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**AEROSPACE MEDICINE  
AND BIOLOGY**

**A CONTINUING BIBLIOGRAPHY**

**WITH INDEXES**

**(Supplement 113)**

**MARCH 1973**

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**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

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# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 113)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in February 1973 in

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



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## INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 321 reports, articles and other documents announced during February 1973 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 1973 Supplements.

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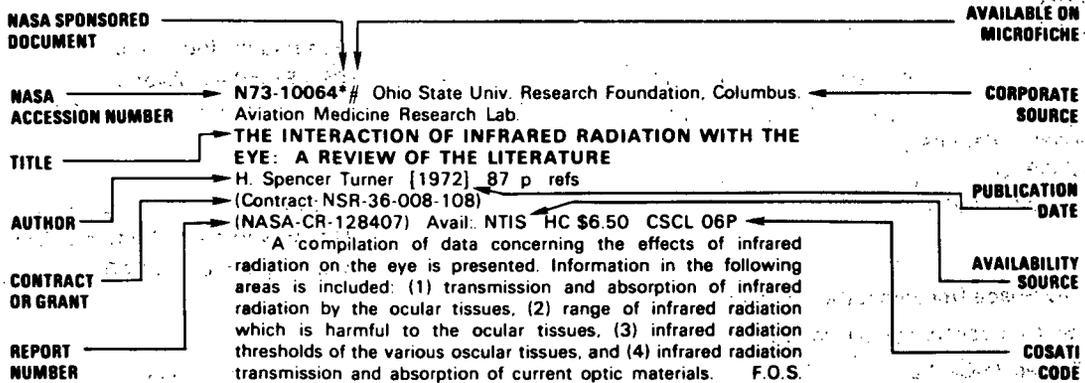
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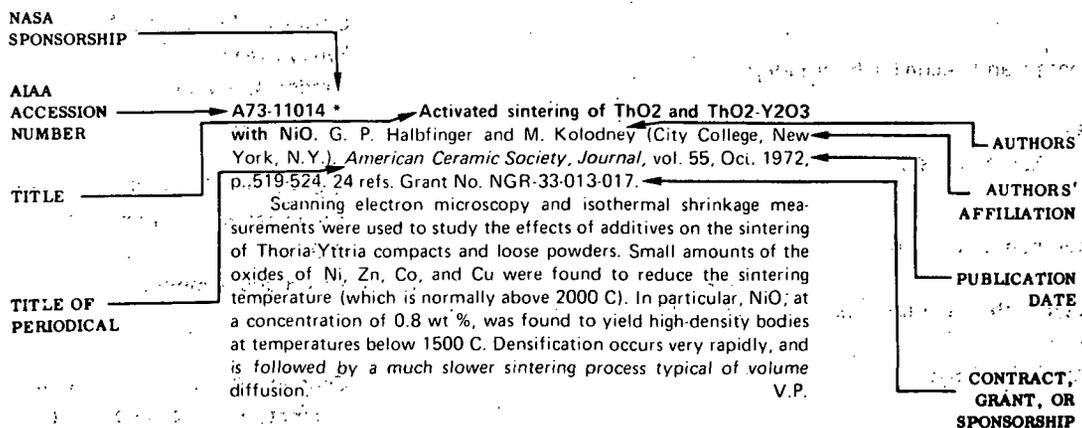
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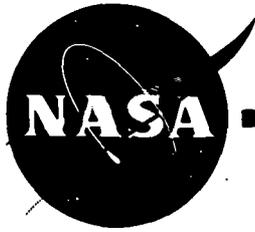
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## TYPICAL CITATION AND ABSTRACT FROM IAA





# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 113)*

MARCH 1973

## IAA ENTRIES

**A73-12980 #** The second noise and social survey around Heathrow, London airport. A. E. Knowler (Department of Trade and Industry, London, England). In: International Congress on Acoustics, 7th, Budapest, Hungary, August 18-26, 1971, Proceedings. Volume 2. Budapest, Akademiai Kiado, 1971, p. 525-528.

Summary of the main features and results of the second noise and social survey conducted around Heathrow airport in 1967 for the purpose of verifying the validity of the results obtained from the first 1961 survey. A brief statement is presented of the 15 main conclusions reached. M.V.E.

**A73-12999** Orientation illusion and masking in central and peripheral vision. R. Over, J. Broerse, and B. Crassini (Queensland, University, Brisbane, Australia). *Journal of Experimental Psychology*, vol. 96, Nov. 1972, p. 25-31. 23 refs. Research supported by the Australian Research Grants Committee.

Experimental study of the visual perception of two groups of subjects who viewed a vertical line in combination with or against a background of tilted lines. The relative values of the associated aftereffects and illusions, with masking applied in some tests, are discussed as sources of information concerning the tuning characteristics of feature analyzers in the human visual system. V.Z.

**A73-13000** Effect of forward head inclination on visual orientation during lateral body tilt. N. J. Wade (Max-Planck-Institut für Verhaltensphysiologie, Seewiesen, West Germany). *Journal of Experimental Psychology*, vol. 96, Nov. 1972, p. 203-205. 6 refs.

Judgments of the visual vertical were made during lateral body tilts up to 180 deg, for different degrees of head inclination in the sagittal plane. The deviations of the visual vertical from the body median plane were not influenced by the forward head inclination at any body tilt. It was concluded that the lateral shear force on the utricular statoliths is the adequate stimulus for visual orientation in the frontal plane. (Author)

**A73-13054 \*** Hepatic lipogenesis in fasted, re-fed rats and mice - Response to dietary fats of differing fatty acid composition. J. C. Bartley and S. Abraham (Northern California, Children's Hospital Medical Center, Oakland, Calif.). *Biochimica et Biophysica Acta*, vol. 280, 1972, p. 258-266. 32 refs. Grants No. PHS-CA-11736; No. NGR-05-059-005.

**A73-13059 #** Unusual diastolic heart beat in pericardial effusion. T. Sakamoto, S. Ookubo, J. Yoshikawa, K. Inoue, U. Ito,

and T. Hayashi (Tokyo, University, Tokyo, Japan). *Japanese Heart Journal*, vol. 13, Sept. 1972, p. 379-393. 21 refs.

Description of an unusual diastolic heart beat found in a patient with tense pericardial effusion and in a patient with seroconstrictive pericarditis. Characteristic of this heart beat is a large and sharp early diastolic thrust with a peak which is coincident in time with a protodiastolic extrasound (pericardial knock). The mechanism and diagnostic value of this heart beat are discussed. V.Z.

**A73-13063** Vernier acuity as affected by target length and separation. G. D. Sullivan, K. Oatley, and N. S. Sutherland (Sussex, University, Brighton, England). *Perception and Psychophysics*, vol. 12, Nov. 1972, p. 438-444. 17 refs. Research supported by the Medical Research Council.

Review of the methods and results of an experimental investigation on the effects of target length and separation on vernier acuity. The obtained results suggest that, in performing the vernier task, subjects do not extrapolate the edges of the vernier elements; instead, they judge the deviations of the inner ends of the stimuli from verticality. This hypothesis explains the effect of increasing separation between vernier elements and also accounts for other types of acuity, such as the detection of curvature. M.V.E.

**A73-13073 #** Problems of flight-pedagogical conferences (Probleme flugpädagogischer Konferenzen). H.-J. Merkel (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt*, vol. 8, no. 8, 1972, p. 378-382. In German.

Brief statement of the purposes of flight-pedagogical conferences in the training of flight personnel, and review of three such conferences actually held for INTERFLUG personnel between September 1971 and June 1972. These conferences dealt with behavioral problems in the training of professional pilots, aiming in particular to ascertain the extent to which correct behavior and decision-making can be taught and learned. Also discussed were problems concerning the requirements imposed on cockpit personnel and the use of scientific methods of selection of such personnel by INTERFLUG. Finally, a critical analysis was made of the role of the instruction commanders and their effectiveness in instilling proper flight habits in young pilots. A.B.K.

**A73-13121** The effects of various seat surface inclinations on posture and subjective feeling of comfort (Die Wirkungen verschiedener Sitzflächenneigungen auf die Körperhaltung und das subjektive Komfortempfinden). W. Hünting and E. Grandjean (Eidgenössische Technische Hochschule, Zurich, Switzerland). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 31, no. 1, 1972, p. 1-9. 11 refs. In German. Research supported by the Giroflex-Entwicklungs AG.

**A73-13122** Correlation between the regional distribution of sweating and the deviation from the 'Predicted 4-hr Sweat Rate' /P4SR/ (Beziehung zwischen regionaler Verteilung der Schweissproduktion und Abweichung von der 'Predicted 4-hrs Sweat Rate')

**P4SR).** G. van Ackeren (Tübingen, Universität, Tübingen, West Germany). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 31, no. 1, 1972, p. 11-40. 31 refs. In German.

The significance of the different distribution of perspiration secretion over the human body is analyzed quantitatively on the basis of Kerslake's (1963) model of a uniformly sweating cylinder extended to include the arms, legs, trunk and head. Each of these members of the body is treated individually. The evaporation conditions are shown to be better at the extremities than at the trunk. Due to these regional and individual differences, the amount of sweat evaporated depends both on the amount of sweat secreted and on its distribution over the body. Under conditions requiring maximum utilization of evaporation capacity, an expression which describes the deviation of the 4-hr sweat rate (4SR) from the P4SR is given. The amount of sweat that drips off unevaporated when the evaporation capacity is fully utilized is determined. V.P.

**A73-13123**      **The effects of passive or active warm-up upon certain physiological measures.** E. R. Elbel and W. J. Mikols (Kansas, University, Lawrence, Kan.). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 31, no. 1, 1972, p. 41-52. 24 refs.

17 runners in training status for the University of Kansas track squad were used as subjects for this study. The purpose was to determine whether significant mean differences in certain physiological measures would result during a treadmill run and during a standard recovery period following active warm-up or passive warm-up. The means for minute-volume of inspired air were found to be significantly larger following active warm-up than those following passive warm-up during the 3rd through the 9th min of a ten-minute treadmill run. Other than the significant t-values for minute-volume of inspired air, there were no consistent trends toward significant differences in the means for other variables whether subjects warmed passively or actively. (Author)

**A73-13124**      **Normal pulmonary pressure-flow relationship during exercise in the sitting position.** S. Degré, A. de Coster, R. Messin, and H. Denolin (Hôpital Universitaire St. Pierre, Brussels, Belgium). *Internationale Zeitschrift für angewandte Physiologie einschliesslich Arbeitsphysiologie*, vol. 31, no. 1, 1972, p. 53-59. 15 refs.

**A73-13302**      **An analysis of blood flow.** M. A. Turk, N. D. Sylvester, and T. Ariman (Notre Dame, University, Notre Dame, Ind.). In: Southeastern Conference on Theoretical and Applied Mechanics, 6th, Tampa, Fla., March 23, 24, 1972, Proceedings: Tampa, S. C. Kranc, University of South Florida, 1972, p. 3-24. 16 refs.

In this paper an improvement in an earlier micro-continuum model of blood is suggested. This improvement is concerned with a new boundary condition on the cell-rotational velocity at the boundaries. Exact solutions to the system of governing equations are given for the case of the steady flow of blood through rigid circular tubes. A comparison of the theoretical velocity and cell-rotational velocity profiles with the experimentally determined profiles of Bugliarello and Sevilla yielded encouraging agreement. (Author)

**A73-13369**      **Myocardial function and ultrastructure in chronically hypoxic rats.** J. T. Maher, A. L. Goodman, W. D. Bowers, L. H. Hartley, and E. T. Angelakos (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.; Hahnemann Medical College, Philadelphia, Pa.). *American Journal of Physiology*, vol. 223, Nov. 1972, p. 1029-1033. 30 refs.

The myocardial function was studied in isolated cardiac muscles from ten rats exposed to simulated altitudes of 5800 m for 24 days. Nine weight-matched and seven age-matched rats were used as controls. Electron microscopy showed structural alterations in the

capillaries of the myocardium of test rats, and also swelling and/or disruption of the endothelial cells and a marked dilatation of the sarcoplasmic reticulum. V.Z.

**A73-13370 \***      **Effect of chronic centrifugation on body composition in the rat.** G. C. Pitts, L. S. Bull, and J. Oyama (Virginia, University, Charlottesville, Va.; NASA, Ames Research Center, Environmental Biology Div., Moffett Field, Calif.). *American Journal of Physiology*, vol. 223, Nov. 1972, p. 1044-1048. 20 refs. Contract No. NAS2-1554.

Two groups of adult female rats were chronically centrifuged for 60 days (2.76 G, 4.15 G, controls at 1.00 G). Live weights of centrifugal rats decreased about 20 g (6%) per Delta 1 G above control. This weight loss comprised reductions in both body fat and fat-free body weight (FFBW) as determined by body-composition studies on eight rats per group killed at the end of centrifugation. Of nine components constituting the FFBW, only skeletal muscle, liver, and heart changed significantly in weight. Chemical composition showed reductions (compared with controls) in the fat fraction of most components and increases in the water fraction of liver and gut. Identical measurements were made on the remaining eight rats per group killed 43 days after return to 1 G. Neither centrifuged group had reached the control body-weight level at this time. No statistically significant effect of previous G level was found in any of the body-composition parameters. The possible involvement of physiological regulation was considered. (Author)

**A73-13498**      **Intensity of exercise and heart tissue catecholamine content.** C. de Schryver and J. Mertens-Strythagen (Facultés Universitaires Notre Dame de la Paix, Namur, Belgium). *Pflügers Archiv*, vol. 336, no. 4, 1972, p. 345-354. 25 refs.

The relation between the catecholamine depletion in heart tissues and the intensity of physical exercise was studied in experiments with rats. A motor-driven rotating drum was used in daily 90-min running sessions at 750 or 500 m/hr over a period of up to six or eight weeks, respectively, after an adaptation period of one week at 300 m/hr. The cardiac catecholamine levels were similar at both speeds and 30 percent lower than in control animals when steady depletion rates were obtained in the sixth week of experiments. V.Z.

**A73-13499**      **Control of exercise hyperpnea under varying durations of exposure to moderate hypoxia.** J. A. Dempsey, H. V. Forster, M. L. Birnbaum, W. G. Reddan, J. Thoden, R. F. Grover, and J. Rankin (Wisconsin, University, Madison, Wis.; Colorado, University, Denver, Colo.). *Respiration Physiology*, vol. 16, Oct. 1972, p. 213-231. 40 refs. Research supported by the Wisconsin Heart Association; Grants No. DADA17-68-C-8013; No. NIH-FRO-00249.

Study of ventilation and arterial acid-base status at rest and during steady-state work at oxygen partial pressures of 100, 145 and 250 mm Hg, in lowlanders at sea level and after 4, 21 and 45 days at 3100 m, in lowlanders residing 2 to 15 years at 3100, and in native altitude residents. The possible causes of differences in hyperpnea in different groups of subjects are discussed. V.Z.

**A73-13500**      **Dynamic aspects of regulation of ventilation in man during acclimatization to high altitude.** S. Lahiri (Pennsylvania, University, Philadelphia, Pa.). *Respiration Physiology*, vol. 16, Oct. 1972, p. 245-258. 25 refs. Grant No. NIH-HE-08805.

Ventilatory adaptation to high altitudes was studied in three adult sea level natives before and during a period of 11 days after ascent to 4540 m. Ventilation and alveolar gas pressure were also measured at rest and during steady physical work at sea level ambient pressure, and under acute hypoxia and acute normoxia. The persistent hyperventilation during the adaptation to high altitude is believed to be largely linked with the hypoxic drive and the increased CO<sub>2</sub> sensitivity shown by the subjects. V.Z.

**A73-13525 \*** General and specific factors in the intersensory transfer of form. J. L. Clark, J. S. Warm, and D. A. Schumsky (Cincinnati, University, Cincinnati, Ohio). *Journal of Experimental Psychology*, vol. 95, Sept. 1972, p. 184-188. 14 refs. Grant No. NGL-36-004-014.

This study assessed the relative contributions of specific and nonspecific components to intersensory transfer between vision and touch. A paired-associate paradigm was used in which visual metric figures and their tactual analogs served as stimuli, and familiar adjectives were the responses. Positive intersensory transfer, characterized by symmetry across modalities was obtained. The contribution of nonspecific learning to this effect was negligible. Intersensory transfer was found to be less efficient than the empirically determined maximum level of intrasensory transfer possible in this task. (Author)

**A73-13538** Exercise testing for evaluation of cardiac performance. A. M. Master (Mount Sinai School of Medicine; Mount Sinai Hospital, New York, N.Y.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 718-721. 23 refs.

The 2-step exercise test is the safest for determining the function of the heart, in evaluating its work capacity and in determining therapeutic measures. The maximal heart rate obtained with the 2-step test is adequate for the detection of coronary artery disease. The augmented 2-step test, when negative, completely excludes the presence of coronary artery disease. Strenuous exercise tests are discussed in a general way. They have not as yet been standardized and they are not for office use. (Author)

**A73-13539** Evaluation of cardiac performance in exercise. E. Simonson (Mount Sinai Hospital, Minneapolis, Minn.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 722-726. 26 refs. Grant No. NIH-HD-02586.

The ratio of cardiac work to myocardial oxygen consumption is suggested as a means for determining cardiac mechanical efficiency. This ratio is believed to represent a potentially valuable qualitative criterion. Other qualitative criteria are shown to be the inability to maintain a steady state in oxygen transport, pulmonary ventilation, blood pressure, and heart rate during aerobic work, and decrease in respiratory oxygen utilization. The most important criterion for the inadequacy of myocardial oxygen supply in exercise is the ischemic depression in the S-T segment. M.V.E.

**A73-13540** Practical exercise test for physical fitness and cardiac performance. N. Sharrock, H. L. Garrett, and G. V. Mann (George Peabody College for Teachers; Vanderbilt University, Nashville, Tenn.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 727-732. 20 refs. Research supported by the Middle Tennessee Heart Association.

A clinical trial was made of the method for measuring physical fitness and the taking of exercise electrocardiograms as proposed by the Tennessee Heart Association. The progressive step test in which the subject proceeds until he reaches 85 percent of his predicted maximal heart rate (HR 0.85) was applied to 66 adult men and women. The test was found feasible, and the results were found highly reproducible. The energy cost was measured and approximated 85 percent of the predicted maximal expenditure. (Author)

**A73-13541** Exercise electrocardiography and vasoregulatory abnormalities. G. C. Friesinger, R. O. Biern, I. Likar, and R. E. Mason (Johns Hopkins University, Baltimore, Md.; Vanderbilt University, Nashville, Tenn.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 733-740. 26 refs. Grants No. NIH-5-T1-HE-5159; No. NIH-5-F2-HE-22-894.

A group of 40 patients who have ischemic electrocardiographic responses to exercise but who do not fulfill the usual criteria for ischemic heart disease are discussed. These patients have been followed up for a minimum of 3 years and clinical findings of ischemic heart disease have not developed. It is suggested that they

have vasoregulatory abnormalities. Vasoregulatory abnormalities include an unusual increase in heart rate on standing, ST-T segment changes on standing, ischemic electrocardiographic changes unaccompanied by chest discomfort occurring early in exercise, and disappearance of ischemic changes as exercise proceeds. (Author)

**A73-13542** Exercise testing for detecting changes in cardiac rhythm and conduction. A. S. Gooch (Deborah Hospital, Browns Mills, N.J.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 741-746. 23 refs.

In addition to other well known applications, treadmill exercise testing can be utilized for provoking transient changes in cardiac rhythm and conduction. When started at low stress levels and limited to easily tolerated levels, the procedure is safe and productive. In ambulatory patients with regular sinus rhythm and heart disease arrhythmias often develop during or after exercise. When abnormalities of rhythm or conduction are present before exercise, the response is unpredictable. Exercise testing for arrhythmias can add significant diagnostic information. Serial treadmill testing is feasible and provides additional information on the natural history of arrhythmias. (Author)

**A73-13543** Correlation of computer-quantitated treadmill exercise electrocardiogram with arteriographic location of coronary artery disease. P. L. McHenry, J. F. Phillips, and S. B. Knoebel (Indiana University; Marion County General Hospital, Indianapolis, Ind.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 747-752. 13 refs. Research supported by the Herman C. Krannert Fund, Indiana Heart Association, Northeast Indiana Heart Association, American Medical Association Committee for Research on Tobacco and Health; Grants No. PHS-HE-6308; No. PHS-HTS-5363; No. PHS-HE-5749.

**A73-13544** Cardiac dysrhythmias associated with exercise stress testing. M. T. Anderson, G. B. Lee, B. C. Campion, K. Amplatz, and N. Tuna (Minnesota, University, Minneapolis, Minn.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 763-767. 21 refs. Grants No. NIH-HE-06314-06; No. NIH-HE-08527-08; No. NIH-0685-5202-02.

The exercise electrocardiograms and coronary arteriograms of 119 patients were examined to evaluate the significance of dysrhythmias associated with exercise testing. The results of the exercise tests were correlated with coronary arteriographic findings to detect false positive and false negative results. There was no significant statistical difference in the frequency of dysrhythmias between patients who responded positively and those who responded negatively to exercise. We conclude that dysrhythmias associated with exercise testing should raise the index of suspicion of underlying coronary artery disease but should not be used as a criterion for a positive test. (Author)

**A73-13545 \*** The National Aeronautics and Space Administration-U.S. Public Health Service Health Evaluation and Enhancement Program - Summary of results. D. C. Durbeck, F. Heinzelmann, J. Schacter, W. L. Haskell, G. H. Payne, R. T. Moxley, III, M. Nemiroff, D. D. Limoncelli, L. B. Arnoldi, and S. M. Fox, III (U.S. Public Health Service, National Institute of Health, Rockville, Md.; NASA, Div. of Occupational Medicine, Washington, D.C.). *American Journal of Cardiology*, vol. 30, Nov. 1972, p. 784-790. 14 refs.

An exercise program was initiated in a federal agency to assess the feasibility of such a program, and to identify the factors that influenced joining, adherence to, and effectiveness of the program. The program was utilized by 237 of the 998 eligible federal employees; mean attendance rate was 1.3 days/week. Those who volunteered perceived a need for increased physical activity, believed they had sufficient time to participate and derived subjective as well as objective benefits. Significant improvements were found in heart rate response to the standard exercise test, body weight, skinfold measurements and triglyceride levels. (Author)

**A73-13551 #** Effects of increasing intensity levels of intermittent and continuous 1000-Hz tones on human equilibrium. C. S. Harris (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 395-405. 12 refs.

Human equilibrium, as measured by the ability of subjects to balance on narrow rails, had been found by Harris (1971) to be sensitive to various types of acoustic stimulation. An investigation was conducted to examine the roles of intermittency, asymmetry, and intensity of acoustic stimuli in terms of their relative effects on the rail task. Four different groups of subjects were tested. The performance of all subjects was measured during exposure to a 1000-Hz tone at intensity levels of 65 db, 85 db, 95 db, and 105 db. Two groups received a steady tone, and the other two groups received a tone interrupted three times a second. Within each type of exposure subjects were further assigned to asymmetrical and symmetrical groups. G.R.

**A73-13552** Verbal estimations of time at four spatial distances. C. J. Adkins (Old Dominion University, Norfolk, Va.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 411-418. 10 refs.

The method of verbal estimation was used to study the kappa effect with unfilled, light-flash-bounded intervals of .5 to 22 sec duration. Subjects viewed dual flashes of one light and single flashes of paired lights set at 4-, 8-, 16-, and 32-in. horizontal separations. Group studies of 56 college students yielded evidence for larger estimations with greater light separation. A significant sex difference was found, female subjects giving longer estimations than males.

(Author)

**A73-13553** Intellectual ability and performance on a non-verbal problem-solving task. W. D. Chiles and R. C. Smith (FAA, Aviation Psychology Laboratory, Oklahoma City, Okla.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 427-434. 10 refs.

A study was conducted in which performance on a nonverbal problem-solving task was correlated with the Otis Quick-scoring Mental Ability Test and the Raven Progressive Matrices Test. The problem-solving task, called code-lock, required subjects to determine the correct sequence in which to push 5 buttons in order to turn on a light. Measures of how quickly subjects responded and how many errors were made on each problem were taken from 45 college student volunteers. Results indicated substantial correlations (.50 to .60) between time measures on the code-lock task and the Otis, but very limited relationships between the Raven and each code-lock measure. (Author)

**A73-13554** Human thresholds for perceiving sudden changes in atmospheric pressure. D. H. Williams and E. Cohen (Singer Co., Simulation Products Div., Binghamton, N.Y.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 437, 438.

Thresholds for detection of the presence of sudden changes in atmospheric pressure, such as might occur in the operation of cabin pressurization systems of transport aircraft, were found to approximate 0.040 psi both for increases and decreases; thresholds for detection of direction of change were higher, but not significantly so. (Author)

**A73-13555** Clairvoyant perception of target material in three states of consciousness. S. Krippner, J. Hickman, N. Auerhahn, and R. Harris (Lund, Universitet, Lund, Sweden). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 539-547. 8 refs.

Four subjects, who had extensively studied and practiced the alteration of their conscious states, participated in the experiments. The experimental design called for all four subjects to attempt clairvoyant perception of target material while in their alert, waking condition, while in a self-induced altered state, and while in an altered state of consciousness induced externally by a multimedia, sensory-bombardment device. Postcard-size reproductions of famous paintings and photographs were used as targets. For all four subjects, in all three conditions, there was a total of 96 trials. On the basis of the subjects evaluation, there were 61 'hits' and 35 'misses'. (Author)

**A73-13556** Correlations between motor learning and visual and arm adaptation under conditions of computer-simulated visual distortion. J. Gyr, R. Willey, and D. G. Gordon (Michigan, University, Ann Arbor, Mich.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 551-561. 11 refs.

**A73-13557** Patterns of changes in binocular contour rivalry. R. Cogan (Texas Tech University, Lubbock, Tex.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 569, 570.

The reports of 3 subjects observing the binocular rivalry of 3.9 deg light contours were examined to determine whether or not patterns of rivalry changes were random. Sequential dependencies were identified in the transitions from one to another of 4 categories of rivalry perception reported by subjects. (Author)

**A73-13558** Effects of a surround upon onset and offset reaction time. V. P. Pease (Clarkson College of Technology, Potsdam, N.Y.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 571-576. 8 refs. Research supported by the Clarkson College of Technology; NSF Grant No. GB-3955.

This study measured onset and offset reaction time (RT) to test stimuli presented in a surround and no-surround condition in the fovea. The differences between onset and offset RT in the surround condition were not significant. However, the differences between onset and offset RT for the no-surround case and the differences between surround and no-surround RTs were significant. RTs were faster with a surround present. A significant luminance by onset-offset interaction for the surround condition was also present.

(Author)

**A73-13559** Effects of resource constraints on ideal plans. H. B. Miller and J. C. Baird (Dartmouth College, Hanover, N.H.). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 587-595. NSF Grant No. GY-9227.

In the investigations described subjects were told to design four ideal organisms possessing 12 properties. A fixed number of 'resource units' was available for distribution among the properties. A subject could allocate to any property an integral number of resource units from 0 to 10. It was found statistically that the average percentage of total resources subjects allocate to any property is a linear function of the total number of resource units. The results obtained suggest that subjects have an essential conception of their ideal and that variation in the resource pool does not lead to a reordering of priorities among the properties. Aspects of quantitative differentiation in a preference ordering are discussed. G.R.

**A73-13560 #** Effects of intermittent and continuous noise on serial search performance. C. S. Harris (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Perceptual and Motor Skills*, vol. 35, Oct. 1972, p. 627-634. 13 refs.

To determine whether high intensity broadband noise has an adverse effect on human performance when special conditions related to type of task, length of testing, and intensity of noise exposure are met, 3 groups of 20 subjects each were tested on a serial search task. The first group was presented continuous broadband noise, the second received intermittent noise, and the third served as a control group. Performance was measured for 36 min continuously on a practice day and 4 test days. Both noise groups produced approximately the same results. Both groups found significantly fewer numbers on the task than the control group on the last two days of testing. The results support the contention that when certain conditions of testing are met, a reliable effect of noise on performance can be demonstrated. (Author)

**A73-13597 \*** Properties of phosphoribulokinase from *Thiobacillus neapolitanus*. R. D. MacElroy, H. M. Mack, and E. J. Johnson (NASA, Ames Research Center, Biological Adaptation Branch, Moffett Field, Calif.; Tulane University, New Orleans, La.). *Journal of Bacteriology*, vol. 112, Oct. 1972, p. 532-538. 24 refs.

**A73-13598 \*** A salt-inhibited cytochrome c reductase obtained from the moderately halophilic bacterium, *Micrococcus halodenitrificans*. J. E. Miller (Allied Chemical Corp., Morristown, N.J.) and L. I. Hochstein (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Journal of Bacteriology*, vol. 112, Oct. 1972, p. 656-659. 11 refs.

**A73-13599** Effect of cultural conditions on the fatty acid composition of *Thiobacillus novellus*. R. A. Levin (Iowa, University, Iowa City, Iowa). *Journal of Bacteriology*, vol. 112, Nov. 1972, p. 903-909. 37 refs.

**A73-13657 #** Electrooptical model of the first retina layers of a visual analyzer (Optoelektronnaiia model' pervykh sloev setchatki zritel'nogo analizatora). Kh. I. Gavrindashvili, A. D. Riabinin, S. V. Svechnikov, Iu. L. Chibalashvili, and A. M. Shkvar. *Poluprovodnikovaia Tekhnika i Mikroelektronika*, no. 8, 1972, p. 15-21. 17 refs. In Russian.

An electrooptical principle of converting and transmitting optical signals is proposed and is used as a basis for constructing a model of the upper layers of the retina of the visual analyzer of animals. It is shown that multichannel fibrous optical systems in which the conversion of optical signals is based on the electrooptical principle are optimum for modeling the upper retina layers. The symbolic circuit of the model and its algorithm are discussed. V.P.

**A73-13698** Perceived exertion, heart rate, oxygen uptake and blood lactate in different work operations. F. Gamberale (National Institute of Occupational Health, Stockholm, Sweden). *Ergonomics*, vol. 15, Sept. 1972, p. 545-554. 10 refs.

The relation between perceived exertion and physiological indicators of exertion during exercise was studied. HR (heart rate), VO<sub>2</sub> (oxygen uptake) and blood lactate concentration were measured, and RPE (rating of perceived exertion) was recorded at different work loads for 12 subjects working with a wheelbarrow, with lifting of weights, and on a bicycle ergometer. The results showed that RPE is related to HR in a fairly linear way irrespective of the kind of work. Differences in the level of perceived exertion in relation to heart rate were found between the different kinds of work. These differences were related, to some extent, to the amount of oxygen uptake and blood lactate concentration. (Author)

**A73-13699** Measurement of the reaction time of muscular relaxation. M. Miyashita, M. Miura, H. Matsui, and K. Minamitate (Nagoya University, Nagoya, Japan). *Ergonomics*, vol. 15, Sept. 1972, p. 555-562. 7 refs.

The reaction time of muscular relaxation was investigated in the elbow flexors. The time interval from the onset of a light stimulus to the response of the elbow flexors was measured using EMG. The subjects were 20 healthy male adults. There was no difference in the reaction time between muscular relaxation and muscular contraction. In terms of mean values for twenty subjects, there was no significant difference in the electrical response of M.biceps brachii between muscular contraction and relaxation. Significant individual differences were noted. (Author)

**A73-13700** Acclimatization to severe dry heat by brief exposures to humid heat. E. Shvartz, D. Benor, and E. Saar (Nagev Institute for Arid Zone Research, Beersheba, Israel). *Ergonomics*, vol. 15, Sept. 1972, p. 563-571. 17 refs. Research supported by the Ministry of Education and Culture of Israel.

**A73-13742 #** Experimental determination of shear moduli in a compact bone tissue (Eksperimental'noe opredelenie modulei sdviga kompaktnoi kostnoi tkani). G. O. Pfafrad, Iu. Zh. Saulgozis, I. V. Knets, and Kh. A. Ianson (Akademiia Nauk Latvii SSR, Institut Mekhaniki Polimerov, Riga, Latvian SSR). *Mekhanika Polimerov*, July-Aug. 1972, p. 697-705. 25 refs. In Russian.

Various methods for measurement of shear moduli G<sub>12</sub>, G<sub>13</sub>,

and G<sub>23</sub> in compact human bone tissues are discussed. It is found that the properties of compact human bone tissues are similar to those of a transversely isotropic material. It is also shown that the shear modulus of tibia remains essentially the same through cingula 9 to 24 along the length of tibial diaphysis but that the rigidity of the bone tissues differs appreciably in different cross sections, with the highest shear modulus values in the corner areas of bone cross sections. The dependence of tangential stresses on the angle of torsion was linear for stresses up to 90 kg/sq cm. V.Z.

**A73-13743 #** Some biomechanical properties of the pelvic girdle of man (Nekotorye biomekhanicheskie svoistva tazovogo poiasa cheloveka). M. A. Khelimskii and T. D. Zyrianova (Khabarovskii Gosudarstvennyi Meditsinskii Institut, Khabarovsk, USSR). *Mekhanika Polimerov*, July-Aug. 1972, p. 706-710. 12 refs. In Russian.

Human pelvis preparations were tested for strength under hydraulic loads up to the occurrence of cracks and fractures. Deformation progress, final deformation, and other damage were recorded during the tests. An evaluation is given for the anatomy and biochemistry of weak areas in the pelvic girdle on the basis of test data. V.Z.

**A73-13744 #** Anisotropy of compact bone material (Ob anizotropii kompaktnogo veshchestva kosti). A. A. Uten'kin (Akademiia Meditsinskikh Nauk SSR, Obninsk, USSR) and E. K. Ashkenazi (Leningradskaia Lesotekhnicheskaiia Akademiia, Leningrad, USSR). *Mekhanika Polimerov*, July-Aug. 1972, p. 711-716. 19 refs. In Russian.

An analysis of the microstructure of compact bone tissue elements suggests the applicability of a transversely isotropic analysis model to compact bone tissues. This conclusion is supported by the results of compression tests. A correlation is established between strength and elastic modulus in compact bone matter. A tensorial formula is shown to describe satisfactorily the anisotropy of compact bone matter. V.Z.

**A73-13748 #** Variability of normal glabellar and supraorbital reflexes in man (Izmenchivost' glabelliarnogo i nadbrovnogo refleksov v norme u cheloveka). T. L. Khomeriki (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR; Akademiia Nauk Gruzinskoi SSR, Institut Kibernetiki, Tiflis, Georgian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 74, Sept. 1972, p. 3-5. 5 refs. In Russian.

The time parameters of glabellar and supraorbital reflexes are discussed on the basis of an analysis of 650 electromyograms taken on 13 healthy subjects. Occasional cases of blending and nonappearance of individual components of these reflexes are indicated. Effects of variations in the latent periods of percussions could not be detected in the reflexes. V.Z.

**A73-13749 #** Corticosterone level and the binding capacity of blood plasma proteins under thermal effects (Uroven' kortikosterona i svyazyvaiushchaia sposobnost' belkov plazmy krovi pri teplovom vozdeistvii). O. V. Molotkov and N. B. Kozlov (Smolenskii Meditsinskii Institut, Smolensk, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 74, Sept. 1972, p. 44-46. 22 refs. In Russian.

**A73-13750 #** Determination of the value of blood oxygen capacity and of the oxyhemoglobin dissociation curves by polarographic coulombometry (Poluchenie velichiny kislorodnoi emkosti krovi i krivykh dissotsiatsii oksigemoglobina metodom poliagroficheskoi kulonometrii). E. A. Mishurov (II Moskovskii Meditsinskii Institut, Moscow, USSR), I. M. Epshtein (Vsesoiuznyi Institut Fizicheskoi Kul'tury, Moscow, USSR), and G. V. Derviz (Tsentral'nyi Institut Gematologii i Perelivaniia Krovi, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 74, Sept. 1972, p. 123, 124. In Russian.

**A73-13757** Reaction time as a measure of the temporal response properties of individual colour mechanisms. J. D. Mollon (Oxford University, Oxford, England) and J. Krauskopf (Bell Telephone Laboratories, Inc., Murray Hill, N.J.). *Vision Research*, vol. 13, Jan. 1973, p. 27-40. 47 refs. Research supported by the Medical Research Council of England.

**A73-13758** A relationship between the detection of size, rate, orientation and direction in the human visual system. B. G. Breitmeyer (Stanford University, Stanford, Calif.). *Vision Research*, vol. 13, Jan. 1973, p. 41-58. 33 refs. Grant No. NIH-NS-08924.

The visual analysis of patterns varying along one or more of four stimulus dimensions: size, orientation, and rate and direction of motion is considered. A model for a relationship between the visual analysis of spatial frequency and velocity is developed, and a general experimental method is described, as well as a one-to-one inverse relation between preferred spatial frequency and velocity. Empirical evidence for a distinction between velocity and rate analyzers is presented, and the critical interval of the unit impulse response (UIR) as a regulator of rate preference is discussed. F.R.L.

**A73-13759** Contrast in night vision. A. Fiorentini and L. Maffei (CNR, Laboratorio di Neurofisiologia, Pisa, Italy). *Vision Research*, vol. 13, Jan. 1973, p. 73-80. 14 refs.

Experiments are described which show that simultaneous contrast phenomena are observable even in scotopic vision. It is shown that the psychophysical temporal and spatial transfer characteristics obtained at low scotopic light levels show an attenuation in the low frequency range, a fact which is usually ascribed to spatial inhibitory interactions in the visual system. F.R.L.

**A73-13760** Asymmetries related to cerebral dominance in returning the eyes to specified target positions in the dark. S. Heywood (Oxford University, Oxford, England). *Vision Research*, vol. 13, Jan. 1973, p. 81-94. 21 refs.

**A73-13761** The time courses of late receptor potentials from monkey cones and rods. D. N. Whitten and K. T. Brown (California, University, San Francisco, Calif.). (*Association for Research in Vision and Ophthalmology, Annual Spring Meeting, Symposium on Recent Advances in Retinal Physiology, Sarasota, Fla., Apr. 24-28, 1972.*) *Vision Research*, vol. 13, Jan. 1973, p. 107-135. 52 refs. Grant No. NIH-EY-00468.

The macaque monkey was used in the experiments because it offers the abundant cones and rods required for comparing cone and rod late receptor potentials (RP's), plus the special advantage of a pure cone fovea. Also, in this animal the neurophysiological basis of human vision can be approached with reasonable confidence because of the close similarity between macaque and human retinas. When isolated, the late RP of this animal can be well maintained for long periods. Evidence strongly suggests that the late RP is a crucial event in signal transmission along the photoreceptor and in the activation of second-order cells. On this basis alone the late Rp merits close analysis. F.R.L.

**A73-13762** Stereopsis without image segregation. L. Kaufman, J. Bacon, and F. Barroso (New York University, New York, N.Y.). *Vision Research*, vol. 13, Jan. 1973, p. 137-147. 16 refs.

In this study one eye was presented with the sum of the left and right half-fields of a random-dot Julesz pattern when the two fields were equally bright. The other eye was also presented with both fields, but the brightness of the two half-fields had different weights. A stereoscopic depth effect resulted which depended in part upon the weightings given to these two superimposed half-fields. It is shown that this depth effect is not predictable from the panum limiting case. There are some interesting implications for the process of disparity detection. F.R.L.

**A73-13763** Study of variations of retinal disparities around the fixation point by the binocular vernier method in the foveal region (Etude des variations des disparités rétinienne autour du point de fixation par la méthode du vernier binoculaire dans la région fovéale). C. Bourdy (Muséum National d'Histoire Naturelle, Laboratoire de Physique Appliquée aux Sciences Naturelles, Paris, France). *Vision Research*, vol. 13, Jan. 1973, p. 149-159. 10 refs. In French.

**A73-13764** Monoptic and dichoptic metacontrast across the vertical meridian. D. McFadden and K. Gummerman (Texas, University, Austin, Tex.). *Vision Research*, vol. 13, Jan. 1973, p. 185-196. 30 refs. NSF Grant No. GU-1598; Grant No. NIH-NS-08754.

Speculation is made about the locus in the nervous system that occurs in metacontrast, where the test or target stimulus (TS) and the masking stimulus (MS) are imaged on different retinal regions. The investigation was made with a viewing arrangement that imaged the test stimulus and the masking stimulus on different sides of the vertical meridian for both monoptic and dichoptic conditions. Some difficulties with the classical accounts of the vertical meridian are discussed. F.R.L.

**A73-13785** The role of extrinsic vagal innervation in the motility of the smooth-muscle portion of the esophagus - Electromyographic study in the cat and the baboon (Rôle de l'innervation extrinsèque vagale dans la motricité de l'oesophage à musculature lisse - Etude électromyographique chez le chat et le babouin). L. Tieffenbach and C. Roman (Aix-Marseille, Université, Marseille, France). *Journal de Physiologie*, vol. 64, Nov. 15, 1972, p. 193-226. 35 refs. In French.

Electromyograms of the esophageal musculature were recorded on anesthetized cats and baboons, and on conscious baboons. When the esophagus is in a resting state, stimulation by a single shock, generally ineffective, may only produce a response in the two muscular layers, longitudinal and circular, when the intensity is sufficiently elevated and preceded by a repetitive facilitatory stimulation. Repetitive neural stimulations produce several effects. When the esophagus is in an active state, the repetitive subliminal stimulation of the vagus has a blocking effect on the preexisting motility. F.R.L.

**A73-13786** Localization and activity of medullary swallowing neurons (Localisation et activité des neurones déglutiteurs bulbaires). A. Jean (Aix-Marseille, Université, Marseille, France). *Journal de Physiologie*, vol. 64, Nov. 15, 1972, p. 227-268. 32 refs. In French.

On decerebellectomized sheep, lightly anesthetized, a study was made by means of tungsten microelectrodes of the activity of medullary neurons which show a constant phasic discharge in relation with the beginning of swallowing reflex (mylohyoideus EMG). The swallowing reflexes were obtained upon stimulation of the superior laryngeal nerve (SLN). The activity of 315 neurons was studied. Some presented a phasic discharge only when swallowing occurred, others demonstrated a spontaneous activity which was altered during swallowing (increased or inhibited). It appears that the nucleus solitarius is not only an afferent relay, but that already at this level, they are neurons responsible for the organization of movement (i.e., swallowing reflex). F.R.L.

**A73-13787** Aerodynamic and temporal parameters of olfactory stimulation - Discussion concerning the lowering of the threshold by prenasal injection in man (Les paramètres aérodynamiques et temporels de la stimulation olfactive - Discussion de l'abaissement du seuil par injection pré nasale chez l'homme). M. Bowers and P. MacLeod (Collège de France, Paris, France). *Journal de Physiologie*, vol. 64, Nov. 15, 1972, p. 303-310. 9 refs. In French.

**A73-13802 #** Medical considerations for aircraft passengers. F. A. Manthey. *Civil Aviation Medical Association, Annual Symposium, 7th, New Orleans, La., Nov. 12-15, 1972, Paper. 7 p.*

The aircraft passenger is shown to be exposed to an environment where the pressure is reduced from 760 to 570 mm Hg and the partial oxygen pressure, from 150 to 115 mm Hg. Based on these changes, it seems advisable that a nasal decongestant be available in the event of sinus pain or barotitis. Cardiopulmonary disease passengers with little functional impairment at sea level are usually suitable aircraft passengers. Oxygen should be available if needed. Post myocardial infarction patients should not travel by air until completely stabilized (usually at least three months post-infarction). Passengers in the later stages of pregnancy should be provided with shoulder style seat belts. V.P.

**A73-13812 #** Experimental investigation of the structure of joint movements in the range of motions of the arms and of the entire body, giving attention to a presentation in a man-related basic system (Experimentelle Untersuchung der Struktur von Gelenkbewegungen im Bewegungsraum der Arme, des ganzen Körpers und Darstellung in einem menschbezogenen Grundsystem). R. Schött. Darmstadt, Technische Hochschule, Dr.-Ing. Dissertation, 1972. 200 p., 200 refs. In German.

**A73-13818 #** Investigations concerning perception levels and transferred vibrational forces in the case of a vertical action of periodic vibrational mixtures on man (Untersuchungen über Wahrnehmungstärken und übertragene Schwingkräfte bei der vertikalen Einwirkung von periodischen Schwingungsgemischen auf den Menschen). W. Lange. Braunschweig, Technische Universität, Fakultät für Maschinenbau und Elektrotechnik, Dr.-Ing. Dissertation, 1971. 157 p. 37 refs. In German.

**A73-13819 #** Correlation between the voltage-time curves of H- and M-responses of a human muscle during various functional states of the spinal center (Sootnoshenie krivyykh napriazheniia - vremeni H i M-otvetov myshitsy cheloveka pri razlichnykh funktsional'nykh sostoianiakh spinal'nogo tsentra). A. D. Pshedetskaia and M. Kh. Starobinets (Petrozavodskii Gosudarstvennyi Universitet, Petrozavodsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Aug. 1972, p. 1223-1229. 22 refs. In Russian.

**A73-13820 #** Cardiovascular reflexes evoked by potassium ion stimulation of the heart under conditions of spinal deafferentation and intact innervation (Serdechno-sosudistye refleksy, vyzyvaemye razdrazheniem serdtsa ionami kaliiia v usloviakh spinal'noi deafferentsii i intaktnoi innervatsii). Ju. E. Maliarenko (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and V. M. Khaudin (Rostovskii Meditsinskii Institut, Rostov, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Aug. 1972, p. 1230-1237. 21 refs. In Russian.

**A73-13821 #** A criterion for oxygen supply optimality in tissues and the capillary circulation rate (Kriterii optimal'nosti snabzheniia tkanei kislorodom i skorost' kapilliarnogo krovotoka). I. A. Sherman (Moskovskii Fiziko-Tekhnicheskii Institut; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Aug. 1972, p. 1245-1252. 23 refs. In Russian.

An expression is derived for capillary circulation rates by solving an equation describing oxygen diffusion from blood into tissues. It is assumed that the diffusion resistance of an erythrocyte membrane is much greater than that of a capillary membrane and that the oxygen release rates from an erythrocyte fluctuate insignificantly during the passage of the erythrocyte through a capillary. It is shown that an optimal oxygen supply of tissues depends essentially on the physical process of oxygen transport into tissues and that a certain adequate capillary circulation rate is the necessary condition for an even oxygen transport into tissues along the entire length of a capillary. The expression is supported by experimental data. V.Z.

**A73-13822 #** Method for quantitative estimation of the functional state of the motor apparatus (Metod kolichestvennoi otsenki funktsional'nogo sostoianiia dvigatel'nogo apparata). V. N. Golubev (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Aug. 1972, p. 1306-1309. In Russian.

Description of an electromyographic assembly which performs automatic data processing for motor activity recording on a theory that a biological motor apparatus is an automatic control system. The basic circuit and a block diagram of the assembly are given. V.Z.

**A73-13823 #** Recording and discrimination of pulsed neuron activity responses to stimulus application and removal (Registratsiia i vydelenie otvetov na vkluchenie i vykluchenie stimula v impul'snoi aktivnosti neuronov). K. N. Dudkin and V. E. Gauzel'man (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Aug. 1972, p. 1312-1317, 7 refs. In Russian.

Description of an assembly for recording and discrimination of on- and off-responses from an information flow during a pulsed neuron activity event. The basic circuit and a block diagram of the assembly are given. The times of appearance and disappearance of individual pulses in a pulsed information-carrying flow can be recorded by this technique. V.Z.

**A73-13824 #** Electron-microscopic investigations regarding the protective effect of hypothermia on cell organelles in the case of whole-body X-irradiation (Elektronenoptische Untersuchungen über den protektiven Einfluss der Hypothermie auf die Zellorganellen bei Röntgenganzkörperbestrahlung). M. Bierther and G. Schlüter (Bundeswehr, Institut für allgemeine und experimentelle Pathologie, Mainz, West Germany). *Wehrmedizinische Monatsschrift*, vol. 16, Nov. 1972, p. 321-330. 48 refs. In German.

The changes produced in the fine structure of the cells of the duodenal villi of rats were studied after the rats had been subjected to temporary hypothermia, a supralethal whole-body irradiation or an irradiation in hypothermia. In the case of rats subjected to a temporary hypothermia, an increased reactive metabolic activity could be observed in the cells of the duodenal villi even 48 hours after the treatment. Two types of damage were produced in the cells by the IR radiation. Very bright swollen cells, in which the protoplasm had been damaged, were observed together with darker cells, which had suffered smaller cytoplasmic changes. The damage observed in the villi cells after irradiation in hypothermia was considerably smaller than in the previous case. G.R.

**A73-13825 #** Variations of evoked potentials during various mental stress situations (Veränderungen evozierter Potentiale während verschiedener mentaler Belastungssituationen). W. Müller-Limmroth and K.-P. Klinger (München, Technische Universität, München, West Germany). (*Flugmedizinische Arbeitstagung, 21st, Fürstfeldbruck, West Germany, Apr. 25, 26, 1972.*) *Wehrmedizinische Monatsschrift*, vol. 16, Nov. 1972, p. 331-337. 10 refs. In German.

The analysis of man-machine systems has to take into account also physiological parameters as a basis for predictions regarding the stress to which the human component in the system is subjected. The measurement of the evoked potential (EP), which is superimposed on the electroencephalogram, provides a suitable approach for the derivation of the activity level of the central nervous system. It was found that the observed variations of the EP amplitude were dependent on the information content of physically identical signals. Changes in the level of vigilance due to fatigue effects were accompanied by a decrease in the EP amplitude. G.R.

**A73-13891 #** Diagnostic value of vectorcardiogram in strictly posterior infarction. W. Gray, M. Corbin, J. King, and M. Dunn (Kansas University, Kansas City, Kan.). *British Heart Journal*, vol. 34, Nov. 1972, p. 1163-1169. 15 refs. Research supported by the

**A73-14157 #** Changes in cardiac rhythm during sustained high levels of positive (+Gz) acceleration. S. J. Shubrooks, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1200-1206. 12 refs.

**A73-14158** Prediction of flight safety hazards from drug induced performance decrements with alcohol as reference substance. K. E. Klein (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg, West Germany). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1207-1214. 31 refs.

**A73-14159** Effect of hydrochlorothiazide on +Gz tolerance in normotensives. J. R. Pfaff and P. D. Newberry (Defence and Civil, Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1225-1229. 11 refs.

Investigation of the effect of Hydro-diuril on tolerance to flight stresses. Six healthy, normotensive males were given a familiarization G-tolerance test to gray-out (GTTG) on the humani accelerator, followed by a control GTTG and a four-minute exposure to +2.5 Gz during which heart rate, blood pressure, and forearm blood flow were recorded. They were then given 50-mg of Hydro-diuril twice daily, and the GTTG, blood pressure and forearm blood flow at +2.5 Gz were repeated after two and four weeks on the drug. Control G-tolerance was 3.9 plus or minus 0.2 S.D. and decreased to 3.1 plus or minus 0.4 S.D. and 3.0 plus or minus 0.4 S.D. after two and four weeks on Hydro-diuril, respectively. The mean control blood pressure at +2.5 Gz was 69 plus or minus 10. S.D. mm Hg and decreased to 56 plus or minus 5 S.D. Hg and 58 plus or minus 6 S.D. mm Hg at two and four weeks, respectively. Resting blood pressure did not change with treatment. It is concluded that tolerance to +Gz acceleration is reduced by Hydro-diuril in normotensive adult male subjects. (Author)

**A73-14160** Sweat sensor for qualitative measurements. J. A. McClure (Toronto University; St. Michael's Hospital, Toronto, Canada; U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.), E. A. Molina, and A. R. Fregly (Toronto, University, Toronto, Canada; U.S. Naval Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1230-1234. 18 refs. Research sponsored by the Bureau of Medicine and Surgery; Defence Research Board of Canada Grant No. 9310-138.

The design and function of a sweat-sensing device for monitoring the motion sickness sweat response are described. A lithium chloride/aluminum chloride sensing element, which changes resistance depending on the uptake or release of moisture, is used in this sensor. This element is enclosed in a housing designed to circulate air from the skin to the sensing element. With an air flow of 15 cc/min and in response to a step change in moisture content on the skin, the sensor has a latency of 1.5 sec and a rise time (to 90% saturation) of about 28 sec. A disadvantage of the sensor is that with profuse sweating the sensing element saturates, resulting in relatively long 'drying out' times. This can be offset by using a higher air flow, although sensitivity is reduced. This sensor can respond to the cyclic sweat activity seen when skin-resistance techniques are used to monitor sweating. (Author)

**A73-14161** Motion sickness symptomatology and performance decrements occasioned by hurricane penetrations in C-121, C-130 and P-3 Navy aircraft. R. S. Kennedy, W. F. Moroney, R. M. Bale, H. G. Gregoire, and D. G. Smith (U.S. Naval Aerospace Medical Center, Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1235-1239. 11 refs.

**A73-14162** Gas phase separation following decompression in asymptomatic rats - Visual and ultrasound monitoring. M. R. Powell (Ocean Systems, Inc.; Union Carbide Technical Center,

Tarrytown, N.Y.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1240-1244. 23 refs. Contract No. N00014-69-C-0346.

**A73-14163** Production of gaseous nitrogen during human steady state exercise. J. H. Cissik, R. E. Johnson, and B. A. Hertig (Illinois, University, Urbana, Ill.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1245-1250. 11 refs.

**A73-14164 #** Idiopathic central serous retinopathy /choroidopathy/ in flying personnel. D. L. Epstein, D. E. Shacklett, T. J. Tredici, and R. J. Houck (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1251-1256. 8 refs.

**A73-14165 #** Psychiatric and psychometric predictability of test pilot school performance. B. W. Culpepper, C. L. Jennings, and C. J. G. Perry (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine*, vol. 43, Nov. 1972, p. 1257-1260. 6 refs.

**A73-14168 \*** Space food systems - Mercury through Apollo. N. G. Roth (Whirlpool Corp., St. Joseph, Mich.) and M. C. Smith (NASA, Manned Spacecraft Center, Houston, Tex.). In: *Advances in space science and technology. Volume 11.* (A73-14166 03-30) New York, Academic Press, Inc., 1972, p. 215-231.

Major achievements which characterized the development of food systems used by American astronauts in manned space flight are reviewed throughout a period spanning the Mercury, Gemini, and Apollo programs up to and including the Apollo 11 lunar landing mission. Lists of food types are accompanied by information on packaging, storage, preparation, consumption, and quality of particular products. Experience gained from development efforts for the Manned Orbiting Laboratory Program is also discussed. T.M.

**A73-14170** Human hibernation and space travel. O. G. Mitchell (Adelphi University, Garden City, N.Y.). In: *Advances in space science and technology. Volume 11.* New York, Academic Press, Inc., 1972, p. 249-265. 36 refs.

Physiological characteristics of natural hibernation in certain mammals are outlined and confronted with the characteristics of certain drug-induced states of the human organism. It is argued that attempts to induce artificial hibernation in man have been failures since the only element of similarity with natural mammalian hibernation consisted of reduced body temperature. Important attributes such as the ability of self-arousal and the retention of a responsive nervous system have not been duplicated in artificial hibernation, and the need for further research on true hibernation is stressed. Rationale for such studies in aerospace applications includes possible advantages in reduced life-support systems and decreased psychological stress occasioned by the practice of hibernation in prolonged space flight. T.M.

**A73-14255** Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. Symposium sponsored by the National Institutes of Health. Edited by C. D. Clemente (California, University, Los Angeles, Calif.), D. P. Purpura (Yeshiva University, Bronx, N.Y.), and F. E. Mayer (U.S. Public Health Service, National Institute of Child Health and Human Development, Bethesda, Md.). New York, Academic Press, Inc., 1972. 472 p. \$19.50.

Aspects of the maturation of neural elements are discussed, together with neurochemical factors in the maturation of sleep behavior. Questions of the development of EEG and activity patterns in relation to sleep are explored, giving attention to the development of wakefulness-sleep cycles and associated EEG patterns in mammals, the basic rest-activity cycle, and the development of states in infants. Other areas considered include the development of reflex patterns in sleep and the developmental aspects of normal and abnormal sleep behavior.

G.R.

**A73-14256** The development of synapses in the rat cerebellar cortex. B. J. Hoffer, F. E. Bloom, G. R. Siggins (Saint Elizabeth Hospital, Washington, D.C.), and D. J. Woodward (Rochester, University, Rochester, N.Y.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 33-39; Discussion, p. 40-48. 19 refs.

The investigations discussed include morphological studies showing the development of synaptic structure, physiological experiments indicating maturation of synaptic function, and pharmacological tests showing the development of receptivity to neurotransmitters. All studies were carried out on midline vermis just behind the primary fissure. It was found that postsynaptic receptivity of the Purkinje cell antedates significant synaptogenesis. G.R.

**A73-14257** Maturing neuronal subsystems - The dendrites of spinal motoneurons. M. E. Scheibel and A. B. Scheibel (California, University, Los Angeles, Calif.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 49-61; Discussion, p. 61-75. 55 refs. Grants No. NIH-NS-01063; No. NIH-HD-00972.

In mature cats and in primates, it has been found that the dendrites of spinal motoneurons are gathered into bundles which run for long distances in the rostrocaudal axis of the cord. These bundles usually contain dendrite shafts from heterogeneous motoneuron groups including pairs of functional antagonists. The bundles are not present at birth but begin to appear between the first and second week of life (kitten). Dendrite bundle complexes appear to provide a promising substrate for extensive processing of information. It has been shown in a recently reported work by Matthews et al. (1971) that longitudinally oriented bundles or thickets of motoneuron dendrites can be interrelated in several ways. G.R.

**A73-14258** Coordination between excitation and inhibition - Development of the GABA system. E. Roberts (City of Hope National Medical Center, Duarte, Calif.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 79-97; Discussion, p. 97, 98. 46 refs.

The underlying principle of information-processing is a coordinated interplay of excitatory and inhibitory influences. Acetylcholine and glutamic and aspartic acids may be excitatory transmitters. Gamma-aminobutyric acid (GABA), glycine, the catecholamines, histamine, and serotonin may be inhibitory transmitters. An outline of chief known reactions of GABA, glutamate, and aspartate in the nervous system is provided. The function of GABA in the cerebellum is discussed, giving attention also to the cerebellum of the developing chick and other vertebrate neuronal systems. G.R.

**A73-14259** Contributions of differential housing to brain development - Some implications for sleep behavior. W. B. Essman (Queens College, Flushing, N.Y.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 99-107; Discussion, p. 107. 36 refs. Grant No. NIH-HD-03493.

One factor contributing to the postnatal development of brain cellular specificity and metabolism is differential housing, which may have direct relevance to the immediate question of sleep behavior, since it affects the same substrates of brain metabolism as those implicated in sleep. Some support for the behavioral and biochemical interaction apparently served by differential housing in mice has been provided by investigations conducted by Essman (1971). A number of substrates, which are altered by differential housing, also have implications for sleep behavior. G.R.

**A73-14260** The role of biogenic amines in sleep. O. Resnick (Worcester Foundation for Experimental Biology, Shrewsbury, Mass.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 109-116; Discussion, p. 116-124. 37 refs.

Professor Jouvett (1969) has postulated that serotonin may be involved in slow wave sleep, whereas, the catecholamines may be involved in paradoxical sleep. Jouvett drew support for his theory of sleep from ontogenetic studies conducted in his laboratory and other investigations: These investigations include studies reported by Shimizu and Himwich (1968) and Roffwarg et al. (1966). The results obtained in the studies and investigations are discussed, giving attention to effects produced by p-chlorophenylalanine, phenylketouria, and monoamine oxidase. G.R.

**A73-14261** Developmental changes in neurochemistry during the maturation of sleep behavior. W. A. Himwich (Galesburg State Research Hospital, Galesburg, Ill.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 125-138; Discussion, p. 139, 140. 30 refs.

Ontogenetic variation in the amount of time occupied by paradoxical sleep, slow wave sleep, and the waking state is a phenomenon which affords the opportunity to correlate biochemical changes in the developing brain with concomitant neurophysiological events. Jouvett (1969) demonstrated through the use of drugs and brain lesions a relationship of biogenic amines to the states of sleep in the adult animal. Aspects of the ontogeny of sleep and wakefulness in kitten during the first 28 days of life are considered, together with conditions in the developing rabbit and in rats. G.R.

**A73-14262** Maturation of neurobiochemical systems related to the ontogeny of sleep behavior. P. J. Morgane (Worcester Foundation for Experimental Biology, Shrewsbury, Mass.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 141-162. 37 refs. NSF Grant No. GB-8066; Grants No. NIH-MH-02211; No. NIH-NS-03097; No. AF-AFOSR-62-364.

Some general observations pertaining to ontogenetic studies in neurobiochemical systems and their interpretation are made. Questions considered are related to the time of the appearance of biochemical systems in the brain and the effect of a newly appearing substance during ontogeny upon an already existing biochemical system. Another question is concerned with the degree of similarity of the postnatal neurochemical profile in different species who show different degrees of maturity at the time of birth. A parasagittal schematic representation of the lower brainstem of the cat illustrating the raphe nuclei is presented and the serotonergic and noradrenergic systems in the medial forebrain bundle are considered. G.R.

**A73-14263** Development of wakefulness-sleep cycles and associated EEG patterns in mammals. R. J. Ellingson (Nebraska, University, Omaha, Neb.). In: Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 165-174. 21 refs. Grant No. NIH-HD-00370.

There are a number of common features in the course of wakefulness-sleep pattern development among the various mammalian species which have been studied. No wakefulness-sleep cycle can be detected at the time at which EEG activity makes its first appearance. Total sleep time is high in the newborn, often increases for a few days after birth, but then decreases gradually with age. Interspecies differences are also considered, taking into account conditions in humans, rats, cats, guinea pigs, monkeys, and sheep. G.R.

**A73-14264** Patterns of reflex excitability during the ontogenesis of sleep and wakefulness. M. H. Chase (California, University, Los Angeles, Calif.). In: *Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior*, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 253-270; Discussion, p. 271-285. 80 refs. Research supported by the U.S. Veterans Administration; Grant No. NIH-MH-10083.

Studies in the adult cat are considered, giving attention to reflex stimulation, masseteric reflex, and digastric reflex. These studies in the adult cat provided the background for the investigation of brain stem somatic reflex activity during sleep and wakefulness in the kitten. The investigation indicates that in kittens less than 2 weeks of age both brain stem somatic reflexes and EEG activity during sleep and wakefulness do not show the characteristic changes observed in the adult. Brain stem reflex modulation reaches an adult pattern by 4 weeks of age, which is a period later than the mature configuration of EEG rhythms. G.R.

**A73-14265 \*** Sleep deprivation and the organization of the behavioral states. W. C. Dement (Stanford University, Stanford, Calif.). In: *Sleep and the maturing nervous system; Proceedings of the Symposium on the Maturation of Brain Mechanisms Related to Sleep Behavior*, Boiling Springs, Pa., June 21-24, 1970. New York, Academic Press, Inc., 1972, p. 319-355; Discussion, p. 355-361. 81 refs. Grants No. NIH-MH-13860; No. NGR-05-020-168.

Questions concerning the significance of sleep in the developing organism are investigated, together with the mechanisms that underlie the unique distribution of behavioral states at any particular age and during any particular experimental manipulation. It is attempted to define the states of sleep and wakefulness in terms of a temporal confluence of a number of more or less independent processes, taking also into account the functional consequences of these attributes. The results of a selective deprivation of rapid eye movement sleep are explored, giving attention to effects on sleep, behavioral changes, brain excitability, pharmacological changes, and biochemical changes. G.R.

**A73-14276** Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971. Edited by H. P. Kimmich and J. A. Vos (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). Leiden, Meander, 1972. 415 p.

The latest telemetric equipment for biomedical applications is described along with techniques and results of telemetric studies of respiratory, cardiac, locomotive, intracranial, and EEG parameters in humans and animals. Attention is given to new developments in sensors, power supplies, transmitters, modulation techniques, recorders, and display equipment. The interpretation of recorded data for retrieval of relevant information is explained for many different physiological parameters.

Individual items are announced in this issue. T.M.

**A73-14277** A three channel telemetry system, compatible with the British medical and biological telemetry regulations. C. Weller (Clinical Research Centre, Harrow, Middx., England) and G. Manson (Western Regional Hospital Board, Glasgow, Scotland). In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 13-20.

**A73-14278** The use of telemetry to obtain physiological data during exercise. H. R. Skutt, R. Kertzer (New Hampshire, University, Durham, N.H.), and R. B. Fell. In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 21-29. 7 refs.

Description of the operation, design, and performance of a four-channel PDM-FM biomedical telemetry system used to monitor

EKG, respiration rate, and oxygen consumption data on humans participating in vigorous exercise and sports activities. Transmitter-multiplexer and receiver designs are explained, and typical channel waveforms are illustrated along with data records for several types of ball games and track activities. T.M.

**A73-14279** A time-division multiplexed telemetry system using delta-modulation. J. M. Ivison, D. W. Hoare, and S. Qazi (Loughborough University of Technology, Loughborough, Leics., England). In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 39-48.

The paper discusses the principles of multichannel time-division multiplexed telemetry systems using digital techniques and suitable for the transmission of biomedical signals. The operation of a system of modulation, known as delta modulation, used for encoding the analogue signals from the transducers is described and its advantages and limitations mentioned. Reference is made to a four-channel system using a radio link, and a system using a single-wire link is discussed in more detail. (Author)

**A73-14280** A programmable four channel system for long-time radio telemetry of biomedical parameters. R. Zerzawy and K. Bachmann (Erlangen-Nürnberg, Universität, Erlangen, West Germany). In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 49-56. 19 refs. Research supported by the Deutsche Forschungsgemeinschaft.

**A73-14281** Single to seven channel lightweight biotelemetry system. H. J. B. Ijzenbrandt, H. P. Kimmich, and A. J. van den Akker (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 57-64. 8 refs.

Description of a PDM-FM seven-channel personal telemetry system capable of transmitting most physiological parameters such as EMG, EEG, ECG, oxygen consumption, tidal volume, temperature, and locomotive-system indices. Channel bandwidths, subcarrier parameters, multiplexer design, and associated modulation circuitry are described along with the telemetry receiver. T.M.

**A73-14282** Telemetric measurement of local blood flow by heat conduction probes. L. Priebe (Marburg, Universität, Marburg an der Lahn, West Germany). In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 65-72.

Local blood flow through a small region of perfused tissue is measured by a telemetry system employing two metal probes in contact with the tissue. One probe is electrically heated by current pulses (rectangular waveform), and the temperature difference between the two probes is affected by blood flow through the tissue separating them. A thermocouple used to measure this temperature difference provides a feedback signal to control circuitry that modifies the pulse repetition rate of the probe heating current in a manner that ensures a constant temperature difference between both probes. The variable pulse repetition rate is used to modulate a 434 MHz carrier wave, and subsequent demodulation at the receiver provides a measure of blood flow through the tissue. T.M.

**A73-14283 \*** A multichannel electromagnetic flowmeter telemetry system. T. B. Fryer, H. Sandler, and D. H. Doane (NASA, Ames Research Center, Moffett Field, Calif.). In: *Biotelemetry; Proceedings of the International Symposium*, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 73-82. 10 refs.

An eight-channel biomedical telemetry system provides four channels of blood flow measurements in addition to blood-pressure and EKG data. Emphasis is placed on the amplifiers and signal

conditioning circuitry required for interfacing of the electromagnetic flow transducers with the transmission and modulation subsystems. The large number of data channels permits measurement of flow distribution as well as total cardiac output. The batteries and electronics for four channels (blood flow) weigh about 500 g and have a volume of 250 cu cm. T.M.

**A73-14284**      **Development and adjustment of a multi-channel miniaturized FM/AM telemetering system adapted to the primates.** M. Klein, C. Milhaud (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France), and J. Rebelle (Société Française d'Equipements pour la Navigation Aérienne, Vélizy-Villacoublay, Yvelines, France). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 83-88. 12 refs. Direction des Recherches et Moyens d'Essais Contract No. 632-68.

**A73-14285**      **Telemetry and ergometry associated to the measure of oxygen consumption during sports events.** R. Deroanne, F. Pirnay, J. C. Servais, and J. M. Petit (Liège, Université, Liège, Belgium). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 101-110. 20 refs.

Results of measurements of heart rate carried out on athletes in competition and in training. The absolute and relative work performed by football players and cycling racers was determined from measurements of heart rate obtained by telemetry in conjunction with certain laboratory results. The football players were found to have a cardiac output which attained the highest permitted limit for aerobic metabolism. In the case of the bicycle racers the cardiac solicitation was found to be definitely lower than the accepted limits for prolonged aerobic work. A.B.K.

**A73-14286**      **Telemetry of respiratory air flow.** H. P. Kimmich, J. A. Vos, and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 111-120. 5 refs.

The system described eliminates part of the difficulties in flow measurements during exercise mentioned by many authors. In addition it is compatible with a previously described oxygen-pressure telemetry system. Contrary to most flowmeters used so far this system is designed to work in conditions of turbulence with no limitation of the measuring range at high air flows which is particularly important for applications during exercise. (Author)

**A73-14287**      **Investigations during exercise with an improved PO<sub>2</sub> telemetry system.** J. A. Vos, H. P. Kimmich, and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 121-129.

Description of a method for achieving continuous telemetric monitoring of the oxygen partial pressure in respiratory air with the aid of an oxygen pressure sensor in the form of a polarographic catheter electrode. In the proposed method a fraction of the respiratory gas is continuously sucked from a small mask in front of the mouth and the nose through a thin plastic tube by a small pump. The gas is warmed up to a constant temperature (37°C) in a heating element where the oxygen partial pressure is continuously measured with a membrane-covered polarographic catheter electrode. The electrode signal is amplified, pulse-duration-modulated, and finally transmitted. A.B.K.

**A73-14288**      **Oxygen consumption measurements during exercise by means of radiotelemetry.** H. P. Kimmich (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 130-136.

Development of a method of measuring oxygen consumption during exercise with the aid of telemetry. A method of calculating the oxygen consumption from the integrated product of the respiratory air flow and the oxygen partial pressure at each moment is proposed which takes into account problems of water vapor and temperature. The proposed method has the advantage that the oxygen consumption can be calculated (graphically or electronically) from three respiratory parameters - flow, oxygen partial pressure, and respiratory temperature - at the receiving end of the telemetry system. A.B.K.

**A73-14289**      **A quick and inexpensive method of monitoring on tape the heart rate during exposure of the human head to pulsed magnetic fields.** D. P. Photiades and S. C. Ayivorh (University of Science and Technology, Kumasi, Ghana). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 168-172.

**A73-14290**      **Telemetry of venous blood pressure at rest and at muscle activity during running.** H. Rieckert and M. Balwanz (Ulm, Universität, Ulm, West Germany). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 179-182.

The venous pressure in feet veins was recorded telemetrically. In standing position venous pressure is about 100 mmHg. Walking decreases the venous pressure from 100 to 27 mmHg. When running it falls to about 40 mmHg. In varicose veins there is no alteration in venous pressure. With tight binders on the leg the venous pressure decreases. Diagnoses and therapeutics result from pressure curve during muscle activity. (Author)

**A73-14291**      **Radiotelemetry of direct bloodpressure measurements in aorta, pulmonary artery and heart.** K. Bachmann and R. Zerzawy (Erlangen-Nürnberg, Universität, Erlangen, West Germany). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 183-195. 26 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Results of continuous radio-telemetric measurements of arterial, pulmonary, and intracardiac blood pressure in unrestricted subjects performing their daily activities. After briefly describing the different types of catheters used in the radio telemetry of the three investigated blood pressures, the results of radio-telemetric measurements are presented for normal subjects, cardiac patients, patients with coronary heart disease, hypertensive patients under medical treatment and coronary subjects under beta-receptor blockade, and patients with pulmonary hypertension. A.B.K.

**A73-14292**      **Electro-rheocardiotelemetric device for complex monitoring of the dynamics and efficiency of cardiac contraction.** R. Vrincianu (Academia Romana, Institutul de Fiziologie Normala si Patologica, Bucharest, Rumania). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 196-201. 7 refs.

**A73-14293**      **Technical improvements in radiotelemetering of the electrocardiogram.** T. Furukawa, Y. Tsuchida, G. Matsumoto (Hokkaido University, Sapporo, Japan), and M. Shigezumi (Sapporo Kosei Hospital, Sapporo, Japan). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 202-215.

Description of a voltage-controlled subcarrier oscillator for use with an FM/FM multiplex telemetry system for ECG recording during exercises. The subcarrier oscillator provides a frequency shift related linearly to the input voltage and has a perfectly isolated control input, a temperature-stable frequency, and good channel isolation with low distortion. The low cutoff frequency required for

accurate waveform recording in ECG diagnostics is obtained by base-line fluctuation and noise minimization by shielding. The efficiency of the system in diagnostic tests covering ascending T waves and descending T and ST waves during exercises is demonstrated. V.Z.

**A73-14294** Telemetrical measurements during sport performance on sportsmen with cardiac arrhythmias. J. Rous and K. Kocnar (Universita J. E. Purkyne, Brno, Czechoslovakia). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 256-263.

**A73-14295** Ways to avoid noise and artefacts when using telemetry. J. Boter and J. Kuiper (Medisch-Fysisch Instituut TNO, Utrecht, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 267-275.

The benefits of implant telemetry in the elimination of hazardous leakage currents in patients during medical tests are discussed along with the disturbances, such as the hand effect, electrode aftereffect, and muscle interferences, caused by implant telemetry in patients. Design suggestions are given for the optimization of implant telemetry in diagnostic applications. V.Z.

**A73-14296** Telemetry of biomechanical forces during exercise. J. A. Vos and H. P. Kimmich (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 279-288. 5 refs.

Methods for measuring the maximum static muscle strength are given after defining 'strength.' All forces or torques are recorded by means of strain gauges. These values can be used for comparison with values from different sports, for instant while rowing. A possibility to measure dynamic force of both legs while rowing by means of telemetry is given. (Author)

**A73-14297** EMG from smooth musculature /uterus, ureter, gut/ in unrestrained animals monitored by telemetry. G. Wagner, J. R. Hrynczuk, and J. F. Nielsen (Copenhagen, University, Copenhagen; Copenhagen County Hospital, Gentofte, Denmark). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 298-304.

**A73-14298** Long-term EEG-telemetry. E. Stalberg (Academic Hospital, Uppsala, Sweden) and E. Kaiser (Kaiser Laboratory, Copenhagen, Denmark). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 307-316.

Description of a telemetry system permitting long-term EEG monitoring of patients with additional options for TV supervision of the patient's activity. Subcarrier frequency modulation is employed in two channels transmitting EEG signals from two electrodes on the patient's skull. A third channel is used for marking purposes; the electrode wires lead to a transmitter box suspended on the patient's chest and permitting freedom of movement. The receiver is contained in the same wardroom with the patient, and cables from the receiver relay the data to a remote site for recording or display purposes. The three telemetry channels can be displayed on a separate oscilloscope or on a split-screen CRT which also displays a visual image of the patient as observed by a remote camera. Block diagrams of the system are discussed, along with data quality and results obtained in routine clinical operation over a two-year period. T.M.

**A73-14299 \*** Telemetered EEG and neuronal spike activity in olfactory bulb and amygdala in free moving rabbits. P. Black-Cleworth (California, University, Los Angeles, Calif.) and G. Ver-

berne (Dierfysiologisch Laboratorium, Amsterdam, Netherlands). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 317-325. 11 refs. Grant No. NGR-05-007-195; Contracts No. NSR-05-007-158; No. F44620-70-C-0017.

**A73-14300** The use of telemetry to study the physiological and clinical variations of intracranial pressure in man. J. C. M. Currie (United Leeds Hospitals, Leeds, England), H. C. Riddle, and B. W. Watson (St. Bartholomew's Hospital, London, England). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 326-331. 10 refs.

**A73-14301** An implantable radiotelemetrical measuring device for simultaneous long term measurements of body temperature and turnover of rabbit serum albumin/I-125 in unrestrained rabbits. J. Bojsen, K. Wallevik, and U. Moller (Finseninstitut, Copenhagen, Denmark). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 337-344. 9 refs.

**A73-14302 \*** Single and multichannel implanted telemetry systems. H. Sandler, T. B. Fryer, and R. M. Westbrook (NASA, Ames Research Center, Moffett Field, Calif.). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 345-352. 9 refs.

Description of improved single-channel and multichannel telemetry systems designed for measurements of single and multiple physiological parameters, respectively, with adequate accuracy. The systems include a single-channel biopotential transmitter, a temperature transmitter, a pressure transmitter, and a multichannel transmitter for implant telemetric applications. V.Z.

**A73-14303** A remotely operated ECG telemeter for chronic implantation in rats. B. T. Evans (St. Bartholomew's Hospital, London, England). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 353-359.

An implantable telemeter has been developed to study the eeg of rats under normal social conditions. Operating life is considerably extended by the inclusion of a logcell magnetic switch that is operated by a nearby bar magnet. This enables the telemeter to be used only after the electrodes have settled down and only when required in an experiment. The telemeter consists of a VHF Colpitts oscillator whose emitter resistor is replaced by a Field Effect Transistor. The electronics are encapsulated in potting resin and the battery and electrodes attached. The assembly is then dipped in wax and a thin skin of silicone rubber added. (Author)

**A73-14304** Measurements of the ultraweak bioluminescence phenomena as a new biotelemetric method. K. A. Bogdanski and M. B. Ruszczynska. In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 365-368. 5 refs.

**A73-14305** Multichannel telemetry of physiological parameters /body temperature eeg/ in the rat. I - Design and methods. F. Voegeli and W. Kraft (Eidgenössische Technische Hochschule, Zurich, Switzerland). In: *Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971.* Leiden, Meander, 1972, p. 371-380.

Block diagrams of single- and multichannel biomedical telemetry transmitters employing pulse-position modulation with time-division multiplexing are described along with typical signal waveforms and equipment specifications. Schematic diagrams are given for astable multivibrator and amplifier circuits which are particularly suited to telemetry applications due to low power consumption and good response characteristics at small supply voltages. T.M.

**A73-14306** Multichannel telemetry of physiological parameters /body temperature, EKG, EEG/ in the rat. II - Applications in neuropharmacology. A. A. Borbely, I. Baumann, and N. M. Waser (Zürich, Universität, Zürich, Switzerland). In: Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 381-388. 5 refs. Research supported by the Hartmann-Mueller Foundation; Swiss National Science Foundation Grant No. 3,287.69.

Body temperature, EKG, EEG, and evoked potentials were recorded by implanted telemetry in unrestrained rats after amphetamine administration. Motor activity, food intake, and water intake were also recorded simultaneously in long-term experiments. Amphetamine increased the heart beat rates, stimulated the motor activity, and reduced temporarily the food and water intakes in subject rats. V.Z.

**A73-14307** Multidimensional coding for telemetric transmission of work load factors in ergonomics research. F. Rosenbrock and W. Rohmert (Darmstadt, Technische Hochschule, Darmstadt, West Germany). In: Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 389-396.

**A73-14308** Telemetric transmission of ergonomic and time study data to describe work load of radar controllers. W. Laurig and W. Rohmert (Darmstadt, Technische Hochschule, Darmstadt, West Germany). In: Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 397-405. 7 refs.

Description of the application of telemetric methods for data acquisition in an ergonomics research program designed to study the tasks and work load of air traffic controllers. Emphasis was placed on finding correlations between factors of stress and strain experienced by the controllers. The telemetry data consisted of objective and subjective parameters such as the number of aircraft, the incoming control strips, a subjective rating of the difficulty of the situation, commentary on specific situations, heart rate, respiration rate, and eye movements. Sample data records are illustrated, and significant results are discussed. T.M.

**A73-14309** Telemetry of cardiovascular parameters on fighter aircraft flying pilots. L. A. Pircher (Swiss Air Force, Dübendorf, Switzerland). In: Biotelemetry; Proceedings of the International Symposium, Nijmegen, Netherlands, May 5-8, 1971. Leiden, Meander, 1972, p. 406-411.

Results of telemetry observations of cardiovascular functions in military jet pilots during various phases of flight missions. EKG, heart frequency, and arterial blood pressure data were monitored continuously with a multichannel system using frequency modulation and frequency division multiplexing. Data records and tables show responses during the taxi mode, takeoff, landing, low-level flight, instrument flight, and special-action phases of different missions in different aircraft. T.M.

**A73-14315** Theory and experiment in exobiology. Volume 2. Edited by A. W. Schwartz (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). Groningen, Wolters-Noordhoff Publishing, 1972. 147 p. \$7.93.

Aspects of chemical evolution under the bion hypothesis are discussed, together with concepts related to the origin of the genetic apparatus. Other topics considered include the evolution of ferredoxins from primitive life to higher organisms, clues from protobiochemical studies in the search for extraterrestrial probiotic signatures, and life detection systems. Reasons for a quarantine procedure in the case of an arrival of samples from Mars on earth are also presented together with plans for such a quarantine. G.R.

**A73-14316** Chemical evolution under the bion hypothesis. G. Allen (National Institute of Health, National Institute of Mental Health, Bethesda, Md.). In: Theory and experiment in exobiology. Volume 2. Groningen, Wolters-Noordhoff Publishing, 1972, p. 1-32. 34 refs.

The significance of metabolism as a unifying biochemical feature of life is examined. It is pointed out that life on other planets need not be based on nucleic acids or proteins if their catalytic functions can be otherwise provided. The bion hypothesis was advanced in the hope of explaining the possible existence of a protoplasm-like environment in which a transition from chemical evolution to genes and enzymes would be plausible. The existence of protoplasm presupposes multiple organic catalysts and their prior evolution by a mechanism subject to the guidance of natural selection. These conditions are supplied under the bion hypothesis. G.R.

**A73-14317 \*** Concepts related to the origin of the genetic apparatus. J. C. Lacey, Jr. (Alabama, University, Birmingham, Ala.) and S. W. Fox (Miami, University, Coral Gables, Fla.). In: Theory and experiment in exobiology. Volume 2. Groningen, Wolters-Noordhoff Publishing, 1972, p. 33-63. 102 refs. Grants No. NGR-10-007-088; No. NIH-5-501-RR-05300-10.

Since the genetic apparatus is composed of nucleic acid and protein, the origin of the apparatus involves the origin of polyaminoacids and of polynucleotides, separately or together. Laboratory models for the origins of the separate macromolecular types are considered. The origin of their joint synthesis, believed to have been necessary at a later stage, is also discussed. Proteins and nucleic acids appear to have definite relationships with each other in three major contemporary biological systems, including chromatin, ribosomes, and the protein synthesizing system using nucleic acid templates. Stages considered in connection with the flow of information in the early evolution of the apparatus are environment, protoprotein, protein, RNA, and DNA. G.R.

**A73-14318** The evolution of ferredoxins from primitive life to higher organisms. D. O. Hall, R. Cammack, and K. K. Rao (King's College, London, England). In: Theory and experiment in exobiology. Volume 2. Groningen, Wolters-Noordhoff Publishing, 1972, p. 65, 67-85. 67 refs.

The ferredoxins are members of a class of metallo-proteins known as iron-sulfur proteins which occur in a wide range of organisms from bacteria to higher plants and animals. Since the ferredoxins are found in anaerobic fermentative bacteria, photosynthetic bacteria, algae and higher plants and animals, they are ideal subjects for the study of biological evolution. The various stages in biological evolution are examined, taking into account the ferredoxin structures of the biological organisms involved. A scheme for the evolution of plants starting from primitive bacteria is proposed, and the role of ferredoxins in animals is discussed. In conclusion, it is pointed out that ferredoxins may have been among the simplest proteins. G.R.

**A73-14319** Clues from protobiochemical studies in the search for extraterrestrial probiotic signatures. G. Steinman (Ames-Yissum, Ltd., Jerusalem, Israel). In: Theory and experiment in exobiology. Volume 2. Groningen, Wolters-Noordhoff Publishing, 1972, p. 87-102. 32 refs.

Results of many laboratory experiments carried out over the last two decades now indicate that the compounds needed to set the stage for the appearance of biological systems on earth could have resulted from known chemical phenomena. It can be proposed with reasonable plausibility that life is deeply rooted throughout the cosmos in general. The most common materials in the cosmos, under a wide range of conditions, tend to move toward the biological state. Principles regarding protobiochemical developments are discussed together with approaches to extraterrestrial exploration, the search for nitriles, and the role of urea as a nitrile indicator. G.R.

**A73-14320 \*** Life detection systems. M. A. Mitz (NASA, Office of Space Science, Washington; D.C.). In: Theory and experiment in exobiology. Volume 2. Groningen, Wolters-Noordhoff Publishing, 1972, p. 103-119. 18 refs.

Some promising newer approaches for detecting microorganisms are discussed, giving particular attention to the integration of different methods into a single instrument. Life detection methods may be divided into biological, chemical, and cytological methods. Biological methods are based on the biological properties of assimilation, metabolism, and growth. Devices for the detection of organic materials are considered, taking into account an instrument which volatilizes, separates, and analyzes a sample sequentially. Other instrumental systems described make use of a microscope and the cytochemical staining principle. G.R.

**A73-14321** Quarantine for samples from Mars. M. Alexander (Cornell University, Ithaca, N.Y.). In: Theory and experiment in exobiology. Volume 2. Groningen, Wolters-Noordhoff Publishing, 1972, p. 121-146. 39 refs.

If life exists on Mars, the return of material gathered there poses the substantial risk of introducing segments of that biota to the earth. The focus of attention is viable, replicating agents which are able to do harm to man, animals, plants or microbiological processes essential for the functioning of geochemical cycles. Toxins are not significant since they are not self-replicating. The entry of foreign replicating agents into this biosphere might result in a disaster of immense proportions, although alien organisms may not survive once introduced. The need for a quarantine regarding samples from Mars is discussed together with aspects of quarantine protocol, plans for several contingencies, and questions concerning the effectiveness of a quarantine. G.R.

**A73-14473 #** Electroencephalogram alterations after delayed acoustic responses to speech (EEG-Veränderungen nach verzögerter akustischer Rückmeldung der Lautsprache). K.-E. Rogge (Heidelberg, Universität, Heidelberg, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 19, 4th Quarter, 1972, p. 641-670. 42 refs. In German.

EEGs were recorded before and after experiments on three groups of subjects who read aloud a fairy tale, listened through microphones to a replay of their reading with a time lag of 1.7 sec, and then rested for 5, 10 or 15 min. Control subjects listened to a replay of their reading without any time delay and rested for 5 min. A decrease of the alpha waves, an increase in beta waves, and interruptions in EEG were observed in test subjects after 5 and 10 min rest, while after a 15 min rest the EEGs of test subjects were not different from those of control subjects and those taken before the experiments. Stresses sustained by test subjects are believed to be responsible for the findings. V.Z.

**A73-14569** Biological effect of a fine sample of lunar soil returned to earth by the automatic station Luna 16. V. V. Kustov, O. F. Ostapenko, and V. G. Petrukhin. (*Kosmicheskie Issledovaniia*, vol. 10, Mar.-Apr. 1972, p. 286-289.) *Cosmic Research*, vol. 10, no. 2, Nov. 1972, p. 255-258. 6 refs. Translation.

A series of experiments was carried out in mice exposed to the action of a specimen of a fine lunar soil fraction from the Sea of Fertility to investigate the specimen's potential harmful effects on living organisms. Results show that the lunar material examined is biologically inert. O.H.

**A73-14589 #** Problems of space medicine and cosmic biology (Probleme ale medicinii spatiale si ale biologiei cosmice). M. D. Nicu (Observatorul Astronomic, Bucharest, Rumania). *Studii si Cercetari de Astronomie*, vol. 17, no. 2, 1972, p. 275-282. 29 refs. In Rumanian.

Consideration of a number of problems preoccupying scientists concerned with the origin of life and the effects of hostile environments on human life. Among the problems considered are the problem of biochemical evolution, including laboratory synthesis of molecules, in particular, amino acids; the study of meteorites; the problem of the existence of life on other planets; problems connected with the effect of cosmic radiation on chemical structures; problems connected with the effects of weightlessness and gravitational acceleration on the human organism; and problems arising from overstraining of the organism during atmospheric reentry and landing. A.B.K.

**A73-14647:** Methodical studies concerning the polarographic measurement of respiration and 'critical oxygen pressure' in mitochondria and isolated cells with the aid of the membrane-covered platinum electrode (Methodische Untersuchungen zur polarographischen Messung der Atmung und des 'kritischen Sauerstoffdrucks' bei Mitochondrien und isolierten Zellen mit der membranbedeckten Platinelektrode). H. Starlinger and D. W. Lübbers (Max-Planck-Institut für Arbeitsphysiologie, Dortmund, West Germany). *Pflügers Archiv*, vol. 337, no. 1, 1972, p. 19-28. 29 refs. In German.

**A73-14648** The effect of time of electrical stimulation of the carotid sinus on the amount of reduction in arterial pressure. H. Warzel and A. Brattström (Medizinische Akademie, Magdeburg, East Germany). *Pflügers Archiv*, vol. 337, no. 1, 1972, p. 39-44. 29 refs.

**A73-14649** Symposium on Capillary Exchange and the Interstitial Space, Bad Dürkheim, West Germany, May 3-6, 1972, Proceedings. Symposium sponsored by Boehringer Mannheim. *Pflügers Archiv*, vol. 336, Supplement, 1972. 104 p.

Studies of factors controlling fluid transport through and fluid uptake by the interstitial space are given. The subjects dealt with include the measurement of tissue pressure; the ultrastructure and physicochemical properties of interstitial connective tissues; the ultrastructure and functions of capillaries and lymphatics; the exchange of molecules between plasma, interstitial tissues, and lymph; and capillary filtration and edema formation mechanisms. V.Z.

**A73-14660** Automatic electrocardiogram interpretation system. S. Shibata, Y. Egashira, and T. Katayama (Tokyo Shibaura Electric Co., Ltd., Tokyo, Japan). *Toshiba Review*, Oct. 1972, p. 23-29. 9 refs.

Description of an automatic electrocardiogram interpretation system designed by Toshiba to facilitate early detection and diagnosis of heart and circulatory disorders without a highly trained human interpreter. Essential in this system is an electrocardiograph-to-computer coupling which reduces the combined time of cardiogram taking and processing to about 50 sec in routine tests. The technique has proved to meet satisfactorily the screening requirements at several multiphase health screening centers in Japan. V.Z.

**A73-14661 \*** Finite element displacement analysis of a lung. F. L. Matthews (Imperial College of Science and Technology, London, England) and J. B. West (California, University, La Jolla, Calif.). *Journal of Biomechanics*, vol. 5, Nov. 1972, p. 591-600. 15 refs. Grants No. NGL-05-009-109; No. NIH-HE-13687-01.

A method is given based on the technique of finite elements which determines theoretically the mechanical behavior of a lung-shaped body loaded by its own weight. The results of this theoretical analysis have been compared with actual measurements of alveolar size and pleural pressures in animal lungs. (Author)

**A73-14662 \*** Biogeochemistry of aragonite mud and oolites. R. M. Mitterer (Texas, University, Dallas, Tex.). *Geochimica et*

*Cosmochimica Acta*, vol. 36, Dec. 1972, p. 1407-1422. 46 refs. NSF Grant No. GA-30695; Grant No. NGL-44-004-001.

Amino acids were determined on an analyzer similar to that described by Hare (1969) in carbonate mud samples from locations in the Bahamas, Bermuda, Persian Gulf, and Florida Bay, and in oolites from the Gulf of Suez, the Abu Dhabi coast, the Bahamas, and Baffin Bay, Texas. A histogram, tables, and chromatograms of the results are given. V.Z.

**A73-14767** Quantitative radionuclide angiocardiology for determination of chamber to chamber cardiac transit times. R. H. Jones, D. C. Sabiston, Jr., B. B. Bates, J. J. Morris, P. A. W. Anderson, and J. K. Goodrich (Duke University Medical Center, Durham, N.C.). *American Journal of Cardiology*, vol. 30, Dec. 1972, p. 855-864. 27 refs. Research supported by the T. C. Bost Research Fund; Grant No. PHS-HE-11309.

The method considered requires only a single intravenous injection. Mean transit time values depend upon the rate of blood flow and the volume of blood included between the sites of measurement. The patients investigated included normal subjects, patients with septal defects and left to right shunting, and patients with valvular lesions. Patients with mitral stenosis and patients with aortic insufficiency were studied. The results obtained confirm the suitability of the method investigated for the determination of the blood transit through the central circulation. G.R.

**A73-14822 #** Protein conformation in a living organism (Konformatsiia bilka v zhivomu organizmi). G. V. Troits'kii. *Akademiia Nauk Ukrain's'koi RSR, Visnik*, vol. 36, Sept. 1972, p. 29-38. 28 refs. In Ukrainian.

The effect of the body temperature on protein conformation stability and variability in healthy and diseased organisms is discussed on the basis of available data. The application of polarimetric spectroscopy to protein conformation studies, the application of electrophoresis for plasma albumin isolation, and the application of an isoelectric focusing technique in albumin fractionation are covered. Various isolated fractions of blood plasma albumin are described. V.Z.

**A73-14841** Identification and adjustment of psychological factors to improve solar patrol observing. R. M. Pickett (Harvard University, Boston, Mass.). In: Solar activity observations and predictions; Proceedings of the Conference, Huntsville, Ala., November 16-18, 1970. Cambridge, Mass., MIT Press, 1972, p. 359-370. 24 refs. Contract No. F19628-71-C-0098.

Discussion of factors adversely affecting attention, scanning completeness, contrast sensitivity and acuity, and pattern perception, recognition and description in solar patrol observations. Possible approaches to improving the solar patrol performance of an observer are assessed. These include breaks and the presence of other workers to enhance his alertness, the reduction of the field of view to improve his scanning capability, and training. The use of psychometric techniques for quantification of qualitative subjective descriptions made by observers is suggested. V.Z.

**A73-14846** Automated calibration of blood pressure signal conditioners. R. W. Martin, M. H. Weil, H. Shubin, N. Palley, J. H. Carrington, J. Bisera, and E. C. Boycks (Southern California University, Los Angeles, Calif.). *IEEE Transactions on Biomedical Engineering*, vol. BME-20, Jan. 1973, p. 55-58. 8 refs. Grants No. PHS-HS-00238; No. NIH-HL-05570; No. NIH-GM-16462.

A system for automatic calibration of blood pressure transducers is described. Automatic calibration is accomplished by activation of an analog-controlled servo system that sets the zero balance and gain in a single sequence. An unlimited number of transducers may be calibrated simultaneously, and calibration is completed within a period of less than 1 min. Accuracy and repeatability are assured without dependence on the operator's judgment. (Author)

**A73-14847** A hybrid broad-band EEG frequency analyzer for use in long-term experiments. R. W. Silverman, D. J. Jenden, and M. D. Fairchild (California University, Los Angeles; U.S. Veterans Administration Hospital, Long Beach, Calif.). *IEEE Transactions on Biomedical Engineering*, vol. BME-20, Jan. 1973, p. 60-62. 8 refs. Grant No. PHS-MH-17691.

A broad-band EEG frequency analyzer system is described which has been designed for the continuous analysis of experiments lasting several hours. It allows the quantitative measurement of the time course of the effects of various centrally active drugs on the EEG. Analog frequency analysis coupled with digital output provides an efficient means of data collection. Subsequent reduction of data is accomplished by statistical techniques described elsewhere. (Author)

**A73-14975 \*** Organ and body mass changes in restrained and fasted domestic fowl. E. L. Besch, R. R. Burton, and A. H. Smith (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.; California University, Davis, Calif.). *Society for Experimental Biology and Medicine, Proceedings*, vol. 141, Nov. 1972, p. 456-459. 12 refs. Grant No. NGR-05-004-010.

**A73-15024** Source locations of pattern-specific components of human visual evoked potentials. I - Component of striate cortical origin. II - Component of extrastriate cortical origin. D. A. Jeffreys and J. G. Axford (Keele University, Keele, Staffs., England). *Experimental Brain Research*, vol. 16, no. 1, 1972, p. 1-40. 86 refs. Research supported by the IBM (U.K.) Laboratories.

**A73-15047 \*** Evolution of ribonuclease in relation to polypeptide folding mechanisms. E. A. Barnard, M. S. Cohen, M. H. Gold, and J.-K. Kim (New York, State University, Buffalo, N.Y.). *Nature*, vol. 240, Dec. 15, 1972, p. 395-398. 47 refs. NIH-NASA-supported research.

Comparisons of the N-terminal region of pancreatic RNAase in seven species are presented, taking into account cow, bison, deer, rat, pig, kangaroo, and turtle. The available limited evidence on hyper-variable regions indicates that there is still an evolutionary constraint on them. It is proposed that there is a selection pressure acting on all regions of a protein sequence in evolution. Mutations that tend to obstruct the folding process can lead to various intensities of selection pressure. G.R.

**A73-15052 \*** Application of frequency discrimination technique to the analysis of electroencephalographic signals. D. C. Lai (Stanford University, Stanford, Calif.) and R. L. Lux (Utah University, Salt Lake City, Utah). In: National Electronics Conference, 28th, Chicago, Ill., October 9-11, 1972, Proceedings. Volume 27. Oak Brook, Ill., National Electronics Conference, Inc., 1972, p. 80-85. 12 refs. Grants No. NGR-46-001-038; No. NGR-05-020-575; No. DAHC15-72-C-0232.

A frequency discrimination technique is described which has proved to be effective in measuring the entrainment phenomenon in EEG signals. The validity of a narrow-band-process model used to characterize the signals is demonstrated. The technique (realized by an inexpensive device described elsewhere) is shown to provide a means of studying the synchronization phenomenon as related to alertness. V.P.

**A73-15072** Visual receptive fields sensitive to absolute and relative motion during tracking. B. Bridgeman (Stanford University, Stanford, Calif.). *Science*, vol. 178, Dec. 8, 1972, p. 1106-1108. 14 refs. Grant No. NIH-MH-12970.

Some neurons in the visual cortex of awake monkeys visually tracking a moving target showed receptive fields that were excited only by stimulus motion relative to a background, while other neurons responded to any kind of stimulus motion. This result was found with two methods, one in which tracking eye movements were identical in both relative-motion and absolute-motion conditions,

and another in which stimulus motions on the retina were identical in both conditions. This response pattern can differentiate translation of the retinal image during eye movement from motion of objects in the world. (Author)

**A73-15200** Clinical electrocardiographic and vector-cardiographic diagnosis of left posterior subdivision block, isolated or associated with RBBB. G. A. Medrano, C. P. Brenes, A. de Micheli, and D. Sodi-Pallares (Instituto Nacional de Cardiología, Mexico City, Mexico). *American Heart Journal*, vol. 84, Dec. 1972, p. 727-737. 15 refs.

**A73-15207** Movements of a man to reach a specified goal. G. V. Korenev. (*Avtomatika i Telemekhanika*, June 1972, p. 131-142.) *Automation and Remote Control*, vol. 33, no. 6, Nov. 1972, pt. 2, p. 1002-1012. Translation.

Study of a man's self-controlled movements directed at reaching his preset goal and self-adjusting to his internal and external environments. These movements are studied in deterministic terms. The human body is regarded as a mechanical plant, and movement control is treated as a deterministic, goal-directed enforcement governed by the laws of mechanics. M.V.E.

**A73-15218 \*** Vestibular adaptation in man - Effects of increased acceleration during different phases of adaptation. T. Luster (San Jose State College, San Jose, Calif.). *Journal of Experimental Psychology*, vol. 96, Dec. 1972, p. 263-272. 11 refs. Grant No. NGL-05-046-002.

The purpose of this study was to investigate the course of vestibular adaptation following a temporary increase in angular acceleration (A). Eight normal subjects, who were rotated in a precision rotation device, gave periodic magnitude estimates of their perceived velocity throughout a prolonged 1 deg per sec per sec acceleration, which was briefly increased to either 2 or 3 deg per sec per sec at four points in the adaptation cycle. The data, tested with analysis of variance, showed that the size of the magnitude estimates was influenced by the magnitude and position of the altered A. The duration of subjective response was affected only by the position of the altered A. (Author)

**A73-15219** Influence of a visual frame and vertical-horizontal illusion of shape and size perception. R. L. Houck, R. B. Mefferd, Jr., and G. J. Greenstein (U.S. Veterans Administration Hospital, Houston, Tex.). *Journal of Experimental Psychology*, vol. 96, Dec. 1972, p. 273-279. 12 refs.

**A73-15220** Effects of 24-hour sleep deprivation on rate of decrement in a 10-minute auditory reaction time task. H.-O. Lisper and A. Kjellberg (Uppsala, Universitet, Uppsala, Sweden). *Journal of Experimental Psychology*, vol. 96, Dec. 1972, p. 287-290. 14 refs. Research supported by the Statens Rad for Samhallsforskning.

**A73-15250 \*** Moving visual scenes influence the apparent direction of gravity. J. Dichgans, R. Held, L. R. Young, and T. Brandt (MIT, Cambridge, Mass.). *Science*, vol. 178, Dec. 15, 1972, p. 1217-1219. 9 refs. Research supported by the Sloan Foundation and Deutsche Forschungsgemeinschaft; Grants No. NIH-MH-07642; No. NGR-22-009-701; No. NsG-496.

It is shown that an observer viewing a wide-angled display rotating about its line of sight develops a feeling that his body is tilted and has the illusion that a vertical straight edge is tilted in a direction opposite to that of rotation. Experiments on subjects who monocularly viewed rotating disks with various settings within restricted fields of view are described to substantiate these findings. Displacement of the perceived vertical increased to a maximum of average 15 deg when the stimulus speed increased to 30 deg per sec. V.Z.

**A73-15278** Status and prospects of EEG spectral analysis. W. Gersch (Hawaii, University, Honolulu; Hawaii). In: Symposium on Nonlinear Estimation Theory and its Applications, 3rd, San

Diego, Calif., September 11-13, 1972, Proceedings. North Hollywood, Calif., Western Periodicals Co., 1972, p. 287-291. 28 refs.

Review of the history and current practices and trends in the quantitative analysis of electroencephalograms (EEG's). The principal areas of EEG analysis applications are reviewed, and the reasons for 'failures' of spectral EEG analyses are discussed. Special attention is given to parametric model methods in EEG analysis that hold forth the prospect of effectiveness for EEG spectral analysis. M.V.E.

**A73-15279** New developments in EEG signal processing. J. J. Vidal (California, University, Los Angeles, Calif.). In: Symposium on Nonlinear Estimation Theory and its Applications, 3rd, San Diego, Calif., September 11-13, 1972, Proceedings.

North Hollywood, Calif., Western Periodicals Co., 1972, p. 292-300. 17 refs. NSF Grants No. GJ-32221; No. GK-31463X; Grant No. AF-AFOSR-72-2384.

A dual set of nonlinear transformations is discussed that aims at uncovering structures in EEG and similar data. By contrast with previous approaches, the method is free from restricting hypotheses other than continuity and sensitivity of the input-output mapping.

(Author)  
**A73-15388 \*** Miniature biotelemeter giving 10 channels of wideband biomedical data. J. Carraway (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: NTC '72; National Telecommunications Conference, Houston, Tex., December 4-6, 1972, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 8C-1 to 8C-5. Contract No. NAS7-100.

A miniature biotelemeter has been developed for sensing and transmitting multiple channels of wideband biomedical data over a radio link. Its small size and weight make it capable of being carried by free-moving laboratory animals as small as rats. Ten data channels each of 5-kHz data bandwidth are provided to permit monitoring of a wide variety of physiological signals. Multichannel telemetry of electroencephalograms, electrocardiograms, electromyograms, state functions, and dynamic processes such as blood flow and body chemistry are possible applications. Utilization of newly available monolithic chip components, low-power COS/MOS MSI digital logic, and state-of-the-art hybrid mounting techniques makes this novel device useful for both research and clinical bioinstrumentation. (Author)

**A73-15408 \*** The transmission of low frequency medical data using delta modulation techniques. G. D. Arndt and C. T. Dawson (NASA, Manned Spacecraft Center, Telemetry and Communications Systems Div., Houston, Tex.). In: NTC '72; National Telecommunications Conference, Houston, Tex., December 4-6, 1972, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1972, p. 20B-1 to 20B-6. 7 refs.

The transmission of low-frequency medical data using delta modulation techniques is described. The delta modulators are used to distribute the low-frequency data into the passband of the telephone lines. Both adaptive and linear delta modulators are considered. Optimum bit rates to minimize distortion and intersymbol interference are discussed. Vibrocardiographic waves are analyzed as a function of bit rate and delta modulator configuration to determine their reproducibility for medical evaluation. (Author)

**A73-15520 #** Reliability of electromyographic measurements by means of surface electrodes (Über die Zuverlässigkeit elektromyographischer Messungen mittels Oberflächenelektroden). H. Kramer, D. Bräuer, and G. Küchler (Deutsches Zentralinstitut für Arbeitsmedizin, Berlin, East Germany). *Acta Biologica et Medica Germanica*, vol. 29, no. 3, 1972, p. 381-388. 13 refs. In German.

Investigation of the test-retest reliability of unipolar and bipolar comparative electromyographic recordings performed on the triceps brachii muscle of 14 subjects at an interval of one week. The retests yielded lower reliability coefficients. No significant differences in reliability were found between unipolar and bipolar array modes. M.V.E.

**A73-15521 #** An epidemiological survey of risk factors for ischemic heart disease in 42,804 men. I - Serum cholesterol value. O. van Houte (Military Hospital, Brussels, Belgium) and H. Kesteloot (St. Rafael University Clinic, Louvain, Belgium). *Acta Cardiologica*, vol. 27, no. 5, 1972, p. 527-564. 37 refs. Research supported by the Militair Fonds voor Wetenschappelijk Onderzoek.

Study of the value of the serum cholesterol level in a military population of 42804 subjects, aged from 15 to 59. The serum cholesterol value shows the closest relationship with age, height, and weight. The relationship with body weight and height diminishes with increasing age. The cholesterol value is higher in subjects with blood group A than with blood group O. Next to the physiological parameters of age, height, and weight, the most important contributing factors are social class, cigarette smoking, arcus senilis, regional differences, and blood groups. M.V.E.

**A73-15523 #** Cardiocirculatory adaptation to chronic hypoxia. III - Comparative study of cardiac output, pulmonary and systemic circulation between sea level and high altitude residents. P. Moret, E. Covarrubias, J. Coudert, and F. Duchosal (Genève, Université, Geneva, Switzerland; Universidad Peruana Cayetano Heredia, Lima, Peru; Instituto de Biología de la Altura, Instituto del Torax, La Paz, Bolivia). *Acta Cardiologica*, vol. 27, no. 5, 1972, p. 596-619. 58 refs. Grant No. PHS-HE-06910-06.

**A73-15592** Behavioural awakening and subjective reactions to indoor sonic booms. J. E. Ludlow and P. A. Morgan (Southampton, University, Southampton, England). *Journal of Sound and Vibration*, vol. 25, Dec. 8, 1972, p. 479-495. 20 refs. Research supported by the Ministry of Defence.

Two experiments were conducted to investigate behavioral awakening (as measured by a button press) and subjective reactions to simulated sonic booms presented during sleep. In each experiment, eight young male subjects were used. In the first experiment, simulated booms, having intensities of 71.2, 74.2 and 77.6 dBA (fast), had no significant differential effects upon behavioral awakening frequencies. Of the subjective tests, only the fatigue test gave significantly adverse results for experimental (boom exposure) nights compared to control nights. However, for all such tests (a subjective stress scale, and simple subjective scales relating to the 'depth' of sleep, sleep disturbance, and fatigue) there was a tendency for reported adverse effects following boom exposure nights. In the second experiment simulated booms covered a wider range of intensities - namely, 69, 79, and 84.5 dBA (fast) - and significant differential behavior awakening was found, with higher frequencies of awakening to higher intensity booms. In addition, all subjective tests revealed significantly more adverse effects, the higher the boom intensity. (Author)

**A73-15643** Elevated ST segments with exercise in ventricular aneurysm. K. N. Manvi and M. H. Ellestad (Memorial Hospital Medical Center of Long Beach, Inc., Long Beach; California, University, Irvine, Calif.). *Journal of Electrocardiology*, vol. 5, no. 4, 1972, p. 317-323. 18 refs.

The results of a progressive maximum treadmill stress test on 29 patients who had documented left ventricular aneurysm were analyzed and compared with angiographic studies. ST segment elevation was observed in 14 patients, ST segment depression in 10 patients, and no ST change in the remaining five patients. It is believed that the presence of ventricular aneurysms can be reliably predicted when stress-induced ST elevation is seen. F.R.L.

**A73-15644** Use of an on-line computer in a study of cardiac arrhythmia. J. R. Holmes (Bristol, University, Bristol, England). *Journal of Electrocardiology*, vol. 5, no. 4, 1972, p. 333-339.

This paper describes the use of a computer on-line to measure, store, display and print out heart beat intervals from ECG signals obtained by radiotelemetry from horses at rest and during and after exercise. Some results of the methods are illustrated. The technique could equally be applied to human patients. (Author)

**A73-15645** A new method to measure non-uniformity in the intact heart. N. S. Sarachek, J. Roberts, and J. J. Leonard (Pittsburgh, University; Pennsylvania, Medical College, Pittsburgh; Pennsylvania, University; U.S. Veterans Administration Hospital, Philadelphia, Pa.). *Journal of Electrocardiology*, vol. 5, no. 4, 1972, p. 341-348. 20 refs. Research supported by the Robinette Foundation.

Four action potentials were recorded simultaneously from the left ventricle of paced isolated cat hearts using suction electrodes which provided firm adherence to the moving epicardium. The times of completion of repolarization of the four action potentials for a given beat were determined, and the interval from earliest repolarization to latest was considered a measurement of 'nonuniformity of repolarization.' This technique allows study of simultaneous action potentials recorded from multiple sites in the intact beating heart. It should prove useful in examining the electrophysiology of manipulations which result in rapid changes in nonuniformity, as well as in the study of fibrillation, aberrance, reentry, and other electrophysiologic phenomena. F.R.L.

**A73-15646** Mathematical analysis of body surface potentials. P. C. Voukydis (Beth Israel Hospital; Harvard University, Boston, Mass.). *Journal of Electrocardiology*, vol. 5, no. 4, 1972, p. 367-371. 12 refs. Grant No. NIH-TI-HL-05909-03.

Body surface potentials were obtained from two humans, one dog, and two monkeys. The potentials of the QRS period were digitized at 5 or 10 equidistant time intervals and analyzed into x- and z-components and were expressed in terms of polynomials, one polynomial per horizontal level per instant within the cardiac cycle. The highest observed polynomial degree was 7. The polynomials were then integrated around the periphery of every horizontal level and the values of the integrals were expressed as functions of their position along the longitudinal axis of the body. New polynomials were fitted on the new functions with a highest observed degree of 5. These results will be helpful in designing vector lead systems giving a maximal accuracy with a minimal number of electrodes. F.R.L.

**A73-15647** Numerical classification and coding of electrocardiograms. J. Wartak (Alberta, University, Edmonton, Alberta, Canada). *Journal of Electrocardiology*, vol. 5, no. 4, 1972, p. 373-376. 5 refs. Research supported by the Ontario Heart Foundation.

A classification scheme based on numerical coding of electrocardiographic abnormalities is described. It employs two groups of six digits; one group is designed for coding rhythm patterns and the other for coding morphological changes. The position of a digit in each group represents a specific ECG parameter, while the numerical value of a digit represents specific abnormality. Some clinical and epidemiological implications have been discussed. (Author)

**A73-15648** Computer-aided ECG analysis and research in a clinical setting. P. Scheinok, L. S. Dreifus, K. W. Thum, M. B. Reich, and A. Krazesky (Hahnemann Medical College and Hospital, Philadelphia, Pa.). *Journal of Electrocardiology*, vol. 5, no. 4, 1972, p. 377-384. 9 refs. Research supported by the Blue Cross of Greater Philadelphia; Grant No. NIH-RR-00266-04.

A computer-aided ECG analysis system used in a hospital specializing in cardiovascular diseases is described. Working in a research environment, it is hoped to improve the analysis program to such an extent that the role of the physician in reading ECG's is minimized except for the more difficult and ambiguous cases. A truly innovative portion of the system is the creation of a computer-driven microfilm system which produces aperture cards which contain all the graphical input, plus graphs of the two-dimensional vector curves and the appropriate patient identification information on microfilm. F.R.L.

**A73-15701 # Radiation genetics of microorganisms (Radiatsionnaya genetika mikroorganizmov).** I. A. Zakharov and A. S. Krivskii. Moscow, Atomizdat, 1972. 297 p. 879 refs. In Russian.

The radiation genetics of microorganisms is discussed for the first time in a systematized form as a separate discipline of genetics and radiobiology. Data concerning the lethal and mutagenic action of various types of radiation on fungi, microscopic algae, bacteria, and viruses are presented and generalized. Particular attention is paid to methods of biophysical analysis of the results of radiation-genetics experiments, to the dependences of radiation effects on dose, to the problem of genetic monitoring of radiostability and the restoration of micro-organisms suffering from lethal and premutational injuries. The molecular bases of the lethal and mutagenic action of radiation are considered. The development of the radiation genetics of microorganisms in the USSR is reviewed, noting the important contributions of Soviet scientists to this field. A.B.K.

**A73-15707 # Information macromolecules during radiation injury to cells (Informatsionnye makromolekuly pri luchevom porazhenii kletok).** V. E. Komar and K. P. Khanson. Moscow, Atomizdat, 1972. 160 p. 649 refs. In Russian.

A study is made of the effect of ionizing radiation and chemical radiosensitizers on the structure and functional activity of the genetic apparatus of the cell. Data concerning the effect of irradiation on the structure of DNA and DNP are discussed, as well as the role of structural damage of the information macromolecules in disturbing processes of nucleic acid metabolism and protein synthesis. Catabolic processes and their role in the realization of radiation cell damage are considered. Particular attention is paid to the biochemical bases of interphase cell annihilation and to the nature of the radiosensitivity of synchronous cell populations. A.B.K.

**A73-15711 # Auto-antibodies of an irradiated organism (Autoantitela obluchennogo organizma).** A. A. Ivanov, N. N. Klemparskaia, V. N. Mal'tsev, G. A. Shal'nova, T. D. Kuz'mina, P. A. Kartashov, V. A. Strel'nikov, N. N. Dobronravova, A. M. Ulanova, and V. V. Shikhodyrov. Moscow, Atomizdat, 1972. 280 p. 442 refs. In Russian.

The literature data and the results of the author's own research on the peculiarities of the dynamics of the formation of auto-antibodies in irradiated animals and humans subjected to X-ray therapy are discussed. An analysis is made of some new data concerning the isolation and purification of auto-antibody preparations from blood serum and the tissues of internal organs of animals, and the results of experiments in which these preparations were used in the treatment of radiation sickness are cited. In addition, the new problem of the significance of the auto-immune reaction of the female organism in the occurrence of pathology in the fetus and descendants is discussed. Data concerning the determination of cells forming auto-antibodies in human blood and in the blood and organs of animals are presented, as well as data concerning methods of increasing the number of such cells during the action of ionizing radiation. A.B.K.

**A73-15784 # Foundations of visual information theory (Osnovaniya informatsionnoi teorii zreniya).** V. K. Kagan. *Problemy Bioniki*, no. 6, 1971, p. 3-16. 11 refs. In Russian.

The capability of the existing mathematical models to describe the function of vision is analyzed, covering the Shannon probability model, the Fisher probability model, the semantic theory of Shreider (1965), and the Kolmogorov algorithmic model. The amounts of information processed by the visual analyzer during the perception of complex visual signal ensembles are estimated. The models are shown to complement each other by providing descriptions of different activity phases of the visual function. V.Z.

**A73-15785 # Visual perception models (K voprosu o modelyakh zritel'nogo vospriyatiya).** Ia. Ia. Belik. *Problemy Bioniki*, no. 6, 1971, p. 16-20. In Russian.

Several mathematical models are proposed for visual perception of the distance of earth's surface features when observations are

made from a vertically ascending vehicle. The models incorporate the mechanisms of convergence, accommodation, and monocular parallax. Theoretical results based on the models are supported by experiments. V.Z.

**A73-15786 # Mathematical description of some visual inertia effects (Matematicheskoe opisaniye nekotorykh yavleniy inertsiy zreniya).** E. G. Kachko and M. F. Bondarenko. *Problemy Bioniki*, no. 6, 1971, p. 21-24. In Russian.

Study of the reactions of the visual system to periodic brightness fluctuations of a visual stimulus. A Maxwell disk is used in experiments on four subjects. It is shown that operators of a certain type give a mathematical description of the reactions of the visual system to flickering stimuli. V.Z.

**A73-15787 # Derivation of a function of nerve-fiber distribution according to fiber diameters on the basis of electrophysiological measurements (Postroyeniye funktsii raspredeleniya volokon nerva po diametram na osnove elektrofiziologicheskikh izmereniy).** Iu. V. Paramonov. *Problemy Bioniki*, no. 6, 1971, p. 24-31. In Russian.

A multichannel analyzer of pulses is used to determine the energy spectrum of responses of nerve fibers to stimulation. A curve of responses is plotted, and the area of the curve is obtained from the energy spectrum. A function of the distribution of axons according to their diameters is constructed on the basis of these measurements. The hypothesis that the parameters of action potentials should be equal in all fibers of a nerve when the diameters of the fibers are equal is assumed to be valid in the process of construction. V.Z.

**A73-15788 # Theoretical aspects of visual edge contrast in man (Voprosy teorii kraevogo kontrasta zreniya cheloveka).** E. P. Putiatin and V. Ia. Serdiuchenko. *Problemy Bioniki*, no. 6, 1971, p. 32-39. 7 refs. In Russian.

An axiomatic approach is used in an attempt to construct a mathematical model for edge contrast in the visual system of man. Axioms are proposed to represent additivity, one-dimensionality, and continuousness of edge contrast as parameters for the construction of a mathematical model of visual edge contrast. A refined form of a linear operator is obtained as an ingredient of the model. Experiments on a Maxwell disk confirmed the correctness of the model within certain limits. V.Z.

**A73-15789 # Image analysis by neuron-like structures (K analizu izobrazheniy neiropodobnymi strukturami).** S. F. Marchenko and V. G. Chervov. *Problemy Bioniki*, no. 6, 1971, p. 39-43. 5 refs. In Russian.

Discussion of the information-yielding capability of neuron-type structures when such structures perform image analysis with separation of desirable image elements. A diagram is plotted to demonstrate a typical measurement data processing event by a network of neuron-like elements with input and output. The ability of such a network to analyze the signals furnished by a receptor is studied. An example is given to demonstrate how image line elements can be analyzed by a network of neuron-like structures of the type under study. V.Z.

**A73-15790 # Some modeling problems of loudness transformations by the auditory system (Nekotoryye voprosy modelirovaniya gromkostnykh preobrazovaniy v slukhe).** G. S. Eremin and G. F. Diubko. *Problemy Bioniki*, no. 6, 1971, p. 43-49. 7 refs. In Russian.

The effect of acoustic-signal phase correlations on loudness perception by the auditory system was investigated in a subject with normal hearing who was to compare the loudness of received signals with consonant intervals 2:3, 1:2 and 1:3. His ability of loudness level perception was also tested on complex auditory signals constituted by consonances of five sinusoidal tones of equal loudness. A mathematical model is proposed to demonstrate that there is no relation between the phase spectra and loudness in a certain class of auditory signals. V.Z.

**A73-15791 # Psychophysical studies of visual image normalization mechanisms in man (Psikhofizicheskie issledovaniia mekhanizmov normalizatsii chelovekom zritel'nykh kartin).** E. P. Putiatin, I. V. Shul'gin, B. K. Lopatchenko, and V. P. Lurchenko. *Problemy Bioniki*, no. 6, 1971, p. 50-56. 8 refs. In Russian.

The invariance of the human visual image recognition capability in the identification of objects regardless of variations of scale, angle of vision, position shifts, illumination, and other visual characteristics was investigated. The subjects viewed test pictures and figures in various combinations, mutual positions, and scales at different angles of vision, and grouped the perceived images in matched identical classes by comparing with reference standards. Classification capability thresholds were obtained for subjects from curves obtained by tests with shifted, displaced, turned about, or scaled-down objects. It was found that the range and threshold of scale normalization perception could be determined from the results of such test programs. V.Z.

**A73-15792 # A model of a memory device based on neuron-like elements which realizes the holographic principles of data recording and readout (Model' zapominaiushchego ustroistva na neupodobnykh elementakh, realizuiushchego golograficheskie printsipy zapisi i schityvaniia informatsii).** V. F. Solomatin. *Problemy Bioniki*, no. 6, 1971, p. 56-60. 10 refs. In Russian.

**A73-15793 # Structure of the memorization process and its modeling (O strukture protsessa zapominaniia i ee modelirovanii).** V. P. Klevtsov and V. Ia. Liaudis. *Problemy Bioniki*, no. 6, 1971, p. 60-62. In Russian.

The structural elements of the persistent memorization faculty of man are discussed in the context of several experimental studies in psychology. Some mathematical and physical models of information processing and memorization at the lower visual perception levels are considered. It is indicated that images can be described with any required accuracy by using the properties of neurons. V.Z.

**A73-15795 # An optical model of a detector of oriented segments of the visual analyzer in animals (Opticheskaia model' detektora orientirovannykh otrezkov zritel'nogo analizatora zhivotnykh).** V. A. Bakhtigozin, Iu. P. Bugai, and V. G. Chervov. *Problemy Bioniki*, no. 6, 1971, p. 74-78. 6 refs. In Russian.

**A73-15796 # Modeling of the process for conversion of angular magnitudes into visual magnitudes (Modelirovanie protsessa transformatsii uglovnykh velichin v vidimye).** Ia. Ia. Belik. *Problemy Bioniki*, no. 6, 1971, p. 79-82. In Russian.

A psychophysical approach to the study of the perception of angular magnitudes (angular velocities) is used to derive a mathematical model describing the conversion of angular velocity magnitudes into visually perceived apparent velocity. The model concerns the perception of an axisymmetric annular field of vision and allowance is made for the threshold properties of the visual analyzer. Practical application of the model for perception of distance to the earth's surface from satellite orbit is discussed, and a formula is given for the viewing angle ensuring identical apparent velocity of all of the reference points of an observed landmark. T.M.

**A73-15797 # An associative-network model of memory (Assotsiativno-setevaia model' pamiati).** E. T. Golovan' and A. N. Luk. *Problemy Bioniki*, no. 6, 1971, p. 82-94. 9 refs. In Russian.

The psychological concepts of an image and a representation must have neurophysiological correlates which are doubtlessly based on the activity of neuron cells. The present study examines the process of neuronal interaction and grouping responsible for the formation of a cerebral structural correlate of psychological phenomena. Models of neuron cell assemblies described by Hebb (1949) and Milner (1957) are reviewed in terms of drawbacks and inconsistencies present in these theories, and a model of human memory is described where the linkage between the nodes of a neuronal network structure is treated as associative linkage between

elements of information. Conditions necessary for mathematical modeling of consciousness and the thought process are described.

T.M.

**A73-15798 # Integration of reflection and relation in a reflex act (Integratsiia otrazheniia i otnosheniia v reflektornom akte).** V. S. Maneshin. *Problemy Bioniki*, no. 6, 1971, p. 94-104. 9 refs. In Russian.

Human life is characterized by direct linkage and interaction with the environment, by reflection and creative reproduction of objective reality, and by penetration into the complex relationships with this reality for their subsequent application in self-serving interests. The structure of the reflex act is analyzed by defining its component elements, the interaction among these elements, and the role played by them in the overall system that controls relations between the organism and the surrounding medium. Attention is given to subjective and objective acts of perception and attitude formation (relative to the perceived) in an individual psychic response. T.M.

**A73-15877 \* # Effect of hypergravity on the circadian rhythms of white rats.** J. F. Lafferty (Kentucky, University, Lexington, Ky.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 26-30, 1972, Paper 72-WA/BHF-14.* 4 p. 7 refs. Members, \$1.00; nonmembers, \$3.00. Grant No. NGR-18-001-008.

The effects of artificial gravity on the circadian rhythm of white rats was observed by comparing feeding activity at 1.0 and 1.75 g. The feeding cycle data were obtained by observing the number of feeding switch responses, as well as the amount of food obtained, as a function of time. One of the three subjects clearly established a free-running cycle with a period of 24.742 hr. During a 40-day exposure to the 1.75 g environment, the subjects maintained the same feeding cycle period which was established at 1.0 g. While the results of this study indicate that the activity rhythms of rats are insensitive to gravity levels between 1.0 and 1.75 g, the effects of gravity levels below 1.0 g are yet to be determined. (Author)

**A73-15878 # Changes in whole body force transmission of dogs exposed repeatedly to vibration.** R. G. Edwards and C. F. Knapp (Kentucky, University, Lexington, Ky.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 26-30, 1972, Paper 72-WA/BHF-11.* 5 p. 12 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. F44620-69-C-0127.

Whole body force transmission was recorded from sitting dogs during 30-sec exposures to vertical, sinusoidal vibration. A vibration test consisted of sequentially exposing each animal to frequencies of 2, 3, 4, 5, 6, 7, and 12 Hz at constant acceleration amplitudes from 0.3 to 1.0 g. Each test was repeated approximately every 2 days. Whole body force transmission was plotted as a function of (1) vibration frequency and (2) repeated exposure to the same vibration. Analysis of the data indicated appreciable changes in the amplitude of whole body force transmission from repeated exposures near the resonant frequency. For this case, the largest value of force transmission occurred during the first test and decreased to lower values with repeated exposure. A 36 per cent reduction in transmitted force from the initial to the 7th exposure was observed from one of the animals during 4 Hz vibration at 0.7 g. (Author)

**A73-15884 \* # The mathematics of coordinated control of prosthetic arms and manipulators.** D. E. Whitney (MIT, Cambridge, Mass.). *American Society of Mechanical Engineers, Winter Annual Meeting, New York, N.Y., Nov. 26-30, 1972, Paper 72-WA/Aut-4.* 7 p. 21 refs. Members, \$1.00; nonmembers, \$3.00. Contract No. SNPN-54; Grant No. NGR-22-009-002.

**A73-15992 External field electromagnetic measurement of blood flow - An alternative approach to the solution of the baseline problem.** A. Kolin, R. N. MacAlpin, H. D. Snow, and M. W. Lenz (California, University, Los Angeles, Calif.). *Pflügers Archiv*, vol. 337,

no. 3, 1972, p. 257-263. 6 refs. Research supported by the Medical Testing Systems, Inc.

An electromagnetic intravascular rate of volume-flow meter of minimal dimensions is described. It is activated by an extracorporeal magnetic field. The location at the apex of the aortic arch minimizes ECG artifacts and circumvents the problem of securing a zero-flow baseline which is given by the lowest mid-diastolic flow level. The magnetic field at the electrodes is maximized by placing the subject axially into the magnetic coil. The flow transducer also offers a means of measuring the artery diameter and its pulsations. The electromagnetic flow measurements of cardiac output agree within about 20% with dye-dilution technique determinations. (Author)

**A73-16033** A note on the hypothesis - Protein polymorphism as a phase of molecular evolution. T. Maruyama (National Institute of Genetics, Mishima, Japan). *Journal of Molecular Evolution*, vol. 1, no. 4, 1972, p. 368-370. 11 refs.

Assuming that various kinds of balancing selection contribute only a small fraction of naturally occurring genetic variation, it is shown that if a fair fraction of evolutionary change in protein is due to neutral mutants, most of naturally occurring polymorphism must be due to random drift of neutral genes. (Author)

**A73-16034** # Biomedical problems of space flights: Index of domestic and foreign literature. (Mediko-biologicheskie problemy kosmicheskikh poletov: Ukazatel' otechestvennoi i zarubezhnoi literatury). E. A. Akhutin (Gosudarstvennaia Tsentral'naia Nauchnaia Meditsinskaia Biblioteka, Moscow, USSR), E. I. Koltun, M. L. Shvarts, and M. E. Ekshtein (Gosudarstvennaia Biblioteka SSSR, Moscow, USSR). Moscow, Izdatel'stvo Nauka, 1972. 304 p. In Russian.

A bibliography of literature on medical and biological aspects of space exploration lists works published in the period from 1961 to 1965. The 4724 entries are catalogued under general subject areas of astronaut training and conditioning, life-support systems and procedures within spacecraft and during extravehicular activity, methods employed for physiological experiments, psychophysiological problems, effects of particular flight factors on living organisms, the biomedical aspects of specific space programs, various national and international conferences, bibliographies, surveys, and reference textbooks. Most of the items contain a single-sentence summary of topics considered, and a separate author index is included. T.M.

A. Lekareva *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972  
15 Nov. 1972 p 1-4 refs

Experiments on white male rats have shown that 30-day exposure of the animals in a hyperoxic atmosphere (320-340 mm Hg) produces an insignificant effect on the intensity of carbon monoxide elimination, increases ammonia elimination and decreases elimination of ketones and aldehydes. Author

## STAR ENTRIES

**N73-12079** Joint Publications Research Service, Arlington, Va.  
**BIOLOGICAL ROLE OF ATMOSPHERIC OXYGEN IN THE BLOOD COAGULATION MECHANISM**

L. A. Palos *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972  
15 Nov. 1972 p 10-17 refs

The biological role of atmospheric oxygen was studied by redox processes in vitro and in vivo and by investigating the processes of biological regulation and functional unity of the respiratory, circulatory and blood coagulation systems. It was established in experiments in vitro that under the influence of oxygen thrombin is inactivated, whereas prothrombin exhibits a considerable resistance since its molecule contains four -S-S- groups. If the disulfide groups are reduced by cysteine, the prothrombin loses its activity. The results of model experiments, conducted with methylene blue and a number of blood coagulation factors are in complete conformity with these data. Author

**N73-12080** Joint Publications Research Service, Arlington, Va.  
**DNA CATABOLISM IN THE ORGANS OF RATS UNDER THE INFLUENCE OF TRANSVERSELY DIRECTED ACCELERATIONS**

G. S. Komolova, V. F. Makeyeva, Ye. V. Belikova, I. D. Yertanov, and I. A. Yegorov *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972  
15 Nov. 1972 p 18-23 refs

Exposure of rats to transverse accelerations of 25 g, imparted for six minutes, resulted in a 20% decrease in the DNA content in their spleens and caused no changes in liver DNA content. The exposure brought about no variations in DNAase activity in tissue homogenates or their supernatants. However, the total activity of the free and bound enzyme in the liver measured in the homogenate after treatment with Triton X-100 was 17% lower in the experimental animals than in the controls. The physicochemical properties of DNA from tissues of animals which were exposed to accelerations remained unaltered in comparison with normal levels. Author

**N73-12081** Joint Publications Research Service, Arlington, Va.  
**QUANTITATIVE EVALUATION OF GAS EXCHANGE OF A CONTINUOUS CULTURE OF HIGHER PLANTS AS A LINK IN A LIFE SUPPORT SYSTEM**

B. G. Kovrov and G. M. Lisovskiy *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972  
15 Nov. 1972 p 24-30 refs

On the basis of experimental data concerning the pattern of age curves of wheat and radish photosynthesis a mathematical model was formulated to describe the gas exchange in continuous cultures of these plants and its integration with the life support system. Computer aided evaluations revealed that the continuous culture need include plants of only four to seven ages to ensure an adequate stabilization of CO<sub>2</sub> consumption by higher plants within the life support system. Author

**N73-12083** Joint Publications Research Service, Arlington, Va.  
**SELECTION OF PARAMETERS OF CARDIOVASCULAR SYSTEM ULTRASONIC DOPPLER PROBES**

A. N. Kozlov *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972  
15 Nov. 1972 p 38-44 refs

The ultrasonic probing of the heart and vessels based on the Doppler effect is enjoying an ever-increasing application in clinical practice and in medical monitoring systems used under various unusual conditions. The lack of standards as applied to ultrasonic Doppler devices makes it difficult to compare the results obtained by different experimenters and involves other difficulties.

**N73-12073\*** National Aeronautics and Space Administration, Washington, D.C.

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 105, AUGUST 1972**

Aug. 1972 101 p refs

(NASA-SP-7011(105)) Avail: NTIS HC \$3.00 CSCL 06E

This special bibliography lists 287 reports, articles, and other documents introduced into the NASA scientific and technical information system in July 1972. Author

**N73-12074\*#** Mayo Clinic, Rochester, Minn.

**STUDIES OF THE EFFECTS OF GRAVITATIONAL AND INERTIAL FORCES ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS** Semiannual Status Report

Earl H. Wood 29 Sep. 1972 68 p refs

(Grant NGR-24-003-001)

(NASA-CR-129603) Avail: NTIS HC \$5.50 CSCL 06S

Developments in the following areas are discussed: television camera in dynamic angiography, dynamic computer generated displays for study of the human left ventricle, and status report on the work statement for the sixth year. A list of publications for the period 1 October 1971 to 1 October 1972 is included.

F.O.S.

**N73-12075\*#** Howard Univ., Washington, D.C. Dept. of Physiology and Biophysics.

**PROLONGED WEIGHTLESSNESS (300 PLUS DAYS) AND CARDIAC PERFORMANCE IN PRIMATES. 1: NEURO-HUMORAL MECHANISMS IN THE CONTROL OF CARDIAC AND VASCULAR PERFORMANCE IN CONSCIOUS ANIMALS** Progress Report, 1 Oct. 1971 - 1 Oct. 1972

Edward Wm. Hawthorne Oct. 1972 68 p refs

(Grant NGR-09-011-017)

(NASA-CR-129512) Avail: NTIS HC \$5.50 CSCL 06S

Research during the period 1 Oct. 1971 to 1 Oct. 1972 is reported. Studies discussed include: development of techniques for instrumentation of dogs and other animals, effects of temporary application of lower body negative pressure, and effect of infusing selected drugs on ventricular performance. F.O.S.

**N73-12076#** Joint Publications Research Service, Arlington, Va.

**SPACE BIOLOGY AND MEDICINE, VOLUME 6, NO. 5, 1972**

O. G. Gzenko, ed. 15 Nov. 1972 151 p refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina" Moscow, Meditsina Publishing House p 1-90

(JPRS-57517) Avail: NTIS HC \$9.75

The aeromedical research reported considers the safety of the human component in manned space flight. Physiological effects of spacecraft environment, radiation, and weightlessness on human biological processes are emphasized.

**N73-12077** Joint Publications Research Service, Arlington, Va.  
**EFFECT OF THIRTY-DAY CONFINEMENT OF RATS IN AN ATMOSPHERE WITH AN INCREASED OXYGEN CONTENT ON THE ELIMINATION OF SOME GASEOUS PRODUCTS OF VITAL FUNCTIONS**

V. V. Kustov, B. I. Abidin, V. I. Belkin, L. T. Roddubnaya, and T.

It seems urgent to develop standard requirements for equipment and put it into mass production. The paper gives specific requirements on how to acquaint physicians better with the biophysical principles of the ultrasonic Doppler method and equipment. It also gives suggestions substantiating selection of the main parameters of this equipment. Author

**N73-12084** Joint Publications Research Service, Arlington, Va. **RELATIONSHIP BETWEEN IMPULSE ACTIVITY OF BULBAR RESPIRATORY NEURONS, ELECTRIC ACTIVITY OF RESPIRATORY MUSCLES AND PULMONARY VENTILATION ACCOMPANYING DEPRESSED RESPIRATION**  
A. M. Kulik and L. N. Kondratyeva *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 45-53 refs

The level of impulse activity of bulbar respiratory neurons, electric activity of respiratory muscles and pulmonary ventilation were investigated using cats anesthetized with Nembutal during different phases of the respiratory cycle. Upon additional resistance to respiration applied during inhalation the activity of inspiratory neurons increased but that of expiratory neurons did not change or decreased. Upon resistance applied during expiration the activity of both expiratory and inspiratory neurons increased. With resistance applied simultaneously during inspiration and expiration the activity of inspiratory and expiratory neurons increased initially; one to two minutes later the activity of inspiratory neurons continued to increase, whereas that of expiratory neurons began to decline. Author

**N73-12085** Joint Publications Research Service, Arlington, Va. **RESULTS OF ELECTROGASTROGRAPHY DURING CREATION OF MODERATE DEGREES OF HYPOXIA IN A PRESSURE CHAMBER**  
N. V. Stepovik *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 54-58 refs

Pilots with gastric disorders and autonomic system disturbances were examined using a combination square procedure and results were processed by the dispersion analysis method. The decline in electrogastrographic amplitude after altitude chamber experiments was used as a representative index. It was demonstrated with a high significant level (over 99%) that the representative index was affected to the greatest extent (76.6%) by the type of gastric peristalsis: normal, excitable, asthenic, inhibitory or inert. A comparison of similar types of gastric peristalsis of healthy persons and pilots with gastric and autonomic nervous system diseases revealed differences in electrogastrographic indices. Author

**N73-12086** Joint Publications Research Service, Arlington, Va. **POSSIBLE ROLE OF ANTITISSUE AUTOANTIBODIES IN THE PROTECTIVE MECHANISM OF LOCAL SHIELDING DURING TOTAL IRRADIATION**  
N. N. Klemparskaya and V. S. Kashirin *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 59-68 refs

Experiments on 115 white rats indicated that shielding of one hind leg considerably increases the number of antibodies eluted from the muscle tissue measured during the first 15 minutes after irradiation. Shielding of the upper abdominal section also induces a significant increase in the number of autoantibodies in the blood, spleen and muscle tissue and an increase in the number of autoantibody-forming cells in the blood and liver. An increase in the number of normal autoantibodies during early post-irradiation stages exerts a protective effect since they have the capacity of binding and rendering harmless tissue decay products which emerge under the influence of ionizing radiation. Author

**N73-12087** Joint Publications Research Service, Arlington, Va. **SOME METHODS FOR EVALUATING THE QUALITY OF THE ERGATIC PROCESS DURING APPROACH OF SPACE VEHICLES**  
V. A. Taran *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 69-79 refs

Evaluating the quality of controlling a spacecraft during its approach and docking with an orbital station is considered. Methods for delimiting the boundaries of successful solutions for the spacecraft approach problem are described and the theoretical aspects of deriving evaluation systems are discussed. These methods can be used in devising techniques for automatic evaluation of the quality of ergatic processes in controlling space vehicles during orbital flight on the basis of simulated flight data. Author

**N73-12088** Joint Publications Research Service, Arlington, Va. **HUMAN CARDIOVASCULAR SYSTEM REACTIONS TO SIGN VARIABLE TRANSVERSE ACCELERATIONS**  
Ye. B. Shulzhenko and I. F. Vil-Vilyams *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 80-87 refs

The cardiovascular effect of continuous accelerations was studied on nine test subjects during 39 experimental runs. The accelerations resulted from a combined effect of centripetal accelerations of 3 to 7 g and additional rotation of the body about its longitudinal axis with an angular velocity of 15 and 60 deg/sec. Electrocardiographic, sphygmographic and pneumographic recordings were monitored. Disturbances of cardiac rhythms in the form of extrasystoles and sinus arrhythmia not related to respiration cycles, as well as periodic changes in the electrocardiographic parameters and peripheral pulse induced by changes in the direction of the acceleration vector were noted. Cardiovascular changes were found to be functional. Author

**N73-12089** Joint Publications Research Service, Arlington, Va. **DIURNAL RHYTHM OF THE CONTENT OF BIOGENOUS AMINES (HISTAMINE, SEROTONIN) IN HUMAN BLOOD UNDER NORMAL CONDITIONS AND DURING ALTERED WORK-SLEEP CYCLES**  
I. L. Veysfeld and R. F. Ilicheva *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 88-98 refs

Variations in the diurnal cycle of the histamine-diaminoxidase system in the blood of healthy subjects involve diaminoxidase activity alone. Its considerable decline in the evening and far greater decrease at night indicates an enhanced influence of histamine at night. The blood serotonin content tends to decrease at night. Changes in work-sleep cycles give rise to noticeable qualitative and quantitative changes in the mentioned parameters. The disturbances become more distinct under hypokinetic conditions. The results of this study show the importance of taking the internal state of the organism into account when formulating work-sleep cycles. Author

**N73-12090** Joint Publications Research Service, Arlington, Va. **CARDIOVASCULAR SYSTEM REACTIONS IN PILOTS WITH SYMPTOMS OF ATHEROSCLEROSIS DURING PROFESSIONAL WORK**  
B. L. Gelman and G. L. Strongin *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 99-106 refs

Commercial airline pilots with symptoms of atherosclerosis were examined during real and simulated flights. Electrocardiograms and arterial pressure were registered prior to flight, during different flight stages and after landing. The emotional stress associated with aircraft control brought about an increase in heart rate, a change in the ECG pattern and a rise in arterial pressure. Most pilots with atherosclerosis symptoms were found to be well adapted to their professional duties. However, some of them exhibited symptoms of relative coronary insufficiency, cardiac arrhythmias, and distinct hypertension reactions. A comparison of the pathological reactions with data from clinical examinations shows that the latter are of a high but not absolute reliability. Author

**N73-12091** Joint Publications Research Service, Arlington, Va. **GAS CHROMATOGRAPHIC INVESTIGATIONS OF VOLATILE PRODUCTS OF HUMAN METABOLISM ACCOMPANYING REDUCED FOOD INTAKE AND STARVATION**

V. P. Savina, L. N. Stepanov, N. L. Sokolov, and Yu. G. Nefedov *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 107-110 refs

The results of comparative studies of volatile metabolites eliminated together with the urine, saliva and exhaled air by human subjects during prolonged starvation are given. Also presented are data obtained by examining the gas-vapor phase of urine from human subjects kept on calorie-reduced diets. Changes in the content of ketones and alcohols are similar in all three analyzed media. Changes of this type may develop in patients suffering from certain metabolic disorders. Accordingly, they can be used as an additional test during functional diagnosis of some diseases. Author

**N73-12092** Joint Publications Research Service, Arlington, Va. **VESTIBULAR REACTIONS DURING EXPOSURE TO CORIOLIS ACCELERATIONS UNDER HYPOXIC CONDITIONS**

S. S. Markaryan and I. A. Sidelnikov *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 111-115 refs

A study of the effect of hypoxia on the vestibular tolerance of human subjects is reported. The method of continuous accumulation of coriolis accelerations was used as a provocative test of the vestibular analyzer in control tests and hypoxic hypoxia tests. It was found that under hypoxic conditions the vestibular-autonomic responses increase and the nystagmic slow phase significantly decreased following exposure to coriolis accelerations. In order to detect latent forms of vestibular-autonomic intolerance it is recommended that the vestibular function be investigated under hypoxic conditions at a simulated altitude of 5,000m and after a 30-minute exposure using the method of continuous accumulation of coriolis accelerations in subject having third degree vestibular tolerance (two to five minutes). Author

**N73-12094** Joint Publications Research Service, Arlington, Va. **USE OF MULTICHANNEL RHEOGRAPHY IN PHYSIOLOGICAL INVESTIGATIONS ON A CENTRIFUGE**

V. B. Zubavin, L. I. Letkova, Yu. S. Miroshnikov, and M. A. Ronkin *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 120-126 refs

An evaluation of the possibility of multichannel rheography as a method for studying the cardiovascular system under experimental conditions on a centrifuge is presented. Author

**N73-12095** Joint Publications Research Service, Arlington, Va. **PROLONGED MONITORING OF HUMAN CARDIAC BIOELECTRIC ACTIVITY DURING GROUND EXPERIMENTS AND IN SPACE FLIGHT**

D. G. Maksimov, V. P. Khmelkov, I. A. Samorukov, and A. M. Finogenov *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 127-133

Methodological difficulties arising when registering electrocardiograms during prolonged contact of the electrode with the body are explained. Irritation of the skin is the most pronounced aspect of interelectrode resistance. Paddings of fabric or leather impregnated with lithium chloride demonstrate their advantages in comparison with electrode paste by improving convenience, noise immunity for the electrode, and decreasing hydration and irritation of the skin. G.G.

**N73-12096** Joint Publications Research Service, Arlington, Va. **HEAT REGULATION REACTIONS IN ANIMALS IN A HELIUM-OXYGEN ATMOSPHERE**

G. V. Troshikhin *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 134-138 refs

An attempt was made to ascertain the comfortable temperature range for rats in a helium-oxygen atmosphere. It is shown that the heat transfer of rats increased at 20 to 28 C as a result of the high heat conductivity of helium. This effect increased chemical heat regulation in comparison with that at the same temperatures in an air atmosphere. At a temperature of 30 C chemical heat regulation became minimal. Author

**N73-12098** Joint Publications Research Service, Arlington, Va. **MICROFLORA IN A CLOSED CABIN IN A THREE-DAY EXPERIMENT WITH HUMAN SUBJECTS AT A REDUCED TEMPERATURE AND HIGH RELATIVE HUMIDITY**

S. D. Polozhentsev and M. N. Chikin *In its Space Biol. and Med.*, Vol. 6, No. 5, 1972 15 Nov. 1972 p 144-146 refs

The dynamics of microbial occupation under conditions of reduced temperature and high relative humidity in a pressurized inhabited cabin are studied. Confined human subjects in a pressurized chamber at reduced temperature and high relative humidity provided microbial contamination of the atmosphere which increased with an increase in pressurization duration. Distinct indicators of sanitary bacteriological deterioration of the chamber atmosphere appeared by the second day of pressurization. Author

**N73-12099\*#** Techtran Corp., Glen Burnie, Md. **STUDIES OF CONFORMATIONAL TRANSITIONS OF CYTOCHROME c BY THE SPIN-LABEL METHOD**

L. M. Raykhman, B. Annayev, and E. G. Rozantsev Washington NASA Nov. 1972 11 p refs Transl. into ENGLISH from Mol. Biol. (Moscow), v. 6, no. 4, 1972 p 552-558 (Contract NASw-2037)

(NASA-TT-F-14623) Avail: NTIS HC \$3.00 CSCL 20H

Isocyanide spin label (ISL) was used for studying the conformational transitions in cytochrome c. Molecular mobility of ISL bound to the heme group of cytochrome c, is markedly increased when the monomeric form of cytochrome c is compounded into dimers. This effect is partially reversed by the agents causing the dissociation of dimers. ISL mobility is also increased after treatment of cytochrome P-450 by urea, guanidine, and sodium dodecylsulfate (but not deoxycholate), as well as with increase of the temperature. These treatments also cause a decrease in cytochrome c redox potential, the changes in ISL mobility, and redox-potential values being closely correlated. The relation between conformational transitions in the protein moiety of cytochrome c and electronic state of its heme group is discussed. Author

**N73-12100\*#** Public Health Service, Phoenix, Ariz. Environmental Microbiology Section.

**SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS OF THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION** Quarterly Report, Jul. - Sep. 1972

Martin S. Favero Sep. 1972 28 p

(NASA Order W-13062)

(NASA-CR-129513; Rept-39) Avail: NTIS HC \$3.50 CSCL 06M

The evaluation is discussed of the terminal sterilization process for unmanned lander spacecraft. Results of biochemical test deviations encountered with the identification schemes are tabulated. Studies to examine the possibility of shifts in biochemical reaction patterns during storage and subculture of the environmental Bacillus isolates are also reported. F.O.S.

**N73-12101\*#** Food and Drug Administration, Cincinnati, Ohio. **ECOLOGY AND THERMAL INACTIVATION OF MICROBES IN AND ON INTERPLANETARY SPACE VEHICLE COMPONENTS** Quarterly Progress Report, 1 Apr. - 30 Jun. 1972

J. E. Campbell Oct. 1972 10 p

(NASA Order R-36-015-001)

(NASA-CR-129272; QPR-29) Avail: NTIS HC \$3.00 CSCL 06M

The sterilization parameters for the Viking lander of D sub 125 C = 30 minutes and z = 21 C for the exposed bioburden were derived from the experimental findings of several laboratories conducting thermal inactivation studies on Bacillus subtilis var. niger by dry heat. The moisture constraint, that the sterilizing gas shall be less than 25 percent relative humidity at standard conditions of 0 C and 760 mm Hg pressure, was added in recognition of the profound influence of water vapor on the time and temperature required for thermal inactivation of these spores. Data is presented demonstrating that the application of

the moisture parameter does not significantly change the D sub 125 C and z values of 30 minutes and 21 C, respectively. Data are presented also to show the maximum influence that could be expected by decreasing the humidity to near zero percent relative humidity at 105, 113, and 125 C. Author

**N73-12102#** Oak Ridge National Lab., Tenn.  
**ANIMAL RADIATION DATA AND THEIR RELEVANCE TO MAN**

Harry E. Walburg, Jr. 1972 8 p refs Presented at the Conf. on Res. Animals in Med., Washington, D. C. (Conf-720108-2) Avail: NTIS

Emphasis is placed on data on the effects of whole-body exposure to external radiations on the manifestation of late somatic effects and the induction and acceleration of neoplasms. It is pointed out that animal studies show there is great variability in the type and sensitivity of radioinduced tumors in different species and among different strains of the same species. Certain qualitative generalizations on the biological effects of radiation that may be extrapolated to man are summarized. These include life shortening and the influence of radiation dose, dose rate, LET, and age at exposure on tumor induction. NSA

**N73-12103#** Joint Publications Research Service, Washington, D.C.

**RADIOBIOLOGY, VOLUME 11, NO. 5, 1971**

Oak Ridge, Tenn. AEC May 1972 254 p refs Transl. into ENGLISH of Radiobiol. (Moscow), v. 11, no. 5, Sep. - Oct. 1971 (AEC-tr-7306) Avail: NTIS

Published articles and abstracts of articles concerning radiobiology are presented. Areas of research include: radiosensitivity in chromosomes, differences between DNA structure and functions in normal and irradiated cells, nuclear protein metabolism in organs of irradiated animals, and effects of brief and prolonged irradiation. F.O.S.

**N73-12104#** Florida State Univ., Tallahassee. Computer-Assisted Instruction Center.

**TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL**

Sigmund Tobias and John J. Hedl, Jr. 15 Jun. 1972 22 p refs (Contract N00014-68-A-0494)

(AD-746453; CAI-TM-49) Avail: NTIS CSCL 05/10

The paper reports two experiments whose purpose was to relate two bodies of research on anxiety: test and trait-state anxiety. It was reasoned that state anxiety measures obtained in an evaluative testing condition should be more similar to test anxiety than state anxiety measures obtained in nonevaluative situations, such as a game in Study I or an instructional setting in Study II. The results of both studies failed to confirm this hypothesis. Test anxiety was less sensitive to fluctuations of evaluative stress than state anxiety, and more closely related to general trait anxiety. Author (GRA)

**N73-12105#** Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

**THE ANALYSIS OF L-3-HYDROXYTYROSINE (L-DOPA) AND ITS METABOLITES** Final Report, May 1969 - Jun. 1971

Eugene L. Arnold May 1972 111 p refs

(AF Proj. 6302)

(AD-745944; AMRL-TR-71-128) Avail: NTIS CSCL 06/1

A procedure for the extraction and analysis by gas-liquid chromatography of a variety of catecholamine metabolites from biological tissue was developed. An extensive investigation and evaluation of extraction techniques was undertaken. Catecholamine reactions which would result in stable, volatile derivatives suitable for separation and measurement by gas-liquid chromatography were also investigated. Since the detection by electron capture provided the greatest sensitivity in analysis for certain compounds, special consideration was given to reactions which would form derivatives suitable for this type detection. Because

of their stability, volatility, and electron affinity, the pentafluoropropionyl derivatives were selected as the derivatives of choice. The rapidity of the technique and the advantage of using small sample volumes should make it applicable for the solution of a wide variety of problems in both research and clinical laboratories. Author (GRA)

**N73-12106#** Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

**HUMAN AND RAT EXPOSURES TO HALON 1301 UNDER HYPOBARIC CONDITIONS** Final Report

Douglas W. Call 19 Jul. 1972 16 p refs

(AD-747958; NADC-72125-CS) Avail: NTIS CSCL 06/20

Halon 1301, (CBrF3) has been proposed for use as a fire extinguishing agent in occupied aircraft sections. To test possible toxicity of this gas under hypobaric conditions, such as would accompany its use in-flight, male Charles River rats and human volunteers were exposed for 3/5 minutes to various Halon 1301 air mixtures in a hypobaric chamber maintained at 760 torr (sea level), 632 torr (5,000 ft.), or 380 torr (18,000 ft.). Electrocardiograms (ECGs) and lung histology data were collected from the rats. Physical examinations, pulmonary function measurements, psychomotor performance evaluations and ECGs were obtained from the human subjects. Results indicate that exposure to CBrF3 under reduced atmospheric pressures is no more harmful than similar exposures at sea level. Therefore, Halon 1301 may be a safe fire suppressant for use in occupied cabin sections. Author (GRA)

**N73-12107\*#** California Univ., Berkeley. White Mountain Research Station.

**PHYSIOLOGICAL RESPONSES TO ENVIRONMENTAL FACTORS RELATED TO SPACE FLIGHT** Semiannual Status Report, 1 Feb. - 31 Jul. 1972

Nello Pace 31 Jul. 1972 66 p

(Grant NGL-05-003-024)

(NASA-CR-129518; Rept-21) Avail: NTIS HC \$5.50 CSCL 05E

The research is reported for establishing physiological base line data, and for developing procedures and instrumentation necessary for the automatic measurement of hemodynamic and metabolic parameters. The work in the following areas is discussed: biochemistry, bioinstrumentation, nutrition, physiology, experimental surgery, and animal colony. F.O.S.

**N73-12108#** National Aviation Facilities Experimental Center, Atlantic City, N.J.

**HUMAN ENGINEERING ANALYSIS OF AIRPORT LIGHTING CONTROL PANELS AND A PROPOSAL FOR A NEW DESIGN** Interim Report, Jan. 1971 - Jul. 1972

James E. Grambart Nov. 1972 39 p

(FAA Proj. 072-324-05X)

(FAA-RD-72-93; FAA-NA-72-37) Avail: NTIS HC \$4.00

An improved airport lighting control panel for use in airport traffic control towers is described. Data on the physical characteristics of in-use panels and operational experience of users were collected at nine control towers in the Eastern Region. The need for a cleanly designed, compact, and easily read and activated lighting system display/control panel was documented. In response to this requirement, a new design was proposed. An important feature of this design is that the operation of the auxiliary systems is contingent upon the activation of the main runway lights in such a manner as to minimize the number of control units. Rather than have one control unit for each combination of runway and auxiliary lighting systems (the number being equal to the product), there is one control unit for each main runway lighting system and one control unit for each class of auxiliary lighting systems (the number being equal to the sum). As the number of runways and lighting systems increases, the adoption of the proposed design should result in a striking reduction in control panel complexity and an increase in efficiency and economy. Author

**N73-12109\*#** Barry Wright Corp., Watertown, Mass.  
**EFFECT OF VERTICAL ACTIVE VIBRATION ISOLATION ON TRACKING PERFORMANCE AND ON RIDE QUALITIES**

Frank P. DiMasi, Rush E. Allen, and Peter C. Calcaterra  
Washington NASA Nov. 1972 80 p refs  
(Contract NAS1-9919)

(NASA-CR-2146) Avail: NTIS HC \$3.00 CSCL 05E

An investigation to determine the effect on pilot performance and comfort of an active vibration isolation system for a commercial transport pilot seat is reported. The test setup consisted of: a hydraulic shaker which produced random vertical vibration inputs; the active vibration isolation system; the pilot seat; the pilot control wheel and column; the side-arm controller; and a two-axis compensatory tracking task. The effects of various degrees of pilot isolation on short-term (two-minute) tracking performance and comfort were determined. Author

N73-12110\*# National Aeronautics and Space Administration.  
Manned Spacecraft Center, Houston, Tex.

**FOOD AND NUTRITION STUDIES FOR APOLLO 16**

Malcolm C. Smith, Jr., Paul C. Rambaut, Norman D. Heidelberg,  
Rita M. Rapp, and Harry O. Wheeler Oct. 1972 38 p refs  
(NASA-TM-X-68161; MSC-07195) Avail: NTIS HC \$4.00 CSCL  
06H

A study has been conducted on nutrient intake and absorption during the Apollo 16 mission. Results indicate that inflight intakes of all essential nutrients were adequate and that absorption of these materials occurred normally. Author

N73-12111\*# North American Rockwell Corp., Downey, Calif.  
Space Div.

**EFFECTS OF SIMULATED ARTIFICIAL GRAVITY ON HUMAN PERFORMANCE**

James A. Green and James L. Peacock Washington NASA  
Nov. 1972 168 p refs

(Contract NAS1-10759)

(NASA-CR-2129) Avail: NTIS HC \$3.00 CSCL 05E

The ability of test subjects to perform operational type tasks was evaluated at rotational rates to 6 rpm and radii to 78 ft (24 m). The tasks included fine motor activity, mental operations, postural equilibrium, cargo handling, radial and tangential locomotion. Performance data indicate that 6 rpm presents a physiological limit at radii to 75 ft (23 m). Radial locomotion was not found to produce excessive adverse stimuli, and tangential locomotion was readily accomplished at walking rates of 2 of 4.8 ft/s (.6 to 1.4 m/s). The absence of vision dramatically reduced an individual's postural equilibrium during rotation. The use of selected anti-motion pharmaceuticals had, generally, a positive effect upon psychomotor performance at 6 rpm, but did not prove to be a panacea for the adverse effects of rotation at this rate. Author

N73-12112\*# McDonnell-Douglas Astronautics Co., St. Louis,  
Mo. Space Systems Lab.

**INFLIGHT BLOOD COLLECTION SYSTEM (IBCS) VERIFICATION PLAN**

R. K. Weinberger Jul. 1972 32 p refs

(Contract NAS9-13013)

(NASA-CR-128645; MDC-E0653) Avail: NTIS HC \$3.75 CSCL  
06B

The verification program for the Inflight Blood Collection System (IBCS) is reported. Specific tests and methods used to verify the IBCS are included. F.O.S.

N73-12113\*# Library of Congress, Washington, D.C.

**COSMONAUT'S EMOTIONAL STRESS IN SPACE FLIGHT**

L. Khachatryan and L. Grimak Washington NASA Dec.  
1972 5 p Transl. into ENGLISH from Aviat. Kosmonaut. (USSR),  
no. 11, Nov. 1972 p 33-34 Sponsored by NASA

(NASA-TT-F-14654) Avail: NTIS HC \$3.00 CSCL 05E

Criteria which determine the emotional stress of cosmonauts during space flight are examined. These criteria cover behavioral and professional responses, dynamics of vegetative shifts (pulse and respiratory frequencies, arterial pressure), and voice characteristics of the cosmonaut's speech. Detailed discussions are given for the spectral changes of cosmonaut's voice with the degree of emotional stress. The causes of such stress are outlined. E.H.W.

N73-12114# Central Research Inst. for Physics, Budapest  
(Hungary). Health Physics Dept.

**WHOLE BODY COUNTER EFFICIENCY CALCULATIONS FOR DISTRIBUTED SOURCES IN A HUMAN PHANTOM**

A. Andrasi and Gy. Koetel Apr. 1972 7 p refs Presented at  
2d European Congr. on Radiation Protective, Budapest, 3-5 May  
1972

(KFKI-72-30) Avail: AEC Depository Libraries

The space and energy dependence of the full energy peak efficiency of the 6 x 4 NaI(Tl) detector of a whole body counter was calculated by computer from input data measured on point sources. By volume integration of this empirical function, the efficiency of the counter was evaluated for a BOMAB-type human phantom. Calculations were carried out for uniformly distributed sources with gamma energies of 0.1 to 2.0 MeV, in chair, arc, and scanning geometries. The calculations were extended to cases of activity confined in geometrically well-defined organs within the phantom. Author (NSA)

N73-12115# Los Alamos Scientific Lab., N.Mex.

**CHARACTERIZATION AND PROPERTIES OF MEDICAL GRADE Pu-238 FUELS**

L. J. Mullins, G. M. Matlack, J. Bubernak, and J. A. Leary 1972  
19 p refs Presented at 2d Intern. Symp. on Power from  
Radioisotopes, Madrid, 29 May 1972 Sponsored by AEC

(LA-DC-72-473; Conf-720519-2) Avail: NTIS

The Pu-238 requirements, 55 to 90g, for an artificial heart or circulatory assist device demand a fuel having minimal radiation properties. The preparation and evaluation of potential Pu-238 fuel forms at the Los Alamos Scientific Laboratory has led to the development of four fuel compositions, electrorefined metal, (Pu-238)(N-15) and (Pu-238)(O-16)2. (The latter three fuels are made from electrorefined metal.) Theoretical and experimental studies of these fuels led to the conclusion that (Pu-238)(O-16)2 is the preferred composition for high temperature application in the artificial heart program. This fuel is prepared as a pressed and sintered oxide. Procedures have been developed for preparing and characterizing cylindrical oxide sources varying in size from one to fifty watts. Author (NSA)

N73-12116# Technische Hogeschool, Eindhoven (Netherlands).  
Dept. of Electrical Engineering.

**THE MULTIPLE DIPOLE MODEL OF THE VENTRICULAR DEPOLARISATION**

A. A. H. Damen and H. A. L. Piceni Oct. 1971 34 p refs

(TH-71-E-25; ISBN-90-6144-0254) Avail: NTIS HC \$3.75

Estimation procedures applied to electrical heart action are examined. The depolarization wave of both ventricles of the heart is represented by a set of current dipoles with time-independent origins and directions. Each dipole time function is simulated by a Gaussian curve. The parameters to be estimated are: the peak times and widths of the Gaussian curves, as well as the transfer coefficients from dipoles to electrodes. Results of parameter estimation are given on the basis of VCG-curves of 50 healthy persons. The averaged directions of the estimated dipoles show a good correspondence to the anatomic configuration of the heart and the chest. The estimation method is intended as a step toward localizing heart defects. Author (ESRO)

N73-12117# Defence Research Information Centre, Orpington  
(England).

**ASSESSMENT OF THE THERMAL RESISTANCE OF CLOTHING**

Y. F. Voinov, K. V. Karlina et al Oct. 1972 8 p refs Transl.  
into ENGLISH from Tekhnol. Legkoj Prom., no. 1, 1972 p 80-84  
(DRIC-Trans-2920; BR-30290) Avail: NTIS HC \$3.00

The thermal resistance of clothing is assessed taking into account the body heat flow, material thickness and air layers. The magnitude of the thermal resistance of the air layers depends on the thickness of the clothing and it is concluded that the air layers in the present day clothing is not efficiently used. Author (ESRO)

N73-12118# Deutsche Forschungs- und Versuchsanstalt fuer  
Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst.

fuer Physik der Atmosphaere.

**EXPERIENCE GAINED IN DETERMINING HORIZONTAL STANDARD VISIBILITY [UEBER EINIGE ERFAHRUNGEN BEI DER BESTIMMUNG DER HORIZONTALEN NORMSICHT DURCH KONTRASTMESSUNGEN AN NATUERLICHEN SICHTZIELEN]**

Hans-Eberhard Hoffmann Mar. 1971 48 p refs In GERMAN; ENGLISH summary (DLR-FB-71-22) Avail: NTIS HC \$4.50; DFVLR, Porz, West Ger.; 13 DM

The horizontal standard visibility was determined by contrast measurements on natural objects. The differences between the measured and the observed ranges of sight can be explained by an insufficient value for the contrast threshold of the human eye, which was used for the calculation of the horizontal standard visibility. Two conditions make possible the use of a mean value for the inherent contrast of natural objects instead of specific values. These conditions are: The distance to the natural objects must be large, and the horizontal standard visibility should be smaller than 40 km.

Author (ESRO)

**N73-12119# Naval Postgraduate School, Monterey, Calif. THE EVALUATION OF AIR-TO-AIR COMBAT SITUATIONS BY NAVY FIGHTER PILOTS WITH ARTIFICIAL INTELLIGENCE APPLICATIONS M.S. Thesis**

Kenneth Levin Jun. 1972 189 p refs (AD-747519) Avail: NTIS CSCL 15/7

The evaluations made by 36 Navy fighter pilots of 64 air-to-air combat situations are statistically analyzed to detect any significant differences between pilots: evaluative techniques in relation to their rank, flight hours and combat missions. Predictor equations are computed and used in a self-analyzing, self-modifying artificial intelligence program modeled on an instructor-flight student interactive situation.

Author (GRA)

**N73-12120# Texas A&M Univ., College Station. Dept. of Industrial Engineering.**

**A COMPARISON OF VISUAL CUING METHODS IN LARGE DISPLAYS DURING PERFORMANCE OF A SECONDARY TASK M.S. Thesis**

John E. Rankin Dec. 1971 59 p refs (AD-747688) Avail: NTIS CSCL 05/8

A study was conducted to investigate five alternative methods of visual cuing as applied to large display panels with the operator engaged in a secondary loading task. The cuing techniques compared were: color coding spatial cuing, linear cuing, and color-modified versions of spatial and linear cuing. A total of 25 subjects were randomly assigned to five groups of five subjects each. Each group was then tested under one of the five cuing conditions. Reaction times to light stimuli were used as the basis of comparison. Subsequent analysis of reaction time data found no significant difference between cuing techniques.

Author

**N73-13069\*+ National Aeronautics and Space Administration, Washington, D.C.**

**AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 107, OCTOBER 1972**

Oct. 1972 105 p refs (NASA-SP-7011(107)) Avail: NTIS HC \$3.00 CSCL 06E

This Supplement of Aerospace Medicine and Biology lists 353 reports, articles, and other documents announced during September 1972 in Scientific and Technical Aerospace Reports or in International Aerospace Abstracts. In its subject coverage, Aerospace Medicine and Biology concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references

to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Author (GRA)

**N73-13070 Iowa State Univ. of Science and Technology, Ames. REMOTE DETECTION OF MOISTURE STRESS: FIELD AND LABORATORY EXPERIMENTS Ph.D. Thesis**

Richard Eugene Carlson 1971 105 p Avail: Univ. Microfilms Order No. 72-5184

The relationship between the spectral properties of leaves and the water status of leaves from three crop species was studied under laboratory conditions. The wavelengths region examined was from 800 to 2,600 millimicrons. Leaf reflectivity and leaf absorptivity were highly correlated with relative leaf water content. The relationship between leaf transmissivity and relative leaf water content was variable with wavelength. Leaf transmissivity was, however, highly correlated with leaf specific densities. Relative leaf water content was estimated from leaf reflectivity. The estimates were improved if leaf transmissivity was included in the regression equation. In field experiments leaf temperature was significantly affected by relative leaf water content, air temperature, and vapor pressure deficit. A relative leaf water content by vapor pressure deficit interaction term was shown to affect leaf temperature. Air temperature affected leaf temperature by modifying stomatal conductivities and, hence, the leaf transpiration rate.

Dissert. Abstr.

**N73-13071\*# Southwest Research Inst., San Antonio, Tex. ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Final Report, 24 Aug. 1971 - 24 Aug. 1972**

David F. Culclasure and Linda Eckhardt 24 Aug. 1972 163 p refs

(Contract NASw-1867)

(NASA-CR-129588) Avail: NTIS HC \$10.25 CSCL 06B

The applications of aerospace technology to biomedical research are reported. The medical institutions participating in the Biomedical Applications Program are listed along with the institutions currently utilizing the services of the Southwest Research Institute Biomedical Applications Team. Significant accomplishments during this period include: ultra-low bandpass amplifier for gastro-intestinal electric potentials; non-encumbering EEG electrode assembly suitable for long term sleep research; accurate cardiac telemetry system for active subjects; warning system for the deaf; tracking cane for the blind; and an improved control mechanism to expand the self-sufficiency of quadriplegics.

F.O.S.

**N73-13072# Joint Publications Research Service, Arlington, Va.**

**SELECTIONS FROM VOYENNO-MEDITSINSKIY ZHURNAL NO. 8, 1972**

17 Nov. 1972 14 p refs Transl. into ENGLISH from Voyenno-Med. Zh. (Moscow), no. 8, 1972 (JPRS-57541) Avail: NTIS HC \$3.00 CSCL 06S

An evaluation of the state of man's psychic functions both during a period of prolonged (up to 30 days) presence at depths up to 160 meters, during the breathing of nitrogen-oxygen and helium-oxygen mixtures and after emergence at the surface is reported along with a review of literature on studies of the possibility of using a skin analyzer for communication purposes, and a study of the effect of mood on performance.

**N73-13073 Joint Publications Research Service, Arlington, Va. STUDY OF SOME PSYCHIC FUNCTIONS OF AQUANAUTS DURING PROLONGED EXPOSURE TO INCREASED PRESSURE**

V. A. Bodrov, A. S. Yegorov, and B. N. Yakovets *In its* Selections from Voyenno-Med. Zh. no. 8, 1972 17 Nov. 1972 p 71-73 refs

The state of man's mental functioning is evaluated for aquanauts during prolonged (up to 30 days) exposure to depths up to 160 m, breathing nitrogen-oxygen, or helium-oxygen

mixtures, and after emergence at the surface. The dynamics of the indices for attention, memory and cogitation were investigated at depths of 5, 40, 70, 100, 130, and 160 m. The nitrogen mixtures were used at depths of 5 and 40 m, and the helium mixtures at depths of 40 m or more. It was found that the nitrogen mixture is tolerated less easily at the 40 m level, and it is concluded that there is no apparent aftereffect caused by prolonged, increased pressure. The results indicate that trained men can be subjected to pressure up to 16 atm, for prolonged periods, without mental impairment. F.O.S.

**N73-13074** Joint Publications Research Service, Arlington, Va.  
**USE OF A SKIN ANALYSOR AS A COMMUNICATION CHANNEL IN CONTROLLING ACTIVITY (REVIEW OF THE LITERATURE)**

S. D. Baryshnikov *In its* Selections from *Voyenno-Med. Zh.* no. 8, 1972 17 Nov. 1972 p 60-62 refs

Studies on the possibilities of using a skin analyzer for communication purposes are reviewed. Among the studies reviewed are the use of tactile and vibrational sensitivity in controlling activity, and an electromechanical tactile control system which transmits information on banking and pitching. It is concluded that the tactile (vibrational) sensitivity of the skin analyzer offers great possibilities as a means of communication. F.O.S.

**N73-13075** Joint Publications Research Service, Arlington, Va.  
**MOOD AS A FACTOR IN AN OPERATOR'S PERFORMANCE**  
A. S. Yegorov *In its* Selections from *Voyenno-Med. Zh.* no. 8, 1972 17 Nov. 1972 p 63-64

The regulating influence of mood on the effectiveness of performance is discussed in terms of the subject's behavior being directed along a previously prepared path. The effectiveness is presented for definite and indefinite instructions. It is concluded that since the dynamics of test results can be affected by changes in parameters such as regulated or unregulated instructions, it is necessary to maintain a uniform mood in the subject for the entire test period. F.O.S.

**N73-13076\***# Translation Consultants, Ltd., Arlington, Va.  
**POLYVINYLPIRROLIDONE USED AS CRYOPROTECTIVE SUBSTANCE FOR ERYTHROCYTE PRESERVATION**

E. Dobry, J. Livora, V. Sebestik, and J. Jelinek Washington NASA Dec. 1972 8 p refs Transl. into ENGLISH from *Vnitri Lekar. (Brno)*, v. 15, no. 12, 1969 p 1152-1155 (Contract NASw-2038)

(NASA-TT-F-14590) Avail: NTIS HC \$3.00 CSCL 06A

Results obtained with polyvinylpyrrolidone (PVP) used as a cryoprotective substance for erythrocyte preservation were presented. Best in vitro results were obtained by rapid freezing of whole blood with a 9% concentration of PVP. Post-transfusion survival values after 24 hours amounted to approximately 76% of transfused erythrocytes. However, for routine blood transfusion service use the method is not fully satisfactory. Author

**N73-13077\***# Translation Consultants, Ltd., Arlington, Va.  
**MICROELECTROPHORESIS OF HUMAN ERYTHROCYTES: IMPORTANCE AND USES IN OBSTETRICS AND GYNECOLOGY**

I. Sagone and Arrotta Washington NASA Dec. 1972 31 p refs Transl. into ENGLISH from *Ann. Ostet. Ginecol. (Milan)*, v. 89, 1967 p 118-137

(Contract NASw-2038)

(NASA-TT-F-14587) Avail: NTIS HC \$3.75 CSCL 06P

On the basis of already acquired ideas about the subject, the electrophoretic behavior of blood cells during the menstrual cycle, in both normal and pathological pregnancy, and in gynecological affections whether of inflammatory nature or comprising benign or malignant tumors is studied. The method used for the study is described in detail along with the clinical diagnostic implications. Author

**N73-13078\***# Techtran Corp., Glen Burnie, Md.  
**STUDY OF THE RESISTANCE OF CULTURED AND NATURAL MICROBES USING THE ETHYLENE OXIDE STERILIZATION METHOD**

E. Steiger Washington NASA Nov. 1972 16 p refs Transl. into ENGLISH from *Z. Ges. Hygiene Ihre Grenzgebiete (Leipzig)*, v. 17, no. 10, 1971 p 744-749

(Contract NASw-2037)

(NASA-TT-F-14612) Avail: NTIS HC \$3.00 CSCL 06M

Resistance of cultured and natural microbes in the ethylene oxide sterilization method as a prerequisite for a test method corresponding to the special method of action of the killing of microbes is discussed. Natural microbes, dried on filter paper and covered with egg white, proved to be very resistant. The possibility of increasing resistance through manipulation of the number of microbes and the suspension medium is mentioned. It is highly advantageous to cultivate the spore strips on solid media, when the results of the test can be determined after only three days. In testing with spore strips, a much better reproducibility and a much smaller scatter were achieved than with existing spore tests. Author

**N73-13079\***# Scientific Translation Service, Santa Barbara, Calif.  
**THE SCIENTIFIC BASIS OF MINERAL WATER THERAPY, ESPECIALLY THAT OF THE KARLSBAD MUEHLBRUNN**

W. Wiechowski Washington NASA Nov. 1972 10 p Transl. into ENGLISH from *Prager Med. Wochenschr. (Prague)*, no. 24, 1914 p 299-301

(Contract NASw-2035)

(NASA-TT-F-14620) Avail: NTIS HC \$3.00 CSCL 06E

The results of experiments with rabbits given different diets to determine cation changes in the body are presented. Particular attention was given to mineral water drinking diets and their therapeutic value. Author

**N73-13080\***# National Aeronautics and Space Administration, Washington, D.C.

**IN REGARD TO BACTERIAL REDUCTION OF ORGANICALLY BOUND PHOSPHORIC ACID**

H. K. Barrenscheen and H. A. Beckh-Wodmanstetter Dec. 1972 11 p refs Transl. into ENGLISH from *Biochem Z. (Heidelberg)*, v. 149, 1923 p 279-283

(NASA-TT-F-14723) Avail: NTIS HC \$3.00 CSCL 06M

Blondlot-Dusart tests on putrid blood give irrefragable proof that bacteria under anaerobic conditions at suitable temperature are capable of reducing organically bound phosphoric acid sufficiently so as to obtain a positive reaction. Experiments performed on human or canine blood obtained under sterile precautions prove completely negative and it is concluded that the optional anaerobians examined - and belonging to the *Proteus* group - are by themselves not capable for the reduction of phosphoric acid. G.G.

**N73-13081\***# National Aeronautics and Space Administration, Washington, D.C.

**DO MICROBES REDUCE PHOSPHATE?**

F. Liebert Dec. 1972 13 p Transl. into ENGLISH from *Zentr. Bakteriol. Parasitenk., Abt. 2 (Jena)*, v. 72, 1927 p 369-374 (NASA-TT-F-14724) Avail: NTIS HC \$3.00 CSCL 06M

It was derived from thermo-chemical data that phosphate reduction through mannite can never provide the bacteria with a gain in energy and it was further proven that this process, when it takes place, does not proceed analog to the process of denitrification. It was also shown, that the results of Rudakov's analyses do not by themselves constitute proof of a phosphate reduction. By means of several distinct qualitative reactions reduction products of the phosphorous acid were searched for but were never encountered. Author

**N73-13082\***# Oak Ridge National Lab., Tenn.  
**BIOLOGY DIVISION HABROBRACON EXPERIMENT P-1079 Annual Report, 1 Jan. - 31 Dec. 1968**

31 Dec. 1968 35 p refs

(NASA Order W-12792)

(NASA-CR-127142; ORNL-TM-3628) Avail: NTIS HC \$3.75 CSCL 06R

Dosimetric analyses accumulated during the five-year period of the biosatellite program are summarized. These data are from a unique source placed in a unique optical bench, the biosatellite. Thus the multitudinous array of dosimeters was mandatory to give confidence in the experiment. Author

**N73-13083#** RAND Corp., Santa Monica, Calif.  
**INTRINSIC OSCILLATIONS IN NEURAL NETWORKS: A LINEAR MODEL FOR PARALLEL, SINGLE-UNIT PATHWAYS**  
R. J. MacGregor Aug. 1972 28 p refs  
(R-984-RC) Avail: NTIS HC \$3.50

An analytical exploration is presented of neuroelectric oscillation in configurations consisting of two parallel, single-unit pathways feeding back on a single primary cell. A linear model with time-lag is used to derive theoretical maps of the characteristic states of such systems. It was found that increasing the mean interconnection coefficient increases the endurance of the leading characteristic state, and increasing the average interunit conduction time increases the number of states that endure for relatively long times as compared to representative times of the system. A differential in conduction time between two parallel pathways essentially tends (1) to increase the number of characteristic states in a given frequency range; (2) to increase slightly the endurance of a given characteristic state; and (3) to relax somewhat the conditions for stability (except for the case of two parallel excitatory pathways). Author

**N73-13084\*#** Naval Aerospace Medical Research Lab., Pensacola, Fla.  
**SPECIFIC ACUTE LOSSES OF VESTIBULAR FUNCTION IN MAN FOLLOWING UNILATERAL SECTION OF ONE OR ALL COMPONENTS OF THE EIGHTH CRANIAL NERVE**  
Earl F. Miller, II, Jack L. Pulec, James G. Wilcox, and Ashton Graybiel 21 Jan. 1972 20 p refs  
(NASA Order T-81633; NASA Order L-43518)  
(NASA-CR-129672; AD-747627; NAMRL-1156) Avail: NTIS HC \$3.00 CSCL 06P

Vestibular and related responses of four patients before and after partial or complete unilateral sectioning of the VIIIth nerve in the treatment of severe vertigo are compared. Measured responses were evaluated with regard to diagnosing a unilateral disorder. Author

**N73-13085#** Joint Publications Research Service, Arlington, Va.  
**METHODS AND TECHNIQUE OF MACHINE ANALYSIS OF BIOLOGICAL STRUCTURES**  
G. M. Frank and G. R. Ivanitskiy 3 Nov. 1972 28 p refs  
Transl. into ENGLISH from the book "Metody i Tekh. Mashinnogo Analiza Biol. Struktur" Moscow, 1972 28 p  
(JPRS-57418) Avail: NTIS HC \$3.50

The application of electronic computers for automatic analyses of structures observed by means of optical or electron microscopes is studied. Investigations of single layer and multiple layer biological preparations are reported and the automatic analysis of a planar contour for chromosomes is illustrated. Author

**N73-13086\*#** Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.  
**PLANETARY QUARANTINE** Semiannual Review, 1 Jan - 30 Jun. 1971  
30 Jun. 1971 138 p refs  
(Contract NAS7-100)  
(NASA-CR-129793; JPL-900-556) Avail: NTIS HC \$9.00 CSCL 06M

Developed methodologies and procedures for the reduction of microbial burden on an assembled spacecraft at the time of encapsulation or terminal sterilization are reported. This technology is required for reducing excessive microbial burden on spacecraft components for the purposes of either decreasing planetary contamination probabilities for an orbiter or minimizing the duration of a sterilization process for a lander. Author

**N73-13087\*#** BioTechnology, Inc., Falls Church, Va.  
**MEASUREMENT OF OPERATOR WORKLOAD IN AN INFORMATION PROCESSING TASK**

Larry L. Jenney, Harry J. Older, and Bernard J. Cameron  
Washington NASA Dec. 1972 71 p refs  
(Contract NAS1-10118)  
(NASA-CR-2150) Avail: NTIS HC \$3.00 CSCL 05E

This was an experimental study to develop an improved methodology for measuring workload in an information processing task and to assess the effects of shift length and communication density (rate of information flow) on the ability to process and classify verbal messages. Each of twelve subjects was exposed to combinations of three shift lengths and two communication densities in a counterbalanced, repeated measurements experimental design. Results indicated no systematic variation in task performance measures or in other dependent measures as a function of shift length or communication density. This is attributed to the absence of a secondary loading task, an insufficiently taxing work schedule, and the lack of psychological stress. Subjective magnitude estimates of workload showed fatigue (and to a lesser degree, tension) to be a power function of shift length. Estimates of task difficulty and fatigue were initially lower but increased more sharply over time under low density than under high density conditions. An interpretation of findings and recommendations for future research are included. This research has major implications to human workload problems in information processing of air traffic control verbal data. Author

**N73-13088\*#** Techtran Corp., Glen Burnie, Md.  
**IS PHYSICAL AND MENTAL EXHAUSTION CAUSED BY A SHORTAGE OF ATMOSPHERIC IONS?**  
Walter Stark Washington NASA Dec. 1972 6 p Transl. into ENGLISH from Med. Tribune, no. 44, Nov. 1972  
(Contract NASw-2485)  
(NASA-TT-F-14646) Avail: NTIS HC \$3.00 CSCL 06P

Various opinions are weighed and discussed concerning exhaustion caused by atmospheric ion shortage. One view is that shortage of atmospheric ions leads to rapid physical and mental fatigue, states of exhaustion and anxiety, difficulty in sleeping as well as other psychoneurotic and psychosomatic symptoms. A second view states that increased amounts of negative atmospheric ions are supposed to improve physical and mental conditions. Author

**N73-13089\*#** Techtran Corp., Glen Burnie, Md.  
**STUDIES ON PRE-BIOLOGICAL EVOLUTION. 3: BLACK AZULMIC ACIDS OBTAINED FROM AMMONIUM CYANIDE**  
M. Labadie, R. Jensen, and E. Neuzil Dec. 1972 12 p refs  
Transl. into ENGLISH from Biochim. Biophys. Acta (Amsterdam), v. 165, 1968 p 525-533  
(Contract NASw-2037)  
(NASA-TT-F-14640) Avail: NTIS HC \$3.00 CSCL 06A

The interest in azulmic acids is connected with the problem of pre-biological molecular evolution; the hydrolysis of azulmic acids gives rise to several natural amino acids, urea, guanidine, glycoxyamine, and 5-amino 4-imidazole carboxamide. Author

**N73-13090#** Florida Univ., Gainesville. Dept. of Physics and Astronomy.  
**CHARGED PARTICLE IMPACT PHENOMENA FOR RADIO-BIOLOGICAL APPLICATIONS** Progress Report  
Alex E. S. Greene 15 Jun. 1972 51 p refs Sponsored by AEC  
(ORO-3798-52) Avail: NTIS

Progress is reported in the microscopic approach to investigation of the underlying physical mechanisms in radiobiology. In this approach systematic studies of basic atomic molecular cross-sections and energy assignments are applied to energy deposition calculations of interest in radiobiology. Emphasis was placed on the spatial aspects and the biological aspects of the energy deposition problem. NSA

**N73-13091#** Cornell Univ., Ithaca, N.Y.  
**STUDIES OF PHOTOSYNTHETIC ENERGY CONVERSION**  
Comprehensive Three-Year Report, 1 Sep. 1969 - 31 Aug. 1972  
Roderick K. Clayton 31 Aug. 1972 51 p refs

(Contract AT(11-1)-3162)  
(COO-3162-9) Avail: NTIS

The composition, structure, and photochemical mechanisms of photosynthetic membranes and tissues and reaction centers were studied in various strains of bacteria. Data cover electron transfer, absorption band shifts in pigments of rcp, and fluorescence. The effect of antibodies and viruses in such systems was also analyzed. E.H.W.

**N73-13092#** Colorado Univ., Denver. Medical Center.  
**PULMONARY GAS TRANSPORT AND THE REGULATION OF VENTILATION AT REST AND EXERCISE** Annual Progress Report, 1 Jan. - 31 Dec. 1971

Giles F. Filley Jun. 1972 41 p refs  
(Contract DA-49-193-MD-2227)

(AD-746979; PR-4) Avail: NTIS CSCL 06/5

Patients with pulmonary disease and normal men have been studied experimentally to determine, respectively, the pulmonary abnormalities causing arterial hypoxemia and the mechanisms responsible for the hypoxic drive of man during exercise. Forty-seven cases of fibrotic lung disease were analyzed with the aid of a two-compartment lung model which dealt with O<sub>2</sub> and CO<sub>2</sub> exchange deficiencies due to wasted ventilation and shunted blood flow. Carbon monoxide data analysis is not yet finished. Hypoxic and hypercapnic drives were measured in 8 subjects at rest and at 3 levels of supine bicycle exercise. Both the respiratory mass spectrometer and the fuel cell O<sub>2</sub> analyzer underwent substantial improvements during the year.

Author (GRA)

**N73-13093#** Naval Medical Field Research Lab., Camp Lejeune, N.C.

**MAXIMAL OXYGEN INTAKE AS A PREDICTOR OF PERFORMANCE IN RUNNING EVENTS** Final Medical Research Progress Report

Philip J. Rasch Jul. 1972 17 p refs

(AD-746867; PR-22) Avail: NTIS CSCL 06/16

The maximal oxygen intake of Marine Corps enlisted men was assessed by means of a treadmill test and predicted by means of a step test and a bicycle ergometer ride. The subjects then ran 1000 meters, 1.5 miles, and 3 miles. Correlations between the assessed maximal oxygen intakes and the predicted intakes were made. Author (GRA)

**N73-13094#** Columbia Univ., New York. Psychophysics Lab.  
**RANGE AND TIME ESTIMATES OF DYNAMIC VISUAL TARGET**

Eugene Galanter 1 Aug. 1972 22 p refs  
(Contract N00014-67-A-0108-0031)

(AD-747271; PLR-27) Avail: NTIS CSCL 05/10

The report presents data based on field research. Previous data involving the ranging of aircraft by ground observers and of ground targets by aerial observers were extended to the ranging of boats and marine markers by ground observers and aerial observers. Time estimates to impact by aerial observers are also reported. Author (GRA)

**N73-13095#** Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

**FLASHBLINDNESS RECOVERY FOLLOWING EXPOSURE TO CONSTANT ENERGY ADAPTIVE FLASHES** Interim Report  
G. T. Chisum 30 Dec. 1971 29 p refs

(AD-747631; NADC-CS-7135) Avail: NTIS CSCL 06/19

Times required to detect a simple display were measured following exposures to adapting flashes of different durations but equal integrated luminances. The results indicate no consistent variation in response times as a function of flash duration when the total integrated luminance of the flash is constant. The variations which do occur are interpreted as indicating that a strict reciprocity relationship does not apply at very short adapting flash durations. Author (GRA)

**N73-13096#** Technology, Inc., San Antonio, Tex. Life Sciences Div.

**OCULAR EFFECTS OF REPETITIVE LASER PULSES** Final

Report, Apr. 1971 - Jun. 1972

C. H. Skeen, W. Robert Bruce, J. H. Tips, Jr., M. Gearity Smith, and G. G. Garza 30 Jun. 1972 93 p refs  
(Contract F41609-71-C-0018)

(AD-746795) Avail: NTIS CSCL 06/18

An argon-ion laser was used to investigate the ocular effects of repetitive laser pulses on rhesus monkeys. The primate eyes were irradiated by trains of pulses held constant at 10 milliseconds, and the duration of the trains was kept uniform at 0.5 sec. The pulse repetition rate was used as a parameter and this parameter was varied to take on the values of 2 Hz (single pulse), 10 Hz, 100 Hz, 1 kHz and 10 kHz. Retinal burn thresholds were determined based on the 1 hr criterion for the appearance of ophthalmoscopically visible lesions. Author (GRA)

**N73-13097#** Technology, Inc., San Antonio, Tex. Life Sciences Div.

**OCULAR EFFECTS OF NEAR INFRARED LASER RADIATION FOR SAFETY CRITERIA** Final Report, Mar. 1971 - Jun. 1972

C. H. Skeen, W. Robert Bruce, J. H. Tips, Jr., M. Gearity Smith, and G. G. Garza Jun. 1972 86 p refs

(Contract F41609-71-C-0016; AF Proj. 6301)

(AD-746793) Avail: NTIS CSCL 06/18

Ocular effects of near infrared laser radiation were studied using a Nd<sup>3+</sup> - YAG laser which emitted light at a wavelength of 1060 nm in the TEM<sub>00</sub> mode. Retinal burn data were obtained on rhesus monkey eyes with the exposure duration used as a parameter. The exposures were for 1 sec, .1 sec, .01 sec, .001 sec and .000001 sec durations and for trains of the .000001 sec pulses with a pulse repetition rate of 1 kHz lasting for 0.5 sec. Thirty eyes were irradiated for each exposure duration. The data were analyzed to find the energy per pulse corresponding to the retinal burn probability  $P = 0.5$  using (1) a probit analysis and (2) a straightforward arithmetical averaging of the retinal burn thresholds obtained for each eye. Author (GRA)

**N73-13098#** American Inst. for Research, Silver Spring, Md. Inst. for Research in Psychobiology.

**PSYCHOBIOLOGICAL FACTORS ASSOCIATED WITH MONOTONY TOLERANCE** Final Report, 1 Jun. 1971 - 31 May 1972

Thomas I. Myers Jul. 1972 76 p refs

(Contract N00014-71-C-0385; NR Proj. 197-015)

(AD-747272; AIR-R72-1; AIR-26400-7/72-FR) Avail: NTIS CSCL 05/10

The research goal was to identify the characteristics of an individual predictive of his tolerance for extreme monotony, as an eventual aid in the selection of persons for duty in isolated and monotonous settings. Author (GRA)

**N73-13099#** Cincinnati Univ., Ohio.

**INVESTIGATION OF OCULAR HAZARD FROM LASERS IN HUMAN SUBJECTS** Final Report, Aug. 1969 - Dec. 1971

Kenneth Rowe and R. James Rockwell, Jr. May 1972 44 p refs

(Contract F41609-69-C-0052; AF Proj. 6301)

(AD-747058) Avail: NTIS CSCL 06/16

Results are presented of experimental studies to determine the threshold level for minimal retinal lesions produced in the human eye by argon laser radiation. A description is given of the equipment used and the method of data recording. Data from patients suffering from diabetic retinopathy was compared with data from non-diabetic patients. The lesion formation threshold level on one volunteer with a perfectly normal eye was noted. One year following the exposures pigment formation was observed. Author (GRA)

**N73-13100#** George Washington Univ., Washington, D.C.

**DYSBARIC OSTEONECROSIS: AN ANNOTATED BIBLIOGRAPHY WITH PRELIMINARY ANALYSES**

Margaret F. Werts and Charles W. Shilling 31 Jul. 1972 76 p refs

(Contract N00014-67-A-0214-0009)

(AD-747258; GW-BSCP-72-10P) Avail: NTIS CSCL 06/5

The citations and abstracts are arranged alphabetically by the author's last name. A preliminary analysis of the material is presented in order to provoke discussion and as a suggestion for future in-depth analyses. This material is presented as the second part of the report. GRA

**N73-13101#** Louisiana State Univ., Baton Rouge. Coll. of Engineering.

**A DETERMINISTIC MODEL OF A HUMAN PERFORMING COMPENSATORY TRACKING**

J. A. Planchard, J. Barzniji, and T. Perkins 3 Aug. 1972 58 p refs

(Contract F44620-68-C-0021; AF Proj. 9769; Proj. Themis) (AD-746725; LSU-T-TR-49; AFOSR-72-1349TR) Avail: NTIS CSCL 05/10

A non-linear, continuous model of well-trained human operator performing a compensatory tracking task was developed. This model, which consists of a tracking of an acquisition mode, satisfactorily tracks a low level fly-by simulation of a high performance aircraft. The model successfully simulates the measured performance of actual operators for a variety of flight paths. A real time simulation of the tracking system, with actual operators in the tracking loop, was programmed on the LSU hybrid computer. These data were used to authenticate parameters used in the above model. Author (GRA)

**N73-13102#** Army Foreign Science and Technology Center, Charlottesville, Va.

**A COMPARATIVE EVALUATION OF THE ENERGY OF LETHAL DOSES OF GAMMA RADIATION, VISIBLE LIGHT AND THE ENERGY OF CELLULAR BASAL METABOLISM**

M. I. Ozerskii 17 Apr. 1972 8 p refs Transl. into ENGLISH from Sb. Tr. po Agron. Fiz., Vses. Akad. Sel'skokhoz. Nauk (Khoz), no. 17, 1969 p 51-53

(AD-746750; FSTC-HT-23-322-72) Avail: NTIS CSCL 06/18

A comparison is made of the energy of lethal doses of gamma radiation and visible light. It is determined that the energy of the lethal dose of gamma radiation is many orders of magnitude lower than the energy of a lethal dose of visible light and the energy of the basal metabolism of a cell. Author (GRA)

**N73-13103#** Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

**THE EFFECTS OF REINFORCEMENT AND RESPONDING TO BOTH SIGNAL AND NON-SIGNAL EVENTS ON VIGILANCE PERFORMANCE**

Daisuke B. Nakashima and Charles G. Halcomb 1972 17 p refs

(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81-A; Proj. Themis) (AD-747798) Avail: NTIS CSCL 05/10

In the standard vigilance task, subjects are provided with a single response button and instructed to respond to the presentation of a signal stimulus. This response has been used as the primary measure of the more continuous responding to the visual display. Some question has arisen, however, as to the appropriateness of this response. Author (GRA)

**N73-13104#** Texas A&M Univ., College Station. Dept. of Industrial Engineering.

**EFFECTS OF PROLONGED STRESS ON STEROID LEVELS IN PAROTID FLUID M.S. Thesis**

Russell C. Hutcherson Dec. 1971 44 p refs Sponsored in part by Army

(AD-747682) Avail: NTIS CSCL 05/10

Ten subjects of approximately the same age, size, and education group were exposed to an unchanging mental stress for a two hour period. Using sour candies to stimulate parotid gland activity, parotid fluid samples were collected at thirty minute intervals. Statistical analysis of the steroid levels showed that there was no significant change in cortisol levels in parotid fluid over the two hour sampling period. Author (GRA)

**N73-13105#** Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

**THE EFFECTS OF NOISE AND RESPONSE COMPLEXITY UPON VIGILANCE PERFORMANCE**

Jerry M. Childs and Charles G. Halcomb 1972 24 p refs Presented at the Southwestern Psychol. Assoc. Conv., Oklahoma City, Apr. 1972

(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81-A; Proj. Themis) (AD-747797) Avail: NTIS CSCL 05/10

Visual vigilance (detection) performance of 140 Ss was investigated with respect to environmental stimulation (noise) and intraorganismic stimulation (simple vs. complex response). Correct detections and false alarms were analyzed. Results are evaluated in terms of the activation hypothesis. Author (GRA)

**N73-13106#** Naval Aerospace Medical Research Lab., Pensacola, Fla.

**HUMAN HEAD AND NECK RESPONSE TO IMPACT ACCELERATION**

Channing L. Ewing and Daniel J. Thomas Aug. 1972 386 p Prepared jointly with Army Aeromedical Research Lab.

(AD-747988; NAMRL-MONO-21; USAARL-73-1) Avail: NTIS CSCL 06/19

A methodical investigation and measurement of human dynamic response to impact acceleration was conducted. Linear accelerations were measured on the top of the head, at the mouth, and at the base of the neck. Angular velocity was also measured at the base of the neck and at the mouth. A redundant photographic system was used for validation. All data were collected in computer-compatible format and data processing was by digital computer. Selected data analysis on 41 representative human runs involving 12 subjects of the 236 human runs completed to date are presented. Description of the experimental design, data collection and processing is given in detail. Ancillary research efforts in support of the program are also described. Representative plots of the human kinematic response are presented, discussed, and compared. Repeatability and quality control plots are also presented. There are a total of 755 computer drawn plots illustrating a characteristic, repeatable response of human subjects to impact acceleration. Author (GRA)

**N73-13107#** California Univ., Los Angeles. School of Engineering and Applied Science.

**UNDERWATER WORK PERFORMANCE AND WORK TOLERANCE**

Glen H. Egstrom, Gershon Weltman, Allan D. Baddeley, William J. Cuccaro, and Michael A. Willis Jul. 1972 64 p refs

(Contract N00014-69-A-0200-4034; NR Proj. 196-100) (AD-747701; UCLA-ENG-7243; TR-51) Avail: NTIS CSCL 06/19

The report presents findings of the research efforts for 1971 in the study of underwater work performance and work tolerance conducted at the University of California, Los Angeles. The studies were directed towards the development of performance decrement curves related to the specific variables which affect underwater work. Experiments designed to add to the body of knowledge necessary to the formation of decrement curves were conducted. The experiments examined: (a) the effect of cold-water exposure upon memory, reasoning ability, and vigilance, (b) the effect of depth upon memory, (c) wet vs. dry training for a specific underwater task, and (d) the physiological and performance effects of heliox as a breathing gas in cold water. Author (GRA)

**N73-13108#** Connecticut Coll., New London. Dept. of Psychology.

**DEVELOPMENT OF TECHNIQUES FOR MEASURING PERFORMANCE IN THE UNDERSEA ENVIRONMENT Final Report, 1 Mar. 1970 - 31 Oct. 1971**

John R. Mackinnon 15 Apr. 1972 10 p refs

(Contract N00014-70-C-0244) (AD-748036) Avail: NTIS CSCL 05/10

The overall objective of the project was to develop precise, reliable techniques for monitoring changes in human performance

during exposure to unusual environmental conditions. Specifically, this research was designed to provide base-line information on the usefulness of a selected task as an instrument in assessing performance degradation under adverse conditions germane to the diving situation. The task selected for investigation was a modified version of the Stroop Color-Word Interference Test (CWIT). Experiments conducted were designed to determine the efficiency of this test in evaluating the effects of environmental and psychological stress on cognitive functioning. GRA

**N73-13109#** Air Force Weapons Lab., Kirtland AFB, N.Mex.  
**WATERFOWL MIGRATION CORRIDORS** Technical Report,  
1 Jul. - 23 Aug. 1972

Robert C. Beason Aug. 1972 12 p refs  
(AF Proj. 68M3E02)

(AD-748114; AFWL-TR-72-166) Avail: NTIS CSCL 06/3

Migration corridors and their densities for ducks and geese, wintering population densities, and some information on the influence of weather on migration are presented. The relationship of bird migrations to aviation safety is discussed.

Author (GRA)

**N73-13110#** Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.

**VIGILANCE PERFORMANCE AS A FUNCTION OF TYPE AND LATENCY OF RESPONSE TO THE SIGNAL EVENT**

Daisuke B. Nakashima and Charles F. Halcomb 1972 8 p  
(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81-A; Proj. Themis)

(AD-747801) Avail: NTIS CSCL 05/10

Investigations of vigilance performance have typically required subjects to make overt responses to the signal events only. When an overt response is not made to the stimulus, it is assumed that the subject observed the stimulus and decided that it was not a signal. A different approach to the study of vigilance has been to require responses to both signal and non-signal events. The investigations indicate that in general, the additional response requirement does not change the characteristic performance demonstrated in vigilance tasks. False alarms made by subjects responding to both signal and non-signal events are discussed.

Author (GRA)

**N73-13111#** Texas A&M Univ., College Station. Dept. of Industrial Engineering.

**EVALUATING THE USE OF PAROTID FLUID ANALYSIS AS A MEASURE OF TASK DIFFICULTY** M.S. Thesis

Larry W. Williams 1971 63 p refs Sponsored by Army

(AD-747671) Avail: NTIS CSCL 05/10

The purpose of the paper was to determine the usefulness of the parotid fluid analysis technique in measuring mental stress. Ten subjects were used in the experimental portion of this work. Three levels of stress were set up. A low stress level was taken with the subjects at rest. The medium and high stress levels were set up using 30 and 60 revolutions per minute respectively on a rotary pursuit tracking task. Parotid fluid was collected for a 30 minute period at each of the three stress levels for each subject. The chemical analysis of the parotid fluid was carried out to determine the concentrations of corticosteroids (17-OHCS) in the parotid fluid samples. Mathematical analysis of the data indicated that there was no change in the 17-OHCS level as a result of increased stress levels. The results were attributed to using a tracking task lacking sufficient difficulty to produce mental stress. Author (GRA)

**N73-13112#** Texas Univ., Austin. Electronics Research Center.

**THE DESIGN AND EVALUATION OF AN ARTIFICIAL EAR**

Harry L. Record and E. L. Hixson 20 Apr. 1972 77 p refs

Prepared in cooperation with Tracor, Inc., Austin, Tex.  
(Contract F44620-71-C-0091)

(AD-746691; AFOSR-72-1117TR; TM-32) Avail: NTIS CSCL 06/5

A wideband artificial ear for the calibration of supraaural audiometric earphones was designed and constructed. The device

consisted of three acoustically coupled cavities, and was designed to possess the acoustic impedance of an average human ear as seen by a standard supraaural earphone. An acoustic impedance measuring device was developed to aid in the evaluation of this artificial ear. Plots of experimentally determined acoustic impedance of this and other artificial ears are presented and discussed. Comparison of the experimentally determined acoustic impedance of the subject artificial ear with design values showed general agreement. It was concluded that lumped parameter representation of acoustic impedances, and the ability to measure acoustic impedance accurately and rapidly, are valuable tools for the development of complex acoustic systems.

Author (GRA)

**N73-13113#** Stanford Research Inst., Menlo Park, Calif.  
**MAMMAL UNDERWATER ACOUSTICS** Final Report,

1 Jan. - 31 Dec. 1971

Ronald J. Schusterman 18 Jul. 1972 28 p refs  
(Contract N00014-72-C-0173; SRI Proj. LSU-1071)

(AD-746520) Avail: NTIS CSCL 06/3

Underwater signal-detection performance of sea lions was influenced by changes in the probability of signal presentation in both acoustic and visual tasks. Normally, marine mammals in a signal-detection task maintain a low level of false alarms while attempting to maximize their correct detections or hits. It was shown that such an objective in a marine mammal (the California sea lion) can be changed without, in some instances, changing the animal's sensitivity. Thus, by changing its response criterion as a function of varying the probability of signal presentation, a set of probability limits could be induced into a sea lion regarding the acceptance or rejection of signal presence or signal difference. By relating the probability of hits to false alarms for several signals of varying magnitude, one can plot the receiver-operating-characteristic (ROC) curves for sea lions. Author (GRA)

**N73-13114\*** General Electric Co., Philadelphia, Pa.

**REACTION TESTER** Patent

Harry H. Brown, inventor (to NASA) Issued 17 Oct. 1972 5 p  
Filed 7 Oct. 1970 Supersedes N72-15097 (10 - 06, p 0727)

Sponsored by NASA

(NASA-Case-MS-C-13604-1; US-Patent-3,698,385;

US-Patent-Appl-SN-78717; US-Patent-Class-128-2N;

US-Patent-Class-35-22R; US-Patent-Class-273-1E) Avail: US Patent Office CSCL 05E

A reaction tester is disclosed for testing the simple and disjunctive reaction of a subject to light stimuli. The tester is in the form of a bar which has spaced grooves for receiving the index fingers of a subject. Near the bottom of each groove are openings aligned along a transverse axis to a groove and a light beam is projected through the openings to a photo transistor. The subject's finger breaks the light beam and when the finger is moved relative to the groove, the light beam actuates the transistor. A logic circuit is provided to interconnect the reaction key to a panel having neon light indicators. A ready, left and right neon light indicators are selectively actuatable. The ready light informs the subject that the test will begin. Next, either the left or right or both lights are actuated through the logic circuit. A counter is started and when the subject reacts by moving the correct finger, the light indicator is extinguished and the counter is stopped. An incorrect reaction causes an error indicator to operate. Official Gazette of the U.S. Patent Office

**N73-13115\*** Techtran Corp., Glen Burnie, Md.

**PNEUMATIC PROSTHESIS CONTROL**

C. E. Beckmann Washington NASA Nov. 1972 6 p Transl. into ENGLISH from Tech. Rundsch. (Bern), no. 22, 26 May 1972 p 41

(Contract NASW-2037)

(NASA-TT-F-14628) Avail: NTIS HC \$3.00 CSCL 06B

The pneumatic control of a prosthetic arm and its application to industrial handling problems are discussed. E.H.W.

**N73-13116\*** Scientific Translation Service, Santa Barbara, Calif.  
**TIME ZONES AND SPORT**

Guilherme S. Gomes Washington NASA Dec. 1972 6 p

Transl. into ENGLISH from Rev. Brasil. Pesqui. Med. Biol. (Rio de Janeiro), v. 26, no. 12, 1969 p.708-710  
(Contract NASw-2035)

(NASA-TT-F-14632) Avail: NTIS HC \$3.00 CSCL 05E

The effect of abrupt changes in environment on the athlete's organs, systems, and performance are discussed. Only differences in the behavior of the athletes caused by differences in time zones, and not those associated with altitude and/or climate, are considered. It was suggested that air trips be taken in stages of less than four time zones and that the athlete be guaranteed a period of two days per time zone crossed, so changes are gradual before he has to exert himself to full capacity. It was also suggested that one not mistake acclimatization for adaptation, since the former is the effect of becoming used to a different climate, i.e., a biological process by which the athlete becomes used to a new environment, while the latter (adaptation) is the preparation of the athlete to accommodate his organism to the new medium. Author

N73-13117# Aeronautical Systems Div., Wright-Patterson AFB, Ohio:

**PILOT PERFORMANCE AS A FUNCTION OF THREE TYPES OF ALTITUDE DISPLAYS** Final Report, 4 Jan. - 1 Apr. 1972

Robert C. Pangburn, Thomas R. Metzler, and Jane M. Kline Aug. 1972 78 p refs Sponsored by FAA  
(Contract F33615-71-C-1921)

(ASD-TR-72-63; FAA-RD-72-130) Avail: NTIS HC \$6.00

A series of missions was flown to compare pilot performance on three altimeters: (1) AAU-19, (2) 3-inch tape, and (3) digital readout. Using a C-135B simulator, each subject flew a series of missions simulating actual procedures used in take-off, flight, and landing maneuvers. The subjects were task-loaded to prevent over concentration on altitude performance. Performance data were based on the pilot's ability to maintain altitudes specified by the ground control operator during various mission phases. From evaluation of the performance data, it was concluded that within the experimental test envelope with optimal flying conditions and high task loading the digital readout was superior to the other two instruments tested; however, the AAU-19 and 3-inch tape were within acceptable limits. Author

N73-13118# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Inst. fuer Flugfuehrung.

**ASSESSMENT OF COCKPIT DISPLAYS**

Ralf Beyer 1972 30 p refs In GERMAN; ENGLISH summary Presented at the 5th Ann. DGLR Meeting, Berlin, 4-6 Oct. 1972 (DGLR-Paper-72-97) Avail: NTIS HC \$3.50

Different methods are presented for the assessment and evaluation of electronic cockpit displays. Particular emphasis is placed on control technology, experimental psychology, and subjective rating. The survey is supported by results from various experiments. Author (ESRO)

N73-13119# California State Univ., Long Beach. Dept. of Biology.

**AN 8-CHANNEL, ULTRASONIC, MARINE BIO-TELEMETRY TRANSMITTER UTILIZING C/MOS (COMPLEMENTARY METAL-OXIDE SEMICONDUCTOR) DIGITAL INTEGRATED CIRCUITS**

Donald W. Ferrel and Donald R. Nelson Sep. 1972 12 p refs

(Contract N00014-68-C-0318; NR Proj. 104-062)

(AD-748605; TR-6) Avail: NTIS CSCL 06/2

Up to 8 multiplexed channels of shark behavioral data at sea are obtained with a 40 kHz acoustic transmitter with a range exceeding 5 km and a life of up to 1 week. Conservation of battery power is achieved with complementary metal-oxide semiconductor (C/MOS) integrated circuits and pulse-interval data format of 10 ms pulses at intervals between 200 ms and 2 sec. A multivibrator oscillator is used to control the operating frequency which is essentially independent of temperature and pressure, and decreases slightly with battery voltage (less than

800 Hz/2-volt drop). An optional crystal oscillator maintains constant frequency. The pulse repetition rate is not significantly affected by voltage, pressure, and temperature. Fail safe devices ensure operation in the event of sensor or multiplexer failure.

Author (GRA)

N73-13120# Missouri Univ., Columbia. Space Sciences Research Center.

**CHRONIC OXYGEN ELECTRODES: A FEASIBILITY STUDY Final Report**

Allen W. Hahn, Ronald E. Barr, and Kenneth G. Mayhan 15 Jul. 1972 50 p

(Contract DADA17-71-C-1104)

(AD-748422) Avail: NTIS CSCL 06/2

The feasibility of obtaining stable oxygen electrodes by coating with a plasma catalyzed polymer film was studied. These electrodes are to be used for chronic in vivo measurement of tissue oxygen tension. The application of the film was tested on both disc-shaped and needle-type platinum oxygen reducing polarographic electrodes in simulated biological media. It was shown that a uniform polymer film of 1-2 micrometers could be applied to the sensing surface. This could be done, however, only if the surface was cleaned by hydrofluoric acid etching. Results of testing coated electrodes showed a significant reduction in noise output and increased electrode stability. From the preliminary feasibility study, it was concluded that plasma deposited polymer films as an electrode coating is a practical technique. Author (GRA)

N73-13121# Illinois Univ., Savoy. Aviation Research Lab.

**RESEARCH AND THE FUTURE OF ENGINEERING PSYCHOLOGY**

Jack A. Adams Sep. 1971 21 p refs Presented at Soc. of Eng. Psychologists, Div. 21 of the Am. Psychological Assoc., 4 Sep. 1971

(Contract F44620-70-C-0105; AF Proj. 9778)

(AD-748237; ARL-71-19/AFOSR-71-6; AFOSR-72-1662TR) Avail: NTIS CSCL 05/5

The vigor of engineering psychology as an applied discipline in engineering and psychology is dependent upon the robustness of the scientific knowledge that it applies to the design of man-machine systems. As a field, engineering psychology mostly has its practitioners applying knowledge and comparatively few generating new knowledge, with the result that the capability for system innovation is not as strong as it should be. Project Hindsight of the Department of Defense and Project TRACES of the National Science Foundation show that rather long-term basic and applied research is necessary for generating the knowledge that brings impressive innovations in products. The demands of product development have called for too much short-term research and too little long-term research of the kind most effective for producing important innovations in new systems. Several remedial courses of action are considered. Author (GRA)

N73-13122# Defense Documentation Center, Alexandria, Va. **PERFORMANCE FACTORS IN UNDERWATER ENVIRONMENT** Report Bibliography, Mar. 1942 - Sep. 1971

Aug. 1972 192 p refs

(AD-748000; DDC-TAS-72-42) Avail: NTIS CSCL 06/19

The 156 references in this bibliography include information on the effects of underwater environment on divers, on tools and equipment, and on human factors aspects of underwater performance. Corporate Author-Monitoring Agency and Subject Indexes are included. Author (GRA)

N73-13123# Naval Personnel and Training Research Lab., San Diego, Calif.

**TECHNICIAN REQUIREMENTS FOR MAINTENANCE OF MICROELECTRONICS EQUIPMENT IN THE FLEET**

J. H. Steinemann and J. D. Coady Jul. 1972 26 p refs

(AD-748040; SRR-73-2) Avail: NTIS CSCL 05/9

The increasing development and utilization of microelectronic technology in Navy shipboard equipments imposes changing demands upon the technical personnel force needed to meet

fleet electronics maintenance responsibilities. The investigation assessed the present and near-future maintenance task requirements of microelectronics equipments and evaluated the extent to which shipboard technicians are qualified to meet assigned maintenance responsibilities. Evaluative information and data were obtained through a series of visits to area electronics facilities and by a questionnaire survey of Pacific Fleet technicians responsible for microelectronics equipment maintenance.

Author (GRA)

**N73-13124#** School of Aerospace Medicine, Brooks AFB, Tex.  
**THE RECORDING OF CARDIAC RHYTHMS ON A MAGNETIC TAPE FOR LATER COMPUTER INPUT ANALYSIS**

Yu. V. Terekhov and I. I. Funtova 1972 7 p ref Transl. into ENGLISH from *Matematicheskie Metody Analiza Serdechnogoritna*. Moscow: (USSR), 1968  
(AD-748105; SAM-TT-R-1144-0972) Avail: NTIS CSCL 06/12

The report describes the development of a system of recording ecgs on magnetic tape, using tape recorders of the type comet, yauza 5, and yauza 10, with the help of an ink-recording electrocardiograph of the O47 type. Presented is a description of the system, usable for dual-channel recording on the yauza-10 recorder. To record ecgs on tape recorders, one uses the frequency-modulation method on the electro-physical signal. In playback, or on entry into computer from magnetic tape, demodulators were used. GRA

**N73-13125#** Navy Clothing and Textile Research Unit, Natick, Mass.

**ENVIRONMENTAL CONTROL UNIT FOR DAMAGE CONTROL SUIT SYSTEM**

George M. Orner and Norman F. Audet Jul. 1972 35 p refs  
(AD-749025; TR-101; Rept-2-71) Avail: NTIS CSCL 13/1

The Navy Clothing and Textile Research Unit (NCTRU) has developed an Environmental Control Unit (ECU) for a life support system which was designed primarily for shipboard operations, such as damage control, rescue, and engineroom use, particularly during shutdown periods. The purpose of the ECU is to control the environment within a fully enclosed, impermeable Damage Control Suit (DCS). This ECU uses wet ice in finned canisters for cooling purposes. Closed circuit, forced ventilation is effected with a battery powered fan. An easily replaceable chemical pack containing lithium hydroxide and potassium superoxide provides for carbon dioxide removal and replenishment of oxygen. A highly efficient oxygen-sensing warning device constantly monitors oxygen level within the suit.

Author (GRA)

**N73-13126#** Illinois Univ., Savoy. Aviation Research Lab.  
**SIMULATOR MOTION AS A FACTOR IN FLIGHT-DIRECTOR DISPLAY EVALUATION**

Robert S. Jacobs, Robert C. Williges, and Stanley N. Roscoe Feb. 1972 31 p refs  
(Contracts N00014-67-A-0305-0014; F44620-70-C-0105; NR Proj. 196-092)  
(AD-749370; ARL-72-1/ONR-72-1/AFOSR-72-1) Avail: NTIS CSCL 05/9

The results of research conducted in ground-based flight simulators must be interpreted with care in view of the potential effects of differences between the simulated and actual flight environments. A study comparing various flight-director displays in a moving-base simulator was replicated without motion. Significantly different results occurred as a function of the presence or absence of motion. Implications of these results raise doubt concerning the validity of findings from simulator experiments in which whole-body acceleration cues might be a factor.

Author (GRA)

**N73-13848\*** Research Triangle Inst., Durham, N.C. Biomedical Application Team.

**ADVANCEMENTS IN MEDICINE FROM AEROSPACE RESEARCH**

F. Thomas Wooten /in NASA. Marshall Space Flight Center Space for Mankind's Benefit 1972 p 215-220

(Contract NASw-2273)  
CSCL 06E

**N73-13849\*** General Electric Co., Philadelphia, Pa. Missile and Space Div.

**DOMESTIC APPLICATIONS FOR AEROSPACE WASTE AND WATER MANAGEMENT TECHNOLOGIES**

Frank DiSanto and Robert W. Murray /in NASA. Marshall Space Flight Center Space for Mankind's Benefit 1972 p 221-230 refs  
CSCL 06I

**N73-13850\*** International Business Machines Corp., Armonk, N.Y. Health Sciences.

**BREATHING METABOLIC SIMULATOR**

Roscoe G. Bartlett, Jr., C. M. Hendricks, and W. B. Morison /in NASA. Marshall Space Flight Center Space for Mankind's Benefit 1972 p 231-235

CSCL 06B

**N73-13851\*** National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

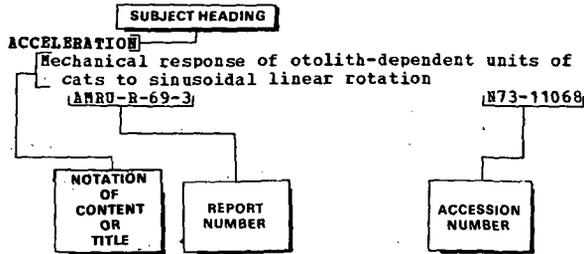
**MEDICAL TECHNOLOGY ADVANCES FROM SPACE RESEARCH**

Sam L. Pool /in its Space for Mankind's Benefit 1972 p 237-244 refs  
CSCL 06B

# Subject Index

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl. 113) MARCH 1973

## Typical Subject Index Listing



The Notation of Content (NOC), rather than the title of the document, is usually used to provide a more exact description of the subject matter. (AIAA occasionally uses the title in lieu of the NOC). The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

## A

- ABIOTENESIS**  
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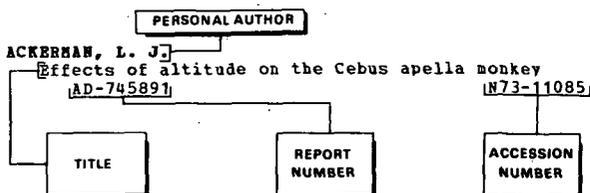
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