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# **AEROSPACE MEDICINE AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY**

**WITH INDEXES**

**(Supplement 149)**

**JANUARY 1976**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

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# AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY  
WITH INDEXES

(Supplement 149)

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 December 1975 in

- *Scientific and Technical Aerospace Reports (STAR)*
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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 205 reports, articles and other documents announced during December 1975 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 1975 Supplements.

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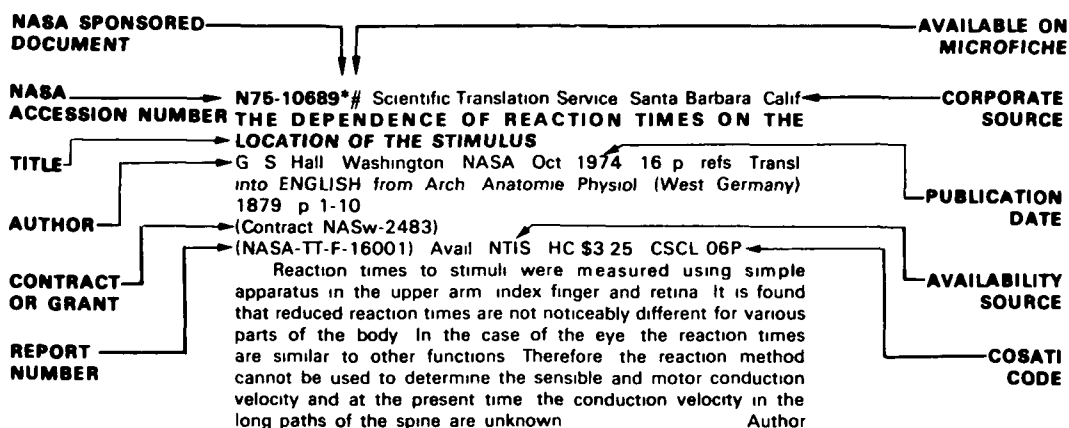
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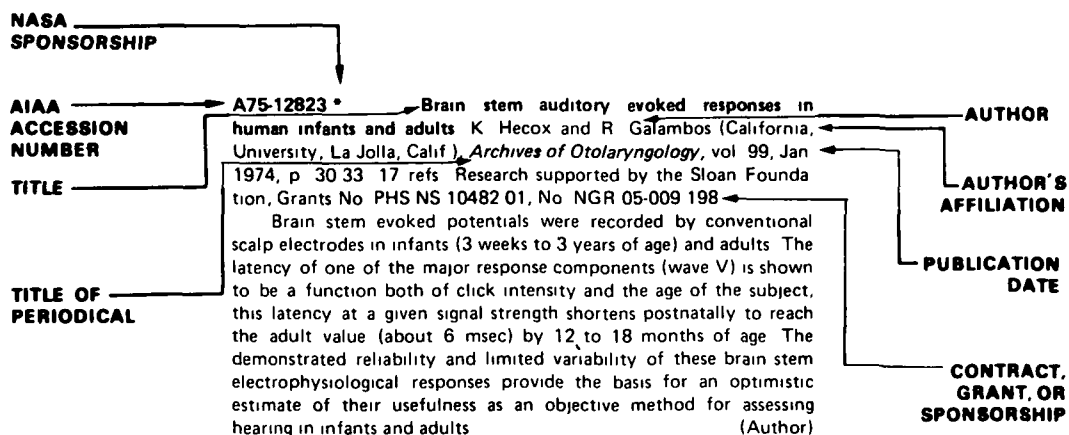
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## TYPICAL CITATION AND ABSTRACT FROM IAA



# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 149)*

JANUARY 1976

## IAA ENTRIES

**A75-45377** Computer simulations of a dynamic visual perception model P J Burt (Massachusetts, University, Amherst, Mass) *International Journal of Man-Machine Studies*, vol 7, July 1975, p 529-546 10 refs Grant No NIH-5-RO1-NS-09755-04

A model is described to suggest how the visual system may keep track of perceived objects as their images move on the retina. We postulate that at some level of the visual system the position of these objects relative to the observer is represented by a pattern of neural activity. Such a pattern of activity must move as a unit as the object it represents moves; the pattern cannot be continually regenerated during motion. In the model proposed information is represented by activity in two-dimensional, homogeneous layers of neuron-like elements. Object velocity, which cannot be directly sensed at the level of the retina, is isolated and represented analogically. This representational isolation of object- and observer-related velocity allows us to explain several illusions of motion perception, including induced motion and the waterfall effect. (Author)

**A75-45378** Eye movements and visual perception - A 'two visual system' model R L Didday (California, University, Santa Cruz, Calif) and M A Arbib (Massachusetts, University, Amherst, Mass) *International Journal of Man-Machine Studies*, vol 7, July 1975, p 547-569 35 refs Grant No NIH-5-RO1-NS-09755-03

A model of the role of eye movements is presented, taking into account neurophysiological investigations of the 'two visual systems' of Ingle et al (1967). Measurements conducted by Noton and Stark (1970, 1971) to test the relationship of a memory scheme to patterns of eye movements are considered and a computer simulation of a simplified version of the model is studied. G R

**A75-45448 #** Neural mechanisms of memory (Нейронные механизмы памяти). M. N. Livanov (Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR) *Uspekhi Fiziolohicheskikh Nauk*, vol 6, July-Sept 1975, p 66-89 63 refs In Russian

Cross-correlation methods are used to investigate the impulse activity of pairs of neurons, one member of which is in the visual and the other in the motor region of rabbit cortices. Results show definite interconnection between them. A histogram describing fluctuations in the conductivity between neurons of these regions shows a periodic nature of stimulus transmission (in the frequency range of 2-5 Hz). Periods of lowered conductivity lasting 150-200 msec are followed by periods of high conductivity about 400 msec in duration. It is proposed that neurons can direct their impulses along various neural pathways, and that connections among cortical neurons are a result of the coadjustment of their intermediate links to a common rhythmicity of processes. This coordination of cortical neurons and synchronization of their discharge during the process of information elaboration may be carried out by the reticular activating system. The prolonged retention of the interconnection provides for an 'account' of the impulses reaching the cortex. C K D

**A75-45449 #** Functions and metabolism of an organism under prolonged hypokinesia in a compound experiment (Функции и метаболизм организма при длительной гипокинезии в комплексном эксперименте) E A Kovalenko, E S Mailian, V L Popkov, Iu S Galushko, A A Prokhonchukov, Z S Dolgun, Iu I Kondrat'ev, M I. Kozar', G P Tikhonova, and A G Kolesnik *Uspekhi Fiziolohicheskikh Nauk*, vol 6, July-Sept 1975, p 110-136 92 refs In Russian

Data are presented on structural and metabolic changes observed with 2000 rats undergoing extended (100-170 days) hypokinesia in specially confining cages. Changes in gas and energy metabolism, tissular oxidation processes, tissue resistance, and tolerance of various functional loads are reported. Deviations in indicators of mineral and protein metabolism are noted, together with phasic changes in the functional activity of the hypophysial adrenal and lymphatic systems. A sharp lag in weight gain and significant growth retardation in the muscular system are observed. Electron micrographs show breakdown in the ultrastructure of the myocardial and hepatic tissue. Disruption of serotonin metabolism is not corrected by a 30-40 day return to normal activity. C K D

**A75-45551 #** Package cushioning for the human head I Y K Liu and K B Chandran (Tulane University, New Orleans, La) (*American Society of Mechanical Engineers, Winter Annual Meeting, New York, N Y, Nov 17-21, 1974, Paper 74-WA/Bio-10*) *ASME, Transactions, Series E - Journal of Applied Mechanics*, vol 42, Sept 1975, p 541-546 12 refs NSF Grant No GK-32047, Grants No NIH-GM-40723-02, No NIH-GM-40723-03, No NIH-GM-19107-01, No NIH-GM-19107-02

The closed head impact problem was idealized as a fluid-filled cylinder attached to a spring-dashpot element striking a rigid wall. The rigid cylinder represents the skull, the fluid denotes the brain, and the cerebrospinal fluid (CSF) and spring-dashpot simulate the composite elastic and dissipative properties of the helmet, hair, skin, skull, and the real wall. The system response was found to be dependent on 4 dimensionless ratios: (1) the brain to skull mass, (2) the skull to closed brain stiffness, (3) the damping factor of the skull, and (4) the impact velocity to the brain wave speed. Results are presented for a range of parameter values realistic for the head injury problem. The severity of the impact was evaluated by the ratio between the cavitation duration at contrecoup and the contact duration between the head and the wall. (Author)

**A75-45775 #** Circadian rhythm in performance on the NRC stressalyser L Buck and R Leonardo (National Research Council, Control Systems and Human Engineering Laboratory, Ottawa, Canada) *Canada, National Research Council, Division of Mechanical Engineering and National Aeronautical Establishment, Quarterly Bulletin*, no 2, 1975, p 11-21, 23-31 5 refs

Forty subjects followed schedules of self-administered tests on the NRC stressalyser over a period of three days. Performance varied systematically according to time of day of testing, with the circadian rhythm more evident for movement times than for reaction times. The rhythm of accuracy scores was out of phase with that for speed scores, with performance being slowest but most accurate early in the waking day. (Author)

**A75-45816 #** Atmosphere revitalization for Spacelab H Eckert, A C Gall (Dornier-System GmbH, Friedrichshafen, West Germany), and H Hassan (ESRO, European Space Research and Technology Centre, Noordwijk, Netherlands) *International Astro-*

*nautical Federation, International Astronautical Congress, 26th, Lisbon, Portugal, Sept. 21-27, 1975, Paper 75-067 17 p*

An environmental control subsystem is designed to maintain the environment in the Spacelab module where the scientists are to conduct their experiments. This study focuses on the atmosphere revitalization section (ARS) and its interfaces with the vehicle and other section of the environmental control subsystem. The baseline ARS comprises the cabin air loop and the avionics air loop, where the separation of the two loops is selected from the standpoint of thermodynamics and contamination control. The ARS maintains a shirtsleeve conditioned environment for the crew members and a temperature controlled environment for avionics and experiments. Air distribution, ventilation, and monitoring in the cabin air loop and in the avionics air loop are examined. The ARS also contains a mass spectrometer which is used in the Spacelab cabin as an internal contamination monitor. Photographs and diagrams supplement the discussion. S D

**A75-45841 \*** **Development of an advanced spacecraft water and waste materials processing system.** R W Murray, J D Schelkopf (GE Valley Forge Space Center, Philadelphia, Pa), and R L Middleton (NASA, Marshall Space Flight Center, Huntsville, Ala.) *International Astronautical Federation, International Astronautical Congress, 26th, Lisbon, Portugal, Sept. 21-27, 1975, Paper 75-071 14 p*

An Integrated Waste Management-Water System (WM-WS) which uses radioisotopes for thermal energy is described and results of its trial in a 4-man, 180 day simulated space mission are presented. It collects urine, feces, trash, and wash water in zero gravity, processes the wastes to a common evaporator, distills and catalytically purifies the water, and separates and incinerates the solid residues using little oxygen and no chemical additives or expendable filters. Technical details on all subsystems are given along with performance specifications. Data on recovered water and heat loss obtained in test trials are presented. The closed loop incinerator and other projects underway to increase system efficiency and capacity are discussed. C K D

**A75-45842 #** **Intensity of excretion of final metabolites and microorganisms into an enclosed atmosphere as a function of the temperature profile.** Iu G Nefedov, V P Savina, and S N Zaloguev *International Astronautical Federation, International Astronautical Congress, 26th, Lisbon, Portugal, Sept. 21-27, 1975, Paper 75-073 10 p*

Studies were conducted on the quantitative characteristics of excretion of trace contaminants and microorganisms via the upper airways and skin of men exposed to an enclosed atmosphere with varying temperature and humidity profiles and a limited choice of personal hygiene means. Calorimetric, nephelometric, linear caloristic and gas chromatographic methods were used for the measurements. The investigation demonstrated that an increase in the temperature and humidity levels was accompanied by an elevation in the microbial release from the upper airways. The quantitative parameters derived can be used in the design of environmental control systems for long-duration space flight. S J M

**A75-45854** **Biological satellites and their contribution to space biology and medicine.** E A Il'in (Ministry of Health of USSR, Institute of Biomedical Problems, Moscow, USSR) *International Astronautical Federation, International Astronautical Congress, 26th, Lisbon, Portugal, Sept. 21-27, 1975, Paper 75-058 11 p 9 refs*

Significant results of biosatellite investigations since 1957 are reviewed, and their importance as a means of studying the adverse physiological effects of prolonged exposure to weightlessness and cosmic radiation and of testing possible countermeasures is stressed. Plans for experiments to be flown aboard a satellite of the Cosmos series are discussed. Among them is an investigation of the biological effects of applying artificial gravity generated by a specially designed

centrifuge. The resistance and structural-functional reserves of the mammalian body in a prolonged weightless state and during readaptation to earth gravity will be the subject of another study. Objectives of 1975 USSR biosatellite flights are outlined. C K D

**A75-45861** **Spacelab environmental control life support system - Design safety.** R Gartner (Dornier System GmbH, Friedrichshafen, West Germany) *International Astronautical Federation, International Astronautical Congress, 26th, Lisbon, Portugal, Sept. 21-27, 1975, Paper A75-020 52 p 5 refs*

The Spacelab environmental control life support system (ECLSS) which is currently being designed by a German aerospace corporation consists of the atmosphere storage and control section and the atmosphere revitalization section. A description is given of the ECLSS used in various spacecraft, taking into account the LM, the Salyut and Soyuz, and the Skylab Safety requirements for Spacelab and Skylab are compared. Attention is given to the Spacelab design features which are to provide protection against identified hazards. G R

**A75-45869** **Medical considerations on the Spacelab Scientist/Payload Specialist and his role in future space flight.** E C Burchard *International Astronautical Federation, International Astronautical Congress, 26th, Lisbon, Portugal, Sept. 21-27, 1975, Paper A75-015 11 p*

General considerations in the screening and subsequent preparation of civilian Shuttle Spacelab scientists and payload specialists to meet the physical and psychological demands of the spaceflight environment are discussed. Attention is given to stresses imposed by lack of space, motion discomfort, heavy workload, and close contact with crew members. C K D

**A75-46130 #** **Levels of slow bioelectric organization of the human brain (Urovni medlennoi bioelektricheskoi organizatsii golovnogo mozga cheloveka).** V A Iliukhina (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR, vol 61, Aug 1975, p 1121-1133 33 refs. In Russian*

The dynamics of slow electrical processes (SEP) in the subcortical formations of the human brain was studied for different ranges of the order of magnitude of the recorded potential in 15 patients suffering from Parkinsonism and 3 patients suffering from the phantom limb syndrome. The patients were subjected to psychological and motor tests under normal observational conditions and under directed pharmaceutical influence. Experimental results revealed a certain dependence of the character of spontaneous dynamics and SEP responses on the order of magnitude of the recorded potential within the same zone of subcortical formations. A close relationship was obtained between the dynamics of constant component (within the range 110-1 mV) and the pronouncedness and character of clinical symptomatology. Subcortical equivalent (CNV) and changes in reproducible pattern in response to meaningless trigrams and words are observed only within the range of weak signals. S D

**A75-46131 #** **Effect of the anterior and posterior hypothalamus on conditioned activity and delayed responses in lower monkeys (Vliianie perednego i zadnego gipotalamusa na uslovnoreflektornuiu deiatel'nost' i otsrochennye reaktsii u nizshikh obed'ian).** A N Bakuradze and T L Naneishvili (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR) *Fiziologicheskii Zhurnal SSSR, vol 61, Aug 1975, p 1134-1141 29 refs. In Russian*

In 4 adult monkeys, electrical stimulation of the anterior hypothalamus followed by subsidence in the animal and the ECoG synchronization evoked also an impairment of conditioned reflex activity and a decrease in the test performance during delayed responses. Strong stimulation of the posterior hypothalamus followed by emotional arousal and desynchronization in the ECoG, on the contrary, improved the conditioned reflex activity and

increased the level of the test performance. The hypothalamus is then supposed to play a certain role in memory as an emotogenic structure (Author)

**A75-46132 #** Changes in cerebral blood flow and oxygen tension during somatic afferent stimulation (Izmeneniia krovotoka i napriazheniia kisloroda v golovnom mozge pri afferentnoi somaticheskoi stimulatsii) I. T. Damchenko, P. Shandor, Iu. E. Moskalenko, and A. G. B. Kovach (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimi, Leningrad, USSR, Semmelweis Orvostudományi Egyetem, Budapest, Hungary) *Fiziologicheskii Zhurnal SSSR*, vol 61, Aug 1975, p 1153-1159 17 refs In Russian

Experiments were conducted to study the vascular reactions and the dynamics of PO<sub>2</sub> in the thalamus and the hypothalamus in dogs during electric stimulation of the sciatic nerve under conditions of artificially stabilized arterial blood pressure, pH, PCO<sub>2</sub>, and PO<sub>2</sub> of the arterial blood. It was found that electric stimulation of the sciatic nerve decreases cerebral blood flow by 32% in the thalamus and by 17% in the hypothalamus as compared to initial levels. Along with these changes, PO<sub>2</sub> decreased by 25% in the thalamus and by 19% in the hypothalamus, but these changes were of short-term character as they were recovered within 3 to 4 min after the beginning of stimulation. It is suggested that the mechanism underlying the vascular reactions in the brain during somatic afferent stimulation is of a neurogenic adrenergic nature and is affected through activation of sympathetic vasoconstrictors. S.D.

**A75-46133 #** Accommodation as a biological system of automatic regulation (Akkomodatsiia kak biologicheskaiia sistema avtomaticheskogo regulirovaniia). V. F. Ananin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 61, Aug 1975, p 1190-1196 12 refs In Russian

The mechanism of visual accommodation by means of an automated system is studied for different kinds of stimuli. The contour of the accommodation reflex is regarded as an analog of a closed system of automatic regulation. The frequency gradient for impulses in the visual fibers is suggested as a criterion for estimating the sharpness of an image on the retina. The increase in the amplitude of accommodation microfluctuations at a short distance is due to a sharp fall in the frequency of impulses in visual fibers, with the result that the activity of the ciliary muscle is accompanied by significant changes. The accommodation contour when tracking a test object is found to act as a self-adjusting system by analogy to closed engineering systems of automatic regulation. S.D.

**A75-46134 #** Effect of mediators on the release of tissular hemocoagulating and fibrinolytic compounds from the kidneys into the blood stream (Vliianie mediatorov na vydelenie pochkami tkanevykh gemokoaguliiruiushchukh i fibrinoliticheskukh soedinenii v krovonosnoe ruslo) N. V. Sokratov (Mordovskii Gosudarstvennyi Universitet, Saransk, Mordovian SSR) *Fiziologicheskii Zhurnal SSSR*, vol 61, Aug 1975, p 1209-1213 7 refs In Russian

The influence of the perfusate of 20 cat kidneys on blood coagulation and fibrinolysis of control plasma is studied experimentally. It is shown that vasoactive substances such as adrenaline or acetylcholine have an effect on the release of hemocoagulating and fibrinolytic compounds from the kidneys into the blood stream. In particular, adrenaline stimulates excretion from the kidneys of factors accelerating blood coagulation and of plasminogen activators. Acetylcholine is found to inhibit transfer of thromboplastic substances from the kidneys into the blood stream, to enhance the level of activators and particularly of fibrinolysis inhibitors, and to stimulate release of natural anticoagulants. S.D.

**A75-46135 #** A device for transforming the graphical recordings of impulse activity into a shape suitable for automatic processing (Ustroistvo dlia preobrazovaniia graficheskikh zapisei impul'snoi

aktivnosti v vid, udobnyi dlia avtomaticheskoi obrabotki). S. P. Bulgakov (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 61, Aug 1975, p 1258, 1259 8 refs In Russian.

An electromechanical device is proposed for manual transformation of the graphical recordings of the impulse activity of human motoneurons into a shape suitable for subsequent automatic processing of data on the action potentials of individual motor units. The design principle of the device consists in substituting the sequence of impulses by a sequence of holes perforated on parallel tracks of the recording paper. A mathematical analysis of the total error of the device is presented. S.D.

**A75-46467** Unusual magnetic activity during 4-10 August 1972 and some of its biological consequences B. J. Srivastava and D. S. B. Rao (National Geophysical Research Institute, Hyderabad, India) *Indian Journal of Radio and Space Physics*, vol 3, Dec 1974, p 384-390

Three major SC-type magnetic storms occurring in association with important solar flares during 4-10 August 1972 are analyzed on the basis of data collected at Hyderabad Observatory and solar observations by Pioneer-9, and their characteristics are given. The second storm is compared in intensity with the great magnetic storm of 17 July 1959, which occurred in a period of intense solar activity. The calculated velocities of the solar winds causing the disturbances are in the range of 1,000-3,000 km/sec, compared with the velocities of 500-800 km/sec measured at a distance of 5000 earth radii by Pioneer 9. Data from two cities show 100% increases in heart cases and road accidents during the period of storm activity, and lesser increases in hospital deaths and admissions. It is suggested that these effects are due to disturbances in physiological electrical potentials as a result of magnetic pulsations. C.K.D.

**A75-46526** The effect of borders and contours on threshold during early dark adaptation F. L. Kitterle and L. E. Leguire (Toledo, University, Toledo, Ohio) *Vision Research*, vol 15, Nov 1975, p 1217-1224 25 refs

The present series of experiments were designed to investigate whether the drop in threshold during early dark adaptation was due to activity within a receptor (or within the direct neural channel from receptor to higher visual centers) or whether the drop in threshold reflected the decay of activity extending over a lateral spatial region. The results show that conditions maximizing lateral effects increased the magnitude of the drop in threshold during early dark adaptation, and that spatial integration of light rapidly changed during the course of early adaptation. It is concluded that early dark adaptation reflects a mechanism sensitive to the spatial distribution of light and consequently rules out an interpretation of early dark adaptation as a process arising solely within a receptor. It is also argued that the mechanism responsible for these changes may not be retinal. (Author)

**A75-46527** Simultaneous motion contrast - Velocity, sensitivity and depth response P. Tynan and R. Sekuler (Northwestern University, Evanston, Ill.) *Vision Research*, vol 15, Nov 1975, p 1231-1238 32 refs Grant No. NIH-EY-00321

A center and surround of spatially random dots were used to study the effect of surround motion on the center's (1) perceived velocity, (2) perceived depth and (3) visibility. The velocity of the surround influenced the center's velocity and depth in similar, complex ways. But surround speed had no effect on the luminance detection threshold of the center dots. Results with these dependent measures bear on theories of motion perception and on processing in other sensory domains. (Author)

**A75-46528** Local retinal adaptation and spatial frequency channels R. M. Jones and U. Tulunay-Keesev (Wisconsin, University, Madison, Wis.) *Vision Research*, vol 15, Nov 1975, p 1239-1244 15 refs Grant No. NIH EY-00308

We have presented evidence that local retinal adaptation is not

the cause of spatial frequency channels This was done by minimizing local retinal adaptation with gratings whose contrast was a sinusoidal function of time The gratings were viewed through an image stabilization apparatus to ensure that the subject would not fixate preferentially on certain portions of the grating providing uneven retinal adaptation (Author)

**A75-46529** Saccadic eye movement latencies to multimodal stimuli - Intersubject variability and temporal efficiency T Carlow, L F Dell'Osso, B T Troost, R B Daroff, and J E Birkett (U S Veterans Administration Hospital, Miami, University, Miami, Fla) *Vision Research*, vol 15, Nov 1975, p 1257-1262 14 refs Research supported by the Seeing Eye Foundation

The saccadic latencies to multimodal stimuli of 10 subjects were studied to determine the range of intersubject variations and to derive values which are representative of the normal population Responses to simple step and pulse-step stimuli were measured where the target mode and pulse width were randomized A matrix notation was introduced to describe all of the relevant latency variables without ambiguity In comparing our results with other studies, we emphasized the importance of considering differing experimental conditions We concluded that (1) intersubject variation is a significant factor in data interpretation, (2) temporal efficiency is inherent in saccadic decision making, and (3) new visual information is continuously available to alter the latency or cause the cancelation of the initial saccade (Author)

**A75-46530** Slow oculomotor control in the presence of moving backgrounds B J Murphy, E Kowler, and R M Steinman (Maryland, University, College Park, Md) *Vision Research*, vol 15, Nov 1975, p 1263-1268 15 refs Grant No NIH-EY-00325

Subjects were able to use slow control to maintain a steady line of sight for 4.5 sec on a stationary point in the center of a field 4 degrees in diameter containing a high contrast squarewave grating that moved horizontally at either 5 minutes of arc, 48 minutes of arc, or 480 minutes of arc per second A small (less than 6%) influence of the grating movement on drift velocity was observed It was reduced by more than a factor of 2 when the point was replaced by an annulus (26 minutes in diameter) These results were not restricted to brief exposures to the moving grating Drifts were still largely independent of the background movement after 3 min of exposure Subjects could also switch at will between keeping the eye in place and tracking the moving grating Our results are consistent with the hypothesis that there is a single low velocity eye position control subsystem We conclude that the input to this subsystem is determined by choice and attention and not by the nature of the stimulus (Author)

**A75-46531** The effects of target orientation on threshold during early dark adaptation F L Kitterle, L E Leguire, and J A Riley (Toledo, University, Toledo, Ohio) *Vision Research*, vol 15, Nov 1975, p 1294-1296 9 refs

**A75-46658** Microwave effect on rabbit superior cervical ganglion K R Courtney (Colorado, University, Boulder, Colo), J C Lin (Wayne State University, Detroit, Mich), A W Guy, and C-K Chou (Washington, University, Seattle, Wash) *IEEE Transactions on Microwave Theory and Techniques*, vol MTT-23, Oct 1975, p 809-813 12 refs U S Food and Drug Administration Grant No R01-FD-00646, U S Department of Health, Education, and Welfare Grant No 16-P-56818-012

Rabbit superior cervical ganglia were exposed to CW 2450-MHz fields within a temperature-controlled waveguide environment Absorbed power densities between 2 and 1000 W/kg failed to significantly influence transmission latencies of responses recorded from postganglionic fibers due to stimulation of either B (myelinated) or C (unmyelinated) fiber in the preganglionic trunk (Author)

**A75-46687** Attitude of judgment and reaction time in estimation of size at a distance W Epstein (Wisconsin, University, Madison, Wis) and K D Broota (Delhi, University, Delhi, India) *Perception and Psychophysics*, vol 18, Sept 1975, p 201-204 8 refs Research supported by the Ford Foundation and ICSSR

Experiment I obtained scalar (absolute) size estimates under full cue conditions for rectangular standards that were presented at distances ranging from 1.22 to 3.05 m Size-estimate reaction times increased linearly with increasing viewing distance Reaction times for distance estimation were the same at all distances Experiment II obtained size estimates over distances ranging from 1.22 to 5.49 m under objective and phenomenal size-estimation instructions Only objective size-estimate reaction times increased with distance Phenomenal size estimates were faster than objective estimates and were the same for all viewing distances It was concluded that the cognitive operations involved in objective size estimation were responsible for the effects obtained in Experiment I and the similar findings reported in earlier studies by Broota and Epstein (1973) (Author)

**A75-46688** Backward interference by tones or noise in pitch perception as a function of practice M Loeb and D H Holding (Louisville, University, Louisville, Ky) *Perception and Psychophysics*, vol 18, Sept 1975, p 205-208 12 refs Army-supported research

In a first experiment, the identification of brief tonal stimuli was unaffected by subsequent presentation of white noise However, subsequent pure tones, whether central to the stimulus frequencies or remote from them, caused substantial declines in correct identification Apparent backward masking seems therefore to follow rather than to precede some degree of categorization of the masking stimulus A second experiment shows that even these effects are temporary Early masking effects are heavily modified by practice, and are not therefore permanent features of sensory processing Neither experiment provides support for preperceptual theory (Author)

**A75-46696** Night myopia and the intermediate dark focus of accommodation H W Leibowitz and D A Owens (Pennsylvania State University, University Park, Pa) *Optical Society of America, Journal*, vol 65, Oct 1975, p 1121-1128 30 refs Grant No NIH-MH-08061

The phenomenon of night myopia, the tendency to over-accommodate for distant objects as luminance is decreased, results from the passive return of accommodation to an individually determined intermediate resting or dark focus More generally, accommodation is viewed as a compromise between the subject's individual resting focus and the accommodative stimulus Under optimum viewing conditions, accommodation tends to correspond to the distance of the stimulus, but is biased progressively toward the dark focus as the adequacy of the accommodative stimulus is degraded by decreased luminance Control experiments suggest that optical aberrations are not major factors that contribute to this effect (Author)

**A75-46922 #** Behavior of oxygen in information-exchange processes of the early biosphere (Pro poviedinku kisniu v informatsiino-obmynnikh protsesakh rann'oi biosferi) V Iu Dnisenko (Vsesoiuznii Naukovo-Doslidnii Institut Iadernoi Geofiziki ta Geokhimii, Ukrainian SSR) *Akademiia Nauk Ukrain'skoi RSR, Dopovid, Seriya B - Geologiya, Geofizika, Khimiia ta Biologiya*, July 1975, p 579-582 16 refs In Ukrainian

The following scheme for the role of oxygen in the development of the early biosphere is proposed As a result of exchange reactions of carbohydrates with isolated silicates there arise the first mobile oxygen compounds - H<sub>2</sub>O, CO<sub>2</sub>, and primitive organic matter (CH<sub>2</sub>O), which evolve in a more and more complex matrix in the order chain-tape-leaf-skeleton to living organisms The basalt and granite shells of the earth's crust appear along with the hydrosphere, the oxygen atmosphere, carbonates, and oxide ores Depleted in

oxygen-anions as well as in microelements and evolutionary information, the mineral masses, such as quartz, form deserts, lowering the productivity of the biosphere with respect to useful minerals and biomass  
P T H

**A75-46924** The reliability of intermittent ECG sampling in arrhythmia detection. L Ryden, A Waldenstrom, and S Holmberg (Sahlgren's Hospital, Goteborg, Sweden) *Circulation*, vol 52, Oct 1975, p 540-545 17 refs Research supported by the Swedish National Association against Heart and Chest Diseases

The efficiency of intermittent ECG sampling in detection of arrhythmia is evaluated from clinical data and results obtained by the use of computerized models Comparison of intermittent sampling with constant ECG monitoring of 52 patients with ventricular tachyarrhythmias (VT) shows that detection rate depends on sampling time and the occurrence and distribution of true arrhythmias, with 80% of intervals containing any type of VT detected in 5 min ECG sample at 15 min intervals, reduced to 50% when 1 min ECG strips are used Infrequent types of ventricular premature contractions are very poorly detected with sampling of as much as 30% of the total time It is concluded that intermittent ECG sampling brings a risk of under- or overemphasis of arrhythmia occurrence depending on periodic arrhythmia distribution, and that sampling is unsuitable for evaluation of antiarrhythmic drugs  
C K D

**A75-46925** Gradual changes of ECG waveform during and after exercise in normal subjects. M L Simoons (Utrecht, Rijks-universiteit, Utrecht, Erasmus Universiteit, Rotterdam, Netherlands) and P G Hugenholtz (University Hospital, Rotterdam, Netherlands) *Circulation*, vol 52, Oct 1975, p 570-577 30 refs

An analysis of the directions and magnitudes of time-normalized P, QRS, and ST vectors, and other ECG parameters was carried out during and after multistage exercise in 56 healthy men 23 to 62 Measurements were taken from a representative beat at each stage obtained by selective averaging with a digital computer A pattern corresponding with ECG signs of predominant right atrial overload was found during exercise Changes in the interval between QRS onset and the maximum spatial magnitude of the T wave, magnitude and direction of the QRS and ST vectors, and the T magnitude were observed QRS duration and the spatial orientation and magnitude of the maximum QRS vectors were unchanged All measurements gradually returned to resting level Possible mechanisms for such ECG changes include changes in blood conductivity and intracardiac blood volume Reduction of variance in some ST-segment measurements was obtained by relating them to heart rate with linear regression equations, a technique which is expected to increase ECG sensitivity for detection of ischemic heart disease Age was not a factor in observed ECG variations  
C K D

**A75-46973** Echocardiography C R Joyner (Pittsburgh, University, Allegheny General Hospital, Pittsburgh, Pa) *American Heart Journal*, vol 90, Oct 1975, p 413-419 48 refs

The evolution of selected areas of echocardiography are reviewed in order to illustrate the capabilities and limitations of this method of noninvasive investigation of the human heart The selected areas are concerned with the mitral valve and mitral stenosis, hypertrophic cardiomyopathy, congenital heart diseases, and left ventricular function It is shown that the mitral leaflets move in essentially the same direction in patients with valve stenosis, that an abnormality of aortic valve motion can help diagnose hypertrophic obstructive cardiomyopathy, that two-dimensional real-time echocardiography is likely to become the most desirable echocardiographic technique for the diagnosis of congenital heart diseases in children, and that electrocardiography is a useful tool in assessing some aspects of left ventricular function Obviously much has been achieved in all of these areas, however, close attention to technical procedure and careful interpretation are required to avoid false information  
S D

**A75-46974** ST-segment isolation and quantification as a means of improving diagnostic accuracy in treadmill stress testing F J Forlini, Jr (Rock Island Franciscan Medical Center, Rock Island, Ill), K Cohn, and M F Langston, Jr (Presbyterian Hospital, Pacific Medical Center, San Francisco, Calif) *American Heart Journal*, vol 90, Oct 1975, p 431-438 25 refs Grants No NIH-HE-05498-08, No NIH-HE-05498-09

A new method of ST-segment analysis employing computer analytic techniques is applied to treadmill exercise testing with a view to enhancing diagnostic sensitivity and specificity The tests included normal subjects, patients with coronary disease and distinct ischemic ST-segment responses to exercise stress testing, and patients with coronary disease but normal or nondiagnostic ST-segment response during or following exercise testing The techniques used comprised computer averaging in order to minimize motion artifact and baseline drift, a means of isolating the ST-segment from the T-wave and quantifying ST amplitude and slope (isolated ST integral, IST), and relating IST to a given heart rate The use of these techniques resulted in a test specificity exceeding 90% and a sensitivity over 85%  
S D

**A75-47096 #** A study on altitude and distance judgements of pilots during final approach K Mizumoto and N Utsugi (Japan Air Self Defense Force, Aeromedical Laboratory, Tokyo, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 15, Mar 1975, p 179-187 15 refs In Japanese, with abstract in English

Tests were performed to determine distance and altitude judgment in five experienced pilots during final landing approach In addition, a questionnaire was given to student and instructor pilots to ascertain the basis for these judgments The experienced pilots underestimated both altitude and distance by about 10 to 20 percent The student pilots obtained this information during the day and during the night from the perspective of the runway as viewed from above The instructor pilots got it during daytime from various sources altimeters, known objects on the ground, and runway perspective, but at night, they used runway perspective more than other indices  
S J M

**A75-47097 #** A study on behavioral analysis of pilot during aircraft controlling III - In-flight recording equipment and method of installation for F-86F and YS-11C Y Nagasawa, M Furuya, and T Ito (Japan Air Self-Defense Force, Aeromedical Laboratory, Tokyo, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 15, Mar 1975, p 188-195 In Japanese, with abstract in English

The specific installation methods of inflight audio/visual recording for the F-86F and YS-11C aircraft are described The F-86F mounted an 8 mm movie camera at the left side of the head rest, it could record a forward scene as viewed through the windshield, along with the upper left side of the instrument panel and part of the pilot's left arm motion Voice communications were recorded by tape recorder from the headset In the YS-11C, two movie cameras were installed between the circuit breaker panel and the hot cup panel, again the view comprised the heading through the windshield, the main instrument panel, and one side of the pilot  
S J M

**A75-47098 #** A study on behavioral analysis of pilot during aircraft controlling IV - Display of behavioral analysis table and flow chart Y Nagasawa, H Hagihara, S Aramaki, Y Kakimoto, Z Kato, M Okawe, M Nakamura, K Mizumoto, and I Kuroda (Japan Air Self-Defense Force, Aeromedical Laboratory, Tokyo, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 15, Mar 1975, p 196-208 20 refs In Japanese, with abstract in English

A method of analyzing and diagramming pilot behavior and decision-making during flight is presented Human function is divided into perception, central processing, and action Diagrams of several aspects of flight are shown, they resemble electric circuit schematics At the tops of the diagrams are the sensory inputs, separated into

their various components eyes, ears, vestibular organs, arrows feed from these 'modules' downward into the central processing operations, mostly decision-making functions, and arrows lead from these units into the action modules, i.e., oral, left hand, right hand, and feet. The new method is useful for analyzing workload and for pinpointing human error. S J M

**A75-47099 #** Studies on respiratory and cardiovascular physiology during combined exposure to sustained acceleration of +Gz with simulated altitude. I - Tolerance to the combined exposure to +Gz with simulated altitude in rats and dogs. M Iwane, H Maru, M Ono, S Ogata, and R Yurugi (Japan Air Self-Defense Force, Aeromedical Laboratory, Tokyo, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 15, Mar 1975, p 209-218. 16 refs. In Japanese, with abstract in English.

Tolerance to combined simulated altitude and acceleration was investigated in conscious rats and dogs. Heart rate was the principal parameter monitored. Dogs showed themselves more resistant to the strenuous conditions; most rats died after 5 minutes of 8 Gz acceleration at 5000 m simulated altitude, whereas dogs survived temporary accelerations of up to 10 Gz at 6000 m simulated altitude. S J M

**A75-47100 #** Studies on an air-mat safety device for protection against falling impact injury. R Yurugi, M Iwane, S Ogata, M Ono, and H Maru (Japan Air Self-Defense Force, Aeromedical Laboratory, Tokyo, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 15, Mar 1975, p 219-228. 8 refs. In Japanese, with abstract in English.

Tests were made with an instrumented dummy on the effectiveness of an air-mat falling protection device. Graphs of the millisecond time course of impact acceleration are given for various dummy heights and for a hard wooden plate control. The air-mat made the impact acceleration much more gradual and lower in magnitude per unit drop height than the hard plate. An air outlet orifice satisfactorily guarded against violent rebounding. It is concluded that subjects escaping from emergency situations could safely jump 10 meters down onto a single mat 1 m thick or 13 meters onto a double mat 2.5 m in total thickness. S J M

**A75-47227 \*** Distribution of sterols in the fungi. I - Fungal spores. J D Weete (Auburn University, Auburn, Ala.) and J L Laseter (New Orleans, University, New Orleans, La.) (*American Oil Chemists' Society, Symposium on Phytosterols, New Orleans, La., Apr. 29-May 3, 1973*) *Lipids*, vol 9, no 8, 1974, p 575-581. 29 refs. Research supported by the Research Corp and Cancer Association of Greater New Orleans, Contract No. NAS9-12941.

Mass spectrometry was used to examine freely extractable sterols from spores of several species of fungi. Ergosterol was the most common sterol produced by any individual species, but it was completely absent from two species belonging to apparently distantly related groups of fungi: the aquatic Phycomycetes and the rust fungi. This fact could have taxonomic or phylogenetic implications. The use of glass capillary columns in the resolution of the sterols is shown to eliminate some of the difficulty inherent in this process. S J M

**A75-47235 \*** Effects of pharmacological agents on subcortical resistance shifts. K A Klivington (California, University, La Jolla, Calif.) *Experimental Neurology*, vol 46, 1975, p 78-86. 13 refs. Grants No. NGR-05-009-198, No. NIH-NS-10482-01.

Micro-liter quantities of tetrodotoxin, tetraethylammonium chloride, and picrotoxin injected into the inferior colliculus and superior olive of unanesthetized cats differentially affect the amplitude and waveform of click-evoked potentials and evoked resistance shifts. Tetrodotoxin simultaneously reduces the negative phase of the evoked potential and eliminates the evoked resistance shift. Tetraethylammonium enhances the negative evoked potential component, presumably of postsynaptic origin, without significantly altering

evoked resistance shift amplitude. Picrotoxin also enhances the negative evoked potential wave but increases evoked resistance shift amplitude. These findings implicate events associated with postsynaptic membrane depolarization in the production of the evoked resistance shift. (Author)

**A75-47241 \*** Thermal profile of a *Bacillus* species /ATCC 27380/ extremely resistant to dry heat. W W Bond and M S Favero (U.S. Public Health Service, Center for Disease Control, Phoenix, Ariz.) *Applied Microbiology*, vol 29, June 1975, p 859, 860. 6 refs. NASA Order W-13062.

**A75-47275** Quantification of air traffic controller's acceptable workload. J C Yu (Utah, University, Salt Lake City, Utah) *The Controller*, vol 14, May 1975, p 7-10, 36. 12 refs. NSF Grant No. GK-303225.

The basic objective of this study is to identify a set of important factors for evaluating the air-traffic controller's performance and to develop a method of quantifying his acceptable workload under various working conditions, including variables such as weather, emergency, work-hour and conflict. The controller's activities are analyzed and grouped into several subtasks which require such human capabilities as visual and auditory monitorings, reading, and recording. (Author)

**A75-47325 #** Rat liver mitochondrial enzyme activities in hypoxia. V L Kinnula (Oulu, University, Oulu, Finland) *Acta Physiologica Scandinavica*, vol 95, Sept 1975, p 54-59. 30 refs.

Rat liver mitochondrial enzyme activities were measured after exposing the animals to an ambient pressure of 380 mm Hg for 5 hours and for 14 days. Succinate dehydrogenase and succinate oxidase activities increased significantly during the hypoxic period of 14 days. No change was observed in cytochrome oxidase activity. Malate dehydrogenase and glutamate dehydrogenase activities increased somewhat, but not significantly. The efficiency of oxidative phosphorylation (the ADP/O ratio) in the isolated mitochondria remained unchanged. The exact mitochondrial protein values showed a 15% decrease as compared with the control group. The concentrations of cytochromes did not change significantly in the hypoxic group. During the short hypoxic period succinate dehydrogenase, succinate oxidase and cytochrome oxidase activities increased as compared with those in the control group. (Author)

**A75-47427 #** The distribution of gas inhaled into the lungs (Raspreделение vdykhaemogo gaza v legkikh). L A Sidorenko (*Akademiya Nauk SSSR, Izvestiya, Mekhanika Zhidkosti i Gaza*, July-Aug 1975, p 12-17. 5 refs. In Russian).

A mathematical model, based on a Laplace transformation variant is proposed for the study of lung ventilation. The distribution of specific respiratory volume is derived from the curves of nitrogen removal during oxygen breathing. On the basis of this specific volume distribution, it is possible to calculate the distribution of gas inhaled into the lungs. B J

**A75-47434 #** Wave motions of a liquid in viscoelastic tubes - Stationary nonlinear waves (Volnovye dvizheniya zhidkosti v trubkakh iz vyzkouprugogo materiala - Statsionarnye nelineinye volny). I M Rutkevich (*Akademiya Nauk SSSR, Izvestiya, Mekhanika Zhidkosti i Gaza*, July-Aug 1975, p 86-95. 5 refs. In Russian).

Unsteady perturbations are applied to the steady flow of a viscous incompressible liquid flow in a long axisymmetric tube with compliant walls. Based on inertialess hydraulic approximation, nonlinear equations, connecting the stationary wave motion of the liquid and the radial deformation of the walls, are presented. This rheological model can be used to study the stability loss of blood flow in the small vessels, taking into account the viscoelasticity of the vessel walls. B J



**A75-47485**      **Weight estimation of manned spacecraft metabolic requirements** C K McBaine (Rockwell International Corp , Space Div , Downey, Calif) *Society of Allied Weight Engineers, Annual Conference, 34th, Seattle, Wash , May 5-7, 1975, Paper 1047* 28 p

A system description is given and an analysis and weight synthesis is considered Attention is given to metabolic energy, the crewman physical dimensions, food, oxygen, carbon dioxide, metabolic water, the water balance, and fecal waste The weight sensitive parameters are briefly examined The metabolic requirements for three men on a Mars round trip, lasting two years, with a stay time of 160 days, are found to amount to almost 10,886 kg It is recommended to consider for long term space exploration a closed mass ecological system  
G R

**A75-47817**      **Influence of acute alterations in heart rate and systemic arterial pressure on echocardiographic measures of left ventricular performance in normal human subjects.** J. Hirschleifer, M Crawford, R A O'Rourke, and J S Karlner (California, University, San Diego, Calif) *Circulation*, vol 52, Nov 1975, p 835-841 44 refs Grant No NIH-HL-17682

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accidental loss or sudden opening of the canopy or after its explosion in-flight. The pathogenetic mechanisms of the injuries caused by windblast are examined along with the relative limits of human tolerance and the systems which could be employed and improved to increase human resistance to aerodynamic pressure of the wind. Emphasis is placed on the prevention and reduction of the fatality of these injuries. Author

## STAR ENTRIES

**N75-32555** Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt Oberpfaffenhofen (West Germany)  
**A SURVEY OF ATTITUDE-CONTROL AND RECOVERY SYSTEMS FOR THE CURRENT GERMAN SOUNDING ROCKET PROGRAMME**  
 E Krieg *In* ESA European Sounding Rocket and Sci Balloon Activity at High Latitudes, with Emphasis on the Intern Magnetospheric Study (IMS) Feb 1975 p 211-215

The attitude control systems and recovery systems are analyzed. The Astro 7 (ESRO S-108 experiment) comprising a UV polychromator and two photometers one for the visible, and the other for the infrared spectrum is described as well as its associated electronic and pneumatic systems. ESA

**N75-32716#** Advisory Group for Aerospace Research and Development, Paris (France)  
**BIODYNAMIC RESPONSE TO WINDBLAST**  
 D H Glaister, ed (RAF Inst of Aviation Med) Jul 1975 87 p refs *In* ENGLISH and partly in FRENCH Conf held at Toronto 6 May 1975 (AGARD-CP-170) Avail NTIS HC \$4.75

The specific problem of windblast is considered as it affects human tolerance to high speed ejection. Topics discussed include prevalence of ejection injury injury mechanisms, protection, and problems of head restraint and helmet loss.

**N75-32717** Aerospace Medical Research Labs Wright-Patterson AFB Ohio  
**USAF NON-COMBAT EJECTION EXPERIENCE 1968-1973 INCIDENCE, DISTRIBUTION, SIGNIFICANCE AND MECHANISM OF FLAIL INJURY**  
 W Steves Ring James W Brinkley, and Frank R Noyes *In* AGARD Biodyn Response to Windblast Jul 1975 8 p refs

The USAF noncombat ejection experience during the period 1968-1973 is reviewed attempting to characterize the incidence distribution significance and mechanism of flail injuries. The overall incidence of flail injury is 7% in which 4% involved injuries of a major type. The distribution of injuries is characterized by (1) an absence of major head and neck flail injury (2) a predominance of proximal over distal injury and (3) in marked contrast to earlier data a slight predominance of upper over lower extremity flail injury. The importance of analyzing the forces acting upon the limbs as well as having a clear understanding of the mechanisms of failure is discussed and the need for improved limb restraints is emphasized. Author

**N75-32718** Italian Air Force Military School of Aviation Medicine, Rome  
**SURVEY ON BIODYNAMIC RESPONSE TO WINDBLAST IN EJECTIONS PATHOGENETIC MECHANISM, ANALYSIS AND PREVENTION OF INJURIES**  
 Gaetano Rotondo *In* AGARD Biodyn Response to Windblast Jul 1975 9 p refs

Injuries caused by windblast during escape by ejection seat from high speed jet aircraft are analyzed along with traumatic injuries suffered by aircrews within the cockpit of aircrafts following

**N75-32719** Defence and Civil Inst of Environmental Medicine Downsview (Ontario)  
**ACCIDENT STATISTICS RELEVANT TO WINDBLAST**  
 R E Noble and S W Olsen *In* AGARD Biodyn Response to Windblast Jul 1975 4 p refs

During the period 1966-1974 injuries were significant problems in ejections from Canadian Forces (CF) aircraft. There were ninety nonfatal ejections. Of these eight crew members escaped free from injuries, sixty-three received minor injuries and nineteen received serious injuries. An analysis of the injury patterns indicates that they occurred at both low and high speeds. Specific problems are addressed and recommendations are made to enhance aircrew safety during ejection. Author

**N75-32720** Royal Naval Scientific Service, London (England)  
**PATHO-PHYSIOLOGICAL EFFECTS OF WIND BLAST FROM CONVENTIONAL AND NUCLEAR EXPLOSIONS**  
 J S P Rawlins *In* AGARD Biodyn Response to Windblast Jul 1975 5 p refs

The patho-physiological effects of wind blast resulting from conventional and nuclear explosions are analyzed and related to the effects of wind blast encountered in high speed aircraft ejections and in airborne aircraft breakup and to some instances of ground impact. It is suggested that data derived from studies of explosive blast effects may contribute to the analysis of aircraft accidents and to the development of protective equipment for the crews of high performance aircraft. Author

**N75-32721** Centre d'Essais en Vol Bretagne-sur-Orge (France)  
**INJURIES OBSERVED FOLLOWING HIGH-SPEED EJECTIONS IN THE FRENCH AIR FORCE [LESIONS OBSERVEES APRES EJECTION A GRANDE VITESSE DANS L'ARMEE DE L'AIR FRANCAISE]**  
 R P Delahaye (Hopital Begin) B Vettes and R Auffret *In* AGARD Biodyn Response to Windblast Jul 1975 8 p refs *In* FRENCH

A review is presented concerning 256 ejections from French Air Force aircraft at speeds ranging between 0 and 750 knots that took place between 1960 and 1974. The following overall statistics are given: 47 ejections (18%) were fatal, while 209 (82%) were successful. A total of 130 helmets (51%) and 30 masks (15%) were lost. In the case of ejections performed at speeds above 400 knots (23 cases), air blast effects increase the severity of injuries to personnel and damage to equipment. The percentage of fatalities remains at 18% while the percentage of injured aircrews reaches 78% (as opposed to an overall percentage of 35%), 78% of helmets and 40% of masks are lost. Only one pilot landed unhurt. Injuries range from ecchymoses to avulsion of limbs. The above data agrees fairly well with comparable data from other air forces. Three cases are discussed in detail. Transl by YJA

**N75-32722** Royal Aircraft Establishment, Farnborough (England)  
 Engineering Physics Dept  
**WINDBLAST PROTECTION FOR THE HEAD BY MEANS OF A FABRIC HOOD**  
 J M Rayne *In* AGARD Biodyn Response to Windblast Jul 1975 10 p refs

Wind tunnel experiments and operational experience indicate that current helmets are lost during ejection as a result of windblast. The feasibility is studied of protecting the head from exposure to blast by means of an automatically erected fabric hood. It is shown that such a hood placed over the face of a dummy test subject drapes the head effectively on exposure to blast and prevents the loss of even simple helmet assemblies up to Mach 1. Author

**N75-32723** Royal Air Force Inst of Aviation Medicine Farnborough (England)

**AN ARM RESTRAINT SYSTEM FOR EJECTION SEATS IN HIGH PERFORMANCE AIRCRAFT**

P H R Gill *In* AGARD Biodyn Response to Windblast Jul 1975 4 p refs

A restraint system designed for high performance aircraft from which ejection at high speeds is likely is described. The system evolved comprises a seat portion consisting of two fixed length tapes and a man portion incorporated into a sleeved life preserver. Each seat tape is enclosed in a fabric tube which allows automatic disconnection of the two portions during emergency ground egress. The system functions on ejection by retracting the arms in a similar manner to leg restraint systems. The development, testing and performance of the system is described. Limited studies have demonstrated that the proposed rate of arm retraction is physiologically acceptable both with the hands on the firing handle and under simulated commanded ejection. The arm restraint tapes can be routed unobtrusively to prevent interaction upon routine cockpit movement during normal flight. The performance of the arm restraint system during ejection tests using dummies is also described. Author

**N75-32724** Payne Inc Annapolis Md  
**ON PUSHING BACK THE FRONTIERS OF FLAIL INJURY**

Peter R Payne *In* AGARD Biodyn Response to Windblast Jul 1975 7 p refs

Under combat conditions, limb flail injury in U S open ejection seats is shown to be a severe problem. Adequate passive entrapment devices demonstrated in the wind tunnel and adequate seat stabilizing devices also demonstrated in full-scale wind tunnel testing and by air drops are reviewed. An extraction escape system is described which offers hope not only of avoiding the high speed problems of existing tractor rocket escape systems but also of substantially reducing system volume, cost and weight, as well as simplifying the flail injury problem. Author

**N75-32725** Payne, Inc., Annapolis, Md  
**EXPERIMENTAL EVALUATION OF LIMB FLAIL INITIATION AND EJECTION SEAT STABILITY**

Fred W Hawker and Anthony J Euler *In* AGARD Biodyn Response to Windblast Jul 1975 17 p refs

(Contract F33615-74-C-4015)

Limb dislodgement forces were determined in free flight simulation of an ejection along with the static stability of the seats/occupant combination. The forces and moments measured with anthropometric dummies and live subjects in identical ejection seats were compared. Results are presented and discussed. Author

**N75-32726** Research Inst of National Defence Stockholm (Sweden)

**HIGH SPEED EJECTIONS WITH SAAB SEATS**

B O Andrae, E Ek, H Lorin and B Ch R Stroemblad *In* AGARD Biodyn Response to Windblast Jul 1975 5 p ref

The Swedish development work on devices to protect against windblast effects at high speed ejections is surveyed. Examples of past, present and future solutions are given. The Swedish Air Force Experience with high speed ejections is summarized. Author

**N75-32727\*#** Kanner (Leo) Associates Redwood City Calif  
**ADMINISTRATION OF ETHANOL IN VARIOUS DOSES LEVELS OF CEREBRAL SEROTONIN IN RATS**

F Bogetto (Turin Univ) and E Torre (Turin Univ) Washington NASA Oct 1975 6 p refs Transl into ENGLISH from Boll Soc Ital Biol Sper (Naples), v 50 1974 p 1639-1642 (Contract NASw-2790)

(NASA-TT-F-16595) Avail NTIS HC \$3.25 CSCL 06C

Scalar doses of ethanol were administered to Wistar rats to determine whether behavioristic effects of ethanol depend on interaction with cerebral serotonin. The results are expressed in

tabular form and indicate that ethanol has no significant effect on cerebral serotonin levels. Author

**N75-32728#** Air Force Weapons Lab Kirtland AFB N Mex  
**A SEASONAL OCCURRENCE CHECKLIST OF WATERFOWL HAZARDOUS TO FLIGHT SAFETY IN SOUTHERN UNITED STATES Final Report, 15 Sep 1973 - 20 Jun 1974**

Robert C Beason Mar 1975 15 p (AD-A010521 AFWL-TR-74-174) Avail NTIS CSCL 01/2

Large numbers of overwintering and migratory waterfowl present a serious hazard to USAF low level training missions in the Southwestern U S. Waterfowl census data from several National Wildlife Refuges in the Southwest have been compiled and summarized in occurrence checklists. Comparison of refuge data with the proposed low level training mission will enable one to assess the potential bird-aircraft strike hazard and determine possible adjustments in flight scheduling and/or alternate areas to reduce the hazard. GRA

**N75-32729** Yeshiva Univ, New York  
**CONDITIONING HUMAN SYSTOLIC PRESSURE THE STIMULUS DURATION PARAMETER Ph D Thesis**

Harry K Wexler 1975 168 p Avail Univ Microfilms Order No 75-20581

Several subjects were tested to determine blood pressure response to intermittent electrical stimulation. The subjects ranged in age from 17-30 years and showed no history of respiratory or cardiovascular disease. Each subject underwent three sessions of conditioning and one of extinction distributed over two weeks. Shocks occurred during light-on (CS+) periods and never in light-off (CS-) periods. The three groups were (SL, ML and LL) ranked according to time spent in the positive stimulus (CS+) such that SL < ML < LL. There were two control groups that received no shocks. The SL group showed an average +/- difference of 2.5 mm Hg, the ML group 0.8 mm Hg, and the LL group 0.2 mm Hg. The control groups showed no discrimination. Magnitudes of discrimination appeared to be a parametric function of CS+ duration. A shock density hypothesis (probability of receiving shock during CS+) was formulated. Finally, the results were related to a conditioned fear model of hypertension. Dissert Abstr

**N75-32730** Fordham Univ., New York  
**THE DETERMINATION OF CADMIUM, CALCIUM, COPPER, LEAD, MAGNESIUM, POTASSIUM, SODIUM, AND ZINC BY ATOMIC ABSORPTION SPECTROSCOPY IN THE BRAIN, KIDNEY, AND LIVER Ph D Thesis**

Robert Charles Messina Jr 1975 171 p Avail Univ Microfilms Order No 75-18891

The concentrations of cadmium, calcium, copper, lead, magnesium, potassium and zinc were determined for the right left caudate and quadrate lobes of the liver. The concentration of each metal in the kidney was examined from the outer cortex through inner medullary tissue. The white and gray matter of the brain was also analyzed. Samples were ashed at 425 C and diluted to volume. The metal concentrations were then determined with an atomic absorption spectrophotometer. The data was computerized to calculate sample concentrations and a scatter plot was made of concentration vs sample location. Data from the liver was subjected to analysis of variance, the kidney data involved Nth order regression analysis and a t-test between correlated means was used on the brain data. The results show a nonuniform distribution of metals in the kidney with varying amounts of uniform distribution in the liver and brain. Dissert Abstr

**N75-32731** California Univ., Santa Barbara  
**THE RESPONSE OF A HUMAN TEMPERATURE REGULATORY SYSTEM MODEL IN THE COLD Ph D Thesis**

Raymond Grey Gordon 1974 259 p Avail Univ Microfilms Order No 75-19299

A mathematical model of the human temperature regulatory system utilizing finite difference techniques with variable nodal spacing is presented. A cold stress control system which includes

a feed-forward controller utilizing the skin temperature and heat transfer rate as disturbances signals is postulated. Model and experimental results are compared for a transient cold exposure and the results show substantial agreement indicating that heat flux is an input to the temperature regulatory system. Simulation of the cardiovascular system and extremity blood flow agrees with experimental data which has not been done by other models before. The model includes new anatomical and basal physiology information with more detail than previous models. The effect of nodal spacing on the calculated temperatures is also analyzed. The finite difference calculations of the transient radial temperature distribution in living tissue are compared with an analytical solution in which metabolism, blood flow rate and arterial blood temperature vary with time. Dissert Abstr

**N75-32733\*#** Oak Ridge Associated Universities, Tenn  
**STUDIES RELATIVE TO THE RADIOSENSITIVITY OF MAN  
 BASED ON RETROSPECTIVE EVALUATIONS OF THERAPEUTIC AND ACCIDENTAL TOTAL-BODY IRRADIATION**  
**Final Report**

R C Ricks comp and C C Lushbaugh, comp 1 Sep 1975  
 226 p refs  
 (NASA Order T-88566)  
 (NASA-CR-144439) Avail NTIS HC \$750 CSDL 06R

The radiobiologic studies carried out with joint (AEC) ERDA and NASA support during the years 1964 to 1974 at the Medical Division of Oak Ridge Associated Universities are presented. The physiologic data generated were similar in many ways to those previously observed in other medical radiobiologic experiences. They differed however in the methods of data acquisition and analysis. Instead of more conventional analytical methods, pulmonary impedance was recorded and quantitated as a measure of radiation-induced gastrointestinal distress and fatigability. While refinements in dose response related to gastrointestinal distress were accomplished it was also found that through the use of Fourier analysis of pulmonary impedance waveform GI distress could easily be recognized and quantified even when the initial stages of nausea were below the subjects subjective level of recognition. The results demonstrate that change in pulmonary impedance waveform closely parallel well-defined stages of GI distress i.e., initial nausea, a progressive increase in nausea, and finally vomiting episodes. Author

**N75-32734\*#** Baylor Univ Houston, Tex  
**APOLLO GASTROINTESTINAL ANALYSIS Final Report**  
 Buford L Nichols and C T L Huang 15 Aug 1975 20 p  
 refs  
 (Contract NAS9-12728)  
 (NASA-CR-144437) Avail NTIS HC \$325 CSDL 06S

Fecal bile acid patterns for the Apollo 17 flight were studied to determine the cause of diarrhea on the mission. The fecal sterol analysis gave no indication of an infectious diarrhea, or specific or nonspecific etiology occurring during the entire flight. It is assumed that the gastrointestinal problems encountered are the consequences of altered physiology perhaps secondary to physical or emotional stress of flight. F O S

**N75-32735#** Royal Aircraft Establishment Farnborough  
 (England)  
**BACK PAINS OF FLYING PERSONNEL. SIXTY-EIGHT  
 CASES OF BACK PAINS OBSERVED IN FLYING PER-  
 SONNEL AT THE HOSPITAL MILITAIRE D'INSTRUCTION  
 DOMINIQUE LARREY, VERSAILLES**  
 R P Delahaye R Pannier and L Tabusse Jul 1975 12 p  
 refs Transl into ENGLISH from French Conference Report  
 Presented at 11th Intern Aeronautical and Cosmonautical Medical  
 Congr (Madrid) 1962  
 (RAE-Lib-Trans-1844 BR48763) Avail NTIS HC \$325

Back pains affecting flying personnel have been classified according to their etiology. Among the most frequent are post-traumatic pains appearing after a more or less considerable length of time following some kind of an accident. Back pains may be due to disc troubles which do not occur until after a considerable lapse of time hence the necessity for clinical and X-ray checking of all spinal injuries. Muscular insufficiency in

the spinal region is another possibility. The second general category of back pains is observed in flying personnel older than 40 years. The clinical signs here are not very different from signs of arthrosis in other non-flying patients. A third category of back pains is due to posture. This affects helicopter pilots especially and these are of varying intensity according to the type of helicopter and the nature of missions. Kinetotherapy and corrective calisthenics are recommended. Author

**N75-32736\*#** Scripps Clinic and Research Foundation La Jolla  
 Calif

**EFFECTS OF WEIGHTLESSNESS ON TISSUE PROLIFERA-  
 TION Annual Report, 4 Sep 1974 - 4 Sep 1975**

William H Crosby and Mehdi Tavassoli 4 Sep 1975 28 p  
 (Contract NAS9-14341)  
 (NASA-CR-144457) Avail NTIS HC \$375 CSDL 06P

The repair of bone marrow stroma following mechanical injury was studied to obtain baseline data for a proposed space experiment regarding the effect of weightlessness on marrow stroma and other proliferating cell systems. Author

**N75-32737#** Naval Coastal Systems Lab., Panama City, Fla  
**GAS CONSUMPTION OF SCUBA DIVERS**

M W Lippitt, Jr and G F Bond Oct 1974 66 p  
 (AD-A009354 NCSL-223-74) Avail NTIS CSDL 06/19

A series of 6-hour test dives were accomplished to determine the gas consumption rates of divers breathing air from an open circuit demand system for rest, light exercise and moderate exercise at water temperatures of 40F, 60F and 80F. Diver dress was the wet suit. The results indicate a significant increase in gas consumption in 40F water for the rest and light exercise activities. The 40F moderate exercise and all exercise levels at 60F and 80F produced values close to those predicted in the U.S. Navy Diving Gas Manual. Only two divers out of six were able to complete the 40F 6-hour dive. GRA

**N75-32738#** Medical Coll of Wisconsin Milwaukee Dept  
 of Environmental Medicine

**SUMMARY RESULTS OF RESEARCH DIRECTED TOWARD  
 ELICITING EFFECTS OF EXPOSURE TO CARBON MONOX-  
 IDE ON THE SPONTANEOUS ELECTROENCEPHALGRAM  
 AND VISUAL EVOKED CORTICAL ELECTRICAL ACTIVITY**  
**Final Report**

14 Aug 1974 36 p refs  
 (Contract CRC-CAPM-3-68)  
 (PB-242202/O, MCOV-ENVM-CO-74-3,  
 CRC-APRAC-CAPM-3-68-7) Avail NTIS HC \$375 CSDL  
 06P

The spontaneous electroencephalogram (EEG) and the visual evoked cortical electrical activity (visual evoked response, VER) were studied in young adult males to ascertain the effects of exposure to carbon monoxide (CO). The EEG was found to be generally resistant to change during eight hours of exposure at the lower CO concentrations (maximum carboxyhemoglobin saturations of 10 and 22 percent). During the eight hour exposures, the VER was generally resistant to change until COHb levels of 22 percent were achieved while with 24 hours of exposure changes were evident even at the lowest concentrations (COHb equals 4-10 percent). This change in VER wave amplitude suggests that these exposures induced central nervous system depression. GRA

**N75-32739#** Institute for Defense Analyses, Arlington, Va  
 Science and Technology Div

**ESTIMATES OF INCREASE IN SKIN CANCER INCIDENCE  
 WITH TIME FOLLOWING A DECREASE IN STRATOSPHER-  
 IC OZONE Final Report**

Pythagoras Cutchis Feb 1975 33 p refs  
 (Contract DOT-OS-30057)  
 (PB-242278/O, DOT-TST-75-91) Avail NTIS HC \$375 CSDL  
 06R

Estimates of skin cancer incidence resulting from a sudden reduction of stratospheric ozone made and based on uncertain epidemiological data are viewed. These estimates are interpreted as saturation values that would not be realized until many decades have elapsed subsequent to the assumed UV perturbation resulting

## N75-32740

from the ozone reduction. Similarly, many decades are required before skin cancer incidence rate is restored to the unperturbed rate following removal of the perturbing agent. Calculations for the growth of skin cancer incidence with time are made. Skin cancer incidence is assumed to be a linear function of either accumulated lifetime or adult dose and several step-function models for the UV perturbation are investigated. GRA

**N75-32740#** Medical Coll of Wisconsin Milwaukee Dept of Environmental Medicine

### **EXPOSURE OF HUMANS TO CARBON MONOXIDE COMBINED WITH INGESTION OF DIPHENHYDRAMINE HYDROCHLORIDE OR PHENACETIN Final Report**

14 Aug 1974 81 p refs Sponsored in part by EPA (Contract CRC-CAPM-3-68) (PB-242098/2, MCOV-ENVM-CO-74-1, CRC-APRAC-CAPM-3-68-5) Avail NTIS HC \$4 75 CSCL 06T

The COHb saturation tested was 14 percent (above average for cigarette smokers) while drug doses were those usually prescribed. No synergistic effects were observed. Three additional observations were made: (1) the occurrence of CO induced headaches at COHb saturations of 14 percent, (2) the possible effect of CO exposure on EEG activity at this level, and (3) the finding that phenacetin, as an analgesic, did not lessen the headaches induced by the CO exposure. GRA

**N75-32741#** Medical Coll of Wisconsin Milwaukee Dept of Environmental Medicine

### **EXPOSURE OF HUMANS TO CARBON MONOXIDE COMBINED WITH INGESTION OF ETHYL ALCOHOL AND THE COMPARISON OF HUMAN PERFORMANCE WHEN EXPOSED FOR VARYING PERIODS OF TIME TO CARBON MONOXIDE Final Report**

14 Aug 1974 41 p refs Sponsored in part by EPA (Contract CRC-CAPM-3-68) (PB-242099/0, MCOV-ENVM-CO-74-2, CRC-APRAC-CAPM-3-68-6) Avail NTIS HC \$3 75 CSCL 06T

The effects of CO and ethyl alcohol on behavioral test performance were assessed at 24 hour exposure as compared to a 5-1/2 hour exposure to identical concentrations of CO. A dose level of 1.6 ml of 100 proof alcohol/kg body weight and a COHb blood level of approximately 14 percent were chosen. The purpose of the study was to test the hypothesis that a 24-hour exposure to low levels of CO would have deleterious effects on behavior and that alcohol would potentiate such effects. The data obtained from tests of coordination, arithmetic, inspection, manual dexterity, time estimation, and vigilance did not provide evidence to substantiate either of these hypotheses. The only positive result was alcohol adversely affects eye-hand coordination. GRA

**N75-32742#** Naval Postgraduate School Monterey, Calif  
**THE EFFECT OF BREATHING 100 PERCENT OXYGEN ON SHORT TERM MEMORY OF MILITARY OFFICERS M S Thesis**

Richard Alan Marsden Mar 1975 52 p refs (AD-A009989) Avail NTIS CSCL 06/19

Using a serial short term memory task, subjects were required to respond to symbols presented one-back, 2-back, and 3-back from a randomly presented list of four different symbols while breathing either 100 percent oxygen or atmospheric air with an oxygen mask. The purpose of the experiment was to determine whether breathing 100 percent oxygen had an effect on short term memory. Analysis of the data collected from 36 subjects showed that breathing pure oxygen had no effect on the subjects' short term memory ability over a 12 minute period. This result is in direct contrast to previously reported results. GRA

**N75-32743#** Air Force Systems Command Wright-Patterson AFB Ohio Foreign Technology Div  
**BIOCHEMICAL RESEARCH IN THE STUDY OF THE TOXICITY OF CHEMICAL SUBSTANCES**

O G Arkhipova and I V Pavlova 12 Nov 1974 22 p refs

Transl into ENGLISH from Mezhdunarodnogo Seminara Uchenykh Sots Stran (Moscow), 1970 p 41-49 Seminar held at Moscow 25-29 Nov 1968

(AD-A001846 FTD-MT-24-992-74) Avail NTIS CSCL 06/20

When evaluating biochemical data as indicators of the toxicity of substances and using them for purposes of standardization, it is first of all necessary to bear in mind the biological significance of these indicators, i.e. to determine which metabolic component is disrupted in this case. It is also necessary to bear in mind the degree of manifestation of these changes. Thus the basic mechanisms of the action of poisons are the changes in the metabolic processes which they cause. They can be revealed with the aid of biochemical procedures and methods. GRA

**N75-32744** United States International Univ San Diego, Calif  
**PERSONALITY CHANGE RESULTING FROM WATER SUSPENSION SENSORY ISOLATION Ph D Thesis**

Mark Kammerman 1975 91 p  
Avail Univ Microfilms Order No 75-20251

The problem was to determine whether normal individuals show positive personality change after experiencing water-suspension isolation and whether the personality changes were stable over a one-month period. A major objective was to place twenty of the thirty volunteers in a water-suspension isolation tank ten of which would hear an audio message designed to encourage free association. The MMPI was administered pre-post and follow-up to determine significant personality changes. The isolation experience was divided into three immersions: the first lasting one half-hour and the second two lasting one and one-half hours each. The importance of the study derives from three neglected issues: the use of water-suspension isolation in creating personality changes, the use of normal subjects and the stability of deprivation-induced personality changes over short times periods. Dissert Abstr

**N75-32745#** Royal Aircraft Establishment Farnborough (England)

### **SLOW ACTIVITIES EVOKED IN MAN FOLLOWING VOLUNTARY MOVEMENT AND ARTICULATED SPEECH**

G Lelord F Laffont D Sauvage and P Jusseume Jun 1975 24 p refs Transl into ENGLISH from Electroencephalog Clin Neurophysiol (Montreal) v 35 no 2 1973 p 113-124 (RAE-Lib-Trans-1845 BR48764) Avail NTIS HC \$3 25

Experiments were conducted in which the subject was invited to carry out a movement after a stimulus. The stimulus was either a click or more frequently a flash of a paired stimulus in which a click was followed by a flash after a 700 msec interval. The phenomenon usually observed is a slow negative wave with a long latency appearing after the movement. This wave is not restricted to the contralateral motor area but extended bilaterally with a maximum at the vertex. Its characteristics appear to be the same after clenching the fist, different movements of the bucco-lingual region, articulation of a word or even its evocation. The slow waves preceding movement described by authors studying the anticipation of or preparation for movement are not usually seen. The conditional slow wave appearing before movement is similar to the contingent negative variation with sharp commands and brisk movements. Author

**N75-32746\*#** National Aeronautics and Space Administration Langley Research Center, Langley Station, Va  
**HUMAN COMFORT RESPONSE TO RANDOM MOTIONS WITH A DOMINANT LONGITUDINAL MOTION**

Ralph W Stone Jr Jul 1975 88 p refs (NASA-TM-X-72746) Avail NTIS HC \$4 75 CSCL 05E

Subjective ride comfort response ratings were measured on the Langley Visual Motion Simulator with longitudinal acceleration inputs with various power spectra shapes and magnitudes. The results show only little influence of spectra shape on comfort response. The effects of magnitude on comfort response indicate the applicability of psychophysical precepts for comfort modeling. Author

**N75-32747\*#** National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

**A METHOD FOR THE STUDY OF HUMAN FACTORS IN AIRCRAFT OPERATIONS**

William Barnhart, Charles Billings, George Cooper, Rob Gilstrap, John Lauber, Harry Orlady, Bert Puskas, and Warren Stephens  
Sep 1975 49 p  
(NASA-TM-X-62472 A-6237) Avail NTIS HC \$3 75 CSCL 05E

A method for the study of human factors in the aviation environment is described. A conceptual framework is provided within which pilot and other human errors in aircraft operations may be studied with the intent of finding out how, and why they occurred. An information processing model of human behavior serves as the basis for the acquisition and interpretation of information relating to occurrences which involve human error. A systematic method of collecting such data is presented and discussed. The classification of the data is outlined. Author

**N75-32748\*# National Bureau of Standards, Washington D C EMOTIONALITY IN RESPONSE TO AIRCRAFT NOISE A REPORT OF DEVELOPMENT WORK Final Report**

Patsy A Klaus Washington NASA Oct 1975 90 p refs  
(NASA Order L-88318)  
(NASA-CR-2600) Avail NTIS HC \$4 75 CSCL 05E

A literature search and pilot study conducted to investigate the topic of emotional response to aircraft noise are described. A Tell-A-Story Technique was developed for use in the pilot study which required respondents to make up stories for a series of aircraft-related and non-aircraft-related pictures. A content analysis of these stories was made. The major finding was that response patterns varied among three groups of respondents - those currently living near airports, those who had lived near airports in the past, and those who had never lived near airports. Negative emotional feelings toward aircraft were greatest among respondents who had lived near airports in the past but no longer did. A possible explanation offered for this finding was that people currently living near airports might adapt to the situation by denying some of their negative feelings, which they might feel more free to express after they had moved away from the situation. Other techniques used in the pilot study are also described including group interviews and a word association task. Author

**N75-32749\*# Massachusetts Inst of Tech Cambridge PILOT PERFORMANCE IN ZERO-VISIBILITY PRECISION APPROACH Ph D Thesis**

Arye R Ephrath Jun 1975 233 p refs  
(Grant NGR-22-009-733)  
(NASA-CR-137759) Avail NTIS HC \$7 50 CSCL 05E

The pilot's short-term decisions regarding performance assessment and failure monitoring is examined. The performance of airline pilots who flew simulated zero-visibility landing approaches is reported. Results indicate that the pilot's mode of participation in the control task has a strong effect on his workload, the induced workload being lowest when the pilot acts as a monitor during a coupled approach and highest when the pilot is an active element in the control loop. A marked increase in workload at altitudes below 500 ft is documented at all participation modes; this increase is inversely related to distance-to-go. The participation mode is shown to have a dominant effect on failure-detection performance, with a failure in a monitored (coupled) axis being detected faster than a comparable failure in a manually-controlled axis. Touchdown performance is also documented. It is concluded that the conventional instrument panel and its associated displays are inadequate for zero-visibility operations in the final phases of the landing approach. Author

**N75-32750# Civil Aeromedical Inst, Oklahoma City, Okla ATTITUDES ON EN ROUTE AIR TRAFFIC CONTROL TRAINING AND WORK A COMPARISON OF RECRUITS INITIALLY TRAINED AT THE FAA ACADEMY AND RECRUITS INITIALLY TRAINED AT ASSIGNED CENTERS**

John J Mathews Bart B Cobb and William E Collins May 1975 38 p refs  
(AD-A013343/9, FAA-AM-75-3) Avail NTIS HC \$3 75 CSCL 05/10

Questionnaires concerning aspects of training-related and work-related attitudes were sent to air traffic control (ATC) trainees who represented groups of attritions and retentions in two En Route training programs: programs that provided basic training at the FAA Academy and programs that provided basic training at the trainees' assigned facilities. The following attitudes were assessed: (1) general attitude toward ATC training, (2) attitude of trainees toward academy and facility training, depending on whether academy training preceded or followed facility training, (3) job attitudes held by trainees, and (4) sex differences and attrition-retention differences in these attitudes. Results are presented and discussed. J M S

**N75-32751# Aeronautical Systems Div, Wright-Patterson AFB, Ohio**

**INVESTIGATION OF PILOTS' TRACKING CAPABILITY USING A ROLL COMMAND DISPLAY Technical Report, Feb - Jun 1970**

Richard Geiselhart, Joseph K Jarboe and Paul T Kemmerling, Jr Dec 1971 64 p refs  
(AD-A009590, ASD-TR-71-46) Avail NTIS CSCL 05/9

Ten Air Force pilots having current flying status flew a series of missions to establish baseline normative data for pilot tracking performance. An F-111A flight simulator was used as the test-bed for the experiment. The mission consisted of flying the aircraft simulator at 450 knots and 6000 feet to a designated target while tracking or keeping the bank steering needle centered. Various segments of the mission were designed to measure pilot tracking ability under perturbed and unperturbed conditions. Twenty-seven different evaluation scores were obtained to determine pilot tracking performance. Recommendations are made for further studies on tracking performance as a function of system and pilot constraints. GRA

**N75-32752# Arizona State Univ Tempe Dept of Psychology**

**VISUAL AND AUDITORY INFORMATION PROCESSING IN FLYING SKILL ACQUISITION Final Report, Jul 1973 - Jun 1974**

Barry Leshowitz, Stanley P Parkinson and Wayne L Waag Dec 1974 20 p refs  
(Contract F41609-74-C-0002 AF Proj 1138)  
(AD-A009636, AFHRL-TR-74-103) Avail NTIS CSCL 05/9

The document summarizes a series of experiments conducted to study further refinements in the development of experimental paradigms for the investigation of information processing skills relevant to pilot training. A series of tasks have been developed and studied which attempt to measure the individual's information processing capacity as well as his susceptibility to performance degradation resulting from the introduction of interfering stimuli. Data suggest performance on these tasks to be highly dependent upon individual differences, therefore making them good candidates for use as tools in the investigation of information processing skills in flying training. Implications for direct application to flying training research are discussed. GRA

**N75-32753# Navy Personnel Research and Development Center San Diego Calif**

**TRAINING MATHEMATICS SKILLS WITH GAMES Research and Evaluation Report, Jul 1973 - Dec 1974**

Patrick H McCann Apr 1975 24 p refs  
(AD-A009364, NPRDC-TR-75-28) Avail NTIS CSCL 05/9

The goal of this study was to test the efficacy of using games presented on the PLATO IV instructional system to provide remedial mathematics training for Basic Electricity/Electronics (BE/E) School trainees. Two learning tasks which provide the most difficulty for students were selected and instructionally programmed for the PLATO IV system. Drill and practice routines for the two tasks were prepared in three methods. Two games were designed which utilized PLATO IV display capabilities along with a conventional problem presentation followed by answer feedback routine. A group of students was assigned to each of the counterbalanced order of the independent tasks. Within each group students received one of the six possible combinations of the three methods (conventional and two games). GRA

**N75-32754#** Systems Control Inc, Palo Alto, Calif  
**IDENTIFICATION OF THE OPTIMAL CONTROL MODEL FOR THE HUMAN OPERATOR Final Report**  
 Anil Phatak Howard Weinert, and Ilana Segall May 1975  
 56 p refs  
 (Contract F33615-13-C-4021)

(AD-A009956, AMRL-TR-74-79) Avail NTIS CSCL 05/10  
 The optimal control model concept appears attractive for modeling human operator behavior in a variety of tasks. However no successful method has existed in the past for estimating the human operator model parameters from experimental data. Forced attempts at identification have failed because some of the model parameters are not identifiable. In this report the optimal control model is analyzed with the system identification point of view to determine which parameters can be identified. As a result a systematic procedure for the identification of the optimal control model parameters from measured experimental data has been developed. This procedure is validated by application to experimental human operator data. GRA

**N75-32755#** Naval Submarine Medical Research Lab Groton, Conn  
**EYE-MOVEMENTS DURING SEARCH FOR CODED AND UNCODED TARGETS**  
 Saul M Luria and Mark S Strauss 28 Jun 1974 30 p refs  
 (AD-A002713 NSMRL-787, PR-10) Avail NTIS CSCL 05/10

Eye-movements and search-time of four subjects were studied as they searched for a target-dial in a 4 x 4 array of dials which were differentiated either by (1) color (2) shape (3) a combination of color and shape or (4) were uncoded. Search-time varied reliably between conditions. It was generally shortest in the color-condition followed by color-shape shape, and the uncoded condition. Subjects were capable of using both shape and color simultaneously. Search-time appeared to be strongly associated with the average number of fixations required for target-detection but not with other measures of eye-movements. Other characteristics are also noted. GRA

**N75-32756#** Air Force Human Resources Lab Brooks AFB Tex  
**TRYOUT OF A GENERAL PURPOSE SIMULATOR IN AN AIR NATIONAL GUARD TRAINING ENVIRONMENT Interim Report, 1 Jun - 31 Aug 1974**  
 Ronald W Spangenberg Dec 1974 16 p refs  
 (AF Proj 1121)  
 (AD-A009993 AFHRL-TR-74-92) Avail NTIS CSCL 05/9

An evaluation of the usability effectiveness and acceptance in a job environment was performed on a general purpose simulator using a simulation of a radar system. General purpose simulators permit sharing of a programmable capability among simulations thus providing economical hands-on training and training not usually economically available by other means. Training and exercises in malfunction isolation were given Air National Guard personnel. Data were obtained using questionnaires a performance test, and interviews. GRA

**N75-32757#** Air Force Human Resources Lab Brooks AFB Tex  
**GROUND TRAINING DEVICES IN JOB SAMPLE APPROACH TO UPT SELECTION AND SCREENING Final Report, Sep 1972 - Aug 1974**  
 W Dean LeMaster and Thomas H Gray Dec 1974 59 p refs  
 (AF Proj 1123)  
 (AD-A009995, AFHRL-TR-74-86) Avail NTIS CSCL 05/9

The purpose of this study was to develop a screening procedure for undergraduate pilot training (UPT). This procedure was based upon the use of ground-based instrument trainers in which UPT candidates, naive to flying were evaluated in their performance of job sample tasks, i.e. basic instrument flying. Training and testing sessions were conducted in a highly standardized and tightly controlled environment. Student performance was scored using only objective measures of aircraft

control and systems management. The job sample approach proved highly successful in predicting student performance in the T-37 phase of UPT. Attrition due to causes other than a lack of flying skill, was not satisfactorily predicted by this approach. GRA

**N75-32758\*#** Beckman Instruments, Inc Anaheim Calif  
**AUTOMATED IODINE MONITORING SYSTEM DEVELOPMENT (AIMS) Final Report**  
 Aug 1975 81 p  
 (Contract NAS9-14298)  
 (NASA-CR-144433 FR-1188-101) Avail NTIS HC \$4.75 CSCL 06K

The operating principle of the automated iodine monitoring/controller system (AIMS) is described along with several design modifications. The iodine addition system is also discussed along with test setups and calibration. A facsimile of the optical/mechanical portion of the iodine monitor was fabricated and tested. The appendices include information on shuttle prototype AIMS preliminary prime item development specifications preliminary failure modes and effects analysis, and preliminary operating and maintenance instructions. M J S

**N75-32759\*#** Martin Marietta Corp Denver Colo  
**MANNED MANEUVERING UNIT TECHNOLOGY SURVEY**  
 G V O Cook, ed 20 Aug 1975 59 p refs  
 (Contract NAS9-14593)  
 (NASA-CR-144444 MCR-75-320) Avail NTIS HC \$4.25 CSCL 05H

The preliminary design of the manned maneuvering unit (MMU) for the shuttle is investigated and the current state of the art in certain technology areas that may find application on the operational EVA shuttle MMU is examined. Three broad areas of technology, namely (1) mechanical energy storage - i.e. the practicality of utilizing the energy storage capability of either a reaction wheel or a control moment gyro (2) numerical and alphanumeric displays, and (3) recent electronics developments such as microprocessors and integrated injection logic were covered. Author

**N75-32760\*#** AiResearch Mfg Co, Los Angeles Calif  
**ELECTRICAL DISTRIBUTION SYSTEM (EDS) AND CAUTION AND WARNING SYSTEM (CWS) Final Report**  
 T McClung 23 Sep 1975 90 p  
 (Contract NAS9-14311)  
 (NASA-CR-144432 AiResearch-75-11994) Avail NTIS HC \$4.75 CSCL 06K

An astronaut caution and warning system is described which monitors various life support system parameters and detects out-of-range parameter conditions. The warning system generates a warning tone and displays the malfunction condition to the astronaut along with the proper corrective procedures required. Author

**N75-32761\*#** Institute for Research Inc Houston, Tex  
**FURTHER DEVELOPMENT OF A BIOCIDIC GENERATION AND WATER SYSTEM PASSIFICATION SYSTEM ADDENDUM Final Report**  
 18 Apr 1975 40 p  
 (Contract NAS9-12998)  
 (NASA-CR-144434) Avail NTIS HC \$3.75 CSCL 06K

An electrochemical process for generating iodine in situ in a potable water metallic storage system was examined. The degree of concurrent corrosion protection and of metallic ion buildup was determined. A working metal bellows system was evaluated and tested for the buildup of metallic ions comparable to that reported in spacecraft potable water specifications. An integrated system was assembled and tested which may be used to maintain the potability of water which is passively stored in metallic containers for extended periods of time. Test conditions and apparatus are described. Author

**N75-32762#** Technion - Israel Inst of Tech Haifa Dept of Aeronautical Engineering



**VEHICULAR CONTROL BY VISUAL FIELD CUES MODEL DEVELOPMENT AND EXPERIMENTAL VALIDATION**

Arthur Grunwald and S J Merhav Jul 1975 38 p refs  
Sponsored by Ministry of Defence  
(TAE-254) Avail NTIS HC \$3 75

The development and experimental validation of an analytical model for manual visual field control (VFC) of aircraft is presented. A basic model for the control oriented visual field information (VFI) is proposed and formulated in an optimal control framework. A special case of VFC is studied namely the manual lateral control of a TV guided remotely piloted vehicle (RPV) along a straight reference trajectory in the presence of side gusts. For experimental validation of five-degree-of-freedom fixed-base simulator was constructed to simulate a RPV flight along a nominally straight reference trajectory. The starting point in the validation program was a VFI model based on error detection at one looking distance, which proved to be correct for fixed distance viewing but not for the complete VFC task. The analytical model was then reformulated to allow VFI detection at two looking distances. This two point VFI model was found to be an adequate representation for the complete VFC task and to match the experimental results closely, thus enabling the determination of the human operator parameters within narrow limits.

Author

**N75-32763\*# LTV Aerospace Corp Dallas Tex SHUTTLE KIT FREEZER REFRIGERATION UNIT CONCEPTUAL DESIGN Final Report**

R J Copeland 22 Aug 1975 85 p refs  
(Contract NAS9-9912)  
(NASA-CR-144445, T122-RP-044) Avail NTIS HC \$4 75 CSCL 06K

The refrigerated food/medical sample storage compartment as a kit to the space shuttle orbiter is examined. To maintain the -10 F in the freezer kit an active refrigeration unit is required, and an air cooled Stirling Cycle refrigerator was selected. The freezer kit contains two subsystems the refrigeration unit and the storage volume. The freezer must provide two basic capabilities in one unit. One requirement is to store 215 lbs of food which is consumed in a 30-day period by 7 people. The other requirement is to store 128.3 lbs of medical samples consisting of both urine and feces. The unit can be mounted on the lower deck of the shuttle cabin and will occupy four standard payload module compartments on the forward bulkhead. The freezer contains four storage compartments.

Author

**N75-32764\*# Boeing Aerospace Co Houston Tex Saturn/Apollo/Skylab Branch**

**CREW APPLIANCE STUDY Final Report**  
B W Proctor R P Reysa, and D J Russell 29 Aug 1975  
131 p refs  
(Contract NAS9-13965)  
(NASA-CR-144449 D2-118572) Avail NTIS HC \$5 75 CSCL 05/4

Viable crew appliance concepts were identified by means of a thorough literature search. Studies were made of the food management, personal hygiene, housekeeping, and off-duty habitability functions to determine which concepts best satisfy the Space Shuttle Orbiter and Modular Space Station mission requirements. Models of selected appliance concepts not currently included in the generalized environmental-thermal control and life support systems computer program were developed and validated. Development plans of selected concepts were generated for future reference. A shuttle freezer conceptual design was developed and a test support activity was provided for regenerative environmental control life support subsystems.

Author

**N75-32765\*# Hamilton Standard, Windsor Locks, Conn ONE MAN ELECTROCHEMICAL AIR REVITALIZATION SYSTEM Final Report, Nov 1973 - Jun 1975**

John C Huddleston and John R Aylward May 1975 136 p refs  
(Contract NAS9-13679)  
(NASA-CR-144447 SVHSER-6546) Avail NTIS HC \$5 75 CSCL 06K

An integrated water vapor electrolysis (WVE) hydrogen

depolarized CO2 concentrator (HDC) system sized for one man support over a wide range of inlet air conditions was designed fabricated, and tested. Data obtained during 110 days of testing verified that this system can provide the necessary oxygen, CO2 removal and partial humidity control to support one man (without exceeding a cabin partial pressure of 30 mmHg for CO2 and while maintaining a 20% oxygen level) when operated at a WVE current of 50 amperes and an HDC current of 18 amperes. An evaluation to determine the physical properties of tetramethylammonium bicarbonate (TMAC) and hydroxide was made. This provides the necessary electrolyte information for designing an HDC cell using TMAC.

Author

**N75-32766\*# National Aeronautics and Space Administration Ames Research Center Moffett Field Calif**

**AUTOMATIC FLUID DISPENSER Patent Application**  
Peter C Sakellaris inventor (to NASA) (Oregon Univ Dental School Portland) Filed 8 Oct 1975 17 p Sponsored by NASA

(NASA-Case-ARC-10820-1 US-Patent-Appl-SN-620675) Avail NTIS HC \$3 25 CSCL 06K

An apparatus for dispensing fluid to test animals according to a time schedule is disclosed. Fluid automatically flows to individual dispensing units at predetermined times from a fluid supply and is available only for a predetermined interval of time after which an automatic control causes the fluid to drain from the individual dispensing units. Fluid deprivation continues until the beginning of a new cycle when the fluid is once again automatically made available at the individual dispensing units.

NASA

**N75-32767\*# National Aeronautics and Space Administration Marshall Space Flight Center Huntsville Ala**

**ACTUATOR DEVICE FOR ARTIFICIAL LEG Patent Application**

John L Burch inventor (to NASA) Filed 12 Sep 1975 27 p  
(NASA-Case-MFS-23225-1, US-Patent-Appl-SN-612965) Avail NTIS HC \$3 75 CSCL 06B

An actuator device is provided for moving an artificial leg of a person having a prosthesis replacing an entire leg and hip joint. The device includes an articulated hip joint assembly carried by the natural leg and a second articulated hip joint assembly carried by the prosthesis. The energy created from the movement of the natural leg is transferred by a compressible fluid from the first hip joint assembly to the second hip joint assembly for moving the artificial leg.

NASA

**N75-32768# Applied Psychological Services, Wayne Pa A MODEL FOR PREDICTING INTEGRATED MAN-MACHINE SYSTEM RELIABILITY MODEL LOGIC AND DESCRIPTION**

Arthur I Siegel J Jay Wolf and Martin R Lautman Nov 1974 230 p refs  
(Contract N00024-72-C-1277)  
(AD-A009814) Avail NTIS CSCL 05/8

A previously developed man-machine model which is capable of simulating closed man-machine systems operated by crews of from 4 to 20 members was substantially modified so as to allow its use for system reliability and system availability predictive purposes. The resultant new model is capable of generating new system availability and reliability measures based on human and equipment performance resulting from the computer simulation runs. A description of the revised computer model including the changes is presented together with the model flowchart and user information and the degree of success in producing rational output achieved during a set of basic runs using the revised model and program is discussed.

GRA

**N75-32769# Army Natick Labs Mass EFFECT OF STORAGE CONDITIONS ON THE QUALITY OF COMPRESSED FOOD BARS**

Abdul R Rahman Harold Gorfien Donald E Westcott Glenn Schafer, and David DuBose Dec 1974 28 p refs  
(AD-A006494/9 FEL-28, USA-NLABS-TR-74-64-FEL) Avail NTIS HC \$3 75 CSCL 06/8

Four prototype compressed bars - cherry beef noodle soup corn flake and bean salad - were developed in the laboratory. They were then produced by commercial firms and were evaluated in prototype individual ration packets in the field. Storage studies indicate that the average technological ratings for color, flavor, and texture of dry as well as rehydrated bars were not adversely affected after storage for 3, 6, and 12 months at 4, 21, or 38C or for 18 months at 4 or 21C. The ratings of beef noodle soup were somewhat lower than the rest of the bars throughout the storage tests. GRA

**N75-33088\*** Martin Marietta Corp., Denver, Colo  
**A MANIPULATOR ARM FOR ZERO-g SIMULATIONS**

Shepard B Brodie, Christopher Grant, and Janos J Lazar /in NASA Kennedy Space Center 9th Aerospace Mech Symp 1974 12 p  
 CSCL 05H

A 12-ft counterbalanced Slave Manipulator Arm (SMA) is described. The SMA is to be used for resolving the questions of operational applications, capabilities, and limitations for such remote manned systems as the Payload Deployment and Retrieval Mechanism (PDRM) for the shuttle, the Free-Flying Teleoperator System, the Advanced Space Tug, and Planetary Rovers. As a developmental tool for the shuttle manipulator system, the SMA represents an approximate one-quarter scale working model for simulating and demonstrating payload handling, docking assistance, and satellite servicing. For the Free-Flying Teleoperator System and the Advanced Tug, the SMA provides a near full-scale developmental tool for satellite servicing, docking, and deployment/retrieval procedures, techniques, and support equipment requirements. For the Planetary Rovers, it provides an oversize developmental tool for sample handling and soil mechanics investigations. Author

**N75-33095\*** McDonnell-Douglas Astronautics Co., St Louis Mo

**THE PERFORMANCE OF COMPONENTS IN THE SKYLAB REFRIGERATION SYSTEM**

Charles E Daniher, Jr /in NASA Kennedy Space Center 9th Aerospace Mech Symp 1974 18 p refs

(Contract NAS9-6555)  
 CSCL 06K

The on-orbit performance of the Skylab refrigeration system components is presented. Flight anomalies are analyzed and performance of the newly developed components is described. Nine months of orbit data proved the practicality of the leak-free coolant system design. Flight-proven application of a thermal capacitor and development test results of the first all-mechanical low-temperature mixing valve represent a significant advance in single-phase, low-temperature coolant loop design. System flight data suggest that additional instrumentation and fluid filters could have prevented system orbit performance anomalies. Author

**N75-33097\*** McDonnell-Douglas Astronautics Co., St Louis, Mo

**SKYLAB TRASH AIRLOCK**

Larry R Price /in NASA Kennedy Space Center 9th Aerospace Mech Symp 1974 12 p

(Contract NAS9-6555)  
 CSCL 06K

The Skylab Trash Airlock (TAL) used throughout the Skylab mission to transfer trash materials that could support microbial growth from the pressurized cabin to the unpressurized waste tank is described. The TAL which uses several basic mechanisms, was successfully operated daily for the 170 days of manned missions for a total of 637 cycles. Author

**N75-33104\*** Rensselaer Polytechnic Inst., Troy NY  
**MODERN MECHANISMS MAKE MANLESS MARTIAN MISSION MOBILE SPIN-OFF SPELLS STAIRCLIMBING SELF-SUFFICIENCY FOR EARTHBOUND HANDICAPPED**

George N Sandor, David R Hassel, and Philip F Manno /in NASA Kennedy Space Center 9th Aerospace Mech Symp 1974 18 p  
 (Grant NGL-33-018-091)  
 CSCL 05H

Concepts were developed for three wheel chairs from progressively improving designs of a proposed unmanned roving vehicle for the surface exploration of Mars, as a spin-off, a concept for a stair-climbing wheel chair was generated. The mechanisms employed in these are described. The Mars mission is envisioned using the booster rockets and aeroshell of the Viking missions. Author

**N75-33106\*** National Aeronautics and Space Administration John F Kennedy Space Center, Cocoa Beach, Fla  
**DEVELOPMENT OF A BONE-FIXATION PROSTHETIC ATTACHMENT**

Lester J Owens /in its 9th Aerospace Mech Symp 1974 13 p  
 CSCL 06B

An artificial limb attached directly to the bone by a quick-disconnect coupling was tested in-place at a California medical rehabilitation center. Its design concept and development, made possible by multiple spinoffs of aerospace technology, are discussed. Author

**N75-33107\*** Rockwell International Corp., Downey Calif  
**A UNIQUE CHALLENGE ENERGY EGRESS AND LIFE SUPPORT EQUIPMENT AT KSC**

Henry M Waddell, Jr /in NASA Kennedy Space Center 9th Aerospace Mech Symp 1974 19 p

CSCL 06K

As a result of the investigation following the January 1967 fire, which took the lives of three astronauts, materials were developed, flight hardware was modified and test procedures were rewritten in order to establish the framework within which a more effective rescue concept could be developed. Topics discussed include breathing units, improved life support equipment, miniresuscitators, and hazardous tasks during space shuttle launch and landing operations. Author

**N75-33634** New York Univ., NY  
**PLANKTON COMMUNITIES AT FIRE ISLAND INLET (GREAT SOUTH BAY, LONG ISLAND, NEW YORK) Ph D Thesis**

Sylvia Short Weaver 1975 148 p  
 Avail Univ Microfilms Order No 75-22935

Both zooplankton and phytoplankton communities were observed and recorded at Fire Island Inlet from 1971 to 1974. Species typical of a temperate neritic environment were found. Sampling by net and bottle at several stations in the area revealed two populations: one representative of the Bay water and the other representative of the Ocean water. It was further found that these two populations could be followed from one station (Oak Beach) by sampling at the appropriate tidal intervals, i.e., mid-tide after slack, on both the ebb and flow tides. Observations of plankton communities representative of Bay water and of ocean water as they move into and out of the Inlet from one station could be of significance in monitoring the effects of proposed man made changes in the environment. Dissert Abstr

**N75-33635\*#** National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif  
**THE EFFECT OF STERILIZATION ON BIOLOGICAL, ORGANIC GEOCHEMICAL AND MORPHOLOGICAL INFORMATION IN NATURAL SAMPLES**

Lawrence I Hochstein, Keith A Kvenvolden and Delbert E Philpott Apr 1974 74 p refs  
 (NASA-TM-X-72883) Avail NTIS HC \$4.25 CSCL 06C

The loss of biological, organic geochemical and morphological science information that may occur should a Mars surface sample be sterilized prior to return to earth is examined. Results of experimental studies are summarized. Author

**N75-33636\*#** Transemanatics, Inc., Washington D C  
**EVOLUTION OF CONCEPTS OF THE ORIGIN OF LIFE,  
 1924 - 1974**

A I Oparin Washington NASA Oct 1975 15 p Transl into ENGLISH of conf paper from Izv Akad Nauk SSSR, Ser Biol (USSR), no 1, Jan-Feb 1975 p 5-10 Presented at Intern Seminar on Origin of Life, Moscow, 2-7 Aug 1974 (Contract NASw-2792)

(NASA-TT-F-16593) Avail NTIS HC \$3 25 CSCL 06C

Basic changes over the past 50 years in the theory of the evolution of life on earth are outlined The first concerns the possibility of the abioegenous synthesis of organic matter on earth Radioastronomic data has indicated that complex and high molecular carbon compounds exist in space Thus earth during its early formation inherited a large amount of organic matter Second evolution did not proceed in an orderly fashion in only one direction at one time in various subvital territories on earth various stages of biopoiesis existed, where decomposition was equally if not more common than synthesis Thus, the concentrated primordial broth theory must be rejected Finally, whole separate-phase systems (probations) initially evolved from the high molecular compound water solution These complex systems then became subject to natural selection, which eventually led to specialization of internal systems and transition from chemical to biological evolution Author

**N75-33637\*#** Scientific Translation Service, Santa Barbara, Calif  
**BACTERIAL RHODOPSIN AS A LIGHT ENERGY CONVERTER**

D Oesterhelt Washington NASA Oct 1975 12 p refs Transl into ENGLISH from Nachrichten Aus Chem und Tech (West Ger), v 22, no 22, 1974 p 475-476 (Contract NASw-2483)

(NASA-TT-F-16597) Avail NTIS HC \$3 25 CSCL 06M

The structure, function, and energy converting properties of bacteriorhodopsin are analyzed Bacteriorhodopsin is a complex of retinal and protein which makes up the purple membrane in halophilic bacteria The membrane serves as a light energy source for the bacteria by pumping protons out of the cell Author

**N75-33638#** General Electric Co., Syracuse, N Y Electronics Lab

**STUDY AND DEVELOPMENT OF INFUSIBLE AND INCORRODIBLE IDENTIFICATION TAGS AND MICRODOTS**

W T Gannon Sep 1974 50 p refs (Contract DAAG17-72-C-0097 DA Proj 1J6-62713-DJ-40) (AD-A010389, USA-NLABS-TR-75-27-CEMEL) Avail NTIS CSCL 15/5

The program covers the development of a new type of personnel identification tag, conceived by the Army Natick Laboratories, for identifying personnel who have been subjected to cataclysmic events In particular the tags are to be incorrodible and infusible at 2000 F The tag is 1 in x 2 in and contains a facial image fingerprints and alphanumeric characters Both chemical and laser etching techniques have been investigated For use with the ID tag, a cable type necklace, which will withstand the temperature required but will fail in tension in order to protect the wearer has been designed Also, an investigation has been made of microdots, which include the basic features of the tag Single pulse laser recording, for selective evaporation of a surface deposited on a substrate is the mechanism investigated GRA

**N75-33639#** National Marine Fisheries Service Seattle Wash Southwest Fisheries Center

**PHYTOPLANKTON PIGMENT AND PRODUCTION MEASUREMENTS IN THE CALIFORNIA CURRENT REGION, 1969-72**

R W Owen, Jr and C K Sanchez Nov 1974 188 p refs (COM-75-10784/7 NOAA-NMFS-dr-91, NOAA-75-52102) Avail NTIS HC \$7 00 CSCL 06C

Phytoplankton production standing stocks, and some relevant environmental characteristics were systematically measured in the California Current system during the period from 1969 through 1972 The report describes the systems and methods of measurement along with the data obtained GRA

**N75-33640\*** National Aeronautics and Space Administration Lewis Research Center Cleveland, Ohio

**OPHTHALMIC LIQUIFACTION PUMP Patent**

Edward F Baehr, Jack B Esgar and William J McGannon, inventors (to NASA) Issued 23 Sep 1975 17 p Filed 14 Sep 1973 Supersedes N73-32000 (11 - 23 p 2749) (NASA-Case-LEW-12051-1, US-Patent-3,906 954

US-Patent-Appl-SN-397478 US-Patent-Class-128-305

US-Patent-Class-128-230) Avail US Patent Office CSCL 06B

A surgical tissue macerating and removal tool is disclosed wherein a rotating member having a cutting tip is utilized When the instrument is to be used in an eye, a treatment fluid is supplied to the operative site and a first pump is provided to evacuate macerated material and treatment fluid from the eye The rotating member may be disposed in a support tube having an aperture and communication with the first pump to provide for discharge of the macerated material and used treatment fluid A second pump means is provided on the rotating member to provide a counter flow of treatment fluid into the space between the rotating member and the support tube The second pump may provide additional support for the rotating member Means is also provided for axially positioning rotating member to increase or decrease cutting action

Official Gazette of the U S Patent Office

**N75-33641\*#** Air Force Academy Colo Instrumentation Lab

**ANALYSIS OF CHANGES IN LEG VOLUME PARAMETERS, AND ORTHOSTATIC TOLERANCE IN RESPONSE TO LOWER BODY NEGATIVE PRESSURE DURING 28-DAYS EXPOSURE TO ZERO GRAVITY SKYLAB 2**

Richard D Barnett Richard J Gowen, and David R Carroll Mar 1975 240 p refs (NASA Order T-66344-G)

(NASA-CR-141883) Avail NTIS HC \$7 50 CSCL 06S

The design of the leg volume measuring system employed for the M092 portion of the Skylab missions required the development of a system sensitive to large and small volume changes at the calf of the leg These changes in volume were produced in response to the orthostatic stress of a Lower Body Negative Pressure Device (LBNPD) or by venous occlusion The cardiovascular responses of the Apollo crewman associated with the postflight evaluations indicate varying decrements of orthostatic tolerance The postflight changes indicate a slightly diminished ability of the cardiovascular system to function effectively against gravity following exposure to weightlessness The objective of the Skylab LBNP experiments (M092) was to provide information about the magnitude and time course of the cardiovascular changes associated with prolonged periods of exposure to weightlessness The equipment signal processing, and analysis of the leg volume data obtained from the M092 experiment of the Skylab 2 Mission are described Author

**N75-33642\*#** National Aeronautics and Space Administration Ames Research Center Moffett Field, Calif

**THERMISTOR HOLDER FOR SKIN TEMPERATURE MEASUREMENTS Patent Application**

John E Greenleaf and Bill A Williams inventors (to NASA)

Filed 29 Sep 1975 12 p

(NASA-Case-ARC-10855-1, US-Patent-Appl-SN-617612) Avail NTIS HC \$3 25 CSCL 06B

An improved thermistor holder structure is disclosed which facilitates skin temperature measurement The device includes a cylindrical plastic housing with tab extensions that permit the apparatus to be held to a skin surface by suitable elastic members Ventilation openings are provided in the plastic housing to permit air circulation An adjustable, resilient metal arm with a thermistor holding cup formed at one end is secured to the interior surface of the plastic housing such that the holding cup is located at the center of the housing A thermistor temperature sensor is inserted into and held in the cup by interference fit NASA

**N75-33643#** McGill Univ, Montreal (Quebec) DRB Aviation Medical Research Unit

**DRB AVIATION MEDICAL RESEARCH UNIT REPORTS,**

**VOLUME 4, 1973-1974**

G Melvill Jones, comp and G Mandl, comp Jun 1975  
270 p refs Sponsored by Defence Res Board  
(DR-223-Vol-4) Avail NTIS HC \$8 50

Basic neural mechanisms implicated in human vestibulo visual perception and sensorimotor performance are elaborated

**N75-33644** McGill Univ, Montreal (Quebec)

**GOAL-DIRECTED FLEXIBILITY IN THE VESTIBULO-OCULAR REFLEX ARC**

G Melvill Jones and A Gonshor *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 1-20 refs Presented at the Intern Symp on Basic Mech of Ocular Motility and their Clinical Implications, Stockholm Submitted for publication

Functional capabilities and limitations in both the mechanical and neural components of the vestibulo-ocular reflex system are studied by different experimental approaches A strong implication of vestibular cerebellum participation, in particular the flocculus, in visual modification of the vestibulo-ocular reflex response seems indicated It is proposed that the cerebellum acts as a major neural source for adaptive control in sensory motor mechanisms G G

**N75-33645** McGill Univ, Montreal (Quebec)

**ABSENCE OF HABITUATION IN THE HUMAN VESTIBULO-OCULAR REFLEX ARC BY ROTATIONAL STIMULATION WITHIN THE RANGE OF NATURAL MOVEMENT**

A Gonshor and G Melvill Jones *In its* DRB Aviation Med Res Unit Rept Vol 4 Jun 1975 p 21-32 refs

Repeated unidirectional rotational stimulation of the semicircular canals leads to a response decline in the vestibulo-ocular reflex termed here habituation The present objective was to examine the question of whether such habituation would occur as a consequence of repeated periodic rotational stimuli in the range of natural head movement For this purpose horizontal sinusoidal rotational stimulation of 1/6 Hz and 60 deg/sec angular velocity amplitude was employed since these parameters lie within the presumed angular velocity transducing range of the human semicircular canals Horizontal eye movements were measured by electrooculography The results revealed no consistent change in the mean VOR gain (ratio of slow phase eye angular velocity to turntable velocity) It is concluded that these conditions of repeated vestibular stimulation did not induce habituation of the kind to be expected from previous habituation studies Author

**N75-33646** McGill Univ, Montreal (Quebec)

**HABITUATION OF THE HUMAN VESTIBULO-OCULAR REFLEX INDUCED BY REVERSAL OF THE RETINAL IMAGE DURING SINUSOIDAL ROTATION OF THE HEAD**

G Melvill Jones and A Gonshor *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 33-46 refs

Mirror habituating trials during human rotational vestibular stimulation tests reversed optokinetic input to the eyes and substantially (25%) declined vestibulo-ocular reflexes in human subjects It is concluded that the observed habituation induced active opposition to eye movements required for retinal image stabilization G G

**N75-33647** McGill Univ, Montreal (Quebec)

**PLASTICITY IN THE VESTIBULO-OCULAR REFLEX ARC REVEALED BY LONG-TERM PRISM-REVERSAL OF VISION DURING NATURAL HEAD MOVEMENT**

A Gonshor and G Melvill Jones *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 47-92 refs

Habituation or change in the human vestibulo-ocular reflex in response to long term prism reversal of vision bear out the intimate relationship of the visual and vestibular systems Response changes are strictly confined to plane of vision reversal and appear to imply reorganization of specific neural networks towards the optimal criterion of minimal retinal image slip during head

rotation Visually evoked changes in the cerebellum constitute a prime factor in the generation of these adaptive changes G G

**N75-33648** McGill Univ, Montreal (Quebec)

**ADAPTIVE NEUROBIOLOGY IN SPACE FLIGHT**

G Melvill Jones *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 93-102 refs Presented at the Skylab Life Sci Symp, Houston, 27-29 Aug 1974

Neurobiological studies conducted in conjunction with Skylab manned space missions clearly revealed adaptive physiological changes in response of the human body to extended weightlessness exposure None of the measured changes proved irreversible after return to earth Symptoms ranged from acute disorientation due to sensory illusion to functional implications of the neuromuscular system G G

**N75-33649** McGill Univ, Montreal (Quebec)

**VESTIBULAR CONTRIBUTIONS TO MOVEMENT CONTROL**

G Melvill Jones *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 103-105 refs Presented at the Symp on Suprasegmental Control of Movement, New Delhi, 20-26 Oct 1974 Submitted for publication

Basic differences in vestibular stimulus response relations associated with reflex systems driving the extraocular muscles, the neck muscles and the postural muscles of the limbs are considered It is indicated that the stabilizing role of the vestibular sensory system is supported by the participation of vestibulo-spinal projections in the synthesis of normal locomotor control G G

**N75-33650** McGill Univ, Montreal (Quebec)

**EIGHTH NERVE CONTRIBUTIONS TO THE SYNTHESIS OF LOCOMOTOR CONTROL**

G Melvill Jones, D G D Watt, and S Rossignol *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 106-120 refs Presented at the Intern Symp on Control of Locomotion and Posture, Edmonton, Can, 1973 Submitted for publication

A short latency EMG response was demonstrated (75 msec) in human gastrocnemius on sudden unexpected initiation of a free fall pointing to a functionally effective vestibulo-spinal response to specifically vertical linear accelerative stimulation of the vestibular otolith end organs Since large cyclical changes in vertical linear acceleration of the head occur during normal human locomotion, especially running, it seems likely that this specific vestibulo-spinal influence could play an important role in the synthesis of normal locomotor control This question has been examined in human subjects using hopping on one leg as a simplified monopodal model of cyclical locomotor activity Author

**N75-33651** McGill Univ, Montreal (Quebec)

**THE INFLUENCE OF AUDITORY STIMULI ON THE H-REFLEX IN MAN**

S Rossignol and G Melvill Jones *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 164-190 refs

The time course of the subliminal effect of a short tone burst at the spinal motoneuron level in man was studied by the H reflex technique Various changes in excitability of motoneurons after a tone burst are discussed It is inferred that a audio spinal influence may participate in the control of rhythmic movements in synchrony with auditory stimuli Author

**N75-33652** McGill Univ, Montreal (Quebec)

**DOES AUDIOSPINAL FACILITATION CONTRIBUTE TO MOTOR CONTROL IN DANCE RESPONSE TO MUSICAL RHYTHMS?**

G Melvill Jones and S Rossignol *In its* DRB Aviation Med Res Unit Rept, Vol 4 Jun 1975 p 191-212 refs

A temporal relationship is established between muscular and auditory events in subjects hopping on one leg at the preferred frequency and synchrony with a sequence of muscle. Various neurological, mechanical and metabolic characteristics involved in the setting up of the preferred frequency of hopping are discussed and a hypothesis concerning the possible effect of music on stereotyped movements is developed. Author

**N75-33653** McGill Univ., Montreal (Quebec)  
**AUDITORY STARTLE RESPONSES RECORDED IN THE LEG OF MAN**

S Rossignol *In its* DRB Aviation Med Res Unit Rept., Vol 4 Jun 1975 p 213-233 refs

Electromyographic recordings of startle responses of the human ankle to high intensity tone bursts show inhibitory phenomena attributed to a reticulo spinal input mechanism. Indications seem to link competing facilitatory and inhibitory reticulo spinal influences to differing levels of stimulus intensities. Author

**N75-33654** McGill Univ., Montreal (Quebec)  
**THE LATE ELECTROMYOGRAPHIC RESPONSE TO MUSCLE STRETCH IN MAN**

C W Y Chan *In its* DRB Aviation Med Res Unit Rept., Vol 4 Jun 1975 p 234-251 refs

Gastrocnemius functional stress reflex latency was studied for variations in the length and velocity of muscle stretch and initial muscle tension. Data on amplitude of ankle angle, angular velocity, and initial torque generated at the ankle showed that functional stress reflex bears a close correlation with the amplitude of dorsiflexion, its latency decreasing with increasing amplitude of stretch. The response was also very sensitive to the initial force generated at the ankle prior to stimulus application. It is concluded that the functional stress reflex is a length dependent response, and that secondary endings of the muscle spindle which signal muscle length are implicated as prime contributors. Author

**N75-33655** McGill Univ., Montreal (Quebec)  
**THE BRAIN IN OUR RAPIDLY CHANGING ENVIRONMENT ADAPTABLE MAN?**

D Guitton *In its* DRB Aviation Med Res Unit Rept., Vol 4 Jun 1975 p 252-264 refs Presented at the World Man Fund Congr., Moltraiso, Italy, Sep 1974

Human adaptation experiments that require a new coordination between sensory input and motor activity indicate a stressful reorganization of neural systems by the brain. Restructuring of the internally generated template which compares what the brain believes should happen with what actually happens is a lengthy process that never may reach optimum criteria. G G

**N75-33656\*** Agnew Tech-Tran, Inc., Woodland Hills Calif  
**PROGESTERONE AND TESTOSTERONE BINDING IN HUMAN ENDOMETRIUM DURING PREGNANCY**

N A Yudayev and M K Asribekova Washington NASA Sep 1975 10 p refs Transl into ENGLISH from Probl Endokrinol i Gormonoterap (Moscow) v 20, no 2, Mar-Apr 1974 p 24-28

(Contract NASw-2789)  
 (NASA-TT-F-16546) Avail NTIS HC \$3 25 CSCL 06A

Progesterone-H3 incubated with a soluble fraction of endometrium of a pregnant woman formed a complex with protein with a sedimentation coefficient of 6.3S and 3.5S, under identical conditions testosterone-H3 formed a complex with a sedimentation coefficient of 7.5S and 3.5S. The specificity of steroid receptors was determined by the method of competent binding of hormones with proteins. Author

**N75-33657\*** Kanner (Leo) Associates, Redwood City, Calif  
**COMPARATIVE ASPECTS OF PHOTORECEPTION OF RETINAL PROTEIN COMPLEXES**

D Oesterhelt Washington NASA Oct 1975 25 p refs Transl into ENGLISH of conf paper from Mosbacher Colloquium der Ges fuer Biol Chem (Berlin), 1974 p 55-77 (Contract NASw-2790)

(NASA-TT-F-16606) Avail NTIS HC \$3 25 CSCL 06P

The differences and shared properties of three types of retinal-protein complexes are discussed. These complexes are visual pigments, retinochromes, and bacteriorhodopsin. It is shown that (1) visual pigments have a binding site for 11-cis-retinal and 9-cis-retinal, while retinochrome and bacteriorhodopsin have a binding site for 13-cis-retinal and all trans-retinal, (2) when the resulting the chromophore absorbs light, all retinal-protein complexes undergo cis-trans isomerizations of their retinal section and conformational changes in their protein section, (3) bacteriorhodopsin regenerates its initial state in a spontaneous, temperature dependent, dark reaction, and (4) in the presence of light, visual pigments have a signal giving function, retinochrome a catalytic function, and bacteriorhodopsin an energy-transforming function. Author

**N75-33658\*** Scientific Translation Service, Santa Barbara, Calif  
**VARIATION OF INTRACARDIAC AND INTRAVASCULAR TEMPERATURE IN MAN**

Mamoru Kawakami Washington NASA Oct 1975 19 p refs Transl into ENGLISH of Japan Circulation J (Kyoto), v 36, Aug 1972 p 905-914

(Contract NASw-2791)

(NASA-TT-F-16598) Avail NTIS HC \$3 25 CSCL 06P

Studies are performed to determine what types of temperature slopes exist in the heart and intravascular space in humans and what temperature variations exist at the sites where measurements are taken. It is found that intracardiac and intravascular temperatures are not constant. Author

**N75-33659\*** Kanner (Leo) Associates, Redwood City, Calif  
**IMMUNE BACTERICIDAL AND BACTERIOLYTIC REACTIONS**

R Audran Washington NASA Oct 1975 53 p refs Transl into ENGLISH from Rev Franc de Transfusion (France), v 15 no 1 1972 p 81-137

(Contract NASw-2790)

(NASA-TT-F-16599) Avail NTIS HC \$4 25 CSCL 06A

The lethal action of the antibody-complement system is examined along with the potential effect of Lysozyme. It is indicated that increased susceptibility to infection is associated with antibody deficiency, and exceptionally with deficiency in complement. Immunoconglutinin is believed to enhance the in vivo activity of antibody and complement in bactericidal activity. Author

**N75-33660\*** Civil Aeromedical Inst., Oklahoma City, Okla  
**ANTHROPOMETRY OF AIRLINE STEWARDESSES**

Clyde C Snow, Herbert M Reynolds, and Mackie A Allgood Mar 1975 106 p refs

(AD-A012965/O, FAA-AM-75-2) Avail NTIS HC \$5 25 CSCL 06/16

This report presents the body measurements of 423 stewardess trainees enrolled in the American Airlines Stewardess Training Academy in Fort Worth Texas, between February and June 1971. It includes the means, standard deviations, coefficients of variation, percentiles and related statistics of 72 standard anthropometric and functional measurements. The survey was initiated to provide adequate criteria for improving the emergency equipment availability and workspace design for stewardesses. Author

**N75-33661\*** Institute for Perception RVO-TNO, Soesterberg (Netherlands)

**DRUG EFFECTS ON HEART RATE AND HEART RATE VARIABILITY DURING A PROLONGED REACTION TASK**  
 A W K Gaillard, D A Trumbo, and A J Krul 1975 24 p refs Partly sponsored by Natl Steering Comm Brain and Behaviour

(Contract A72/K/070)

(IZF-1975-3, TDCK-65965) Avail NTIS HC \$3 25

The effects of an amphetamine and a barbiturate on heart rate were investigated during long term performance (three

hours in a serial reaction task) Besides the interbeat interval (IBI) derived from the successive R-tops of the ECG, the variability of IBI was scored in three ways Each of the four scores increased as a function of time on the task, indicating a gradually decreasing activation level during the three hour session The amphetamine had an activating effect decreasing both IBI and IBI variability, the barbiturate, on the other hand, tended to increase IBI variability but decrease IBI IBI changes between constant and variable blocks were negligible after amphetamine treatment but pronounced after barbiturate treatment IBI variability was reduced during blocks with variable interstimulus intervals, where mental effort was assumed to be maximal This reaction was more pronounced for the amphetamine than the barbiturate  
Author (ESA)

**N75-33662#** Institute for Perception RVO-TNO Soesterberg (Netherlands)

#### **ACTH 4-10 AND LEARNING**

A F Sanders, C L Truijens, and A A Bunt 1975 20 p refs Sponsored by N V Organon (IZF-1975-4 TDCK-66363) Avail NTIS HC \$3 25

Three experiments on the effects of ACTH 4-10 on the processes of learning and retention are described The first study concerns a paired associate learning and retention experiment The results show no effect of ACTH 4-10 on either speed of learning or interference in comparison with the placebo In the second study, on learning a functional rule, ACTH 4-10 was found to have a beneficial effect in particular on learning a more difficult rule A final experiment on immediate retention of digits strings do not show any differences between test persons treated with ACTH 4-10 and those who received a placebo There is no theoretical framework to explain these divergent results and it is proposed to repeat and extend the rule learning study before developing any theory  
Author (ESA)

**N75-33663#** Medical Biological Lab RVO-TNO, Rijswijk (Netherlands)

#### **SOME REACTIONS OF THE HYDROXYL ADDUCT OF ADENINE**

J J VanHemmen 1975 12 p refs Sponsored by Neth Organ for the Advan of Pure Res (ZWO) (MBL-1975-8, TDCK-65963) Avail NTIS HC \$3 25

The chemical reactions of purine derivatives resulting from pulse radiolysis were studied Some reactions of the hydroxyl adduct of adenine are described and one of these reactions was compared with similar reactions of hydroxyl adducts of other purine derivatives Evidence is given that in various purines opening of the imidazole ring is due to unimolecular rearrangements of the hydroxyl adducts  
ESA

**N75-33664#** Medical Biological Lab RVO-TNO Rijswijk (Netherlands)

#### **INACTIVATION OF BIOLOGICALLY ACTIVE DNA BY GAMMA RAY INDUCED SUPEROXIDE RADICALS AND THEIR DISMUTATION PRODUCTS SINGLET MOLECULAR OXYGEN AND HYDROGEN PEROXIDE**

J J VanHemmen and W J A Meuling 1975 23 p refs (MBL-1975-10 TDCK-66036) Avail NTIS HC \$3 25

The reactivity of gamma ray induced superoxide radicals and dismutation products (singlet molecular oxygen and hydrogen peroxide) with DNA were studied Superoxide dismutase, which removes superoxide radicals and inhibits the formation of singlet oxygen, protects biologically active DNA (OX174 RF) against inactivation by ionizing radiation Catalase which removes hydrogen peroxide, also protects the DNA Attempts with various chemical sources of singlet oxygen to determine whether this species inactivates DNA did not yield an unequivocal answer It was concluded that a combination of the protonated form of the superoxide radical and hydrogen peroxide inactivates DNA  
Author (ESA)

**N75-33665#** Medical Biological Lab RVO-TNO, Rijswijk (Netherlands)

#### **COMPARISON OF THE OXYGEN ENHANCEMENT RATIO FOR GAMMA RAY INDUCED DOUBLE-STRAND BREAKS IN THE DNA OF BACTERIOPHAGE T7 AS DETERMINED**

#### **BY TWO DIFFERENT METHODS OF ANALYSIS**

G P VanDerSchans and A C M VanDerDrift 1975 20 p refs

(MBL-1975-11 TDCK-66035) Avail NTIS HC \$3 25

The influence of oxygen on the rupture of the double-strand DNA molecule in the T7 bacteriophage caused by gamma radiation was investigated The bacteriophage was irradiated with gamma rays from Cobalt-60 in a protecting medium under nitrogen and oxygen Double-strand breaks were measured by sucrose gradient sedimentation and by boundary sedimentation analysis Both methods showed that the presence of oxygen during irradiation enhances the production of double-strand breaks This is in contrast to a recent report which suggests that boundary sedimentation analysis does not exhibit any effect from oxygen The discrepancy must be ascribed to differences in interpretation of the sedimentation data  
Author (ESA)

#### **N75-33666#** Hazleton Labs America, Inc Vienna, Va **EFFECTS OF INHALING SULFUR DIOXIDE, SULFURIC ACID, AND FLY ASH**

Apr 1975 70 p refs Sponsored by the Elec Power Res Inst and the Tenn Valley Authority (PB-241788/9 EPRI-RP74) Avail NTIS HC \$4 25 CSCL 06F

The physiological effects of the inhalation of three air pollutants in cynomolgus monkeys and guinea pigs are studied Exposures were conducted 24 hours per day seven days a week for three 78-week phases in monkeys and four 52-week phases in guinea pigs The pollutants examined, singly and in binary and ternary combinations were one gas, sulfur dioxide, sulfuric acid mist and fly ash The nominal exposure levels selected were 0.1, 0.5, 1.0 and 5.0 ppm for SO<sub>2</sub>, 0.1 and 1.0 mg/cubic meters for H<sub>2</sub>SO<sub>4</sub> and 0.1 and 0.5 mg/cubic meters for fly ash Nominal particle sizes selected were less than one micron and one to five microns for H<sub>2</sub>SO<sub>4</sub> and less than five microns for fly ash  
GRA

**N75-33667#** Union Carbide Corp., Tarrytown N Y Corporate Research Lab

#### **IN VIVO BUBBLE GROWTH STUDIES FOLLOWING DECOMPRESSION**

Michael Robert Powell and Karl J Weydig 16 Dec 1974 30 p refs

(Contract N00014-74-C-0415)

(AD-A009963 CRL-T-798) Avail NTIS CSCL 06/16

In this series of investigations on the in vivo growth of a gas phase following decompression, the authors removed sections of skeletal muscle tissue following decompression and quickly placed them between two glass plates Histological procedures were not employed as the gas phase was found to vanish quickly, and therefore untreated whole mounts were employed Studies indicated that (1) bubbles were not found to originate in the capillaries but rather in venules (2) a cylindrical, rather than a spherical, gas phase was found in the microvasculature, (3) few extravascular bubbles were ever seen even in adipose tissue (4) bubbles could be found more easily in adipose than muscle tissue, (5) bubbles were not found to coalesce in venules (6) when the gas phase was seen to resolve in the tissue slices the capillaries lost gas first then the venules (7) the gas phase caused a great distension of the capillary walls, (8) bubbles could not be found in peripheral nerve tracts although they could be found in the microvasculature associated with the nerve  
GRA

**N75-33668#** Yale Univ, New Haven Conn School of Medicine

#### **AN EVALUATION OF POLICY RELATED RESEARCH ON NEW AND EXPANDED ROLES OF HEALTH WORKERS ANNOTATED BIBLIOGRAPHY**

Eva D Cohen, Kathleen Keenan Linda M Crootof Beverly S Greenberg and Mieko M Korper Oct 1974 168 p refs (Grant NSF APR73-07902)

(PB-242283/0 NSF/RA/S-74-015A) Avail NTIS HC \$6 25 CSCL 06E

The annotated bibliography includes a selection of evaluations of research on the quality, quantity and nature of services provided by new types of health personnel, such as nurse practitioners and physician's assistants. Additional topics covered are the acceptance by providers and consumers, as well as the costs and legal issues associated with the training and use of new health practitioners in the health services system. A separate project report provides a summary of the studies by subject areas. GRA

**N75-33669#** Nuclear Regulatory Commission Washington, D C  
**OCCUPATIONAL RADIATION EXPOSURE AT LIGHT WATER COOLED POWER REACTORS, 1969 - 1974**

Jun 1975 21 p refs Supersedes WASH-1311  
(PB-242532/O, NUREG-75/032, WASH-1311) Avail NTIS  
HC \$3 25 CSCL 06J

Occupational radiation exposures at commercial light-water-cooled power reactors (LWR'S) for the years 1969 through 1974 are given. The information is derived from reports submitted to the United States Nuclear Regulatory Commission in accordance with requirements of individual plant Technical Specifications. The average man-rem per unit for all LWR's in 1974 is less than the 1973 value. The grand average since 1969 however, continues to increase. No significant trend was indicated over the period of 1969-1974 in the mean value of man-rem per megawatt-year. GRA

**N75-33670#** Clarkson Coll of Technology Potsdam N Y Dept  
of Mechanical and Industrial Engineering  
**THREE-DIMENSIONAL HUMAN DISPLAY MODEL Technical Report, Feb 1974 - Jul 1975**

Tom E Potter and Kenneth Willmert Jul 1975 48 p refs  
(Contract N00014-70-A-0311-0003)  
(AD-A011097, MIE-010) Avail NTIS CSCL 06/19

A two-dimensional computer graphic display of a three-dimensional human model has been developed. The major body segments of the model are represented as non-uniform elliptical cylinders. The shadow outlines of these cylinders are displayed on the terminal screen and connected by circular arcs and straight lines to produce a realistic representation of a human being in any position. The human model was developed for the display of results of three-dimensional simulation programs which calculate the position of an occupant during vehicle impact. However, it is well suited to any other type of human motion. It allows the user to select the viewing orientation and was designed for low cost computer and graphic terminal systems. GRA

**N75-33671#** Aerospace Medical Research Labs Wright-Patterson AFB, Ohio  
**PRACTICAL PROBLEMS IN USING HUMAN OPERATOR PERFORMANCE DATA**

Clyde R Replogle, C N Day F M Holden and D B Rogers  
Jul 1973 5 p Presented at the Interagency Conf on  
Management and Technol in the Crew System Design Process  
Los Angeles 12-14 Sep 1972  
(AF Proj 7222)  
(AD-A011574 AMRL-TR-72-84) Avail NTIS CSCL 05/10

During the past two years human performance has been investigated within two generic system contexts--manually controlled anti-aircraft artillery against high performance aircraft and air-to-air combat in air superiority fighters. The broad objective of this research was to assess the effectiveness of proposed air weapon systems, combat strategies and countermeasures techniques. In meeting these objectives, it was necessary to address many problems associated with the use of human operator performance data. This paper describes six problem areas considered relevant for this workshop: system versus operator effectiveness, performance feedback, attrition modeling, stress tolerance, human operator identification, and system simulation. GRA

**N75-33672#** Arizona State Univ Tempe Dept of Educational  
Technology  
**SYSTEMATIC VARIATIONS OF INSTRUCTIONAL VARI-**

**ABLES ON LEARNER PERFORMANCE AIRCRAFT INSTRUMENT COMPREHENSION TASK Final Report, Jun 1973 - Jul 1974**

Barbara G Tenpas Robert A Reiser Donald R Kearns, George E Booth, and Ann E Deden Dec 1974 51 p refs  
(Contract F41609-71-C-0027, AF Proj 1123)  
(AD-A010106, AFHRL-TR-74-105) Avail NTIS CSCL 05/9

Incentive practice, instruction, and feedback were manipulated in a series of four 2 x 2 factorial studies, with AFROTC cadets and graduate students in education, to determine the individual and combined effects of these variables on learner performance of an aircraft instrument comprehensive task. Results are discussed in terms of instruction, as the variable of singular importance in designing materials and procedures to facilitate desired learning outcomes. GRA

**N75-33673\*#** Boeing Aerospace Co, Houston, Tex Saturn/  
Apollo/Skylab Branch

**CREW APPLIANCE COMPUTER PROGRAM MANUAL, VOLUME 1**

D J Russell 29 Aug 1975 331 p refs  
(Contract NAS9-13965)  
(NASA-CR-144450 D2-118571-1-Vol-1) Avail NTIS  
HC \$9 50 CSCL 05H

Trade studies of numerous appliance concepts for advanced spacecraft galley, personal hygiene, housekeeping and other areas were made to determine which best satisfy the space shuttle orbiter and modular space station mission requirements. Analytical models of selected appliance concepts not currently included in the G-189A Generalized Environmental/Thermal Control and Life Support Systems (ETCLSS) Computer Program subroutine library were developed. The new appliance subroutines are given along with complete analytical model descriptions, solution methods, user's input instructions, and validation run results. The appliance components modeled were integrated with G-189A ETCLSS models for shuttle orbiter and modular space station, and results from computer runs of these systems are presented. Author

**N75-33674\*#** Boeing Aerospace Co Houston, Tex Saturn/  
Apollo/Skylab Branch

**CREW APPLIANCE COMPUTER PROGRAM MANUAL, VOLUME 2**

D J Russell 29 Aug 1975 246 p refs  
(Contract NAS9-13965)  
(NASA-CR-144451, D2-118571-2-Vol-2) Avail NTIS  
HC \$7 50 CSCL 05H

For abstract, see N75-33673

**N75-33675\*#** National Aeronautics and Space Administration  
Ames Research Center Moffett Field Calif  
**ELEVENTH ANNUAL CONFERENCE ON MANUAL CONTROL**

May 1975 719 p refs Conf held at Moffett Field Calif,  
21-23 May 1975  
(NASA-TM-X-62464, A-6211) Avail NTIS HC \$17 25 CSCL  
05H

Human operator performance and servomechanism analyses for manual vehicle control tasks are studied.

**N75-33676\*** Institut fuer Informationsverarbeitung in Technik  
und Biologie, Karlsruhe (West Germany)

**MULTIVARIABLE MANUAL CONTROL WITH SIMULTANEOUS VISUAL AND AUDITORY PRESENTATION OF INFORMATION**

Hartmut Uhlemann and Georg Geiser In NASA Ames Res  
Center 11th Ann Conf on Manual Control May 1975 p 3-18  
refs  
CSCL 05H

Multivariable manual compensatory tracking experiments were carried out in order to determine typical strategies of the human operator and conditions for improvement of his performance if one of the visual displays of the tracking errors is supplemented by an auditory feedback. Because the tracking

error of the system which is only visually displayed is found to decrease but not in general that of the auditorally supported system it was concluded that the auditory feedback unloads the visual system of the operator who can then concentrate on the remaining exclusively visual displays Author

**N75-33677\*** National Aeronautics and Space Administration Ames Research Center Moffett Field, Calif  
**EXPERIMENTS IN PILOT DECISION-MAKING DURING SIMULATED LOW VISIBILITY APPROACHES**

Renwick E Curry (MIT), John K Lauber, and Charles E Billings *In its* 11th Ann Conf on Manual Control May 1975 p 19-32

CSSL 05H

A simulation task is reported which incorporates both kinds of variables, informational and psychological, to successfully study pilot decision making behavior in the laboratory Preliminary experiments in the measurement of decisions and the inducement of stress in simulated low visibility approaches are described Author

**N75-33678\*** Illinois Univ , Urbana  
**TRACKING PERFORMANCE UNDER TIME SHARING CONDITIONS WITH A DIGIT PROCESSING TASK A FEEDBACK CONTROL THEORY ANALYSIS**

Daniel Gopher and Christopher D Wickens *In NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 33-63 refs*

(Contract F44620-70-C-0105)

CSSL 05H

A one dimensional compensatory tracking task and a digit processing reaction time task were combined in a three phase experiment designed to investigate tracking performance in time sharing Adaptive techniques, elaborate feedback devices, and on line standardization procedures were used to adjust task difficulty to the ability of each individual subject and manipulate time sharing demands Feedback control analysis techniques were employed in the description of tracking performance The experimental results show that when the dynamics of a system are constrained, in such a manner that man machine system stability is no longer a major concern of the operator, he tends to adopt a first order control describing function, even with tracking systems of higher order Attention diversion to a concurrent task leads to an increase in remnant level or nonlinear power This decrease in linearity is reflected both in the output magnitude spectra of the subjects, and in the linear fit of the amplitude ratio functions Author

**N75-33679\*** California Univ , Berkeley  
**TIME ESTIMATION AS A SECONDARY TASK TO MEASURE WORKLOAD**

Sandra G Hart *In NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 64-77 refs*

(Grant NCA2-OR-050-503)

CSSL 05H

Variation in the length of time productions and verbal estimates of duration was investigated to determine the influence of concurrent activity on operator time perception The length of 10- 20- and 30-sec intervals produced while performing six different compensatory tracking tasks was significantly longer 23% on the average than those produced while performing no other task Verbal estimates of session duration, taken at the end of each of 27 experimental sessions reflected a parallel increase in subjective underestimation of the passage of time as the difficulty of the task performed increased These data suggest that estimates of duration made while performing a manual control task provide stable and sensitive measures of the workload imposed by the primary task, with minimal interference Author

**N75-33680\*** Massachusetts Inst of Tech , Cambridge Man Vehicle Lab

**FAILURE DETECTION BY PILOTS DURING AUTOMATIC LANDING. MODELS AND EXPERIMENTS**

Eli G Gai and R E Curry *In NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 78-93 refs*

(Grant NGR-22-009-733)

CSSL 05H

A model of the pilot as a monitor of instrument failures during automatic landing is proposed The failure detection model consists of two stages a linear estimator (Kalman Filter) and a decision mechanism which is based on sequential analysis The filter equations are derived from a simplified version of the linearized dynamics of the airplane and the control loop The perceptual observation noise is modelled to include the effects of the partition of attention among the several instruments The final result is a simple model consisting of a high pass filter to produce the observation residuals and a decision function which is a pure integration of the residuals minus a bias term The dynamics of a Boeing 707 were used to simulate the fully coupled final approach in a fixed base simulator which also included failures in the airspeed glideslope, and localizer indicators Subjects monitored the approaches and detected the failures, their performance was compared with the predictions of the model with good agreement between the experimental data and the model Author

**N75-33681\*** National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

**HUMAN FACTORS RESEARCH PROBLEMS IN ELECTRONIC VOICE WARNING SYSTEM DESIGN**

C A Simpson and D H Williams *In its* 11th Ann Conf on Manual Control May 1975 p 94-106 refs

CSSL 05H

The speech messages issued by voice warning systems must be carefully designed in accordance with general principles of human decision making processes, human speech comprehension, and the conditions in which the warnings can occur The operator's effectiveness must not be degraded by messages that are either inappropriate or difficult to comprehend Important experimental variables include message content, linguistic redundancy, signal/noise ratio, interference with concurrent tasks, and listener expectations generated by the pragmatic or real world context in which the messages are presented Author

**N75-33682\*** Air Force Flight Dynamics Lab , Wright-Patterson AFB, Ohio

**A DECISION AND CONTROL MULTI-AXIS PILOT MODEL BASED ON AN URGENCY FOR ACTION CONCEPT**

J J Pollard and R A Hannen (Wright State Univ) *In NASA Ames Res Center 11th Ann Conf on Manual Control May 1974 p 107-118 refs*

CSSL 05H

An all digital multiple axis, multiple input multiple output pilot model flies five different tasks in aircraft of different classes while encountering turbulence represented by the Dryden spectral model Six degree of freedom linearized aircraft equations of motion are used together with a generalized stability augmentation system The pilot model consists of two parts (1) a decision maker and (2) a control action implementer This decision maker selects the critical variable and predicts the error at action implementation The control action implementer decides the magnitude of control to be applied and applies it This system has been successfully compared with hybrid/analog man in the loop simulations of the F-5, A-7, T-33 and 707 aircraft, thus validating the all digital simulation and the decision and control pilot model Author

**N75-33683\*** Office National d'Etudes et de Recherches Aeronautiques, Paris (France)

**DISCRETE TIME MODELIZATION OF HUMAN PILOT BEHAVIOR**

Daniel Cavalli and Dominique Soulatges *In NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 119-129 refs*

CSSL 05H



This modelization starts from the following hypotheses pilot's behavior is a time discrete process he can perform only one task at a time and his operating mode depends on the considered flight subphase Pilot's behavior was observed using an electro oculometer and a simulator cockpit A FORTRAN program has been elaborated using two strategies The first one is a Markovian process in which the successive instrument readings are governed by a matrix of conditional probabilities In the second one, strategy is an heuristic process and the concepts of mental load and performance are described The results of the two aspects have been compared with simulation data

Author

**N75-33684\*** Illinois Univ, Urbana Dept of Mechanical and Industrial Engineering  
**HUMAN INTERACTION WITH AN INTELLIGENT COMPUTER IN MULTI-TASK SITUATIONS**

William B Rouse /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 130-143 refs

(Contract F33615-73-C-1238)

CSCL 05H

A general formulation of human decision making in multiple task situations is presented It includes a description of the state event, and action space in which the multiple task supervisor operates A specific application to a failure detection and correction situation is discussed and results of a simulation experiment presented Issues considered include static vs dynamic allocation of responsibility and competitive vs cooperative intelligence

Author

**N75-33685\*** Massachusetts Inst of Tech Cambridge Man-Vehicle Lab

**A MODEL FOR SIMULTANEOUS MONITORING AND CONTROL**

Renwick E Curry David L Kleinman (Conn Univ), and William C Hoffman (Aerospace Systems, Inc) /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 144-150 refs

(Contract NAS1-13653)

CSCL 05H

Mathematical models of the human operator have been concerned primarily with his input/output characteristics and his adaptive behavior to sudden changes in the controlled element dynamics Newer models have examined the ability of the human to detect failures when acting as a monitor However, models for simultaneous monitoring and control (eg an aircraft pilot flying a split axis approach) are necessary for performing pilot task allocations and for coordinated design of display and control subsystems Flight test results of simulated instrument helicopter approaches conducted have shown the following (1) constant speed approaches can be made quite comfortably by the pilots, (2) pilots cannot hover on situation displays alone, and (3) pilots can hover with a flight director display but feel uncomfortable because they do not have enough time to monitor the situation displays

Author

**N75-33686\*** Massachusetts Inst of Tech Cambridge Man-Vehicle Lab

**DETECTION OF SYSTEM FAILURES IN MULTI-AXES TASKS**

Arye R Ephrath /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 151-169 refs

CSCL 05H

The effects of the pilot's participation mode in the control task on his workload level and failure detection performance were examined considering a low visibility landing approach It is found that the participation mode had a strong effect on the pilot's workload, the induced workload being lowest when the pilot acted as a monitoring element during a coupled approach and highest when the pilot was an active element in the control loop The effects of workload and participation mode on failure detection were separated The participation mode was shown to have a dominant effect on the failure detection performance with a failure in a monitored (coupled) axis being detected

significantly faster than a comparable failure in a manually controlled axis

Author

**N75-33687\*** New Mexico State Univ University Park  
**RECOGNITION OF STIMULUS DISPLAYS AN ELECTRO-PHYSIOLOGICAL ANALYSIS**

Victor S Johnston /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 173-178 refs

CSCL 05H

Late components of evoked waveforms recorded from the frontal areas of the brain are correlated with an observer's interpretation of a stimulus display The possible use of such signals as control inputs is discussed

Author

**N75-33689\*** Rush Medical Coll Chicago Ill Dept of Biomedical Engineering

**ROLE OF STRETCH REFLEX IN VOLUNTARY MOVEMENTS**

Gerald L Gottlieb and Gyan C Agarwal (Ill Univ Chicago) /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 192-203 refs

(Grants NSF GK-37540 RR-05477)

CSCL 05H

The stretch reflex is often described as a spinal servomechanism a device for assisting in the regulation of muscle length Observation of the EMG response to mechanical interruption of voluntary movements fails to demonstrate a significant role for spinal reflexes at 40 msec latency Two functional responses with latencies of 120 msec and 200 msec, implying supraspinal mediation are observed

Author

**N75-33690\*** Aerospace Medical Div Aerospace Medical Research Labs (6570th) Wright-Patterson AFB Ohio

**HEAD-EYE TRACKING IN TWO-DIMENSIONAL PURSUIT TASKS**

D K Shirachi and J H Black, Jr /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 204-216 refs

CSCL 05E

The neurological control systems for the eye and head are studied by investigating dynamic eye and head rotations in two degrees of freedom using bandlimited, white noise stimuli, nominally wide field of view stimulus presentations of + or - 10 deg and power spectral analysis of the data to produce input/output transfer and coherence functions Determined were frequency response characteristics of these systems the linearity of the transfer functions in both coupled and decoupled vertical and horizontal stimulus/response reference axes and the amount of cross axis coupling present in system responses A comparative study was also conducted to assess the differences in response characteristics between single axis and dual axis visual stimulation for the same subject

Author

**N75-33691\*** Illinois Univ Chicago

**EFFECTS OF LOW FREQUENCY VIBRATION OF A LIMB**

Gyan C Agarwal (Rush-Presbyterian-St Luke's Med Center) and Gerald L Gottlieb (Rush-Presbyterian-St Luke's Med Center) /in NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 217-242 refs

(Grants NSF GK-37540, RR-05477)

CSCL 05H

Low frequency oscillations were applied on the ankle joint in plantarflexion/dorsiflexion rotation using a torque motor The torque, the angular rotation and the evoked electromyogram from the gastrocnemius soleus and the anterior tibial muscles were recorded Significant nonlinearities were observed in the angular rotation from 8 to 12 Hz The following methods are used for data analysis (1) Two cycle averaged response, (2) Fourier transform, and (3) Fourier analysis at the driving frequency Important observations are (1) resonance near 6 to 8 Hz, (2) slowly increasing amplitudes of oscillation near resonance, (3)

self sustaining oscillations after the motor is turned off particularly in the fatigued limb, and (4) distortion of angular rotation during which there are spontaneous recurrences of oscillation at the driving frequency Author

**N75-33692\*** Purdue Univ , Lafayette, Ind School of Aeronautics and Astronautics

**MANUAL CONTROL DISPLAYS FOR A FOUR-DIMENSIONAL LANDING APPROACH**

James T Silverthorn and Robert L Swaim *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 245-267 refs  
CSSL 05H

Six instrument rated pilots flew a STOL fixed base simulator to study the effectiveness of three displays for a four dimensional approach The three examined displays were a digital readout of forward position error, a digital speed command, and an analog display showing forward position error and error prediction A flight director was used in all conditions All test runs were for a typical four dimensional approach in moderate turbulence that included a change in commanded ground speed, a change in flight path angle, and two standard rate sixty degree turns Use of the digital forward position error display resulted in large overshoot in the forward position error Some type of lead (rate or prediction information) was shown to be needed The best overall performance was obtained using the speed command display It was demonstrated that curved approaches can be flown with relative ease Author

**N75-33693\*** National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

**SIMULATOR EVALUATION OF A PERSPECTIVE CLIPPED-POLE DISPLAY AND A THRUST-VECTOR CONTROLLER FOR VTOL ZERO-ZERO LANDINGS**

M R Murphy and R K Graif *In its* 11th Ann Conf on Manual Control May 1975 p 268-282 refs

CSSL 05H

Five pilots participated in a simulator study to evaluate design features of a perspective clipped pole display and a side arm thrust vector controller for potential applications to VTOL zero visibility landings Analyses of objective measures by a t test for related means showed significant learning effects, but did not show significant performance differences among display conditions A mean longitudinal touchdown velocity of less than 4 knots, a mean vertical touchdown velocity of less than 1.22m/sec, and a mean longitudinal position error of approximately 15.24 m were attained during the final 10 trials of the experiment The conclusion that adequate airspeed and altitude cues could be obtained from the glideslope and runway poles is supported by the absence of significant performance differences among display conditions Author

**N75-33694\*** Medical Research Council, Cambridge (England) Applied Psychology Unit

**LAGGED LOW ORDER CONTROL SYSTEMS WITH POWERED CONTROLS**

E C Poulton *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 284-296 refs

CSSL 05H

With powered controls, a high order control system can be changed to a lower order control system with a lag, which is better suited to our position control skills and strategies Separate groups of untrained men were trained on an acceleration control system or on a rate control system with an exponential lag of either 5, 2, or 4 sec Acquisition time was reliably shorter with all the lagged rate control systems than with the unlagged acceleration control system Author

**N75-33695\*** Calspan Corp , Buffalo NY

**RESULTS OF A FLIGHT INVESTIGATION OF CONTROL-DISPLAY INTERACTIONS FOR VTOL DECELERATING DESCENDING INSTRUMENT APPROACHES USING THE X-22A AIRCRAFT**

J V Lebacqz and E W Aiken *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 297-324 refs Sponsored in part by NASA

(Contract N00019-73-C-0504)

CSSL 05H

Control, display, and guidance requirements for VTOL instrument transitions were studied to provide meaningful data related to the interaction of aircraft control system and pilot display characteristics on pilot rating and performance during a steep decelerating descending transition from a representative forward velocity to the hover under simulated instrument conditions Thirty seven evaluations were performed of combinations of five generic display presentations, ranging from position information only to four axis control directors and five levels of control augmentation systems ranging from rate augmentation only to decoupled velocity responses and automatic configuration changes Primary results include the demonstration of an inverse relationship between control complexity and display sophistication and the definition of acceptable and satisfactory control display combinations Author

**N75-33696\*** Aeronautical Systems Div , Wright-Patterson AFB, Ohio

**A SIMULATOR STUDY ON INFORMATION REQUIREMENTS FOR PRECISION HOVERING**

James L Lemons and Theodor A Dukes (Princeton Univ) *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 325-336 refs

CSSL 01D

A fixed base simulator study of an advanced helicopter instrument display utilizing translational acceleration, velocity and position information is reported The simulation involved piloting a heavy helicopter using the Integrated Trajectory Error Display (ITED) in a precision hover task The test series explored two basic areas The effect on hover accuracy of adding acceleration information was of primary concern Also of interest was the operators' ability to use degraded information derived from less sophisticated sources The addition of translational acceleration to a display containing velocity and position information did not appear to improve the hover performance significantly However, displayed acceleration information seemed to increase the damping of the man machine system Finally the pilots could use translational information synthesized from attitude and angular acceleration as effectively as perfect acceleration Author

**N75-33697\*** National Aeronautics and Space Administration Ames Research Center Moffett Field Calif

**A MODEL-BASED ANALYSIS OF A DISPLAY FOR HELICOPTER LANDING APPROACH**

Ronald A Hess and L William Wheat *In its* 11th Ann Conf on Manual Control May 1975 p 338-355 refs

CSSL 01D

A control theoretic model of the human pilot was used to analyze a baseline electronic cockpit display in a helicopter landing approach task The head down display was created on a stroke written cathode ray tube and the vehicle was a UH-1H helicopter The landing approach task consisted of maintaining prescribed groundspeed and glideslope in the presence of random vertical and horizontal turbulence The pilot model was also used to generate and evaluate display quickening laws designed to improve pilot vehicle performance A simple fixed base simulation provided comparative tracking data Author

**N75-33698\*** Martin Marietta Corp , Denver, Colo

**SIMULATION OF MAN-MACHINE INTERACTION ON SHUTTLE PAYLOAD MANIPULATOR**

R O Hookway and R S Jackson *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 356-376 refs

CSSL 05H

The main objective of this simulation was to evaluate the feasibility of a simplified control system for a remote manipulator for space shuttle payloads The motion commanded by the operator

through the control system to the six degree of freedom manipulator approximates that of a backhoe Compatibility of low arm damping heavy payloads, small clearances in the shuttle cargo bay and stringent mission timelines were evaluated The effects of various devices to enhance visual cues were evaluated Phase I of the simulation was capture of a payload flying free in space relative to the shuttle Phase II was simulation of cargo stowage into a mockup of the space shuttle cargo bay A shuttle remote manipulator control station mockup including TV monitors and hand controllers is used in the simulation Results evaluating various parameters of the control system and the task, including arm flexibility are presented Author

**N75-33699\*** Army Avionics Lab, Ft Monmouth, NJ  
**UNIQUE WIDE FIELD OF VIEW VISUAL SIMULATION**  
 John Niemela /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 377-382

CSCL 05E

Visual simulations are required to support investigations of the man-machine aspects of helicopter nap-of-the-earth flight The visual simulation requirements are discussed vis-a-vis available technology A wide field of view of the world outside the cockpit is necessary to provide adequate visual cues to the pilot A unique design is described employing three TV monitors, collimating lenses and electronics to selectively display a wide field of view without the use of a costly wide angle optical probe Author

**N75-33700\*** Systems Technology, Inc, Hawthorne, Calif  
**TEST PROCEDURES AND PERFORMANCE MEASURES SENSITIVE TO AUTOMOBILE STEERING DYNAMICS**  
 Richard H Klein, Duane T McRuer, and David Weir /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 383-395 refs  
 (Contract DOT-HS-359-3-762)  
 CSCL 05H

A maneuver complex and related performance measures used to evaluate driver/vehicle system responses as effected by variations in the directional response characteristics of passenger cars are described The complex consists of normal and emergency maneuvers (including random and discrete disturbances) which taken as a whole represent all classes of steering functions and all modes of driver response behavior Measures of driver/vehicle system response and performance in regulation tasks included direct describing function measurements and rms yaw velocity In transient maneuvers, measures such as steering activity and cone strikes were used Author

**N75-33701\*** Systems Technology, Inc, Hawthorne, Calif  
**AN INTERACTIVE DRIVING SIMULATION FOR DRIVER CONTROL AND DECISION-MAKING RESEARCH**  
 R Wade Allen, Jeffrey R Hogge and Stephen H Schwartz /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 396-407 refs

CSCL 05H

Display techniques and equations of motion for a relatively simple fixed base car simulation are described The vehicle dynamics include simplified lateral (steering) and longitudinal (speed) degrees of freedom Several simulator tasks are described which require a combination of operator control and decision making, including response to wind gust inputs, curved roads, traffic signal lights, and obstacles Logic circuits are used to detect speeding, running red lights, and crashes A variety of visual and auditory cues are used to give the driver appropriate performance feedback The simulated equations of motion are reviewed and the technique for generating the line drawing CRT roadway display is discussed On-line measurement capabilities and experimenter control features are presented, along with previous and current research results demonstrating simulation capabilities and applications Author

**N75-33702\*** Systems Technology, Inc, Hawthorne, Calif  
**EFFECTS OF AUTOMOBILE STEERING CHARACTERISTICS**

#### ON DRIVER VEHICLE SYSTEM DYNAMICS IN REGULATION TASKS

Duane T McRuer and Richard Klein /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 408-439 refs  
 CSCL 05E

A regulation task which subjected the automobile to a random gust disturbance which is countered by driver control action is used to study the effects of various automobile steering characteristics on the driver/vehicle system The experiments used a variable stability automobile specially configured to permit insertion of the simulated gust disturbance and the measurement of the driver/vehicle system characteristics Driver/vehicle system dynamics were measured and interpreted as an effective open loop system describing function Objective measures of system bandwidth, stability, and time delays were deduced and compared These objective measures were supplemented by driver ratings A tentative optimum range of vehicle dynamics for the directional regulation task was established Author

**N75-33703\*** Ohio State Univ, Columbus  
**A KINESTHETIC-TACTUAL DISPLAY FOR STALL DETERMINANCE**

Richard D Gilson, Ronald W Ventola and Robert E Fenton /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 440-451 refs

(Contract DOT-FA74WA-3515)

CSCL 05E

A kinesthetic tactual display may be effectively used as a control aid per previous flight tests Angle of attack information would be continuously presented to a pilot, via this display during critical operational phases where stalls are probable A two phase plan for evaluating this concept is presented A first development phase would encompass (1) display fabrication for a conventional control yoke (2) its installation, together with other necessary instrumentation, in an experimental aircraft, and (3) preliminary flight testing by experienced pilots Author

**N75-33704\*** Tufts Univ, Medford, Mass  
**VERBAL WORKLOAD IN DISTRIBUTED AIR TRAFFIC MANAGEMENT**

J G Kreifeldt B Pardo (Calif State Univ), T E Wempe (NASA Ames Res Center), and E Huff (NASA Ames Res Center) /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 455-471 refs

(Grants NGR-05-046-002, NCAR-785-401)

CSCL 17B

The effects of alternative traffic management possibilities on task performance and pilot controller verbal workloads were studied Two new rule structures - sequencing and advisory - in addition to vectoring were studied in conjunction with CRT pilot displays incorporating traffic situation displays with and without aircraft flight path predictors The sequencing and advisory systems gave increasing control responsibility to the pilots It was concluded that distributed management systems could in practice significantly reduce controller verbal workload without reducing system performance Implications of this conclusion suggest that distributed management would allow controllers to handle a larger volume of traffic safely either as a normal operating procedure or as a failure mode alternative in a highly automated ground centered system Author

**N75-33705\*** Systems Technology Inc, Hawthorne Calif  
**EFFECTS OF AUTOMOBILE STEERING CHARACTERISTICS ON DRIVER/VEHICLE SYSTEM PERFORMANCE IN DISCRETE MANEUVERS**

Richard H Klein and Duane T McRuer /n NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 472-485 refs

(Contract DOT-HS-359-3-762)

CSCL 05H

A series of discrete maneuver tasks were used to evaluate the effects of steering gain and directional mode dynamic

parameters on driver/vehicle responses The importance and ranking of these parameters were evaluated through changes in subjective driver ratings and performance measures obtained from transient maneuvers such as a double lane change an emergency lane change and an unexpected obstacle The unexpected obstacle maneuver proved more sensitive to individual driver differences than to vehicle differences Results were based on full scale tests with an experienced test driver evaluating many different dynamic configurations plus seventeen ordinary drivers evaluating six key configurations Author

**N75-33706\*** Air Force Flight Dynamics Lab Wright-Patterson AFB, Ohio

**THE EFFECTS OF STABILITY AUGMENTATION ON THE GUST RESPONSE OF A STOL AIRCRAFT DURING A CURVED MANUAL APPROACH**

Milton B Porter, Jr and Robert L Swaim (Purdue Univ) *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 486-503 refs

**CSSL 05H**

The task of investigating the effect of SAS was formulated as two optimal control problems for stochastic systems (1) to compute SAS gains with a rate model in the performance index algorithm, and (2) to calculate the pilot gains and system gust response using an optimal pilot model Both problems were solved to yield reasonable low gains for the pilot and SAS, and the lateral directional mode poles and the longitudinal short period poles could be placed accurately by the model matching algorithm Of the longitudinal (SAS) poles achieved the vertical rms path error was least for the unaugmented poles The lateral rms path error was an order of magnitude larger than the vertical error and showed a plus or minus 50 percent variation with SAS It increased with dutch roll frequency and damping and it decreased most significantly with increased roll stability The variation in lateral error with bank angle for curved flight was also a significant function of the augmented poles Author

**N75-33707\*** Tufts Univ Medford, Mass Dept of Engineering Design

**SUBJECTIVE EVALUATION WITH FAA CRITERIA A MULTIDIMENSIONAL SCALING APPROACH**

J G Kreifeldt, L Parkin T E Wempe (NASA Ames Res Center), and E F Huff (NASA Ames Res Center) *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 504-525 refs (Grant NCAR-785-401)

**CSSL 05E**

Perceived orderliness in the ground tracks of five A/C during their simulated flights was studied Dynamically developing ground tracks for five A/C from 21 separate runs were reproduced from computer storage and displayed on CRTS to professional pilots and controllers for their evaluations and preferences under several criteria The ground tracks were developed in 20 seconds as opposed to the 5 minutes of simulated flight using speedup techniques for display Metric and nonmetric multidimensional scaling techniques are being used to analyze the subjective responses in an effort to (1) determine the meaningfulness of basing decisions on such complex subjective criteria (2) compare pilot/controller perceptual spaces (3) determine the dimensionality of the subjects' perceptual spaces and thereby (4) determine objective measures suitable for comparing alternative traffic management simulations Author

**N75-33708\*** Air Force Inst of Tech, Wright-Patterson AFB, Ohio

**SLUSHY WEIGHTINGS FOR THE OPTIMAL PILOT MODEL**

James D Dillow, Douglas G Picha, and Ronald O Anderson *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 526-540 refs

**CSSL 05H**

A pilot model is described which accounts for the effect of motion cues in a well defined visual tracking task The effect of visual and motion cues are accounted for in the model in two

ways First, the observation matrix in the pilot model is structured to account for the visual and motion inputs presented to the pilot Secondly, the weightings in the quadratic cost function associated with the pilot model are modified to account for the pilot's perception of the variables he considers important in the task Analytic results obtained using the pilot model are compared to experimental results and in general good agreement is demonstrated The analytic model yields small improvements in tracking performance with the addition of motion cues for easily controlled task dynamics and large improvements in tracking performance with the addition of motion cues for difficult task dynamics Author

**N75-33709\*** National Aerospace Lab, Amsterdam (Netherlands) **A THEORETICAL STUDY OF THE PILOT AS A SYSTEM MONITOR**

P H Wewerinke *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 541-547 refs

**CSSL 05H**

The ever increasing complexity of aerospace vehicles is associated with a greater emphasis on the monitor and decision making functions of the pilot This paper deals with the perceptual load imposed on the pilot monitoring his system A theoretical model of this load is tested against experimental data This model is based on a system state estimation model to be associated with the internal representation of the task environment Author

**N75-33710\*** Wright State Univ, Dayton Ohio **HUMAN PERFORMANCE EVALUATION IN DUAL-AXIS CRITICAL TASK TRACKING**

Malcolm L Ritchie and N S Nataraj (Sinclair Community Coll) *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 548-560 refs

**CSSL 05E**

A dual axis tracking using a multiloop critical task was set up to evaluate human performance The effects of control stick variation and display formats are evaluated A secondary loading was used to measure the degradation in tracking performance Author

**N75-33711\*** Operating Systems, Inc, Tarzana, Calif **CONTINUOUS PERFORMANCE MEASUREMENT IN FLIGHT SYSTEMS**

Edward M Connelly, Nicholas A Sloan and Robert M Zeskund *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 561-573

**CSSL 05H**

The desired response of many man machine control systems can be formulated as a solution to an optimal control synthesis problem where the cost index is given and the resulting optimal trajectories correspond to the desired trajectories of the man machine system Optimal control synthesis provides the reference criteria and the significance of error information required for performance measurement The synthesis procedure described provides a continuous performance measure (CPM) which is independent of the mechanism generating the control action Therefore, the technique provides a meaningful method for online evaluation of man's control capability in terms of total man machine performance Author

**N75-33712\*** Vereinigte Flugtechnische Werke-Fokker G m b H, Bremen (West Germany)

**PROBLEMS, QUESTIONS AND RESULTS IN THE USE OF THE BBN-MODEL**

Dieter Day *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 577-598 refs

**CSSL 05E**

A hierarchical structured control model was used to describe pilot performance in a multivariable control problem The model is based on the assumption that a well trained operator optimized a quadratic optimization criterion The model considers some special characteristics of the human operator as time delay,

neuromuscular time lag, observation and motor noise and the ability to extract the first derivative of a displaced value. Numerical results of a simple human engineering example using the BBN model demonstrate the influence of the variation of different parameters on covariance matrices of the state and observation vectors G G

**N75-33713\*** Aerospace Medical Research Labs Wright-Patterson AFB, Ohio

**PERFORMANCE EVALUATION OF TRACKING BASED ON A LOW PASS FILTER MODEL**

Daniel W Repperger and Andrew M Junker *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 599-624 refs

CSCS 05E

The performance of a human in a closed loop tracking task can be determined by using a simple low pass filter model with a least squares identification algorithm. The crossover model and the extended crossover model can be shown to be special cases of the low pass filter model presented here. Performance in tracking can be easily determined by mean square tracking error which can be written in terms of the parameters of the low pass filter model. A closed form expression for the effective time delay is also obtained. Experimental data from a roll axis tracking simulation is presented and simple prediction rules are determined. A comparison is made between this model and the crossover model with respect to their differences and similarities. Author

**N75-33714\*** National Aerospace Lab Tokyo (Japan)

**A STUDY OF PILOT BEHAVIOR DURING CONTROLLING THE LATERAL DIRECTIONAL MOTION OF AIRPLANES IN TURBULENT AIR**

Goro Beppu *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 625-644 refs

CSCS 05H

The pilot behaviors controlling the lateral directional motion of airplanes in turbulent air have been investigated by using the pilot transfer function which has been obtained by the analysis of flight test data. The pilot uses the gains for the aileron manipulation proportionally to bank angle so as to minimize r m s of bank angle. The pilot rudder manipulations are done proportionally to rolling velocity, yawing velocity and yaw angle. Namely, the pilot carries out the cross control for the rudder. Author

**N75-33715\*** Aerospace Medical Research Labs Wright-Patterson AFB, Ohio

**A MULTILoop APPROACH TO MODELING MOTION SENSOR RESPONSES**

Andrew M Junker, Daniel W Repperger, and John A Neff (AFOSR) *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 645-655 refs

CSCS 05H

By using a least squares identification algorithm, a multiloop approach is taken to effectively model the response characteristics of the motion sensors. The inputs to the model include the possible sources of information provided to the human via his motion sensing system. One input models the response of the angular acceleration sensors (second derivative of position) and the second input models the response of the linear sensors (sine of position). The third input is the visual display error provided to the human in the closed loop tracking experiment. Data from a roll axis tracking simulation were analyzed. The major source of pilot lead under the motion mode of operation is discussed for control of plants in which motion information improved performance and in which there was no improvement in performance. Author

**N75-33716\*** Bolt, Beranek and Newman Inc., Cambridge, Mass  
**EFFECTS OF CONTROL-STICK PARAMETERS ON TRACKING PERFORMANCE IN A VIBRATION ENVIRONMENT**  
William H Levison *In* NASA Ames Res Center 11th Ann

Conf on Manual Control May 1975 p 656-674 refs

(Contract F33615-74-C-4041)

CSCS 05H

A set of manual control experiments was conducted to determine the effects of control stick parameters on tracking performance in a vibration environment. Primary experimental variables were stick design parameters: stick location and presence or absence of vibration. Considerable effect on control activity suggests that stick design parameters will significantly influence overall performance in systems that respond at vibration frequencies. Stick location had no significant effect on either tracking or biodynamic performance measures. The vibration correlated component of tracking error was relatively small. A model based guide for the design of control sticks in a vibration environment is described. This model is based on the state variable model for pilot/vehicle systems. Effects of vibration are represented as additional model elements and by changes in pilot related parameters of the tracking model. Author

**N75-33717\*** Systems Control, Inc., Palo Alto, Calif

**EVALUATION OF OPTIMAL CONTROL TYPE MODELS FOR THE HUMAN GUNNER IN AN ANTI-AIRCRAFT ARTILLERY (AAA) SYSTEM**

Anil V Phatak and Kenneth M Kessler *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 675-683 refs

(Contract F33615-75-C-0016)

CSCS 05H

The selection of the structure of optimal control type models for the human gunner in an anti aircraft artillery system is considered. Several structures within the LQG framework may be formulated. Two basic types are considered: (1) kth derivative controllers and (2) proportional integral derivative (P-I-D) controllers. It is shown that a suitable criterion for model structure determination can be based on the ensemble statistics of the tracking error. In the case when the ensemble tracking steady state error is zero, it is suggested that a P-I-D controller formulation be used in preference to the kth derivative controller. Author

**N75-33718\*** Systems Technology, Inc., Hawthorne, Calif

**COMPARISON OF HUMAN DRIVER DYNAMICS IN SIMULATORS WITH COMPLEX AND SIMPLE VISUAL DISPLAYS AND IN AN AUTOMOBILE ON THE ROAD**

Duane T McRuer and Richard H Klein *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 684-692 refs

(Contract DOT-HS-359-3-762)

CSCS 05H

As part of a comprehensive program exploring driver/vehicle system response in lateral steering tasks, driver/vehicle system describing functions and other dynamic data have been gathered in several milieus. These include a simple fixed base simulator with an elementary roadway delineation only display, a fixed base statically operating automobile with a terrain model based, wide angle projection system display and a full scale moving base automobile operating on the road. Dynamic data with the two fixed base simulators compared favorably, implying that the impoverished visual scene, lack of engine noise, and simplified steering wheel feel characteristics in the simple simulator did not induce significant driver dynamic behavior variations. The fixed base vs moving base comparisons showed substantially greater crossover frequencies and phase margins on the road course. Author

**N75-33719\*** Systems Technology, Inc., Hawthorne, Calif

**MANUAL AND AUTOMATIC CONTROL OF SURFACE EFFECT SHIPS**

Warren F Clement, John J Shanahan and R Wade Allen *In* NASA Ames Res Center 11th Ann Conf on Manual Control May 1975 p 693-710

(Contract N00024-73-C-0914)

CSCS 05H

A recent investigation of crew performance in the motion environment of a large generic high speed surface effect ship by means of a motion base simulation addressed some of the

helmsman's control task with an external forward visual field of the seascape and navigation and steering displays in the pilot house. In addition to the primary steering control task, a subcritical speed tracking task provided a secondary surrogate for trimming the water speed of the craft. The results of helmsman's steering describing function measurements are presented, and some suggestions for their interpretation are offered. The likely steering loop closures comprise heading and lateral displacement for the course keeping task investigated. Also discussed is the manner in which these loop closures were implemented for automatic steering of the surface effect ship. Regardless of the influence of workload, steering technique, water speed and sea state, the helmsmen apparently adopted a disturbance regulation bandwidth of about 0.2 rad/sec for lateral displacement. Author

**N75-33720\*#** Boeing Co., Houston, Tex  
**CREW APPLIANCE CONCEPTS VOLUME 1, APPENDIX A BIBLIOGRAPHY**

B W Proctor, R P Reysa and D J Russell 25 Jul 1975  
 479 p refs

(Contract NAS9-13965)  
 (NASA-CR-144452 D2-118561-1-Vol-1-App-A) Avail NTIS  
 HC \$12.00 CSCL 05H

A review of crew appliance related literature was made to provide background engineering information for development of conceptual appliance systems for the shuttle orbiter and the modular space station. From this review a file containing abstracts of 299 appliance-related documents coded according to subject was developed along with a computerized bibliography of 682 references. Trade studies were conducted using information from these references to determine the optimum concepts to satisfy the shuttle and space station mission requirements. An appliance system was devised for each vehicle which has minimum impact to the respective environmental control system with the smallest possible weight, volume, and electrical penalty. Engineering parameters for each appliance concept considered are presented along with the total thermal and electrical loads and weight and volume penalties for each of the optimized appliance systems. Author

**N75-33721\*#** Boeing Co., Houston, Tex  
**CREW APPLIANCE CONCEPTS VOLUME 2, APPENDIX B SHUTTLE ORBITER APPLIANCES SUPPORTING ENGINEERING DATA**

B W Proctor, R P Reysa, and D J Russell 25 Jul 1975  
 331 p

(Contract NAS9-13965)  
 (NASA-CR-144453 D2-118561-2-Vol-2-App-B) Avail NTIS  
 HC \$9.50 CSCL 05H

Technical data collected for the food management and personal hygiene appliances considered for the shuttle orbiter are presented as well as plotted and tabulated trade study results for each appliance. Food storage, food operation, galley cleanup, waste collection/transfer, body cleansing, and personal grooming were analyzed. F O S

**N75-33722\*#** Boeing Co., Houston, Tex  
**CREW APPLIANCE CONCEPTS VOLUME 3, APPENDIX B SHUTTLE ORBITER APPLIANCES SUPPORTING ENGINEERING DATA**

B W Proctor, R P Reysa and D J Russell 25 Jul 1975  
 400 p

(Contract NAS9-13965)  
 (NASA-CR-144454, D2-118561-3-Vol-3-App-B) Avail NTIS  
 HC \$10.25 CSCL 05H

Technical data collected for housekeeping, off-duty activities and medical appliances considered for the shuttle orbiter are presented. Equipment cleaning, refuse management, garment/linen maintenance, entertainment, physical conditioning, sterilization, and physical monitoring were analyzed. F O S

**N75-33723\*#** Boeing Co., Houston, Tex  
**CREW APPLIANCE CONCEPTS VOLUME 4, APPENDIX C MODULAR SPACE STATION APPLIANCES SUPPORTING ENGINEERING DATA**

B W Proctor, R P Reysa and D J Russell 25 Jul 1975

371 p

(Contract NAS9-13965)  
 (NASA-CR-144455 D2-118561-4-Vol-4-App-C) Avail NTIS  
 HC \$10.00 CSCL 05H

Data collected for the appliances considered for the space station are presented along with plotted and tabulated trade study results for each appliance. The food management, and personal hygiene data are applicable to a six-man mission of 180-days. F O S

**N75-33724\*#** Boeing Co., Houston, Tex  
**CREW APPLIANCE CONCEPTS VOLUME 5, APPENDIX C MODULAR SPACE STATION APPLIANCES SUPPORTING ENGINEERING DATA**

B W Proctor, R P Reysa and D J Russell 25 Jul 1975  
 331 p

(Contract NAS9-13965)  
 (NASA-CR-144456 D2-118561-5-Vol-5-App-C) Avail NTIS  
 HC \$9.50 CSCL 05H

Housekeeping, off-duty and medical data concerning the appliances considered for the space station are presented. Appliance functions analyzed include cleanup, collection, processing and storage of refuse, crew entertainment and physical exercise, and the autoclaves and ergometers. F O S

**N75-33725\*#** National Aeronautics and Space Administration  
 Marshall Space Flight Center, Huntsville, Ala  
**AN IMPROVED LOAD HANDLING DEVICE Patent Application**

John L Burch, Peter H Broussard Jr., and Calvin O Mueller inventors (to NASA) Filed 16 Sep 1975 17 p

(NASA-Case-MFS-23233-1, US-Patent-Appl-SN-613845) Avail  
 NTIS HC \$3.25 CSCL 06K

An improved load handling device particularly suited for use as an escape device for high altitude structures is reported. The device is characterized by a vertically oriented base adapted to be mounted near a selected opening of a building or the like, having mounted thereon a capstan including a drum supported for rotation. A storage reel is mounted on the base in spaced relation with the drum. A flexible line is stored in a variable number of turns on the storage reel and wound about the drum in a fixed number of turns for suspending loads attached. A double acting dashpot restrains the drum against load induced rotation. NASA

**N75-33726\*#** General Dynamics/Convair, San Diego, Calif  
**BOSCH CO2 REDUCTION SYSTEM DEVELOPMENT Interim Report**

R F Holmes, C D King and E E Keller Jul 1975 53 p  
 refs

(Contract NAS8-27276)  
 (NASA-CR-143959 CASD-NAS-75-030 IR-3) Avail NTIS  
 HC \$4.25 CSCL 06K

Refinements in the design of a Bosch CO2 reduction unit for spacecraft O2 production are described. Sealing of the vacuum insulation jacket was simplified so that high vacuum and high insulation performance are easily maintained. The device includes a relatively simple concentric shell recuperative heat exchanger which operates at approximately 95% temperature effectiveness and helps lower power consumption. The influence of reactor temperature, pressure, and recycle gas composition on power consumption was investigated. In general, precise control is not required since power consumption is not very sensitive to moderate variations of these parameters near their optimum values. There are two process rate control modes which match flow rate to process demand. Catalyst conditioning support and packing pattern developments assure consistent starts, reduced energy consumption, and extended cartridge life. Operation levels for four or five men were maintained with overall power input values of 50 to 60 watts per man. Author

**N75-33727#** Coast Guard, Washington, D C  
 Pollution Prevention Projects Branch

**SURVEY OF PERSONNEL PROTECTIVE CLOTHING AND RESPIRATORY APPARATA FOR USE BY COAST GUARD PERSONNEL IN RESPONSE TO DISCHARGES OF HAZARD-**

**OUS CHEMICALS Final Report**

W M Hammer and K R Nicholson Sep 1974 79 p refs  
(AD-A010110, USCG-D-89-75) Avail NTIS CSCL 06/17

A survey was conducted to determine the availability of protective clothing and breathing apparatus and their capability for protecting man from dangerous environments caused by discharges of hazardous chemicals. The information was evaluated to determine the applicability of the equipment to Coast Guard discharge amelioration responsibilities. GRA

**N75-33728#** Operations Research Inc., Silver Spring Md  
**DESIGN CRITERIA FOR ADVANCED PFD'S Final Report**  
Robert B Dayton Aug 1974 129 p  
(Contract DOT-CG-31446)  
(AD-A010404 ORI-TR-861, USCG-D-76-75) Avail NTIS CSCL 06/7

The study is devoted to an analysis of Personal Flotation Devices (PFD). An analytical model is developed which allows the PFD designer to select desirable PFD characteristics based on a typical accident scenario. In addition PFD design criteria are established based on wearability, physical effectiveness and reliability parameters. Each of these parameters is analyzed in detail and their affect on PFD design discussed. PFD components and materials are surveyed and space age developments are analyzed for potential PFD application. The survey includes inflation techniques, fabric and plastic materials, valves, puncture proofing, detection and automatic actuators. The design of an advanced PFD is developed using the analytical techniques and materials and components study. A prototype PFD is constructed and tested to verify the analysis. GRA

**N75-33729#** Texas Instruments Inc., Dallas Equipment Group  
**MINE AIR MONITOR Final Report, 19 Jun 1972 - 17 Jun 1974**

David Collins and Arnold Stalder 17 Jun 1974 53 p  
(Contract DI-BM-HO-122044)  
(PB-242488/5, BM-OFR-43-75) Avail NTIS HC \$4.25 CSCL 081

Two portable battery powered breathing air monitors are reported for toxic gases CO and NO<sub>2</sub> and for oxygen deficiency for use in underground mines including coal mines. The device used commercially available electrochemical transducers, features audible and visual alarms with adjustable threshold levels, selectable digital readout of gas concentrations, alarm level set points and battery condition. It can run continuously for 30 hours from batteries before recharging is necessary. This report details the design effort including electrochemical cell characterization of response versus temperature and contains portions of operation and instruction manual. GRA

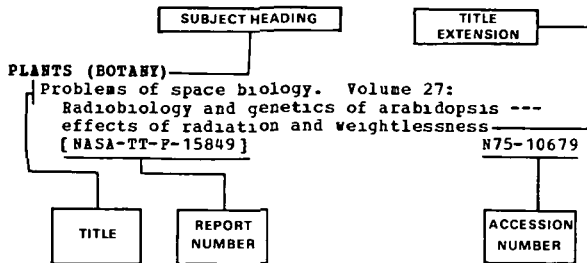
**N75-33999** National Research Council of Canada Ottawa (Ontario) Control Systems and Human Engineering Lab  
**CIRCADIAN RHYTHM IN PERFORMANCE ON THE NRC STRESSALYSER**

Leslie Buck and Ralph Leonardo *In its Quart Bull* of the Div of Mech Eng and the Natl Aeron Estab, 1 Apr - 30 Jun 1975 30 Jun 1975 p 11-31 refs

Human subjects followed schedules of self-administered tests on the NRC stressalyser over a period of three days. Performance varied systematically according to time of day of testing with the circadian rhythm more evident for movement times than for reaction times. The rhythm of accuracy scores was out of phase with that for speed scores, with performance being slowest but most accurate early in the waking day. Author

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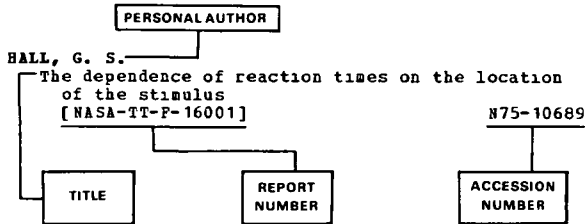
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