risk factors, such as drugs, alcohol, fatigue, or illness. A large study involving thirty-two subjects, five RTP tests, two work sample tasks, and three self-report measures was conducted at the University of Oklahoma to provide the FAA with a basic laboratory investigation of the 'Readiness-to-Perform' (RTP) testing concept. This report (Volume 1) presents the objectives and methodology for the overall study, along with the analysis of data from the initial training phase of the study. Learning rate information for more than seventy task measures used in the study, as well as information on the reliability of those measures, is presented. Based on the learning curve analysis, it was determined that the customary initial high rate of learning was complete for most of the candidate RTP tasks by the tenth training session. A few tasks required additional sessions, but major learning effects for nearly all of these task measures did not exist beyond the middle of the second week of training. Even following five full weeks of experience, most task measures showed some continued improvement, with the rate of improvement determined by the complexity of the task. Test-retest correlation coefficients computed for various intervals throughout the study confirmed that the RTP tasks provided multiple, highly repeatable measures that were both reliable and stable over the latter four weeks of the study. Interpretations of several interesting findings with respect to performance assessment are provided within the framework of job performance and RTP testing.
Author
Education; Performance Tests; Data Processing; Human Performance; Learning Curves

19970013351 Department of the Navy, Washington, DC USA
Projector Slides for Night Vision Training
Mittelman, Michael H., Inventor, Department of the Navy, USA; Still, David L., Inventor, Department of the Navy, USA; Temme, Leonard A., Inventor, Department of the Navy, USA; Aug. 13, 1996; 4p; In English
Patent Info.: Filed 25 Aug. 1994; US-Patent-Appl-SN-295581; US-Patent-5,546,241
Report No.(s): AD-D018227; No Copyright; Avail: US Patent and Trademark Office, Microfiche

A slide holding a film with an image containing portion adapted for use in an application such as Night Vision Goggle training in which the film in the slide is to receive an extremely low level of light is discussed. A combination of filters is placed adjacent the light receiving face of the film and an opaque mat having a cutout corresponding to the film image bearing portion is placed adjacent both the light receiving side of the filters and the light output face of the film to reduce the amount of stray light reaching the film with the components held together by a pair of frame members each holding a glass plate next to a mat.
DTIC
Night Vision; Goggles; Training Devices

19970013375 Colorado Univ., Boulder, CO USA

Bending the Power Law: The Transition from Algorithm-Based to Memory-Based Performance ***Annual Report, Aug. 1993 - 1994***

Rickard, Timothy C., Colorado Univ., USA; Mar. 1996; 120p; In English

Contract(s)/Grant(s): MDA903-93-K-0010

Report No.(s): AD-A310224; ARI-RN-96-38; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Two theories of tasks that exhibit a transition from algorithm-based to retrieval-based performance were compared. The instance theory of automaticity assumes parallel strategy execution and instance-based memory representation and predicts power function reduction in mean reaction time and Standard Deviation of mean reaction time (SD) with practice. An alternative theory is proposed that assumes nonparallel strategy execution and strength-based memory representation and that predicts, among other things, power function speed-up and reduction in SD within each strategy, and systematic deviations from power functions in both of these variables when strategy transition occurs. Two of these experiments employing pseudoarithmetic are reported. The results of these experiments are consistent with the new theory that assumes nonparallel strategy execution and strength-based memory representation. These results also constitute the first convincing demonstration of a class of adult skill acquisition tasks for which the power law of practice does not apply overall, a finding that should have notable implications for a variety of human skill acquisition theories.

DTIC

Memory; Algorithms; Mental Performance; Reaction Time

19970013541 Army Aeromedical Research Lab., Aircrew Health and Performance Div., Fort Rucker, AL USA

Female and Male Aviators are not Affected Differently by Sleep Deprivation and Continuous Task Demands ***Final Report***

Caldwell, John A., Jr., Army Aeromedical Research Lab., USA; Caldwell, J. L., Army Aeromedical Research Lab., USA; Jun. 1996; 25p; In English

Contract(s)/Grant(s): DA Proj. 3M1-62787-A-879

Report No.(s): AD-A311655; USAARL-96-28; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Recent changes in U.S. military regulations have brought about the assignment of female aviators to combat roles. This has been the topic of serious debate, but there are few facts concerning differences between males' and females' abilities to withstand combat-relevant stressors. This study was conducted to determine whether there are gender differences in responses to a common operational stressor, sleep deprivation. Six male and six female UH-60 helicopter pilots were exposed to a 40-hour period of continuous wakefulness and tested on flight performance and mood. The flight performance results indicated that gender produced virtually no operationally significant differences in the effects of sleep loss. Furthermore, although mood evaluations showed that women felt less tense and more energetic overall than their male counterparts, there were no interactions between sleep deprivation and gender. Thus, male and female aviators appear equally capable of performing flight-related tasks despite moderate sleep loss.

DTIC

Sleep Deprivation; Aircraft Pilots; Sex Factor; Human Performance; Wakefulness

19970013628 Institute for Human Factors TNO, Soesterberg, Netherlands

The Effect of Field of View and Scene Content on the Validity of a Driving Simulator for Behavioral Research ***Interim Report Het effect van beeldhock en beeldinhoud op de validiteit van een rijsimulator voor gedragsonderzoek***

Kaptein, N. A., Institute for Human Factors TNO, Netherlands; vanderHorst, A. R., Institute for Human Factors TNO, Netherlands; Hoekstra, W., Institute for Human Factors TNO, Netherlands; Jun. 06, 1996; 28p; In English

Report No.(s): AD-A311440; TNO-TM-96-A022; TDCK-RP-96-0156; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The present study addresses the effects of field of view and scene complexity on the validity of a fixed- base driving simulator with respect to braking behavior. Two driving simulator experiments were performed. The results were compared to those of a field study (Van der Horst, 1990). When approaching a stationary vehicle, subjects were instructed to brake as late as possible, without causing a collision. The instruction was either to brake "hard", or to brake "normal". Experiment 1 showed that the timing of the start of the braking maneuver was not affected by field of view and scene complexity. Yet, the coordination of the ongoing braking maneuver was more realistic with increasing field of view (120 versus 40'). In contrast to the Van der Horst (1990) study, in the present experiment drivers took larger safety margins (i.e., started to brake earlier) with higher approach speeds. This result

indicates that, for the present task, perceptual information at larger distances was insufficient in the driving simulator, even with 120' FOV and a relatively complex scene. In Experiment 2 on half of the trials the image was occluded immediately after the onset of the braking maneuver, in order to investigate the use of visual information after the start of the braking maneuver. Results showed that without visual information during the braking maneuver, drivers tended t o overshoot the intended stopping position more often. This result indicates that drivers use visual information during the braking maneuver in order to timely stop before the stationary vehicle.
DTIC
Braking; Visual Perception; Simulators; Field of View; Maneuvers

19970013637 Ohio State Univ., Columbus, OH USA
A New Approach to Aeronautical Decision-Making: The Expertise Method ***Final Report***
Kochan, Janeen A., Ohio State Univ., USA; Jensen, Richard S., Ohio State Univ., USA; Chubb, Gerald P., Ohio State Univ., USA; Hunter, David R., Federal Aviation Administration, USA; Mar. 1997; 50p; In English
Contract(s)/Grant(s): DTFA01-93-C-00041; DTFA01-92-C-10204
Report No.(s): DOT/FAA/AM-97/6; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Four studies of pilot decision-making were conducted to formulate a general model of the expert pilot that might be applied to novice pilots in order to increase their decision-making skills and reduce their risk of accident involvement. This set of studies began with a series of unstructured interviews of pilots to identify and compile characteristics of the pilot. Each succeeding study, then, became more structured in its approach as the characteristics of an expert pilot were more closely defined. From structured interviews conducted as part of the second study, a preliminary definition was obtained that stressed motivation, confidence, superior learning and performance skills, and an intuitive decision-making style. The third study evaluated these characteristics as they were possessed by pilots of three types of relatively high-performance general aviation aircraft. In the final study, experienced pilots were presented with a plausible general aviation flight scenario using a verbal protocol methodology. The responses of the pilots to this table-top simulation were recorded and analyzed. These data suggest that, when compared to competent pilots, expert pilots tend to (1) seek more quality information in a more timely manner; (2) make more progressive decisions to solve problems; and, (3) communicate more readily with all available resources.
Author
Decision Making; Aircraft Performance; Aircraft Pilots; General Aviation Aircraft

19970013691 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Human Factors Research Inst., Soesterberg, Netherlands
Test Spatial Orientation Ability ***Final Report Test Ruimtelijk Orientatievermogen***
Boer, L. C., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Jun. 10, 1996; 25p; In Dutch
Report No.(s): AD-A311550; TNO-TM-96-A023; TDCK-RP-96-0157; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The report describes the test Spatial Orientation Ability (in Dutch 'Ruimtelijk Orientatievermogen' ROV). The test aims at predicting how good people are in keeping oriented despite changes in the environment and changes in their observation position. The test is given to the Royal Nethertands Navy for further (vatidity) investigation. The report describes rationale and identity of the test. Then, the test is described, its scoring and the meaning of the scores. Also included is a manual for the test assistant. Attached as appendices are a table to decide on the presence of a guessing strategy and a teller accompanying delivery and installation of the test.
DTIC
Identities; Installing; Attitude (Inclination)

19970013757 Defence Science and Technology Organisation, Melbourne, Australia
Use of Simulation in Maritime Operations and Training
Richardson, D. D., Aeronautical Research Labs., Australia; Feb. 1996; 29p; In English
Report No.(s): AD-A311541; DSTO-GD-0045; DODA-AR-009-214; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A review was undertaken of the needs within the Royal Australian Navy for simulation and simulators. These are being used increasingly for a wide variety of purposes, or are being considered for use. A summary of the interest within Navy on the subject is presented. In addition, an assessment has been made of those aspects in which Maritime Operations Division could provide a

contribution, either through assessment, modification, or development of simulations. A list of recommendations for the way ahead for MOD activities in this area is provided.
DTIC
Requirements; Simulation; Education; Computerized Simulation

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19970013262 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
A Human Factors Evaluation of the Albedos Human-Machine Interface for Search and Rescue
McFadden, S. M., Defence and Civil Inst. of Environmental Medicine, Canada; Shek, Y. P., Defence and Civil Inst. of Environmental Medicine, Canada; Jul. 1996; 47p; In English
Report No.(s): AD-A314788; DCIEM-96-R-44; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

ALBEDOS (Airborne Laser Based Enhanced Detection and Observation System) is an active imaging device designed to enhance surveillance capability at night and under degraded weather conditions. It is currently being developed for use in search and rescue (SAR) operations. DCIEM was requested to carry out a human factors evaluation of the ALBEDOS human-machine interface (HMI) as part of a technical evaluation of the syst em. The human factors evaluation included a desktop analysis of the HMI for compliance with MIL-STD-1472D and structured interviews with potential users of the system. The users participated in the technical trials and carried out several scenarios that involved detecting and identifying targets at night. The results of the desktop evaluation indicated that the current ALBBDOS interface does not meet MIL-STD-1472D. The participants' comments supported this finding. They thought that the system could be useful for identifying targets at night and under degraded weather conditions. However, due to the current physical and manpower constraints of the SAR environment, the interface should be simplified considerably and many of the functions should be automated.
DTIC
Human Factors Engineering; Airborne Lasers; Rescue Operations; Imaging Techniques; Identifying

19970013300 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
The Effects of Wave Conditions on Dry Immersion Suit Insulation: A Comparison Between Humans and Manikin,
Ducharme, Michel B., Defence and Civil Inst. of Environmental Medicine, Canada; Brooks, Christopher J., Canadian Forces Base, Canada; Jun. 1996; 50p; In English; Original contains color plates
Contract(s)/Grant(s): W7711-2-7179/01-WSE
Report No.(s): AD-A314791; DCIEM-96-R-46; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of the present study was to investigate the effect of standard wave conditions (0 to 70 cm) on dry immersion suit insulation when tested on humans and a manikin simultaneously. Six human subjects and a thermal manikin dressed with the same dry immersion suit system (pile undergarment insulation, uninsulated immersion suit and neoprene gloves and hood) were immersed simultaneously for one hour in 16 deg C water rendered turbulent with an irregular wave pattein. One immersion was performed for each randomly chosen wave condition, from 0 to 70 cm wave height, changing by steps of 10 cm. In addition to the physiological parameters measured on the human subjects (skin and rectal temperatures, skin heat loss and heart rate), and the ambient temperature of water and air, heat fluxes and surface temperatures were measured at 12 sites on the subjects and manikin for each compartment of the dry suit system (skin, pile garment, suit garment). This allowed the calculation of the thermal resistance of every suit compartment in addition to the air and water boundary layer surrounding the suit. The results showed that none of the physiological parameters were significantly affected by the wave conditions, except for the skin heat flux which increased with wave height from 72.0 +/- 1.9 W m(-2) at 0 cm to 85.5 +/- 2.9 W m(-2) at 70 cm. The thermal resistance data showed that wave height up to 70 cm decreased dry suit system insulation by 14 and 17% when measured on human subjects and manikin, respectively; and that the only suit component significantly affected by the wave motion was the insulation of the water and air boundary layers surrounding the body.
DTIC
Body Temperature; Water Temperature; Thermal Resistance; Surface Temperature; Insulation; Human Beings; Heart Rate; Gloves; Garments

19970013348 General Accounting Office, National Security and International Affairs Div., Washington, DC USA
Physically Demanding Jobs: Services Have Little Data on Ability of Personnel to Perform
Jul. 09, 1996; 16p; In English
Report No.(s): AD-A311392; GAO/NSIAD-96-169; B-272083; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We reviewed the use and development of gender-neutral occupational performance standards in the military. Specifically, we (1) determined the military services' approaches to implementing gender-neutral performance standards and screening servicemembers to ensure that they can meet the physical demands of their occupations, (2) determined how the military services identified the extent to which servicemembers had problems in accomplishing the physical demands of their jobs, and (3) evaluated the Air Force's implementation of its strength aptitude testing program.
DTIC
Congressional Reports; Armed Forces (USA); Tasks; Military Operations

19970013362 Department of the Navy, Washington, DC USA
Respiratory System Particularly Suited for Aircrew Use
Jones, Timothy J., Inventor, Department of the Navy, USA; Hollingsworth, John E., Inventor, Department of the Navy, USA; Jul. 30, 1996; 11p; In English; Supersedes AD-D017867
Patent Info.: Filed 5 Dec. 1994; US-Patent-Appl-SN--310539; US-Patent-5,540,218
Report No.(s): AD-D018223; No Copyright; Avail: US Patent and Trademark Office, Microfiche

A respiratory system that is particularly suited to provide uncontaminated ventilation and oxygen needs of an aircrew during the ground and flight operations is disclosed. The respiratory system has provisions to provide for a continuous flow of air or oxygen during the failure mode conditions of the ventilator and oxygen generating systems supplying the respiratory system so that the aircrew is always provided with at least a flow of uncontaminated breathing fluid under such failure mode conditions.
DTIC
Oxygen Supply Equipment; Air Flow; Flight Crews; Respiratory System; Breathing Apparatus; Life Support Systems; Continuum Flow

19970013581 Geo-Centers, Inc., Fort Washington, MD USA
Core-Control (Trademark) Cooling System Worn Under Firefighting Ensemble Increases Heat Exposure Stay Time
Hagan, R. D., Geo-Centers, Inc., USA; Huey, K. A., Geo-Centers, Inc., USA; Jacobs, K. A., Geo-Centers, Inc., USA; Bennett, B. L., Naval Health Research Center, USA; Hodgdon, J. A., Naval Health Research Center, USA; Jul. 1995; 35p; In English
Report No.(s): AD-A308697; NHRC-95-40; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Shipboard firefighting can produce rapid and large increases in Heart Rate (HR) and body temperatures. The extremely high air temperatures and presence of steam indicates the need to identify and investigate different countermeasures to heat strain for use by damage control personnel during training and actual shipboard operations. In previous studies reported that torso cool vests reduced heat strain in males wearing the U.S. Navy single-piece Firefighting Ensemble (FFE) and exercising in warm/humid and hot/humid environments. However, the heat-strain reduction capacity provided by torso cool vests is limited.
DTIC
Fire Fighting; Ships; Protective Clothing

19970013679 Institute for Human Factors TNO, Soesterberg, Netherlands
Physiological Workload Reactions to Increasing Levels of Task Difficulty
Veltman, J. A., Institute for Human Factors TNO, Netherlands; Gaillard, A. W. K., Institute for Human Factors TNO, Netherlands; Jun. 21, 1996; 32p; In English
Report No.(s): AD-A311411; TNO-TM-96-A026; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The sensitivity of physiological measures to mental workload has been investigated in a flight simulator. Twelve pilots had to fly through a tunnel with different Levels of difficulty. Additionally, they had to perform a memory task with four levels of difficulty. The easiest memory task was combined with the easiest tunnel task and the most difficult memory task with the most difficult tunnel task. Between each tunnel session, subjects had to fly a pursuit task in which a target jet had to be followed at a large distance. Rest periods before and after the experiment were used as a baseline for the physiological measures. Mental workload was measured with heart period, continuous blood pressure, respiration and eye blinks. Heart rate variability, blood pressure variability and the gain between systolic blood pressure and heart period (modulus) was derived from the measures. All measures showed differences between rest and flight, and between the pursuit task and the tunnel task. Only heart period was sensitive to the different levels of the tunnel. Heart rate variability is affected by respiration, and therefore, can only be interpreted together with the respiratory data. The modulus was hardly influenced by respiration and therefore, appears to be a better measure than

heart rate variability. From the respiratory parameters, the duration of a respiratory cycle was the most sensitive to changes in workload. The time in between two successive eye blinks (blink interval) increased and the blink duration decreased as more visual information had to be processed. Increasing the difficulty of the memory task leaded to a decrement in blink interval, probably caused by subvocal activity during the rehearsal of the letters. Blink duration was not influenced by the memory load.
DTIC
Workloads (Psychophysiology); Flight Simulators; Aircraft Pilots; Physiological Responses; Task Complexity; Mental Performance; Stress (Physiology); Memory

19970013680 Institute for Human Factors TNO, Soesterberg, Netherlands
Predictive Information in the Cockpit as a Target Acquisition Aid ***Final Report Helpt Predictie-Informatie in de Cockpit bij het Opsporen van Doelvliegtuigen***
vanBreda, L., Institute for Human Factors TNO, Netherlands; Veltman, J. A., Institute for Human Factors TNO, Netherlands; May 06, 1996; 32p; In Dutch
Report No.(s): AD-A311427; TNO-TM-96-A021; TDCK-RP-96-0155; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Under contract to the Royal Netherlands Airforce, the TNO Human Factors Research Institute conducts background research concerning effects of advanced interface principles in the cockpit on flight performance, (des)orientation and workload. In this connection, a simulator experiment was conducted to investigate the potential benefits of predictive information for tracking targets. Eight fighter pilots had to trace as soon as possible a target aircraft, initially flying from an arbitrary position at a fixed distance from the own aircraft. During the search of the target aircraft, the pilots received visual support by a perspective excentric radar display with inside-out motion reference. In two experimental conditions, additional predictive graphics information was presented: based on extrapolation of translations of own aircraft and target aircraft, and based on translation and pitch. The difficulty of the scenarios was varied by directing the target towards and away from the observatory. The experimental results show that pilots were not able to find the target faster when additional predictive information was presented in the radar image. The perspective radar display offered so many anticipation possibilities that no increase of target search time was possible. There even appeared a tendency to decreased search performance. This may be caused by the fact that too much information deteriorated the interpretation (display clutter). A follow-up study is proposed, investigating whether the situational awareness of the pilot still can be increased. The results of the ongoing experiments suggest that inside-out referenced displays cause more frequent controlled flight into ground.
DTIC
Aircraft Pilots; Target Acquisition; Workloads (Psychophysiology); Human Factors Engineering; Flight Control; Cockpits; Flight Characteristics; Radar Tracking; Fighter Aircraft

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1. Report No. NASA SP-7011 (439)	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Aerospace Medicine and Biology A Continuing Bibliography (Supplement 439)		5. Report Date May 19, 1997 6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address NASA Scientific and Technical Information Program Office		11. Contract or Grant No.
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681		13. Type of Report and Period Covered Special Publication 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

This report lists reports, articles and other documents recently announced in the NASA STI Database.

17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects	18. Distribution Statement Unclassified – Unlimited Subject Category – 52

19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 34	22. Price A03/HC

For sale by the NASA Center for AeroSpace Information, 800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934