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N73-26055

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 114)

APRIL 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (114)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 114)

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 March 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 342 reports, articles and other documents announced during March 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.

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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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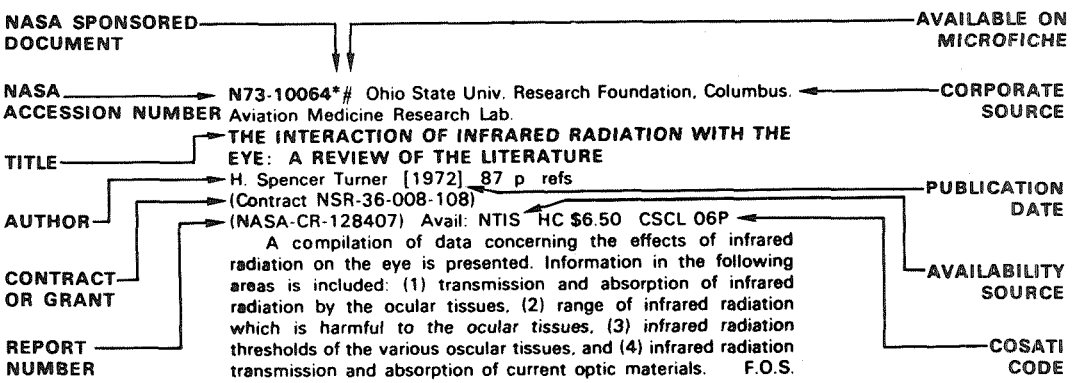

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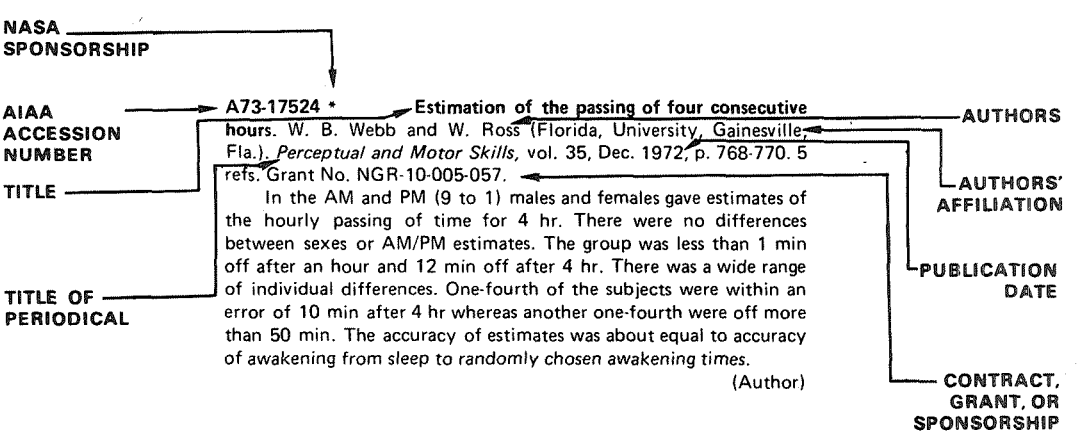

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 114) APRIL 1973

IAA ENTRIES

A73-16090 **Effect of lunar soil on radiation injuries in mice.** V. V. Antipov, B. I. Davydov, N. A. Gaidamakin, T. S. L'vova, V. G. Petrukhin, S. N. Komarova, and E. B. Skvortsova. *(Kosmicheskie Issledovaniia,* vol. 10, May-June 1972, p. 439-449.) *Cosmic Research,* vol. 10, no. 3, Dec. 1972, p. 394-402. 8 refs. Translation.

Survival rates and peripheral blood responses to gamma radiation were not changed when fine lunar rock material was introduced aerogenically, orally, or abdominally into mice. Weight gain was lower in irradiated mice after inhalation or oral intake of lunar material. Neoplasms have developed in some of the mice after contact with lunar material. V.Z.

A73-16151 **Deep hypothermia induced in the golden hamster by altering cerebral calcium levels.** R. D. Myers and J. E. Buckman (Purdue University, Lafayette, Ind.). *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1313-1318. 36 refs. NSF Grant No. GB-24592; Contract No. N00014-67-A-0226-0003.

A73-16152 **Oxidation of leucine by rat skeletal muscle.** R. Odessey and A. L. Goldberg. *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1376-1383. 46 refs. Research supported by the Muscular Dystrophy Associations of America and U.S. Air Force.

In the isolated rat diaphragm, carbon-14 dioxide production from L-leucine-1-C-14 occurred at 86% of the rate of its incorporation into protein. Experiments with L-leucine-U-C-14 indicate complete oxidation of leucine under these conditions. Carbon-14 dioxide production from leucine-1-C-14 was inhibited slightly by glucose (15%) but not by acetate, pyruvate, beta-hydroxbutyrate, or palmitate. Amino acids at plasma concentrations inhibited carbon-14 dioxide production (30-40%) without affecting protein synthesis. Cycloheximide blocked incorporation into protein but stimulated carbon-14 dioxide production, whereas cyanide and iodoacetate inhibited both processes. (Author)

A73-16153 **Oxidation of amino acids by diaphragms from fed and fasted rats.** A. L. Goldberg and R. Odessey. *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1384-1391. 33 refs. Research supported by the Muscular Dystrophy Associations of America and U.S. Air Force.

The oxidation of L-amino-C-14 acids was studied in isolated diaphragms from fed and fasted rats. During a 90-min incubation, diaphragms from fed rats produced carbon-14 dioxide from leucine-1-C-14, isoleucine-1-C-14, valine-1-C-14, alanine-1-C-14, glutamate-U-C-14, and aspartate-U-C-14 at a comparable or greater rate than they incorporated label into protein. By contrast, muscle degraded to CO2 less than 5% of the glycine, serine, and proline entering the tissue and none of the threonine, lysine, methionine, phenylalanine, histidine, tyrosine, and tryptophan. It is suggested that the increased capacity of kidney and muscle to degrade branched-chain amino acids is an important adaptation to starvation. (Author)

A73-16154 **Effects of hypoxemia and acute coronary occlusion on myocardial metabolism in dogs.** A. F. Whereat and A. Chan (Pennsylvania, University, Philadelphia, Pa.). *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1398-1406. 47 refs. Grants No. PHS-HE-08805; No. PHS-HE-05239.

Four pairs of redox substrates were measured on the arterial and venous sides of hearts in intact anesthetized dogs following hypoxemia and myocardial infarction. Hypoxemia caused increased lactate/pyruvate, beta-hydroxybutyrate/acetoacetate, and glutamate/alpha-ketoglutarate ratios in the arterial blood. The arterial pyruvate and dihydroxyacetone phosphate concentrations increased modestly in response to hypoxemia; however, hypocapnia and respiratory alkalosis, either alone or plus hypoxemia, caused a much larger increase in arterial pyruvate and a ninefold increase in dihydroxyacetone phosphate concentration. (Author)

A73-16155 **Myosin ATPase and fiber composition from trained and untrained rat skeletal muscle.** G. J. Bagby, W. L. Sembrowich, and P. D. Gollnick (Washington State University, Pullman, Wash.). *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1415-1417. 19 refs.

Myosin ATPase and fiber composition were determined in the gastrocnemius muscle of sedentary, endurance-trained, and sprint-trained rats. Muscle fiber types were identified histochemically as slow or fast twitch on the basis of myosin ATPase activity. No changes in the percentage of the two fiber types existed in either the red or white regions of the gastrocnemius muscle among the three experimental groups. These results indicate that no change in myosin ATPase or fiber composition occurs in rat skeletal muscle following strenuous training. (Author)

A73-16156 **Energy balance and lactic acid production in the exercising rabbit.** M. J. Kluger, E. R. Nadel, M. Hitchcock, and J. A. J. Stolwijk (Yale University, New Haven, Conn.). *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1451-1454. 9 refs. Grant No. NIH-ES-00123.

Three male New Zealand white rabbits ran in an exercise wheel at 1.4 km/hr at ambient temperatures of 10, 20, and 30 C. Two rabbits consistently ran for less than 10 min before becoming exhausted; one ran as long as 30 min and did not fatigue. Fatigue was associated with high levels of arterial lactic acid but not necessarily high internal body temperature. The lactate levels in the exhausted

rabbits (ca. 100 mg/100 ml) were similar to the levels found in exhausted human subjects. (Author)

A73-16157 Effects of physical training on cardiac actomyosin adenosine triphosphatase activity. A. K. Bhan and J. Scheuer (Pittsburgh, University, Pittsburgh, Pa.). *American Journal of Physiology,* vol. 223, Dec. 1972, p. 1486-1490. 42 refs. Research supported by the American Heart Association.

Actomyosin ATPase activities were studied in the hearts of rats that were conditioned by swimming 90 min/day for 4, 6, and 8 weeks and compared with activities in hearts of sedentary controls. Rats were also made to swim 150 min daily for 8 weeks to assess the effect of severity of exercise on ATPase activity. Calcium-activated ATPase activity showed a progressive increase after 6 weeks of conditioning. Magnesium-activated ATPase activity was significantly increased in both of the 8-week groups. The maximum increases in activity were observed in the group made to swim 150 min daily for 8 weeks. (Author)

A73-16247 # *Muscle metabolites with exhaustive static exercise of different duration.* J. Karlsson and B. Ollander (Gymnastik- och Idrottshogskolan, Stockholm, Sweden). *Acta Physiologica Scandinavica,* vol. 86, Nov. 1972, p. 309-314. 15 refs. Research supported by the Swedish Sport Federation; Swedish Medical Research Council Grant No. 40X-2203.

Concentrations of ATP, CP, glycogen and lactate were determined in the lateral portions of the thigh at rest and at different percents (75, 50, 25 and 10%) of the individual maximal voluntary isometric contraction (MVC). Endurance times were 0.5, 1.6, 5.8 and 38.7 min, respectively. A phosphagen depletion of 15 mmol/kg wet muscle and a lactate accumulation of 20 mmol/kg was obtained only with the 50% MVC which is similar to what is observed with short time exhaustive bicycle exercise. At both higher and lower intensities, phosphagen depletion and lactate accumulation were less. (Author)

A73-16248 # Functional dependence of the ciliary epithelium ATPase activity and intraocular pressure on the autonomic nervous system. M. Harkonen, A. Palkama, and R. Uusitalo (Helsingin Yliopisto, Helsinki, Finland). *Acta Physiologica Scandinavica,* vol. 86, Nov. 1972, p. 327-341. 45 refs. Research supported by the Sigrid Juselius Foundation, Valtion Laaketieteellinen Toimikunta, and Finnish Eye Foundation.

A73-16249 # The dynamic properties of the acoustic middle ear reflex in nonanesthetized rabbits - Quantitative aspects of a polysynaptic reflex system. E. Borg (Kungl. Karolinska Medico-Kirurgiska Institutet, Stockholm, Sweden). *Acta Physiologica Scandinavica,* vol. 86, Nov. 1972, p. 366-387. 38 refs.

A73-16250 # Extent of engagement of various cardiovascular effectors to alterations of carotid sinus pressure. E. Kendrick, B. Oberg, and G. Wennergren (Goteborg, Universitetet, Goteborg, Sweden). *Acta Physiologica Scandinavica,* vol. 86, Nov. 1972, p. 410-418. 17 refs. Research supported by the Universitetet i Goteborg, Magnus Bergwalls Stiftelse, and Wilhelm och Martina Lundgrens Vetenskapsfond; Swedish Medical Research Council Grant No. B70-14X-644-06.

A73-16306 Life in the Universe. F. D. Kahn (Manchester, Victoria University, Manchester, England). In: The emerging universe: Essays on contemporary astronomy.
Charlottesville, University Press of Virginia, 1972, p. 71-89.

It is noted that stars, planets, and living systems are all physical objects made up of very many separate particles. The crucial difference between such systems lies not in just how many particles each system contains, but in the manner in which it is organized. There are four basic kinds of force between material particles that are of importance. They are due to gravitational, electromagnetic, nuclear, and weak interactions. It is suggested that the best chance of finding a living system is to look among the planets of single stars whose masses are within 50% or so of the mass of the sun. F.R.L.

A73-16324 Memory and hibernation in Citellus lateralis. M. C. McNamara and M. L. Riedesel (New Mexico, University, Albuquerque, N. Mex.). *Science,* vol. 179, Jan. 5, 1973, p. 92-94. 12 refs. NSF Grant No. GB-5339.

Study of the effects of low body temperature on memory under the natural physiological conditions of hibernation. Twenty-four hours after reaching the criterion of learned behavior, squirrels that had learned to escape from a water bath by making a visual discrimination were exposed to the first of two 11-day cold exposures. The animals that hibernated showed better retention of the learned behavior. It is believed that hibernation eliminates or greatly reduces cortical activation and thereby protects memory traces from being eliminated. M.V.E.

A73-16331 # Genesis mechanism of slow cortical after-discharges during brain injuring by radiation (K voprosu o mekhanizme proiskhozhdeniia korkovogo medlennogo posledeistviia v usloviiakh radiatsionnogo porazheniia mozga). K. Sh. Nadareishvili, O. S. Bakradze, M. G. Dashniani, and V. Ia. Sandodze (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Oct. 1972, p. 189-192. 11 refs. In Russian.

Investigation of some of the physiological properties of the so-called slow cortical after-discharge (SAD) such as it arises in response to photic stimuli in nonanesthetized rabbits during exposure to radiation of various parts of the body, including hemilateral X irradiation of the brain. The data obtained and a comparative analysis suggest that SAD may be caused mainly by radiation injury of the mesencaphalic reticular substance. M.V.E.

A73-16332 # Characteristic of collicular responses to stimulation of various sections of the visual afferent pathway in cats (Kharakteristika kollikuliarnykh otvetov na razdrazhenie raznykh uchastkov zritel'nogo afferentnogo puti u koshek). Z. S. Khanaeva (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobschcheniia,* vol. 68, Oct. 1972, p. 193-196. 7 refs. In Russian.

A73-16333 # Electron-microscopy investigation of Corti's organ after noise trauma (Elektronnomikroskopicheskoe issledovanie Kortieva organa pri shumovoi travme). O. Sh. Gogniashvili (Tbilisskii Gosudarstvennyi Institut Usovershenstvovaniia Vrachei, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 68, Oct. 1972, p. 229-232. 8 refs. In Russian.

Study of the auditory function impairment resulting from the effects of high-intensity sound irritation. Guinea pigs exposed to broadband (250 to 5000 Hz) noise at a 135-dB intensity level showed significant damage in the basal coil of the cochlea, particularly in the outer hair cells. M.V.E.

A73-16359 Understanding electrocardiography: Physiological and interpretive concepts. E. G. Zalis (Granada Hills Community Hospital, Granada Hills; Northridge Hospital, Northridge; Pacoima Memorial Lutheran Hospital, Lake View Terrace; Serra Memorial Hospital, Sun Valley; California, University, Los Angeles, Calif.) and M. H. Conover (West Hills Hospital; West Park Hospital, Canoga Park, Calif.). St. Louis, Mo., C. V. Mosby Co., 1972. 200 p. 66 refs. $5.75.

The anatomy and physiology of the heart is discussed together with the electrophysiology of the normal heart, the recording equipment used, the lead systems, and the electrical activation of the normal heart. Other subjects considered include arrhythmias originating in the sinus node, atrial ectopics, ventricular ectopics, the atrioventricular junction, the bundle branch block, aberrant ventricular conduction, preexcitation, hypertrophies, the dual rhythms,

fusion beats, and pacemakers. Problems of myocardial infarction are also investigated together with drugs and electrolytes and their effect on the ECG. Attention is given to the electrical hazards of ECG monitoring. G.R.

A73-16410 # **The problem of human efficiency in automated control systems (Problema effektivnosti cheloveka v avtomatizirovannykh sistemakh upravleniia).** N. D. Zavalova, V. A. Ponomarenko, and V. A. Popov. In: Control of moving objects. Moscow, Izdatel'stvo Nauka, 1972, p. 124-132. In Russian.

Consideration of the optimal distribution of functions between the automatic equipment and the human operator in an automated flight control system. It is recommended that the human operator be given not just an honorary commanding role but also the role of a backup unit in the control system, capable of taking upon himself some of the functions of the system during equipment failures. Using an aircraft control system as an example, recommendations are made concerning the creation of a data model which ensures a high degree of efficiency of a human operator as a backup unit in the control system and thus increases the overall reliability of the man/machine system. A.B.K.

A73-16476 **The assessment of visual function.** Edited by A. M. Potts (Chicago, University, Chicago, Ill.). St. Louis, Mo., C. V. Mosby Co., 1972. 227 p. $24.50.

Subjects related to visual acuity and the visual field are discussed together with problems of visual adaptation, taking into account rod vision and the clinical aspects of night vision. Attention is given to color vision of normal observers and abnormal color vision. Special topics considered in visual function include practical aspects of depth perception, electrophysiological measurements, and the assessment of special visual functions. G.R.

A73-16477 **Visual acuity.** M. L. Rubin (Florida, University, Gainesville, Fla.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 3-33. 22 refs.

The various types of visual acuities are discussed, giving attention to visibility acuity, resolution acuity, and spatial acuities. Visibility situations involving bright-on-dark targets are considered together with diffraction effects and black-on-white targets. Other subjects investigated include resolution and factors affecting resolution, taking into account illumination, luminance, adaptation, target type, pupil, refractive state, wavelength of stimuli, and anatomical variations. The merits of tests involving the Snellen chart are also examined. G.R.

A73-16478 **Visual field.** M. Newman (Washington University, St. Louis, Mo.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 34-55. 30 refs.

Differences between vision and visual acuity are pointed out and attention is given to the reciprocal nature of detection and resolution. Aspects of spatial summation are discussed together with the effect of ametropic blur, the effect of retinal eccentricity, and temporal summation. An important basic variable determining the detectability of a target is the brightness or luminance of the background. Various techniques are considered, taking into account tangent screen perimetry, the Goldmann projection, kinetic perimetry, the mapping of scotomata, static perimetry, and Enoch's technique. G.R.

A73-16479 **Rod vision.** M. Alpern (Michigan, University, Ann Arbor, Mich.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 59-82. 18 refs.

The chemistry of rod vision is explored, giving attention to rhodopsin, the visual cycle, and relations between pigments and vision. It is pointed out that the absorption of a single quantum of light, presumably by a single molecule of rhodopsin, is sufficient to excite a single retinal rod. The subject of dark adaptation is considered, taking into account an apparatus for measuring the dark-adaptation curve, the Goldmann-Weekers dark adaptometer, and the characteristics of the dark-adaptation curve. Problems of light adaptation are also investigated. G.R.

A73-16480 **Clinical aspects of night vision.** A. E. Krill (Chicago, University, Chicago, Ill.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 83-102. 63 refs.

The most important changes occurring in visual capabilities under reduced illumination are considered, giving attention to visual acuity, color vision, light detection sensitivity, optical changes, visual field changes, and glare. Methods for the determination of the abnormalities of night vision are discussed together with extraretinal causes of abnormal night vision. These causes are connected with clinical vitamin deficiencies, other systemic diseases, hypoxia, refractive errors, and glaucoma. Retinal causes of abnormal dark adaptation are related to Oguchi's disease, the flecked retina syndrome, nightblindness, and toxic retinopathy. G.R.

A73-16481 **Color vision of normal observers.** J. Pokorny and V. C. Smith (Chicago, University, Chicago, Ill.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 105-135. 28 refs. Grants No. NIH-EY-00277; No. NIH-EY-00523.

Basic approaches of obtaining color stimuli are considered, giving attention to monochromators, selective filters, colored papers, chromatic light sources, color temperature, and additive and subtractive mixtures. Aspects of color appearance are investigated, taking into account color naming, color contrast, and Bezold-Brücke and Abney phenomena. Problems of spectral sensitivity are discussed together with questions of colorimetry, color discriminations, and the mechanism of color vision. The subjects examined include the spectral response of the three pigments, the direct measurement of cone pigments, and the psychophysical evidence for the opponent-process mode of neural processing. G.R.

A73-16482 **Abnormal color vision.** A. E. Krill (Chicago, University, Chicago, Ill.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 136-157. 91 refs.

The nomenclature of congenital color vision defects is derived from the classical concept that there are three fundamental colors, red, green, and blue. The frequency of color blindness varies from about 1% to 13% of the male population, depending on the area of the world. A clinical evaluation of defective color vision is discussed, taking into account sorting tests, pseudoisochromatic plates, Farnsworth's hue discrimination tests, the Sloan achromatopsia test, lantern tests, and screening for various occupations. Congenital color vision defects are also examined. G.R.

A73-16483 **Practical aspects of depth perception.** H. M. Burian (North Carolina, University, Chapel Hill; Duke University, Durham, N.C.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 161-186. 20 refs.

Man's orientation in space in the third dimension is based on binocular and monocular clues. Aspects of stereopsis are examined. Stereopsis results from the fusion of horizontally disparate retinal stimuli located within Panum's area of single binocular vision. Monocular clues to spatial orientation are discussed, taking into account motion parallax, linear perspective, overlay of contours, and the distribution of high-lights and shadows. The interaction of stereoscopic and monocular clues is considered together with aspects of depth perception and testing for stereopsis. G.R.

A73-16484 **Electrophysiological measurements.** A. M. Potts (Chicago, University, Chicago, Ill.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 187-206. 57 refs. Grant No. PHS-EY-00212.

The electroretinogram (ERG) is a series of small voltage changes measured across the globe when a light stimulus is presented to the eye. An electrode system for examining the ERG is discussed together with ERG recording, light stimulus, and problems of adaptation. Questions of morphology are considered along with the origin of the components of the ERG, its clinical significance, the visual evoked response, the electrical evoked response of the visual system, and the electrooculogram. It is pointed out that many aspects of the function of the visual system which have been amenable only to psychophysical test methods can now be measured objectively with the aid of the newly developed approaches. G.R.

A73-16485 **Assessment of special visual function.** A. H. Keeney (Wills Eye Hospital; Temple University, Philadelphia, Pa.). In: The assessment of visual function. St. Louis, Mo., C. V. Mosby Co., 1972, p. 207-214. 16 refs.

'Special functions' in vision are areas in which basic physiology is subject to varied influences that are difficult to standardize. Some of these functions are related to glare. Glare or dazzle is the unpleasant effect of unneeded light striking the retina and impairing vision at that time. Aspects of dynamic visual acuity are discussed together with changes produced by aging. Attention is given to structural alterations in the globes and functional impairments of vision with age. G.R.

A73-16582 **Study of intraventricular conduction times in patients with left bundle-branch block and left axis deviation and in patients with left bundle-branch block and normal QRS axis using His bundle electrograms.** R. A. J. Spurrell, D. M. Krikler, and E. Sowton (Guy's Hospital; Prince of Wales Hospital, London, England). *British Heart Journal*, vol. 34, Dec. 1972, p. 1244-1249. 12 refs. Research supported by the British Heart Foundation.

A73-16609 **Effect of hypoxia on free fatty acid metabolism during exercise.** N. L. Jones, J. W. Kane, R. A. Hart (McMaster University, Hamilton, Ontario, Canada), and D. G. Robertson. *Journal of Applied Physiology*, vol. 33, Dec. 1972, p. 733-738. 49 refs. Medical Research Council of Canada Grant No. MA-4234.

A study of the metabolic responses to exercise in four healthy subjects under normoxic and hypoxic conditions was conducted. The results suggest that in man, in contrast to animals, exercise under hypoxic conditions, although associated with increased blood lactate levels, may stimulate free fatty acid release and uptake. Two work loads were performed during the tests, amounting to about one-fourth and one-half of the subject's maximal oxygen uptake. G.R.

A73-16610 **Augmentation of chemosensitivity during mild exercise in normal man.** J. V. Weil, E. Byrne-Quinn, I. E. Sodal, J. S. Kline, R. E. McCullough, and G. F. Filley (Colorado, University, Denver, Colo.). *Journal of Applied Physiology*, vol. 33, Dec. 1972, p. 813-819. 28 refs. Research supported by the U.S. Department of Health, Education, and Welfare, American Thoracic Society, and Council for Tobacco Research; Grants No. NIH-HE-13475; No. NIH-HE-03191.

Hypoxic and hypercapnic ventilatory drives were measured in normal men during mild-to-moderate exercise. The results demonstrate that enhancement of chemosensitivity occurs with very mild exercise, becomes more pronounced with increasing work levels, and accounts for a greater proportion of minute ventilation at higher work levels. An increase in hypercapnic ventilatory drive during exercise was found in association with the augmentation of hypoxic drive. G.R.

A73-16624 # **Radiation problems of supersonic flight - The operators' viewpoint.** F. S. Preston (British European Airways Corp., Ruislip; British Overseas Airways Corp., Hounslow, Middx., England). *Society for Radiological Protection, Conference on Radiation at High Altitudes, London, England, Oct. 10, 1972, Paper.* 6 p.

A73-16692 # **Space-time dynamics of the impulse activity in human-brain neuron populations (Prostranstvenno-vremennaia dinamika impul'snoi aktivnosti v neironnykh populiatsiiakh mozga cheloveka).** Iu. K. Matveev (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Sept. 1972, p. 1341-1346. 15 refs. In Russian.

A73-16693 # **Intercortical functional connections in lower monkeys, Macacus rhesus, exhibited by evoked responses (Kortiko-kortikal'nye funktsional'nye sviazi u nizshikh obez'ian Macacus rhesus, vyiavliaemye vyzvannymi otvetami).** G. A. Khasabov and V. A. Khasabova (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Sept. 1972, p. 1347-1354. 31 refs. In Russian.

A73-16694 # **Effect of visual work on the optic papilla (Vliianie zritel'noi raboty na slepoe piatno setchatki).** V. V. Kolbanov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Sept. 1972, p. 1362-1365. 8 refs. In Russian.

Tests on six healthy male subjects who performed simple manual assignments in response to light stimuli showed considerable expansions and shape alterations in their optical papillae when the duration or intensity of the needed visual work increased. The shape alterations of the optic papilla were greater in trained than in untrained subjects. V.Z.

A73-16695 # **Investigation of cutaneous sensibility by focused ultrasound (Izuchenie kozhnoi chuvstvitel'nosti s pomoshch'iu fokusirovannogo ul'trazvuka).** L. R. Gavrilov, G. V. Gershuni, O. B. Il'inskii, M. G. Sirotiuk, E. M. Tsirul'nikov, and V. A. Tsukerman (Akademiia Nauk SSSR, Institut Fiziologii and Institut Evoliutsionnoi Fiziologii i Biokhimii and Akusticheskii Institut, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Sept. 1972, p. 1366-1371. 13 refs. In Russian.

A concave ceramic barium titanate plate immersed in distilled water in a tub was used as the emitter of focused short ultrasound pulses in the investigation at 30 to 37 C of cutaneous ultrasound sensibility in the palms, wrists and forearms of male and female subjects. A wide spectrum of sensations, including those of touch, pulsation, cold, warmth and prick, were evoked in individual subjects by this technique. Possible applications in receptor physiology studies are discussed. V.Z.

A73-16696 # **Utilization extent of the muscle apparatus capabilities during maximum voluntary force exertion (Stepen' ispol'zovaniia vozmozhnostei myshechnogo apparata pri maksimal'nom proizvol'nom usilii).** V. A. Mart'ianov, Iu. A. Kopylov, and M. I. Gnutov (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Sept. 1972, p. 1390-1396. 16 refs. In Russian.

A73-16697 # **Energy cost of muscle work in a state of fatigue (Energeticheskaia stoimost' myshechnoi raboty v sostoianii utomleniia).** V. V. Mikhailov, S. V. Erdakov, V. V. Abrosimov, and V. B. Sergienko (Gosudarstvennyi Tsentral'nyi Institut Fizicheskoi Kul'tury; Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 58, Sept. 1972, p. 1397-1402. 12 refs. In Russian.

Oxygen requirement and vegetative and biometric characteristics were determined in trained cyclists during the performance of variable submaximum-intensity exercises on a bicycle ergometer. The

oxygen requirement was markedly high in subjects showing fatigue symptoms than in those without fatigue symptoms, after exercise periods up to 255 sec. V.Z.

A73-16698 # **Cerebral circulation alteration during hypothermia (Izmenenie mozgovogo krovoobrashcheniia pri gipotermii).** V. V. Suvorov (Tiumenskii Pedagogicheskii Institut, Tiumen', USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Sept. 1972, p. 1425-1430. 17 refs. In Russian.

Cerebral vessel tonus, regional vessel blood flow volume, and cerebral tissue oxygen intake were measured in adult dogs with exterior cranial tegmenta cooled to 22 C. The blood circulation volume in the brain of the dogs went down to 60% of control at 32 deg, to 40% at 28 deg, and to 20% at 22 deg. The blood intake in cerebral tissue also went down to 14 to 12% of control with decreasing temperature. All these changes were reversible. V.Z.

A73-16699 # **Responses of bulbar respiratory neurons to apparatus-aided artificial respiration (Reaktsii bul'barnykh dykhatel'nykh neironov na primenenie apparatnogo iskusstvennogo dykhaniia).** V. P. Doroshchuk (Ministerstvo Zdravookhraneniia, Institut Gigieny i Toksikologii Pestitsidov Polimernykh i Plasticheskikh Mass, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Sept. 1972, p. 1431-1440. 13 refs. In Russian.

The extracellular potentials of bulbar respiratory neurons were measured by implanted microelectrode techniques in a study of the responses of these neurons to positive and negative pressure phases of artificial respiration performed with a DP-1 apparatus on anesthetized cats. The responses of alpha-inspiratory and delta-expiratory bulbar neurons were similar to those of the corresponding respiratory muscles, and the responses of delta-inspiratory and alpha-expiratory bulbar neurons were similar to those of the corresponding respiratory mechanoreceptors. V.Z.

A73-16700 # **Mechanisms of certain functional shifts during change in the blood of the content level of external pancreatic-gland secretion components (O mekhanizmakh nekotorykh funktsional'nykh solvigov pri izmenenii v krovi urovnia komponentov vneshnei sekretsii podzheludochnoi zhelezy).** N. A. Bannikova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 58, Sept. 1972, p. 1441-1447. 26 refs. In Russian.

A73-16701 **Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972.** Meeting sponsored by the Human Factors Society. Edited by W. B. Knowles, M. S. Sanders, and F. A. Muckler. Santa Monica, Calif., Human Factors Society, Inc., 1972. 490 p. Members, $10.00; nonmembers, $15.

Effects of numerous environmental factors on human psychophysiological reactions are examined in papers dealing with the specification of equipment, systems, and procedures to ensure compatibility with human requirements in various control and observation tasks. Topics considered include behavioral effects of isolation and confinement, noise annoyance sensitivity, automobile control principles, effects of alcohol on driving performance, aircraft-status display systems for navigational and landing-control tasks, human performance in target detection and acquisition, features of occupational stress factors, and computer applications in human factors research. T.M.

A73-16702 **The use of bivariate distributions in achieving anthropometric compatibility in equipment design. I, II.** W. F. Moroney (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 16-23. 13 refs.

A73-16703 * **The interaction of auditory noise and subjective noise annoyance sensitivity with peripheral visual sensitivity.** D. W. Conrad (North Carolina State University, Raleigh, N.C.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 26-30. 19 refs. Grant No. NGL-34-002-055.

A73-16705 **Perceptual considerations for a wide field of view, helicopter night landing system /HENILAS/.** A. D. Le Cocq (Texas Instruments, Inc., Dallas, Tex.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 102-109. 6 refs.

A73-16706 **Manual digital positioning in 2 axes - A comparison of joystick and track ball controls.** M. H. Mehr and E. Mehr (Measurements Systems, Inc., Norwalk, Conn.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 110-116. 5 refs.

A series of experiments comparing various configurations of joystick and track ball controls operating in rate and position modes are described. Data are presented on optimizing a given control configuration and on comparative performance of the optimized controls. Test results using the best configuration of each type of control showed times-to-position values of 2.5 to 4.0 seconds for target displacements of 300 steps and from 2.9 to 4.8 seconds for displacements of 900 steps. M.V.E.

A73-16708 **Interactive aspects of man/learning system control teams.** A. Freedy, G. Weltman, and R. Steeb (Perceptronics, Inc., Encino, Calif.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 127-135. 9 refs. Contract No. N0014-72-C-0093.

This paper describes the initial phases of an ongoing program to develop human factors criteria for the application of adaptive, computer-aided decision making and control in complex man/machine systems. The research program is based on the Autonomous Control Subsystem, a new concept for sharing control responsibility between the human operator and a learning 'automaton.' Included in the present report are a short description of the ACS, its integration into a generalized task simulation, and some early experimental results. (Author)

A73-16709 **Need for within-trial feedback as a function of task similarity in adaptive training of manual control.** D. A. Norman and W. G. Matheny (Life Sciences, Inc., Hurst, Tex.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 136-139. 9 refs.

A73-16710 **The prediction of team monitoring performance under conditions of varied team size and decision rules.** W. L. Waag (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 140-143. 6 refs.

A73-16711 **Target acquisition in a restricted visual field.** M. J. Kelly (Montana State University, Bozeman, Mont.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 144-147.

Experimental investigation of the effect of target position within a restricted visual field on an observer's target acquisition performance. The described experiment was conducted with the participation of 5 male and 4 female subjects. The results have demonstrated a definite effect of target position on target acquisition performance and have shown that restricted visual search is, indeed, a different task than free visual search. The nature of this difference and its implications are discussed. M.V.E.

A73-16717 **Crew performance in extended operation under vibrational stress.** M. A. El-Nawawi (Rochester Institute of Technology, Rochester, N.Y.) and R. A. Dudek (Texas Tech University, Lubbock, Tex.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 180-188. 35 refs. Grant No. DAAD05-69-C-0102. Project THEMIS.

This study was conducted in an attempt to investigate the effects of prolonged vibration on performance and recovery of different crews involved in the operation of a multi-station work system. Eight-, six-, and five-man crews were under investigation while operating a 4-station work system. The performance measure was a compensatory one-dimensional vertical tracking task. This task was performed under normal and vibrational environments. The simulated 4-station system's mission duration was taken as 4 hours, wherein performance data were collected. Crew recovery was monitored throughout a 20-minute period after mission completion. (Author)

A73-16718 **An evaluation of sinus arrhythmia as a measure of mental load.** J. A. Hicks, III and S. M. Soliday (North Carolina State University, Raleigh, N.C.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 191-196. 13 refs.

Sinus arrythmia, the irregularity in the length of interbeat intervals found in the heart rate pattern of a normal individual sitting at rest, is investigated as a measure of mental workload by means of modified versions of Kalsbeek's (1971) experiments. The results obtained are shown to validate the basic findings reported by Kalsbeek and to accentuate the need for allowing workers to maintain a reserve mental capacity while performing their jobs. M.V.E.

A73-16719 **Double cross-validation of video cartographic symbol location performance.** R. A. North and R. C. Williges (Illinois, University, Urbana, Ill.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 220-230. 16 refs. USAF-sponsored research.

A Response Surface Methodology (RSM) central-composite design was used to obtain multiple regression prediction equations of location and latency performance on a video cartographic symbol search task. The variables used to predict performance on both a black and white and a color television monitor were focus, density of nontarget symbols, visual angle of the observer, and television raster lines per mm of actual map size. A double cross-validation design was used to assess the predictive validity of the resulting multiple regression equations derived through collapsed and uncollapsed, within-subject analyses. The double cross-validated multiple correlations were compared to two estimates of shrinkage. It was concluded that the uncollapsed data analysis provided the more valid prediction equations of individual subject data. (Author)

A73-16720 **Biorhythm and its relationship to human error.** H. R. Willis (Missouri Southern State College, Joplin, Mo.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 274-282. 8 refs.

Review of the discovery at the turn of the century, the development, and present state of the notion of biorhythm, a triumvirate of a 23-day physical, 28-day emotional, and 33-day intellectual cycles governing the periodic variations in the physical, emotional, and intellectual performance capabilities of man. Special attention is given to the technique of developing biorhythm curves, their analysis, and practical applications. The relationship of biorhythm to human error is discussed briefly. M.V.E.

A73-16721 # **Human engineering computer aided design /HECAD/.** N. M. Aume and D. A. Topmiller (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 315-317.

Description of two computer programs for calculating the activation time (i.e., the time an operator spends on a given control or display) and the reliabilities of operating a workstation's components, and for evaluating workspace designs. The first program is based on an index of electronic equipment operability, while the second analyzes workspace (i.e., panels, components, and operator) deployment. M.V.E.

A73-16722 **Relating operator capabilities to system demands.** T. J. Klein and W. B. Cassidy (Vought Aeronautics Co., Dallas, Tex.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 324-334.

An exploratory study of operator proficiency in tasks analogous to piloting an aircraft is discussed. Task performance was measured while task difficulty (system workload demand) was varied from easy through moderate and hard levels. From these measurements, preliminary workload capability limits were derived for single and two-axis control tasks and for several combinational mixes of control and procedural tasks. The data also provided a basis for development of mathematical equations for (a) predicting work response levels from known system demands, (b) relating tracking accuracy to system workload demands and (c) combining tracking and procedural workload components. (Author)

A73-16723 **Toward the development of a criterion for fleet effectiveness in the F-4 fighter community.** R. H. Shannon and W. L. Waag (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 335-337.

In a previous investigation, an attempt was made to isolate the most critical skills and procedures within each of the stages comprising replacement air group (RAG) training in the F-4 aircraft. For each of the stages analyzed, a small set of graded items were selected on the basis that they could adequately discriminate among replacement pilots according to their final RAG grade. The resulting set of items were found to be highly predictive of both the stage grade from which they were obtained and the final RAG grade. The present investigation attempted to replicate these findings with data obtained from a different squadron. The findings suggest that skills and procedures can be effectively isolated which are highly predictive of pilot performance in the RAG. (Author)

A73-16724 **Computer-assisted instruction in pilot training and certification.** S. R. Trollip and S. N. Roscoe (Illinois, University, Urbana, Ill.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 357-359. USAF-sponsored research.

Review of the potential merits of computer-assisted instruction (CAI) as an innovative time-saving method for pilot training and certification. It is shown that CAI holds forth considerable promise of reducing the costs and improving the quality of pilot training, particularly with respect to cognitive instruction. M.V.E.

A73-16725 Computer-controlled differential review-time payoff as a training aid. M. G. Samet (U.S. Army, Behavior and Systems Research Laboratory, Arlington, Va.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 374-376. 6 refs.

Target identifications and confidence in each identification were provided by five groups of eight image interpreters each. Three groups were given the correct identification after each response and instructed to review the stimulus for a length of time that was either constant, or a function of identification correctness, or a function of identification correctness and confidence. One group received identification feedback but no review time, and another group received neither of these. Identification accuracy and confidence appropriateness were significantly enhanced by identification feedback; however, performance was not affected by review time. (Author)

A73-16726 Measurement for flight training research. R. W. Obermayer and D. Vreuls (Manned Systems Sciences, Inc., Northridge, Calif.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 377-384. 9 refs.

Training research goals are identified to point up the need for objective quantitative performance measures and a performance measurement system. To show what is involved to produce the needed information, a performance measurement system is defined based on combat-crew flight training. The steps for defining performance measures are outlined. The performance measurement system is presented in detail including data acquisition and processing hardware/software, the personnel subsystem, facilities, implementation steps and costs. It is concluded that comprehensive measurement, though costly, is essential if quantitative studies of flight training effectiveness are to be performed. (Author)

A73-16727 The isolation of critical elements within selected maneuvers during primary flight training. G. M. Long, R. H. Shannon, and W. L. Waag (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 385-388.

Primary flight training maneuvers presenting the greatest difficulty to student pilots are selected, highly detailed descriptions of these maneuvers are developed, and critical detail elements deemed to represent recurrent student pilot errors are isolated. A previously used task analysis procedure is shown to offer an effective tool for developing such detailed maneuver descriptions. And once the detailed maneuver descriptions have been developed, the experienced flight instructor has no difficulty in isolating the critical elements within the maneuver. This, in turn, should make it possible early to detect the errors the student pilot makes and to correct them, as well as to improve training methods. M.V.E.

A73-16728 * The employment of a spoken language computer applied to an air traffic control task. J. I. Laveson and C. A. Silver (Drexel University, Philadelphia, Pa.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 410-415. 9 refs. Grant No. NGR-39-004-028.

Assessment of the merits of a limited spoken language (56 words) computer in a simulated air traffic control (ATC) task. An airport zone approximately 60 miles in diameter with a traffic flow simulation ranging from single-engine to commercial jet aircraft provided the workload for the controllers. This research determined that, under the circumstances of the experiments carried out, the use of a spoken-language computer would not improve the controller performance. M.V.E.

A73-16729 The effect of illumination level, stroke width and figure ground on legibility of NAMEL numbers. S. Konz and R. Mohan (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 431-435. 40 refs.

A73-16730 A human factors approach to lighting recommendations and standards. H. R. Blackwell (Ohio State University, Columbus, Ohio). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 441-451. 16 refs.

The report describes the effects of lighting upon human visual performance in terms of three physical variables: task luminance, task contrast, and the spatial pattern of luminances in the environment. The variable of least importance is task luminance, the only variable of the three related to illumination, which was formerly used as the basis for assessing lighting. Special emphasis is placed on the role of human factors analysis of the conditions under which visual elements of complex tasks are performed. (Author)

A73-16731 Identifying pilot error potential in the F-4 aircraft. R. H. Shannon and W. L. Waag (U.S. Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 452-455.

Naval accident reports involving the F-4 aircraft were examined for the period between July 1966 and June 1971. Human errors were found to account for 140 major accidents involving 107 fatalities. These errors were categorized according to: (1) phase of operation, (2) personnel, and (3) type of error. Of the total human errors, 79% occurred while inflight or during takeoff and landing; 90.4% of the errors were committed by the flight crew while only 3.1% resulted from the maintenance crew. According to type, 33.5% were considered to be perceptual-motor skill errors, 42.8% procedural errors, and the remaining 23.7% vigilance errors. Recommendations are made concerning crew coordination, training, and equipment redesign. (Author)

A73-16732 Are there accident-prone pilots. R. A. Alkov (U.S. Navy, Naval Safety Center, Naval Air Station, Norfolk, Va.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 456-458. 10 refs.

Life-change and health stresses acting as precipitating factors in a pilot error, viewed as the culmination of a number of adverse events, are discussed in contradistinction from accident proneness and accident liability in pilots. Life changes in a pilot's daily style of living and personal family matters may have little influence on his performance until they add up to an unbearable psychological burden. It is incumbent upon those in supervisory positions to monitor and observe the effects of turmoil in the personal lives of their aviators on their performance in flight. If necessary and upon consultation with the medical officer, the aircrewmember might be temporarily grounded or provided with leave until his problems are resolved. M.V.E.

A73-16733 Handling qualities and realistic training. W. R. Laidlaw, T. M. Harris, and D. B. Ruhmel (Flight Systems, Inc.,

Newport Beach, Calif.). In: Technology for man 72; Proceedings of the Sixteenth Annual Meeting, Los Angeles, Calif., October 17-19, 1972. Santa Monica, Calif., Human Factors Society, Inc., 1972, p. 459-464.

Discussion of the implications of realistic pilot training and aircraft handling qualities in minimizing the risks of pilot errors in military aviation, commercial transport operation, and in general aviation. The problems peculiar to each aviation category are reviewed and illustrated by specific examples. Recommendations are presented for future safety improvements. M.V.E.

A73-16734 # **Body thermotopography and some metabolic process characteristics in scuba divers under various underwater exposure conditions (Termotopografiia tila ta deiaki pokazniki obminnikh protsesiv u legkovodolaziv na umov riznikh rezhimiv pidvodnikh zanuren').** K. V. Ostashkov, V. V. Larin, V. S. Sokolovs'kii, V. A. Savits'kii, and S. I. Biutner (Odes'kii Medichnii Institut, Odessa, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Sept.-Oct. 1972, p. 614-620. 12 refs. In Ukrainian.

A73-16735 # **Effect of hypercapnia on the electrical discharges of the bulbar respiratory neurons and motor neuron ganglia of respiratory muscles (Vpliv giperkapnii na elektrichni rozriadi bul'barnikh dikhal'nikh neironiv ta neiromotornikh odinits' dikhal'nikh m'iaziv).** D. O. Kocherga and T. L. Zhigailo (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Sept.-Oct. 1972, p. 636-643. 13 refs. In Ukrainian.

A73-16736 # **Functional state of various portions of the cerebrum under the action of extremal stimulation (Funktsional'nii stan riznikh viddiliv golovnogo mozku pri dii ekstremal'nikh podraznikiv).** Ia. M. Britvan, M. A. Vievs'kii, S. S. Krokhmal', Z. O. Makarova, I. P. Nikiforova, L. I. Poplavs'ka, and T. M. Slobodianiuk (Vinnits'kii Medichnii Institut, Vinnitsa, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Sept.-Oct. 1972, p. 644-653. 35 refs. In Ukrainian.

Investigation of the electrical activity of the cortex and subcortical cerebral regions in cats and rabbits with evoked syndromes of soft tissue compression, intracranial hypertension, alcoholic intoxication, asphyxia, blood loss, and various forms of hypertonia. The functional state of the cerebrum was altered by administration of phenamine and aminazine, by electrocoagulation of the anterior hypothalamus, and by degeneration of the sinocarotid and aortal zones. The relation between the cortical and subcortical electrical activity on the one hand and respiration and arterial pressure on the other is discussed on the basis of the results. V.Z.

A73-16737 # **Some physiological reactions to acceleration in albino rats in a state of hypothermia (Deiaki fiziologichni reaktsii bilikh shchuriv u stani gipotermii na perevantazhennia).** V. V. Matsinin and I. F. Sokolian'skii (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Sept.-Oct. 1972, p. 675-680. 33 refs. In Ukrainian.

The oxygen intake, the oxygen partial pressure in skeletal muscles and the cerebrum, and the bioelectrical activity of muscles were measured in a study of the resistance to 4-min acceleration of 40 g in rats with body temperatures of about 20 or 14 C. The resistance to acceleration was higher in test rats than in control rats. Accelerations reduced the oxygen partial pressure in the cerebrum and skeleton muscles, and suppressed the bioelectrical activity of the muscles to the state of 'bioelectrical silence.' Reactions of the respiratory system to accelerations were also less pronounced when the body temperature of test rats was lower. V.Z.

A73-16738 # **Cardiac output and oxygen transport in early ontogenesis (Sertseve vikidannia i kisnevii transport u rann'omu ontogenezi).** M. M. Koganovs'ka (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Sept.-Oct. 1972, p. 689-697. 80 refs. In Ukrainian.

Discussion of the relation between the cardiac output and oxygen transport in fetuses of man and sheep and in newborn infants, newborn lambs, and newborn kids. Oxygen metabolism values are given for dogs of various ages. Published data on oxygen metabolism in the organism are discussed and evaluated. V.Z.

A73-16739 # **Universal transistorized stimulator with external control (Universal'nii tranzistornii stimuliator iz zovnishnim keruvanniam).** V. M. Burakhin, V. V. Ogorodnii, A. E. Potapova, and O. K. Florov (Dnipropetrovs'kii Derzhavnii Universitet, Dnepropetrovsk, Ukrainian SSR). *Fiziologichnii Zhurnal,* vol. 18, Sept.-Oct. 1972, p. 707-711. In Ukrainian.

Discussion of the design and operation of a three-channel generator of pulsed electrical stimuli for application in electrophysiological studies. The generator produces square rhythmic pulses, individually or in sequences, whose amplitudes, frequencies and durations can be controlled and varied during generation. The basic circuit of the generator is shown in a diagram. V.Z.

A73-16799 # **A new method for simultaneous measurement of total respiratory resistance and compliance.** Y. Miyamoto and N. Saizen (Hokkaido University, Sapporo, Japan). *Japanese Journal of Physiology,* vol. 22, Oct. 1972, p. 453-466. 13 refs.

In estimating the work of breathing, total respiratory resistance and compliance are terms of great importance. A new method has been developed for obtaining the resistance and compliance simultaneously. A subject inspires air passively from an airtight box of known capacity containing compressed air. By analyzing the transient and equilibrium box pressure curves from the single inspiration, the resistance and compliance are separated from the time constant. F.R.L.

A73-16800 # **Effect of high-fat diet on thermal acclimation with special reference to thyroid activity.** M. Yoshimura, S. Hori, and H. Yoshimura (Kyoto Prefectural University of Medicine, Kyoto, Japan). *Japanese Journal of Physiology,* vol. 22, Oct. 1972, p. 517-531. 29 refs. Research supported by the Ministry of Education.

A73-17098 ***Studies in stress-relaxation* and distensibility characteristics of small skin veins in vivo by a combined photoelectric-photographic and plethysmographic technique.** L. Lange, M. Echt, K. Kirsch, and O. H. Gauer (Berlin, Freie Universität, Berlin, West Germany). *Pflügers Archiv,* vol. 337, no. 4, 1972, p. 311-322. 27 refs. Research supported by the Deutsche Forschungsgemeinschaft; Contract No. F44620-71-C-0117.

A73-17134 **The potential application of space technology to the radio tracking and biotelemetry of unrestrained animals.** R. F. Pascucci, N. A. Liskov, and L. E. Garvin (Raytheon Co., Equipment Div., Wayland, Mass.). In: Remote sensing of earth resources; Proceedings of the Conference on Earth Resources Observation and Information Analysis Systems, Tullahoma, Tenn., March 13, 14, 1972. Volume 1. Tullahoma, Tenn., F. Shahrokhi, University of Tennessee, 1972, p. 219-247.

A73-17174 # **Mislocation of visual stimuli during voluntary saccades.** S. M. Mateev (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady,* vol. 25, no. 10, 1972, p. 1437-1440. 8 refs.

Description of experiments designed to study factors affecting perception of the location of a brief visual stimulus presented before and after the onset of saccadic eye movement. Faulty perception of the stimulus position is analyzed, and it is shown that the dependence of the magnitude of the mislocation on time can be described by a curve with a maximum in the beginning of the saccadic movement. It is suggested that faulty perception of stimulus position is caused by a predictive mechanism that anticipates the future position of a moving target. T.M.

A73-17177 # **Plasticity of the spinous-process apparatus in the functional stimulation of the cerebrum (Plastichnost' shipikovogo apparata pri funktsional'noi stimuliatsii golovnogo mozga).** A. A. Manina (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Bolgarskaia Akademiia Nauk, Doklady,* vol. 25, no. 9, 1972, p. 1277-1280. 10 refs. In Russian.

Investigation of the influence of learning and phenamine on the ultrastructure of the cerebrum. Electron microscopy is used in studying the synapses of the motor region of the neocortex in rats and monkeys. Learning is implemented by conditioned-reflex methods. Phenamine is applied as stimulant that enhances the functional activity of the cerebrum. The results obtained indicate that learning and functional stimulation result in a pronounced activation of the synaptic, protein-synthesizing, and energy-generating apparatuses and are accompanied by a rise in complexity of the spinous process ultrastructure. M.V.E.

A73-17178 # **Influence of different motor regimes on the convulsive reactivity of the central nervous system.** K. S. Roussinov and D. I. Ionkov (B'lgarska Akademiia na Naukite, Institut po Fiziologiia, Sofia, Bulgaria). *Bolgarskaia Akademiia Nauk, Doklady,* vol. 25, no. 9, 1972, p. 1301-1304. 8 refs.

Experimental investigation upon rats of the effects of various motor regimes on the convulsive reactivity of the central nervous system. In particular, electric-, pentylenetetrazol-, and strychnine-treatment induced convulsions were studied. The results indicate that the motor regime has a certain influence upon the convulsive reactivity. M.V.E.

A73-17195 **Transinformation and real time identification applied to the study of pilot workload (Transinformation et identification en temps réel appliquées à l'étude de la charge de travail du pilote).** A. Rault and J. Richalet (Groupe d'Etudes et de Recherches en Bio-systèmes, Vélizy-Villacoublay, Yvelines, France). *L'Aéronautique et l'Astronautique,* no. 37, 1972, p. 80-89. 21 refs. In French. Research supported by the Direction des Recherches et Moyens d'Essais, Office National d'Etudes et de Recherches Aérospatiales, and Centre d'Etudes et de Recherches de Toulouse.

A73-17199 **Space-time relations - The effects of variations in stimulus and interstimulus interval duration on perceived visual extent.** J. C. Bill and L. W. Teft (Bridgeport, University, Bridgeport, Conn.). *Acta Psychologica,* vol. 36, Nov. 1972, p. 358-369. 16 refs.

Experiments on human subjects showed that the tau phenomenon was in evidence when the interstimulus intervals ranged from 0.1 to 10 sec, that the absolute difference between standard and variable interstimulus intervals was the principal factor determining the tau effect, and that a stimulus duration reduction had a substantial enhancing effect on the tau phenomenon. New directions for research in this field are discussed. V.Z.

A73-17274 **Application of constant temperature anemometry in measurement of intra-arterial blood flow velocity.** W. A. Seed and N. B. Wood (Imperial College of Science and Technology, London, England). *International Journal of Engineering Science,* vol. 10, Dec. 1972, p. 1009-1021. 14 refs. Research supported by the Goldsmiths' and Skinners' Companies, Pfizer, Ltd., and Medical Research Council.

Considerations relevant to the application of constant temperature hot-film anemometry to measurement of point blood velocity in arteries are discussed. Hot-film probes suitable for intra-arterial use have been constructed and tested in regimes of steady and unsteady flow in both water and blood. Suitable calibration procedures have been established, and measurement errors due to system frequency-response distortion minimised by means of a simple filter. Errors due to fluid dynamic effects have been measured and analysed. A technique for detecting flow-reversal is described, and results obtained in preliminary animal experiments presented. (Author)

A73-17276 **Pathology of angina pectoris.** Z. Vlodaver, H. N. Neufeld, and J. E. Edwards (Charles T. Miller Hospital, St. Paul; Minnesota, University, Minneapolis, Minn.). *Circulation,* vol. 46, Dec. 1972, p. 1048-1064. 49 refs. Grant No. NIH-5-R01-HE-05694.

Among the wide variety of causes of angina pectoris, two major categories may be recognized: the anatomic, causing arterial obstruction, and the functional. The anatomic causes may be divided according to anatomic sites as follows: (1) the major coronary arterial trunks and their epicardial branches, (2) the coronary ostia at the aorta, and (3) the intramyocardial small arteries. The major coronary arteries are by far the most common sites for anatomic lesions. Atherosclerosis in its various anatomic manifestations is responsible for about 90% of the cases of angina. Commonly, hypertension and, less commonly, valvular disease are associated. Functional causes of angina pectoris include aortic valvular disease and functionally related conditions, thyroid disease, and pulmonary hypertension. (Author)

A73-17277 **Clinical diagnosis.** N. O. Fowler (Cincinnati, University, Cincinnati, Ohio). *Circulation,* vol. 46, Dec. 1972, p. 1079-1097. 92 refs.

In the majority of instances, the clinical diagnosis of angina pectoris can be made from the history alone. The chest discomfort is characteristically a sensation of deep pressure, is occasionally of burning quality, is found near the sternum (not sharply localized), and has a gradual buildup. Its duration is most often 2-10 min, but may be 30 sec to 30 min or more. Physical effort, emotional strain, large meals, nightmares, or sexual intercourse are common precipitating factors. Nitroglycerin tends to relieve the distress within 1-2 min, but the response is often difficult to evaluate, especially with angina of brief duration or with acute unstable rest angina. Physical examination of the anginal patient is often negative between attacks. During an attack of rest angina, the physical examination usually reveals increased systolic blood pressure and tachycardia. A fourth heart sound and a delayed apical systolic murmur may be found. Premature ventricular beats may develop. (Author)

A73-17279 **Correlation of electrocardiographic studies and arteriographic findings with angina pectoris.** G. C. Friesinger and R. F. Smith (Vanderbilt University, Nashville, Tenn.). *Circulation,* vol. 46, Dec. 1972, p. 1173-1184. 51 refs.

The relationships among angina pectoris, stress tests, and arteriography are complex. The majority of patients with angina pectoris can be adequately diagnosed by a careful history. Considerable attention to detail and repeated questioning is often necessary before the pain syndrome can be accurately classified. The resting electrocardiogram is of limited value in the diagnosis despite the fact that there is a high positive correlation between abnormal ST-T changes on the electrogram and significant obstructive lesions on coronary arteriograms. The value of the electrocardiogram is enhanced, and its specificity and sensitivity increased, when used in combination with exercise stress. The lowest error percentage is achieved by utilizing rate-standardized exercise tests and multiple leads with loads that produce heart rate responses of 80-90% of the expected maximum. (Author)

A73-17473 **The birth of blood cells (La naissance des cellules du sang).** L. G. Lajtha (Christie Hospital; Holt Radium Institute, Manchester, England). *La Recherche,* vol. 3, Dec. 1972, p. 1045-1054. In French.

The construction of blood cells follows a succession of differentiations and maturations. Blood cells are manufactured in the red bone marrow, which contains a reserve of all-purpose source cells which automatically renew themselves and differentiate among themselves according to requirements. Comment is made on the origin of the large variety of white corpuscles, an origin which is still not well understood. A single and unique source cell can again give birth to the entire hematopoietic system in an animal whose bone marrow has been destroyed by radiation. A succession of cellular compartments leads from the source cell in the marrow to the blood cells. F.R.L.

A73-17522 **Apparatus note - A system for detecting and recording movements of the head.** R. G. Beschle (Worcester Polytechnic Institute, Worcester, Mass.), L. Cirillo, and S. Wapner (Clark University, Worcester, Mass.). *Perceptual and Motor Skills,* vol. 35, Dec. 1972, p. 725, 726. Grant No. PHS-MH-00348.

A system is described which measures continuously changes in the orientation of the head in three planes. Three synchro transmitters mounted on a lightweight headband, with gravity as a reference for two planes of movement and a magnetic field as reference for the third, provide output voltages which, when properly rectified, filtered, and amplified, are each a linear function of angular movement of the head in one plane over a range of 40 deg. (Author)

A73-17523 **Effects of noise and response complexity upon vigilance performance.** J. M. Childs and C. G. Halcomb (Texas Tech University, Lubbock, Tex.). *Perceptual and Motor Skills,* vol. 35, Dec. 1972, p. 735-741. 14 refs. Grant No. DAAD05-69-C-0102. Project THEMIS.

Visual vigilance performance was investigated with respect to environmental stimulation (90 dB, 1000 cps noise) and intra-organismic stimulation (simple vs complex response). 140 subjects monitoring a display for 1 hr under 1 of 2 noise types were instructed either to press a button upon detection of aperiodic signals (simple response) or to perform also a checklist operation subsequent to the signal detection (complex response). Significant correct detection differences occurred between response groups with complex groups showing higher performance. Differences in correct detection were obtained for noise conditions. Results were evaluated in terms of the activation hypothesis. (Author)

A73-17524 * **Estimation of the passing of four consecutive hours.** W. B. Webb and W. Ross (Florida, University, Gainesville, Fla.). *Perceptual and Motor Skills,* vol. 35, Dec. 1972, p. 768-770. 5 refs. Grant No. NGR-10-005-057.

In the AM and PM (9 to 1) males and females gave estimates of the hourly passing of time for 4 hr. There were no differences between sexes or AM/PM estimates. The group was less than 1 min off after an hour and 12 min off after 4 hr. There was a wide range of individual differences. One-fourth of the subjects were within an error of 10 min after 4 hr whereas another one-fourth were off more than 50 min. The accuracy of estimates was about equal to accuracy of awakening from sleep to randomly chosen awakening times. (Author)

A73-17525 **Hypobaric hypoxia - Within-subject transition effects in albino rats.** R. T. Sterner (Fitzsimons General Hospital, Denver, Colo.) and G. D. Schwank (Fitzsimons General Hospital, Denver, Colo.; Southwest Texas State University, San Marcos, Tex.). *Perceptual and Motor Skills,* vol. 35, Dec. 1972, p. 799-806. 16 refs.

The effect of rapid hypobaric transition (1 hr) upon water consumption, food consumption, body weight, feeding activity and spontaneous activity of albino rats was studied using a within-subject design. Transition from 635 mm Hg (5,000 ft) to 455 mm Hg (14,000 ft) induced temporary hypophagia, hypodipsia and concomitant weight loss; gradual recovery occurred during the exposure period; return to 635 mm Hg after 7 days abruptly alleviated these effects. Alterations in feeding activity (time-in-foodwell) during the off portions of the light cycle paralleled food intake changes. No reliable changes in spontaneous activity as a function of hypobaric transition were noted. (Author)

A73-17569 * # **Developments in space medicine.** S. Warren (NASA, Washington, D.C.). *Astronautics and Aeronautics,* vol. 11, Jan. 1973, p. 18-22. 14 refs.

The principal directions and results of space medicine studies are reviewed, starting with the early 1950s. The effects of prolonged inaction, a gravity-free environment, and isolation on the survival and functioning of man in space are examined. Quarantine and other measures developed to guard the health of astronauts during space missions are described. Space radiation hazards and means of overcoming them are discussed. The development of exobiology as a new field of science from our increasing knowledge of the universe is noted, together with some technological and medical advances resulting from space research. V.P.

A73-17575 **A new illusion - The underestimation of distance during pursuit eye movements.** A. Mack and E. Herman (New School for Social Research, New York, N.Y.). *Perception and Psychophysics,* vol. 12, no. 6, Dec. 1972, p. 471-473. 8 refs.

A new visual illusion is reported. The apparent distance through which a displaced target appears to move is significantly shorter when pursuit tracked than when that same distance is observed by means of a saccadic eye movement. This misperception of distance seems to be related to the Aubert-Fleischl paradox, the underestimation of the velocity of a tracked target, and to reveal a consistent characteristic of the pursuit eye movement system. (Author)

A73-17593 # **Examples for signal-noise improvement with the aid of polarity correlation analysis in the biological sector (Beispiele für Signal-Rausch-Abstandsverbesserung durch die Polaritätskorrelationsanalyse im biologischen Bereich).** J. Stebel and R. Sinz (Leipzig, Universität, Leipzig, East Germany). *Zeitschrift für elektrische Informations- und Energietechnik,* vol. 2, no. 6, 1972, p. 353-356. 11 refs. In German.

A73-17596 **Systolic time intervals in constrictive pericarditis and severe primary myocardial disease.** T. G. Armstrong, B. S. Lewis, and M. S. Gotsman (Wentworth Hospital, Durban, Republic of South Africa). *American Heart Journal,* vol. 85, Jan. 1973, p. 6-12. 15 refs. Research supported by the Medical Research Council and Anglo-American Corp. of South Africa.

A73-17636 # **Military contributions to aviation medicine.** P. V. Siegel (FAA, Office of Aviation Medicine, Washington, D.C.). *American Institute of Aeronautics and Astronautics, Annual Meeting and Technical Display, 9th, Washington, D.C., Jan. 8-10, 1973, Paper 73-68.* 5 p. Members, $1.50; nonmembers, $2.00.

The military was a primary motivating force in the early development of aviation medicine. It was during World War I when the first major emphasis was placed on the relationship between health and flying. During the period of the war, aviation medicine developed into a well-organized science. This development, in general, was concerned with the selection of pilots, aviation medical research, and the formation of a special medical service for air units. In particular, the following areas were stimulated by the need for military air superiority: development of oxygen systems, pressurized cabins, medical support for supersonic flights, and the development and use of blind flying instruments. (Author)

A73-17676 # **Effect of a 30-day stay in a medium with increased oxygen content on the discharge of some gaseous bioactivity products in rats (Vliianie 30-sutochnogo prebyvaniia krys v srede s povyshennym soderzhaniem kisloroda na vydeleniia nekotorykh gazoobraznykh produktov zhiznedeiatel'nosti).** V. V. Kustov, B. I. Abidin, V. I. Belkin, L. T. Poddubnaia, and T. A. Lekareva. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 3-5. 7 refs. In Russian.

A73-17677 # **Effectiveness of the application of tightly bonded sulfo-cation exchange resins in water recycling by the sorption method (Ob effektivnosti ispol'zovaniia sil'nosshitykh sul'fokationitov dlia regeneratsii vody sorbtsionnym sposobom).** V. V. Shaidorova. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 5-8. 7 refs. In Russian.

A73-17678 # **Biological role of atmospheric oxygen in the mechanism of blood coagulation (Biologicheskaia rol' kisloroda atmosfery v mekhanizme svertyvaniia krovi).** L. A. Palos (Institut Usovershenstvovaniia Vrachei, Budapest, Hungary). *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 8-13. 12 refs. In Russian.

Review of the results of several series of experiments performed by various researchers since the 1940's for investigating in vitro and in vivo the redox processes and biological control mechanisms of the respiratory, circulatory, and blood coagulation systems. These results are shown to justify the postulation of a working hypothesis regarding the interrelations of the 'functional triad' of respiration, blood circulation, and blood coagulation. Problem areas are pointed out, and recommendations are presented about the desirable orientation and techniques of future research. M.V.E.

A73-17679 # **DNA catabolism in rat tissues in response to transverse accelerations (Katabolizm DNK v organakh krys pri deistvii poperechno napravlennykh uskorenii).** G. S. Komolova, V. F. Makeeva, E. V. Belikova, I. D. Ertanov, and I. A. Egorov. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 14-17. 17 refs. In Russian.

Investigation upon rats of possible connections between the labilizing action of transverse accelerations upon subcellular structure membranes reported by Barer et al. (1968) and the DNA condition in the tissues of animals subjected to the action of transverse accelerations. The results obtained indicate that no alteration occurs in the physicochemical properties of DNA in the tissues of acceleration-exposed rats. M.V.E.

A73-17680 # **Quantitative estimation of the gas metabolism of continuous higher plant cultures as a life support system component (Kolichestvennaia otsenka gazoobmena nepreryvnoi kul'tury vysshikh rastenii kak zvena sistemy zhizneobespecheniia).** B. G. Kovrov and G. M. Lisovskii. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 17-21. 5 refs. In Russian.

Experimental photosynthesis data over continuous vegetation cycles are used as a basis for a mathematical gas metabolism model of self-sustaining life support systems incorporating wheat and radish cultures with staggered times of vegetation phases. The combined gas metabolism of such cultures and crew members is also discussed. Computer calculations indicate that the use of cultures with four to seven staggered vegetation phases can be sufficient for stabilization of the carbon dioxide balance in such systems. V.Z.

A73-17681 # **Investigation of gas sorption and desorption in polymer materials in the process of gaseous sterilization of such materials (Issledovanie sorbtsii i desorbtsii gazov polimernymi materialami v protsesse ikh gazovoi sterilizatsii).** L. B. Chudnova, N. V. Kul'kova, and V. M. Tsetlin. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 21-25. In Russian.

Sorption and desorption of ethylene oxide, methyl bromide and their mixtures are investigated in plastic foam, porolon, plasticized rubber, microporous rubber, polyamide, nitron, and glass nitron. Heat of sorption of ethylene oxide and methyl bromide is calculated, and specific areas of the polymer materials before and after gas sorption are measured. Desorption isotherms of these gases are plotted for plasticized rubber and polyamide. V.Z.

A73-17682 # **Parameter selection for Doppler ultrasonic heart and vessel locators (O vybore parametrov ul'trazvukovykh Dopplerovskikh lokatorov serdtsa i sosudov).** A. N. Kozlov. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 25-29. 16 refs. In Russian.

Discussion of the performance characteristics of available ultrasonic Doppler locators for peripheral vessel blood circulation measurements and myocardium and valvular motor activity recording. Theoretical considerations are given concerning the useful frequency range of these devices, suggesting suitable carrier frequencies and Doppler frequency filter characteristics. Suggestions are also given as to the numbers of Doppler frequency filters and signal processing channels which are best suited for specific measurement assignments. V.Z.

A73-17683 # **Correlation between the impulse activity of bulbar respiratory neurons, the electrical activity of respiratory muscles, and pulmonary respiration volume during obstructed respiration (O sootnoshenii impul'snoi aktivnosti bul'barnykh dykhatel'nykh neironov, elektricheskoi aktivnosti dykhatel'nykh myshts i velichiny legochnoi ventiliatsii pri soprotivlenii dykhaniiu).** A. M. Kulik and L. N. Kondrat'eva. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 29-35. 18 refs. In Russian.

A73-17684 # **Electrogastrographic data pertinent to exposures in a pressure chamber to moderate hypoxia levels (Rezul'taty elektrogastrografii pri sozdanii umerennykh stepenei gipoksii v barokamere).** N. V. Stepovik. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 35-38. 10 refs. In Russian.

Electrogastrograms were taken on 60 pilots confined for 30 min in a pressure chamber at a simulated altitude of 5000 m. The subjects included 20 healthy persons, 20 with stomach conditions, and 20 with vegetative nervous system conditions. The gastric motor activity was less affected by exposure in healthy subjects than in subjects with health problems. V.Z.

A73-17685 # **Possible role of antitissular autoantibodies in the protective mechanism of local shielding during total radiation exposure (O vozmozhnoi roli protivotkanevykh autoantitel v mekhanizme zashchitnogo deistviia lokal'nogo ekranirovaniia pri total'nom obluchenii).** N. N. Klemparskaia and V. S. Kashirin. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 38-44. 19 refs. In Russian.

A73-17686 # **Some approaches to the quality evaluation of the ergatic process of a spacecraft rendezvous (Nekotorye puti otsenki kachestva ergaticheskogo protsessa pri sblizhenii kosmicheskikh apparatov).** V. A. Taran. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 44-51. 6 refs. In Russian.

The ergatic process is defined as any purposeful physical process controlled by a human operator. Tree-graphs are plotted and expressions are derived to evaluate the quality of a spacecraft rendezvous ergatic process. Phase diagrams are also given for successful-decision regions of some spacecraft ergatic processes satisfying certain rendezvous and docking requirements. V.Z.

A73-17687 # **Cardiovascular system reactions to alternating transverse accelerations in man (Reaktsii serdechno-sosudistoi sistemy cheloveka na vozdeistvie znakoperemennykh poperechnykh peregruzok).** E. B. Shul'zhenko and I. F. Vil'-Vil'iams. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 51-56. 12 refs. In Russian.

EKGs, sphygmograms and pneumograms were recorded in experiments on nine male subjects who were exposed to continuous alternating centrifugal and centripetal accelerations by combined motions of the centrifuge and a revolving test chamber. The development of sinusal arrhythmia was recorded in all cases, and extrasystolic arrhythmia was observed in 22 experiments out of 50. V.Z.

A73-17688 # **Daily rhythm of biogenetic amine /histamine and serotonin/ contents in human blood during usual and shifted work schedules (Sutochnyi ritm soderzhaniia biogennykh aminov /gistamin, serotonin/ v krovi liudei v norme i pri perestroennom rezhime truda).** I. L. Veisfel'd and R. F. Il'icheva. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 56-62. 20 refs. In Russian.

A73-17689 # **Reactions of the cardiovascular system of pilots with atherosclerosis symptoms under professional activity**

conditions (Reaktsiia serdechno-sosudistoi sistemy pilotov, imeiushchikh priznaki ateroskleroza, v usloviiakh professional'noi deiatel'nosti). B. L. Gel'man and G. L. Strongin. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 62-67. 11 refs. In Russian.

A73-17690 # **Gas-chromatography investigation of volatile metabolites in man on reduced food rations and during starvation (Gazokhromatograficheskie issledovaniia letuchikh produktov metabolizma cheloveka pri ponizhennom ratsione pitaniia i golodanii).** V. P. Savina, L. N. Stepanov, N. L. Sokolov, and Iu. G. Nefedov. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 67-69. 5 refs. In Russian.

A73-17691 # **Vestibular reactions to Coriolis accelerations under hypoxia conditions (Vestibuliarnye reaktsii pri vozdeistvii uskorenii Koriolisa v usloviiakh gipoksii).** S. S. Markarian and I. A. Sidel'nikov. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 70-72. 13 refs. In Russian.

Vestibular reactions were studied in 51 subjects seated in a remote-controlled revolving chair in a pressure chamber. Cumulative Coriolis forces were applied after the subjects have stayed for 30 min at a simulated altitude of 5000 m. The Coriolis force tolerance time under hypoxia was lower than in control tests for 43 subjects and remained unaffected in the remaining eight subjects. V.Z.

A73-17692 # **Spectral method of trace element determination in biological sample solutions (Spektral'nyi metod opredeleniia mikroelementov v rastvorakh biologicheskikh prob).** V. P. Naidina and A. P. Tereshchenko. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 73-75. 9 refs. In Russian.

Description of a twin-spectrograph technique for spectral measurements at 2520 to 3375 A in the determination of small amounts of Mn, Pb, Sn, Ni, Co, Fe, Mo, V, Cu, Zn, Cr and Ti in liquid biological samples by comparison with standard solutions. Determinations of 10 to 12 trace elements with adequate accuracy can be made simultaneously by this technique. V.Z.

A73-17693 # **Application of multichannel rheography to physiological studies on a centrifuge (Primenenie mnogokanal'noi reografii pri fiziologicheskikh issledovaniiakh na tsentrifuge).** V. B. Zubavin, L. I. Letkova, Iu. S. Miroshnikov, and M. A. Ronkin. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 75-79. 6 refs. In Russian.

Differential rheograms and EKGs of 10 male subjects were taken with a 6-channel rheograph and an 18-channel electroencephalograph in a 8-m radius cetrifuge in three series of experiments with accelerations in different directions. The experiments showed that parallel observations of hyperemia in different portions of the cardiovascular system could be effectively performed by this technique under brief extremal conditions. V.Z.

A73-17694 # **Prolonged control of cardiac bioelectrical activity in man in ground experiments and during spaceflight (Dlitel'nyi kontrol' bioelektricheskoi aktivnosti serdtsa u cheloveka v nazemnykh eksperimentakh i v kosmicheskom polete).** D. G. Maksimov, V. P. Khmel'kov, I. A. Samorukov, and A. M. Finogenov. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 79-84. 11 refs. In Russian.

A73-17695 # **Thermoregulatory reactions of animals in a helium-oxygen medium (Termoreguliatsionnye reaktsii u zhivotnykh v gelio-kislorodnoi srede).** G. V. Troshikhin. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 84-86. 15 refs. In Russian.

Gas metabolism, muscle thermoregulatory activity, and rectal temperature variations were studied in 55 male rats exposed for one hour each to alternate atmospheres of air, helium-oxygen (21%) and air at temperatures from 20 to 30 C. Heat release and thermoregulatory activity of the rats were higher in a helium-oxygen atmosphere than in air at the same temperatures, and thermoregulation activity was minimum at 30 C in all cases. V.Z.

A73-17696 # **Action of Freon-114B2 on the activity of lactate-dehydrogenase iso-enzymes (Deistvie Freona-114B2 na aktivnost' izofermentov laktatdegidrogenazy).** L. A. Tiunov, V. A. Voronin, A. A. Denisenko, L. A. Liniucheva, and T. S. Kolosova. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 87-89. 23 refs. In Russian.

A73-17697 # **Microflora of a sealed cabin with human subjects in a 3-day experiment with reduced temperature and high relative humidity (Mikroflora zamknutoi kabiny v trekhsutochnom eksperimente s ispytateliami pri ponizhennoi temperature i vysokoi otnositel'noi vlazhnosti).** S. D. Polozhentsev and M. N. Chikin. *Kosmicheskaia Biologiia i Meditsina,* vol. 6, Sept.-Oct. 1972, p. 89, 90. 6 refs. In Russian.

A73-17748 # **Harmful effects of vibrations (Vrednye posledstviia vibratsii).** V. N. Morozov. *Voenno-Meditsinskii Zhurnal,* Sept. 1972, p. 61-65. 10 refs. In Russian.

Review of some non-Soviet papers concerning the harmful effects of vibrations on the human organism, covering impairment of working capacity; the vibration disease; traumas; pathological, physiological, and psychological reactions; and mechanical damage. Vibration tolerance diagrams are plotted. V.Z.

A73-17749 # **Evaluation of the state of the cardiovascular system from polycardiographic test data (Otsenka sostoianiia serdechno-sosudistoi sistemy po dannym polikardiograficheskogo issledovaniia).** L. A. Kustov, N. S. Kuz'mich, and M. I. Brusakov. *Voenno-Meditsinskii Zhurnal,* Sept. 1972, p. 66-70. In Russian.

Mechano-, phono- and polycardiographic tests and EKGs were taken in 98 parachutists of different ages (from under thirty to over forty) during the preparation for and after parachute jumps. The subjects received various measured doses of physical stresses from step and knee-bend exercises after the jumps. The shifts from a normal reaction to such stresses were more pronounced in the cardiovascular systems of subjects over 30 years old than in younger subjects. V.Z.

A73-17750 # **Visual-motor coordination characteristics of parachute jumpers (Osobennosti zritel'no-motornoi koordinatsii u parashiutistov).** D. D. Sherman. *Voenno-Meditsinskii Zhurnal,* Sept. 1972, p. 70-72. In Russian.

Tests on a portable scanning sight recorder of special design were carried out to investigate the visual-motor coordination capacity in 20 student parachute jumpers and 15 experienced parachute jumpers, 20 to 30 min before aircraft boarding, immediately before a jump, and 15 to 20 min following a jump. Visual-scanning frequency and amplitude characteristics of student parachute jumpers were affected generally to a higher degree during tests than those of experienced parachute jumpers. V.Z.

A73-17769 # **Research on the displacement of blood-plasma proteins and on the nerve conduction velocity in rats subjected to accelerations and hypokinesia (Badania nad przemieszczeniem sie bialek osocza krwi oraz szybkoscia przewodnictwa nerwowego u szczurow poddanych dzialaniu przyspieszen i hipokinezji).** S. Baranski, Z. Edelwejn, and M. Wojtkowiak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki,* vol. 5, no. 2, 1972, p. 61-70. 8 refs. In Polish.

A73-17770 # **Coronary circulation in states of hypoxia and emotional stress (Krazenie wiencowe w stanach niedotlenienia i emocji).** K. Niewiadomska-Skolasinska (Akademia Medyczna,

Warsaw, Poland). *Postepy Astronautyki,* vol. 5, no. 2, 1972, p. 71-86. 20 refs. In Polish.

Coronary circulation is not only subject to regulation by the nervous system but is affected by intravascular receptors whose stimulation can also regulate the coronary flow. The hypothalamus contains regions where stimulation can change the coronary flow regardless of heart rate and arterial pressure. Stimulation of peripheral chemoreceptors in the sinus carotis will produce specific changes in coronary flow. Intracardiac baroreceptors control heart dynamics by way of cardiac-cardiac reflexes. T.M.

A73-17775 # **Periods of development and trends in space psychology (Okresy rozwoju i kierunki psychologii kosmicznej).** K. Galubinska. *Postepy Astronautyki,* vol. 6, no. 1, 1972, p. 55-69. 34 refs. In Polish.

Research on psychological and psychophysiological factors affecting human performance under circumstances encountered in manned space missions is outlined in a historical review that attempts to delineate goals, methods, and results for major areas of study. Topics considered include environmental effects of space flight, adaptation mechanisms, emotional states, special drugs, selection of astronauts, relationships among crewmembers, and the man-machine interface. T.M.

A73-17801 The reconstruction of three-dimensional objects from two orthogonal projections and its application to cardiac cineangiography. S.-K. Chang and C. K. Chow (IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.). *IEEE Transactions on Computers,* vol. C-22, Jan. 1973, p. 18-28. 19 refs.

A73-17824 Circadian rhythms - Subcellular and biochemical aspects. H. G. Schweiger (Max-Planck-Institut für Zellbiologie, Wilhelmshaven, West Germany). In: Circadian rhythmicity; Proceedings of the International Symposium, Wageningen, Netherlands, April 26-29, 1971. Wageningen, Netherlands, Centre for Agricultural Publishing and Documentation, 1972, p. 157-174. 37 refs.

Acetabularia is a unicellular and uninuclear green alga that grows to a length of up to 5 cm. One life cycle takes about 15 weeks under optimum conditions in the laboratory. Mainly because of size and resistance to techniques of cell surgery, acetabularia has proved suitable for studies of cell biology. Numerous studies of the circadian rhythm of photosynthesis in the alga are described. It is shown that in anucleate cells neither translation nor transition play an essential part in circadian periodicity. F.R.L.

A73-17825 Biological clocks in animal orientation and in other functions. K. Hoffmann (Max-Planck-Institut für Verhaltensphysiologie, Erling-Andechs, West Germany). In: Circadian rhythmicity; Proceedings of the International Symposium, Wageningen, Netherlands, April 26-29, 1971. Wageningen, Netherlands, Centre for Agricultural Publishing and Documentation, 1972, p. 175-204; Discussion, p. 204, 205. 119 refs.

Attention is given to functions that show periodicities corresponding to those of the environmental cycles and which reflect general principles. Emphasis is placed on the circadian clock, but biological cycles with other cycle lengths are discussed when appropriate. Biological clocks in celestial orientation, sun compass orientation in birds and other animals, moon and star compass orientation, and direction finding by the earth's magnetic field are considered. The function and mechanism of clock-controlled pupal eclosion in insects are studied, as well as biological clocks in other functions. F.R.L.

A73-17860 Television/computer dimensional analysis interface with special application to left ventricular cineangiograms. H. Dominic, J. Covvey, A. G. Adelman, C. H. Felderhof, K. W. Taylor, and E. D. Wigle (Toronto General Hospital; Toronto, University, Toronto, Canada). *Computers in Biology and Medicine,* vol. 2, Nov. 1972, p. 221-233. 24 refs. Research supported by the Ontario Heart Foundation and Toronto General Hospital.

A73-17864 Human perception of humidity under four controlled conditions. I. Andersen, G. R. Lundqvist (Arhus Universitet, Arhus, Denmark), and D. F. Proctor (Johns Hopkins University, Baltimore, Md.). *Archives of Environmental Health,* vol. 26, Jan. 1973, p. 22-27. 14 refs. Research supported by the Statens almindelige Videnskabsfond, Statens laegevidenskabelige Fond, Statens teknisk-videnskabelige Fond, and F. L. Smidth og Co.; Grants No. PHS-EHS-00454; No. PHS-HE-10342; No. NATO-450.

We have studied the subjective perception of humidity and temperature in 48 young male subjects exposed to clean air at 23 deg C with a relative humidity (RH) of 70, 50, 30, and 10%. We observed no change in the perception of humidity on lowering it from 70% to either 50, 30, or 10%, nor on returning it to the initial level of 70%. The decrease and rise in RH did cause highly significant changes in the subjective sensation of temperature, although this factor was held constant throughout. (Author)

A73-17871 Peripheral vascular diseases: Diagnosis and management. H. E. Holling (Pennsylvania, University, Hospital, Philadelphia, Pa.). Philadelphia, J. B. Lippincott Co., 1972. 263 p. 149 refs. $13.

Vascular disease is discussed with the intent that patients may be cared for with better understanding of their condition. The peripheral circulation, and interview and examination of a patient with arterial disease are first considered. Disorders of the large arteries are acute arterial obstruction, atherosclerosis obliterans, medial arteriosclerosis and aneurysms, and arteriovenous fistula. Indications for amputation are outlined, and attention is given to disorders of small vessels, veins, and lymphatics. F.R.L.

A73-17926 Molecular evolution: Prebiological and biological. Edited by D. L. Rohlfing (South Carolina, University, Columbia, S.C.) and A. I. Oparin (Academy of Sciences, Institute of Biochemistry, Moscow, USSR). New York, Plenum Press, 1972. 472 p. $24.

The origin of life, the levels of evolution, the relation between space exploration and studies of the origin of life, and problems concerning the recognition of life are considered. Thermodynamic and philosophical considerations are discussed together with topics related to micromolecules, macromolecules, protocells, and cells. Academic aspects are also explored, taking into account the place of the origin of life in the undergraduate curriculum.

Individual items are announced in this issue. G.R.

A73-17927 The origin of life problem - A brief critique. J. Keosian. In: Molecular evolution: Prebiological and biological. (A73-17926 06-04) New York, Plenum Press, 1972, p. 9-21. 27 refs.

Developments in the attitude of the scientific world towards the origin of life are considered, giving attention to the investigations conducted by Pasteur, the gene theory of the origin of life proposed by Troland (1914), modifications regarding this theory reported by Muller (1966), the views expressed by Oparin (1924), and a letter written by Darwin in 1871. Present views regarding the origin of life in an environment exposed to UV rays in the presence of a reducing atmosphere are critically examined. G.R.

A73-17928 Origins. J. L. Fox (Texas, University, Austin, Tex.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 23-34. 37 refs.

It is pointed out that Oparin's theory (1924) constitutes today's most commonly accepted theory of the origin of life on earth. The principles of this theory are discussed together with Oparin's concept of selectivity, the origin of simple molecules, the development of macromolecules, the origin of enzymes, the processes leading to the appearance of cells, and the beginning of genetic control. A number of modifications to the Oparin theory are introduced. G.R.

A73-17929 **Evolution of levels of evolution.** T. O. Fox. In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 35-42.

Levels of evolution involve systems that are distinguished by their primary constituents, the interactions of these constituents, and the focus of selection by which each system changes in time. As an example, in the genetic level of evolution, the focus of selection is the set of genes. Aspects of the syntheses of new systems are discussed together with the selection of new levels, and questions of the continuality of evolution. G.R.

A73-17930 * **Space exploration and the origin of life.** R. S. Young (NASA, Washington, D.C.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 43-65. 35 refs.

An important aspect of space exploration is connected with investigations regarding the existence of life on other celestial bodies. The most important objects to be studied for this purpose include the planets, the satellites of planets, meteorites, asteroids, and comets. The exploration of Mars, in particular, beginning with the telescope, fly-by and orbiting spacecraft, followed by landed laboratories, and perhaps culminating eventually in manned expeditions, may well provide a significant portion of the data we seek about the origin of life and introduce a new era of understanding of man's place in the universe. G.R.

A73-17931 **A non-equilibrium thermodynamical analysis of the origin of life.** R. F. Fox (Georgia Institute of Technology, Atlanta, Ga.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 79-99. 40 refs.

The basic concepts of nonequilibrium thermodynamics and biochemical energetics are brought together in an attempt to define sharply the problem of the origin of life. An analysis of the energetics of cellular metabolism requires two fundamental distinctions. Firstly, one must distinguish between arbitrary systems, in which the time evolution is governed by the entropy, and thermally buffered systems, in which the time evolution is governed by the free energy. Secondly, one must distinguish between systems closed with respect to energy inputs, and systems open with respec to energy inputs. G.R.

A73-17932 **Thermodynamics of self assembly - An empirical example relating entropy and evolution.** J. R. Jungck (Merrimack College, North Andover, Mass.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 101-109. 27 refs.

Approaches for applying simple thermodynamic principles to biological questions are discussed. A resolution of the paradox of the development of order through spontaneous processes is offered, taking into account empirical data on biological organization. It is pointed out that the selection of entropy-driven processes in biological systems has been responsible for the evolution of the sophisticated organization of contemporary biota. G.R.

A73-17933 **The sources of phosphorus on the primitive earth - An inquiry.** A. W. Schwartz (Nijmegen, Katholicke Universiteit, Nijmegen, Netherlands). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 129-140. 49 refs.

The three possible mechanisms described for the prebiological incorporation of phosphorus into primitive reaction sequences include apatite catalysis, concentration-sequestration, and volatilization. Experiments show that the first of these schemes constitutes at least a possible sequence. The second has been tested only by computation, but is potentially capable of experimental verification. The third proposal is purely speculative, although the secondary consequences are testable. G.R.

A73-17934 **Abiogenic formation of porphin, chlorin and bacteriochlorin.** A. A. Krasnovskii and A. V. Umrikhina (Academy of Sciences, Institute of Biochemistry, Moscow, USSR). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 141-150. 17 refs.

A73-17937 **Proteins and nucleic acids in prebiotic evolution.** J. C. Lacey, Jr. and D. W. Mullins, Jr. (Alabama, University, Birmingham, Ala.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 171-188. 43 refs. Grant No. NIH-5-S01-RR-05300-10.

The parameters of molecular evolution are considered. It is found that the unidirectional transition from primordial to contemporary is characterized by increases in functionality, complexity, and independence. Relations between proteins, nucleic acids, and molecular evolution are discussed, taking into account natural occurrence, the development of isolated microsystems, functionality, a duplicating function, and experiments needed to clear up remaining questions. G.R.

A73-17938 **Model experiments on the prebiological formation of protein.** S. Akabori and M. Yamamoto (Protein Research Foundation, Osaka, Japan). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 189-197. 18 refs.

A prerequisite for the formation of coacervate particles in the primitive ocean must have been the presence of high-molecular organic substances, including a long-chain polypeptide. The most difficult problem is to find a reasonable chemical explanation for the prebiological formation of lysyl residues. Experiments using N.N'-dibenzoyldiketopiperazine as a model substance were conducted. The results obtained support the theory proposed by Akabori (1959). G.R.

A73-17943 **A mechanism for polypeptide synthesis on a protein template.** F. Lipmann (Rockefeller University, New York, N.Y.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 261-269. 13 refs. Grant No. PHS-GM-13972.

Description of the mechanism of biosynthesis of tyrocidine and gramicidin S, two cyclic decapeptides. A synopsis of this mechanism of polypeptide synthesis on a protein template is presented. It is shown that the amino acid selection mechanism of the activating enzymes is used for positioning and fixing the amino acid in an energy-rich thioester linkage on a polyenzyme that can be triggered into sequentially ordered polymerization. M.V.E.

A73-17944 **Myeloperoxidase, the peroxidase of a primitive cell - Its reaction with Fe and H2O2.** J. Schultz and S. Rosenthal (Papanicolaou Cancer Research Institute, Miami, Fla.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 271-289. 29 refs. Grants No. NIH-CA-0315; No. NIH-CA-10904.

A73-17945 **Dependence of poly U-directed cell-free system on ratios of divalent and monovalent cations.** A. S. Spirin, S. A. Bogatyreva, and E. N. Trifonov (Academy of Sciences, Institute of Biochemistry, Moscow, USSR). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 291-296. 6 refs.

A73-17946 * **Informational biopolymer structure in early living forms.** M. O. Dayhoff, P. J. McLaughlin, W. C. Barker, and L. T. Hunt (Georgetown University, Washington, D.C.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 297-317. 35 refs. Grants No. NIH-GM-08710; No. NIH-RR-05681; Contract No. NASw-2288.

Some studies devoted to the search in various organisms for 'relics' of the biochemical nature of ancient organisms, preserved by the conservative nature of the evolutionary process in all living

species, are reviewed. Investigations of five families of informational molecules constituting such 'relics' in very diverse organisms are reported. They include: cytochrome c, ferredoxin, trypsin, transfer ribonucleic acid (RNA), and 5S ribosomal RNA. It is shown that, even from these few informational molecules, some interesting inferences about early living organisms can be drawn. M.V.E.

A73-17947 Trypsinogen activation peptides - An example of molecular epigenesis. M. Florkin and S. Bricteux-Grégoire (Liège, Université, Liège, Belgium). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 319-329. 32 refs. Research supported by the Fonds de la Recherche Fondamentale Collective.

A73-17948 * Solvent effects on enzymes - Implications for extraterrestrial life. M. R. Heinrich (NASA, Ames Research Center, Planetary Biology Div., Moffet Field, Calif.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 331-339. 32 refs.

Review of several studies on the alterations taking place in the structure, catalytic activity, specificity, and stability of an enzyme when some or all of the water in the medium is replaced by another solvent. These studies show the utility of solvents as a tool for probing enzyme function. They also suggest that solvents other than water should be investigated as media for controlling and directing enzyme reactions. M.V.E.

A73-17949 Protein-lipid films as prototypes of biological membranes. A. I. Oparin, G. A. Deborin, and N. D. Ianopol'skaia (Academy of Sciences, Institute of Biochemistry, Moscow, USSR). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 343-352. 17 refs.

It is suggested, on the basis of the literature data and experimental results, that the appearance of a lipid membrane of the simplest composition separating solutions of protein or protein-like polymer and corresponding substrate may have resulted, due to certain chemical and physicochemical requirements, in the fact that the membrane has developed a capacity of controlling the penetration of primary catalytically active polypeptides and proteins to their substrates. Of great importance may have been the presence of other compounds in the environment, e.g., ions, inhibitors, activators, denaturants, chelates, etc. The model helps to reveal certain features typical of biological membranes at the molecular level. F.R.L.

A73-17950 Modelling of structure and functional unity on coacervate systems. K. B. Serebrovskaia (Academy of Sciences, Institute of Biochemistry, Moscow, USSR) and G. I. Lozovaia (Ukrainian Academy of Sciences, Institute of Botany, Kiev, Ukrainian SSR). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 353-360. 25 refs.

The work is based on Fox's (1957) concept that assumes the possibility of applying the biogenetic law to evolution at the prebiological level, and his concept which postulates that the material of which the supramolecular organizations (e.g., microspheres) are made influences their functions and properties. It is suggested that evolution tended (1) to find a way of utilizing a cheap proton donor, i.e., water, (2) to attain hydrophobization of pigments in order to assure their optimal orientation on the structure which facilitates complete utilization of the incident light, and (3) to provide elongation of the chain of donors and acceptors required for a maximally complete reduction, in the oxygen atmosphere, of structural lipids to eliminate, if possible the formation of their peroxides. F.R.L.

A73-17951 Coacervate systems and evolution of matter on the earth. T. N. Evreinova, T. W. Mamontova, and V. N. Karnaukhov (Moskovskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Institut Biofiziki, Moscow, USSR). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 361-370. 10 refs.

It is shown how the cooperation of molecules in a coacervate affects the size and chemical composition of the individual coacervate drops. Coacervate systems were obtained from aqueous solutions of acidic and basic proteins, RNA, DNA, carbohydrates, and enzymes (phosphorylase, polyphenoloxidase, etc.) and their substrates. Some low molecular weight substances took part in these systems. Twenty different systems were studied; most existed at the pH range (5.0 to 7.5) characteristic of protoplasm. There are many different coacervate drops. Their diameter, content of solids, and molecular content may be the same as in bacteria, mammalian cells, or amoebas. F.R.L.

A73-17952 Conjugation of proteinoid microspheres - A model of primordial recombination. L. L. Hsu (Miami, University, Coral Gables, Fla.). In: Molecular evolution: Prebiological and biological. New York, Plenum Press, 1972, p. 371-378. 8 refs.

Hsu et al. (1971) showed the formation of specialized junctional structures following contact between proteinoid microspheres. Experiments are described which show the ability of proteinoid materials (endoparticles) to meet across junctions and fuse through the communicative portals. The 'recombinant' endoparticles are able to behave as condensation nuclei around which new proteinoid materials are deposited to form normal sized microspheres. F.R.L.

A73-18030 * Orientation: Sensory basis; Proceedings of the Conference, New York, N.Y., February 8-10, 1971. Conference supported by the New York Academy of Sciences, American Museum of Natural History, and NASA. *New York Academy of Sciences, Annals,* vol. 188, Dec. 3, 1971. 408 p.

Topics related to photoreceptors are considered, giving attention to visual pattern recognition and directional orientation in insects, the sensory basis of orientation in amphibians, and the aerial and underwater visual acuity in the California sea lion as a function of luminance. Other subjects explored are in the fields of phonoreceptors, chemoreception, vestibular receptors, and electrical and magnetic sensitivity. Questions of the development and evolution of orientation are also investigated, taking into account field studies of mass emigration and orientation in the spiny lobster and investigations concerning the jumping behavior in the Gobiid fish. G.R.

A73-18031 Sensory, learned, and cognitive mechanisms of size perception. H. W. Leibowitz (Pennsylvania State University, University Park, Pa.). *(New York Academy of Sciences and American Museum of Natural History, Conference on Orientation: Sensory Basis, New York, N.Y., Feb. 8-10, 1971.) New York Academy of Sciences, Annals,* vol. 188, Dec. 3, 1971, p. 47-60; Discussion, p. 60-62. 29 refs. Grant No. NIH-MH-08061.

Questions of size constancy in human beings are investigated, giving attention to a determination of quantitative implications of the reafference theory in an experimental situation devoid of all other cues. The subjects viewed a white equilateral triangle in total darkness and matched size by adjustment of a similar triangle. Accommodation and convergence were varied by inserting prisms and lenses into the optical path. The magnitude of the Ponzo illusion as a function of age was also investigated. The results of the studies show that size constancy can be mediated by a number of different mechanisms which are encoded differently in the nervous system and acquired at different rates of development. G.R.

A73-18032 Vestibular influences on orientation in zero gravity, produced by parabolic flight. R. S. Kellogg (Rochester, University, Rochester, N.Y.). *(New York Academy of Sciences and American Museum of Natural History, Conference on Orientation: Sensory Basis, New York, N.Y., Feb. 8-10, 1971.) New York Academy of Sciences, Annals,* vol. 188, Dec. 3, 1971, p. 217-222;

Discussion, p. 222, 223. 9 refs.

Questions relating to the type of sensory information which is mediated by way of the otolithic and canal system in zero and sub-g levels are investigated. Attention is given to aspects of static and dynamic conterrolling, the inversion illusion, and kinesthetic effects on subjective horizontality. A systematic study of ecocentric localization of the horizontal in both normal persons and individuals with bilateral labyrinthine defects is considered for the case of an exposure to zero and to one-g parabolic flight. G.R.

A73-18033 * **The null magnetic field as reference for the study of geomagnetic directional effects in animals and man.** D. E. Beischer (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *(New York Academy of Sciences and American Museum of Natural History, Conference on Orientation: Sensory Basis, New York, N.Y., Feb. 8-10, 1971.) New York Academy of Sciences, Annals,* vol. 188, Dec. 3, 1971, p. 324-330. 10 refs. NASA-sponsored research.

Techniques for producing very low and zero magnetic fields are considered, giving attention to the compensation of the geomagnetic field by a Helmholtz coil system, approaches utilizing the shielding power of highly permeable alloys, and the complete exclusion of the geomagnetic field with the aid of a superconductive shield. Animal experiments in low magnetic fields are discussed, together with the exposure of man to 'null' magnetic fields and the Josephson junction as a possible biosensor of magnetic fields. It is found that neither the functions nor the behavior of man changes significantly during a two-week exposure to magnetic fields below 50 gammas. G.R.

A73-18065 * **A robot conditioned reflex system modeled after the cerebellum.** J. S. Albus (NASA, Goddard Space Flight Center, Greenbelt, Md.). In: Fall Joint Computer Conference, Anaheim, Calif., December 5-7, 1972, Proceedings. Part 2. Montvale, N.J., AFIPS Press, 1972, p. 1095-1104. 14 refs.

Reduction of a theory of cerebellar function to computer software for the control of a mechanical manipulator. This reduction is achieved by considering the cerebellum, along with the higher-level brain centers which control it, as a type of finite-state machine with input entering the cerebellum via mossy fibers from the periphery and output from the cerebellum occurring via Purkinje cells. It is hypothesized that the cerebellum learns by an error-correction system similar to Perceptron training algorithms. An electro-mechanical model of the cerebellum is then developed for the control of a mechanical arm. The problem of modeling the granular layer which selects the set of parallel fibers which are active at any instant of time is considered, and a relevance matrix is constructed to model the relative degree of influence which mossy fibers from the various joints have on the sets of granule cells unique to each joint. A.B.K.

A73-18159 # **Electrophysiological correlates of mental activity (Elektrofiziologicheskie korreliaty umstvennoi aktivnosti).** V. D. Nebylitsyn and V. D. Mozgovoi (Akademiia Pedagogicheskikh Nauk SSSR, Institut Obshchei i Pedagogicheskoi Psikhologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 899-906. 25 refs. In Russian.

EEG energy and frequency characteristics, asymmetry of individual EEG waves, and EEG autocorrelation function characteristics were studied in 50 male and female subjects who were to solve written arithmetical problems. A statistically proven relation between the characteristics of the total beta-2 rhythm energy and the coefficient of autocorrelation function periodicity is demonstrated. Some relations are also found to exist between the average asymmetry level of individual EEG waves, EEG dispersion characteristics, and the total EEG beta rhythm energy, on the one hand, and mental activity characteristics, on the other. V.Z.

A73-18160 # **Effect of ethimizol on short term memory and mental working capacity (Vliianie etimizola na kratkosrochnuiu pamiat' i umstvennuiu rabotosposobnost').** V. A. Krauz, V. A. Sorokoumov, and A. A. Skoromets (Akademiia Meditsinskikh Nauk SSSR; I Meditsinskii Institut, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 907-911. 12 refs. In Russian.

Conditioned reflexes of feeding in response to acoustic stimuli in seven dogs and mnemonic process in 68 healthy human subjects were studied after administration of an imidazole dicarboxylic acid derivative - a new compound called ethimizol (Anichkov et al., 1962). Administration of this compound improved short term memory in subjects with a low immediate memorization capacity, showed no effect in subjects with high memory characteristics, and increased the maximum time span of delayed reactions in dogs, especially in those with untrained memory. V.Z.

A73-18161 # **Visual after-images in athletes and coaches as a prestart condition index (O zritel'nykh posledovatel'nykh obrazakh u sportsmenov i trenerov kak pokazatele predstartovogo sostoianiia).** A. A. Lalaian, S. P. Chatalbashian, and R. K. Arutiunian (Armianskii Gosudarstvennyi Institut Fizicheskoi Kul'tury, Yerevan, Armenian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 912-916. 10 refs. In Russian.

A73-18162 # **Participation of the hippocampal structures in the formation of external inhibition (Uchastie struktur gippokampova kruga v formirovanii vneshnego tormozheniia).** K. A. Soldatova and Sh. K. Sagimbaeva (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 924-929. 22 refs. In Russian.

Tests on intact rabbits showed that conditioned reflex inhibition by acoustic stimuli was a single-phase process when the stimuli were delivered before the execution of a conditioned reflex and was a two-phase process when stimulus delivery followed a conditioned reflex. The second phase of the inhibition process vanished when the thalamus, the dorsal hippocampus, and the mamillar bodies were destroyed. V.Z.

A73-18163 # **Functional alterations in the auditory and visual analysor systems of monkeys during experimental neurosis (Funktsional'nye izmeneniia v sistemakh slukhovogo i zritel'nogo analizatorov u obez'ian pri eksperimental'nom nevroze).** Sh. L. Dzhalagoniia (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 955-961. 13 refs. In Russian.

A chronic gregarious conflict situation and a chronic erratic diurnal illumination rhythm were used as neurotic condition stimulants in a study of the effect of evoked neurosis on the auditory and visual systems of 12 male baboons with developed alimentary conditioned motor reflexes. Diagrams are given to show the effects of neurosis on the conditioned reflex activity of individual baboons in response to acoustic and light stimuli. V.Z.

A73-18164 # **Role of visual and articular afferentation in the implementation of motor reactions involving complex coordination and precision (Rol' sustavnoi i zritel'noi afferentatsii v osushchestvlenii slozhnokoordinirovannoi tochnostnoi dvigatel'noi reaktsii).** N. I. Stul' (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 986-994. 23 refs. In Russian.

A73-18165 # **Role of the visual cortex in the organization of nystagmic reactions evoked by optokinetic stimulation (Rol' zritel'noi kory v organizatsii nistagmennykh reaktsii, vyzvannykh optokineticheskoi stimuliatsiei).** V. P. Neverov and T. F. Kuleshova

(Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 1055-1060. 21 refs. In Russian.

A73-18166 # **Methods of analyzing the formation process of conditioned reflexes to time intervals (O sposobakh analiza protsessa obrazovaniia uslovnogo refleksa na vremia).** R. Ia. Atnagulov (Bashkirskii Gosudarstvennyi Universitet, Ufa, Bashkir SSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 1077-1081. 9 refs. In Russian.

Discussion of the methods proposed by Kuncova et al. (1961), Dmitriev (1968), and the author (1971) for studying the formation of conditioned reflexes to time intervals between periodic unconditioned stimuli. The interrelation between these methods and their relative values are considered. V.Z.

A73-18167 # **Miniature four-channel radiotelemetry system for the transmission of cerebral biopotentials (Chetyrekhkanal'naia miniatiurnaia radiotelemetricheskaia sistema dlia peredachi biopotentsialov mozga).** V. V. Popenchenko, V. M. Koltun, G. A. Lekhtman, B. A. Fomin, and A. V. Ulogov (Moskovskoe Vysshee Tekhnicheskoe Uchilishche, Moscow, USSR). *Zhurnal Vysshei Nervnoi Deiatel'nosti,* vol. 22, Sept.-Oct. 1972, p. 1087-1089. 5 refs. In Russian.

A73-18225 **Sleep and memory.** M. J. Fowler, M. J. Sullivan, and B. R. Ekstrand (Colorado, University, Boulder, Colo.). *Science,* vol. 179, Jan. 19, 1973, p. 302-304. 18 refs. Grant No. NIH-MH-15655.

It has been attempted to link the beneficial effects of sleep on memory to one particular stage of sleep, rapid eye movement sleep. The two experiments reported, on the contrary, suggest that it is delta-wave sleep, particularly stage 4 sleep, that is most beneficial to memory. The results of the first experiment indicate a strong memory effect of the retention-interval condition for a paired-associate work task. The data obtained in the second experiment document the fact that memory of the subjects in the first half of the night is superior to memory in the second half of the night. G.R.

A73-18241 * **Studies in interactive communication. I - The effects of four communication modes on the behavior of teams during cooperative problem-solving.** A. Chapanis, R. B. Ochsman, R. N. Parrish, and G. D. Weeks (Johns Hopkins University, Baltimore, Md.). *Human Factors,* vol. 14, Dec. 1972, p. 487-509. 44 refs. NSF Grant No. GN-890; Grant No. NGR-21-001-073.

Two-man teams solved credible, 'real-world' problems for which computer assistance has been or could be useful. Conversations were carried on in one of four modes of communication: (1) typewriting, (2) handwriting, (3) voice, and (4) natural, unrestricted communication. Two groups of subjects (experienced and inexperienced typists) were tested in the typewriting mode. Performance was assessed on three classes of dependent measures: time to solution, behavioral measures of activity, and linguistic measures. Significant and meaningful differences among the communication modes were found in each of the three classes of dependent variable. This paper is concerned mainly with the results of the activity analyses. Behavior was recorded in 15 different categories. The analyses of variance yielded 34 statistically significant terms of which 27 were judged to be practically significant as well. When the data were transformed to eliminate heterogeneity, the analyses of variance yielded 35 statistically significant terms of which 26 were judged to be practically significant. (Author)

A73-18242 # **Estimating the detectability of target luminances.** W. H. Teichner and M. J. Krebs (New Mexico State University, Las Cruces, N. Mex.). *Human Factors,* vol. 14, Dec. 1972, p. 511-519. 19 refs. Research supported by the New Mexico State University and U.S. Navy.

The literature on the absolute threshold for seeing was used to develop a method for estimating the probability of detection of a light given only by luminance threshold value as information, and for predicting the luminance threshold as a function of target size and duration. The analysis also supported the general conclusion that for small visual areas and up to a critical duration, there is a reciprocity between duration and luminance and that the critical duration decreases with increasing area. It did not support the conclusion of a similar reciprocity or trade-off between luminance and area. (Author)

A73-18243 * **Visual performance with high-contrast cathode-ray tubes at high levels of ambient illumination.** W. B. Knowles and J. W. Wulfeck (Dunlap and Associates, Inc., Santa Monica, Calif.). *Human Factors,* vol. 14, Dec. 1972, p. 521-532. 5 refs. Contract No. NAS12-2262.

A73-18244 # **Monitoring performance across sense modes - An individual differences approach.** D. M. Tyler, W. L. Waag, and C. G. Halcomb (Texas Tech University, Lubbock, Tex.). *Human Factors,* vol. 14, Dec. 1972, p. 539-547. 12 refs. Grant No. DAAD05-69-C-0102. Project THEMIS.

Attempt to determine the relationship between performance measures across different sense modes by controlling for task difficulty on an individual basis. Performance measurements were made under conditions of visual stimulus presentation, auditory stimulus presentation, and auditory-visual stimulus presentation wherein signals and events for both sense modalities were presented simultaneously. For each subject stimulus values were experimentally determined which resulted in similar detection rates for both visual and auditory presentation. In this manner an attempt was made to equate task difficulty on an individual basis. All measures were found to be highly correlated across the three task conditions, thus lending support to the notion of a common 'vigilance factor.' A.B.K.

A73-18245 **Effects of ancillary information upon photo-interpreter performance.** J. M. Levine (American Institutes for Research, Washington, D.C.) and D. Eldredge (FAA, Atlantic City, N.J.). *Human Factors,* vol. 14, Dec. 1972, p. 549-560. Army-supported research.

Evaluation of the effects of ancillary information upon photo-interpreter performance under four modes of system operation. The four modes evaluated were image interpretation using no intelligence information, image interpretation with the interpreter receiving and integrating externally generated intelligence information, the interpreter performing his usual interpretation task without information and subsequently being provided with externally generated intelligence information, and image interpretation with the interpreter receiving no intelligence information but with a computer serving to integrate the interpreter reports with intelligence information. It is found that the provision of ancillary information enhanced accuracy of identification regardless of whether the information was qualitative or quantitative and regardless of whether the information was presented simultaneously with or subsequent to the imagery. Also, it was found that the integration function was best carried out by the interpreter, and not by the computer. A.B.K.

A73-18256 # **Effects of exposure to microwave fields (O posledstviiakh vozdeistviia SVCh polia).** E. V. Gembitskii. *Voenno-Meditsinskii Zhurnal,* Oct. 1972, p. 58-63. 5 refs. In Russian.

The physiological and clinicophysiological effects of the action of microwave fields upon the human organism and that of experimental animals are reviewed in the light of published observations and research. Discussed facets include the ethiology, pathogenesis, clinical and diagnostic aspects, therapy, prophylaxis, and medical opinion. M.V.E.

A73-18257 # **Functional state alteration of the visual analysor in pilots (Izmeneniia funktsional'nogo sostoianiia zritel'nogo analizatora u letchikov).** V. V. Koblianskii. *Voenno-Meditsinskii*

Zhurnal, Oct. 1972, p. 68-70. 7 refs. In Russian.

Study of the functional-state alteration of the visual analysor in fighter pilots during performance of various types of flight tasks, including flights in daytime, nighttime, and under conditions of abrupt changes in brightness. Alteration assessments are based on visual acuity, rate of adaptation to darkness, critical flicker-mergence frequency, and electrical sensitivity of the eye. M.V.E.

A73-18258 # **Study of erroneous actions of flying personnel (Ob izuchenii oshibochnykh deistvii letnogo sostava).** N. P. Beliaev and A. I. Palamarchuk. *Voenno-Meditsinskii Zhurnal,* Oct. 1972, p. 70-72. In Russian.

The identification and study of erroneous actions committed by flying personnel is discussed from the viewpoint of its importance for enabling the medical service to discharge fully its flight-safety protective duties. It is shown that the human factor in many of these erroneous actions is so deeply entangled in the whole man-machine system as to be for any useful purposes simply inseparable. In the light of presented case histories, it is argued that effective operation of the medical service calls for its full involvement and ample competence in the whole man-machine system. M.V.E.

A73-18334 **Regional lung volumes with positive pressure inflation in erect humans.** J. Lemelin, W. R. D. Ross, R. R. Martin (Royal Victoria Hospital; McGill University Clinic, Montreal, Canada), and N. R. Anthonisen. *Respiration Physiology,* vol. 16, Dec. 1972, p. 273-281. 8 refs. Research supported by the Medical Research Council of Canada.

Four seated subjects attained a preselected lung volume (V sub zero) in two ways: voluntarily, and by relaxing against a positive airway pressure of 14 to 16 cm H2O; V sub zero were 1.0 to 1.5 L below total lung capacity. Using Xe, the regional distribution of lung volumes at V sub zero under both conditions. The apex to base differences in regional expansion and, by implication, regional pleural pressure differences were the same on both conditions. All regional volumes were slightly less during positive pressure inflation, implying an increase in regional, total lung capacity, presumably due to a shift of blood volume out of the thorax. (Author)

A73-18335 **Effects of cardiac output on /O-18/2 lung diffusion in normal resting man.** H. Gong, Jr., C. J. Kurpershoek, D. H. Meyer, and C. E. Cross (California, University, Davis, Calif.). *Respiration Physiology,* vol. 16, Dec. 1972, p. 313-326. 70 refs. Research supported by the American Heart Association; Grant No. PHS-HE-42892-01.

The purpose of this study was to further validate the technique of using tracer isotopic O2 for the measurement of DL sub O2 in a large number of subjects. The isotope is stable and of negligible natural importance, and leads to desired simplifications due to the absence of /O-18/2 back pressure in mixed venous blood. The subjects had a large spread of resting cardiac outputs, making it possible to determine the simultaneous dependency for both DL sub O2 and DL sub CO on cardiac output. F.R.L.

A73-18336 * **Mixed-venous oxygen tension by nitrogen rebreathing - A critical, theoretical analysis.** G. R. Kelman (Aberdeen, University, Aberdeen, Scotland). *Respiration Physiology,* vol. 16, Dec. 1972, p. 327-336. 13 refs. Grant No. NGL-05-009-109.

There is dispute about the validity of the nitrogen rebreathing technique for determination of mixed-venous oxygen tension. This theoretical analysis examines the circumstances under which the technique is likely to be applicable. When the plateau method is used the probable error in mixed-venous oxygen tension is plus or minus 2.5 mm Hg at rest, and of the order of plus or minus 1 mm Hg during exercise. Provided, that the rebreathing bag size is reasonably chosen, Denison's (1967) extrapolation technique gives results at least as accurate as those obtained by the plateau method. At rest, however, extrapolation should be to 30 rather than to 20 sec. (Author)

A73-18337 **The influence of age, sex, body size and lung size on the control and pattern of breathing during CO2 inhalation in Caucasians.** J. M. Patrick and A. Howard (Dundee, University, Dundee, Scotland). *Respiration Physiology,* vol. 16, Dec. 1972, p. 337-350. 36 refs.

A73-18347 **The superior colliculus of the brain.** B. Gordon. *Scientific American,* vol. 227, Dec. 1972, p. 72-82.

The latest views on the role of the superior colliculus in aiding the eye in detecting and tracking the motion of objects are discussed. Convergence in the superior colliculus of sensory stimuli generated in other nerve centers is described and is shown in a diagram. Experiments on cats and primates are also noted as part of research aimed at obtaining more data on the participation of superior colliculus cells in visual signal processing. Experiments and theories concerning the possible role of superior colliculus cells in auditory and tactile stimulus processing are also covered. V.Z.

A73-18348 # **The effects of hypoxia, hypercapnia, and asphyxia on the baroreceptor-cardiac reflex at rest and during exercise in man.** D. J. C. Cunningham, P. Sleight (Oxford University; Radcliffe Infirmary, Oxford, England), E. S. Petersen, and T. G. Pickering. *Acta Physiologica Scandinavica,* vol. 86, Dec. 1972, p. 456-465. 16 refs. Research supported by the Danish Medical Research Council, Medical Research Council of England, and British Heart Foundation.

The sensitivity of the baroreceptor-cardiac reflex was tested in 12 healthy subjects by relating changes in pulse interval to pressure changes induced by phenylephrine. Hypercapnia in high oxygen at rest was associated with a significant rise in systolic pressure and a significant fall of baroreflex sensitivity. Pulse interval changed little. The changes in exercise were qualitatively the same but much smaller. Hypoxia with hypocapnia at rest was associated with a substantial tachycardia but no significant change in pressure or in reflex sensitivity. In exercise the changes were similar except that baroreflex sensitivity was depressed more than by exercise itself. Asphyxia (hypercapnia with hypoxia) at rest was associated with a combination of the changes induced by the two stimuli separately. (Author)

A73-18349 * **Limitations of terrestrial life.** P. Molton (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.). *Spaceflight,* vol. 15, Jan. 1973, p. 27-30. 21 refs.

Questions of the suitability of other planets in the solar system for terrestrial organisms are discussed. It is found that life forms similar to terrestrial organisms but modified to fit the prevailing conditions could exist on Venus, Mars, and Jupiter. Of these, only in the case of Jupiter is there any evidence that life would have been able to evolve. Life on Jupiter would be restricted to the clouds. It is pointed out that life may have developed on other celestial bodies in forms which are quite dissimilar to terrestrial organisms with regard to their biochemistry. G.R.

A73-18350 **Visual evoked responses elicited by rapid stimulation.** J. A. S. Kinney, C. L. McKay, A. J. Mensch, and S. M. Luria (U.S. Navy, Naval Submarine Medical Research Laboratory, Groton, Conn.). *Electroencephalography and Clinical Neurophysiology,* vol. 34, Jan. 1973, p. 7-13. 26 refs.

The study discussed involves an assessment of the technique of using rapid flash rates to obtain visual evoked responses (VERs). It was found that differences in evoked response due to stimulus parameters may be minimized under the conditions of this technique. The use of both a fast and a slow rate to obtain VERs is recommended as a good methodological technique for studying brain functioning. G.R.

A73-18416 * **Search for biogenic structures and viable organisms in lunar samples - A review.** V. I. Oyama (NASA, Ames

Research Center, Exobiology Div., Moffett Field, Calif.). *(Conference on the Organic Analysis and Carbon Chemistry of Lunar Samples: Their Significance for Exobiology, College Park, Md., Oct. 26-28, 1971.) Space Life Sciences,* vol. 3, Oct. 1972, p. 377-382. 19 refs.

An attempt is made to summarize the examinations and tests of the lunar samples to date and point out the limitations and tentative conclusions regarding the biology of the moon. The low levels of organic carbon, the lack of hydrous minerals, and inability to hold an atmosphere all make it unlikely that the moon could provide sufficient sources of organics and water to generate even the rudimentary beginnings of chemical precursors to life. F.R.L.

A73-18417 Distribution and isotopic abundance of biogenic elements in lunar samples. I. R. Kaplan (California, University, Los Angeles, Calif.). *(Conference on the Organic Analysis and Carbon Chemistry of Lunar Samples: Their Significance for Exobiology, College Park, Md., Oct. 26-28, 1971.) Space Life Sciences,* vol. 3, Oct. 1972, p. 383-403. 36 refs.

Lunar samples are a source of material to help elucidate cosmic and planetary problems concerning elemental distribution and isotopic abundances. The elements considered (H, C, N, O, P, and S) are present either as minor or trace elements, with the exception of oxygen. To the endogenous lunar content, elements are contributed by solar wind irradiation and meteorite impacts. 'Hydrogen stripping' appears to be responsible for enrichment of the heavy isotopes C13, O18, and S34 in the bulk fines, which have a history of long exposure to the solar wind. General lack of a concentration mechanism for water, potent destructive processes by radiation, and volatilization by high daytime temperatures and low atmospheric pressures all suggest a steady state condition in which rate of destruction and removal of organic molecules is much greater than the rate of synthesis and concentration. F.R.L.

A73-18418 * Compounds of the organogenic elements in Apollo 11 and 12 lunar samples - A review. E. K. Gibson, Jr. (NASA, Manned Spacecraft Center, Geochemistry Branch, Houston, Tex.) and C. B. Moore (Arizona State University, Tempe, Ariz.). *(Conference on the Organic Analysis and Carbon Chemistry of Lunar Samples: Their Significance for Exobiology, College Park, Md., Oct. 26-28, 1971.) Space Life Sciences,* vol. 3, Oct. 1972, p. 404-414. 37 refs.

Investigations of low molecular weight compounds of the organogenic elements on lunar samples are reviewed. The three general techniques of vacuum pyrolysis, acid hydrolysis, and crushing have been employed by most investigators. Vacuum pyrolysis of lunar fines produce a variety of gaseous species which are either: (1) indigenous, (2) solar wind products and/or (3) chemical reaction products of mineral phases found in the lunar samples. Acid hydrolysis of lunar fines using deuterium-labeled acids yields evidence for indigenous methane and ethane. Methane and ethane found in the lunar fines are largely derived from the solar wind with only trace amounts indigenous to the samples. Crushing experiments with lunar fines and breccias produce methane, ethane, hydrogen, nitrogen, hydrogen sulfide and the rare gases. (Author)

A73-18421 * Amino acid precursors in lunar samples. S. W. Fox, K. Harada (Miami, University, Coral Gables, Fla.), and P. E. Hare (Carnegie Institution of Washington, D.C.). *(Conference on the Organic Analysis and Carbon Chemistry of Lunar Samples: Their Significance for Exobiology, College Park, Md., Oct. 26-28, 1971.) Space Life Sciences,* vol. 3, Oct. 1972, p. 425-431. 10 refs. Grant No. NGR-10-007-088.

The use of hot water to extract lunar samples, followed by the hydrolysis of the aqueous extract, appears to be the method of choice for identification and quantitation of amino acid precursors in extraterrestrial sources. The net inferences from the analyses to date are (1) that amino acid precursors are verifiably present in lunar dust, and (2) that they are quite certainly not the consequence of contamination by terrestrial organisms, including man. It is suggested that prebiotic evolutionary pathways such as have been traversed on the earth were terminated on the moon for lack of sufficient water. Although some or all of the amino acid precursors may be indigenous, the low level observed suggests that they may also result from onfall of organic compounds from interstellar matter, comets, tails, solar wind, or meteorites. F.R.L.

A73-18428 * The search for indigenous lunar organic matter. C. Sagan (Cornell University, Ithaca, N.Y.). *(Conference on the Organic Analysis and Carbon Chemistry of Lunar Samples: Their Significance for Exobiology, College Park, Md., Oct. 26-28, 1971.) Space Life Sciences,* vol. 3, Oct. 1972, p. 484-489. 19 refs. Grant No. NGR-33-010-101.

It is argued that the absence of organic compounds from returned lunar samples is to be expected even for a lunar history rich in primordial organics. The sites most likely to yield lunar organic compounds have not been investigated, and there may be an area of investigation conceivably critical to problems in prebiological chemistry and the early history of the solar system awaiting continued lunar exploration, manned or unmanned. F.R.L.

A73-18439 Learning of a behavior for regulation of the respiratory environment in rats. I (Apprentissage d'un comportement de régulation de l'ambiance respiratoire chez le rat. I). C. Hantz (Collège de France, Paris; SEBC, Laboratoire de Physiologie, Vert-le-Petit, Essonne; CNRS, Laboratoire de Neurophysiologie Sensorielle et Comportementale, France). *Journal de Physiologie,* vol. 64, Dec. 30, 1972, p. 343-354. 17 refs. In French.

The study was undertaken to define the various conditions and characteristics of learning an instrumental response to oxygen, and the utilization of this response for regulation of the oxygen content of the environment. Conscious and intact male rats placed in a chamber containing oxygen and nitrogen were exposed daily to repetitive and moderate hypoxia. It was observed that 80 per cent of the animals learned to press a lever restoring normoxic conditions. The learning of such a response toward oxygen restoration was obtained with only a moderate degree of hypoxia. F.R.L.

A73-18469 Vigilance under induced hyperthermia. W. P. Colquhoun (Sussex, University, Brighton, England) and R. F. Goldman (U.S. Army, Military Ergonomics Laboratory, Natick, Mass.). *Ergonomics,* vol. 15, Nov. 1972, p. 621-632. 9 refs.

The experiment described was stimulated by a study by Wilkinson et al. (1964), who found that detection rate in a vigilance task increased as body temperature was raised. In the experiment, the subjects performed for 60 min, and the task was a visual rather than an auditory one. Elevation of temperature was achieved by physical work in hot and humid conditions. Results of the experiment, when considered together with those of Wilkinson et al., suggest that it is only when actual body temperature increases that performance in a vigilance task will noticeably alter in hot environmental conditions and, furthermore, the extent of this increase must be considerable before any such alteration occurs. F.R.L.

A73-18470 Directional errors and their correction in a discrete tracking task. E. D. Megaw (Birmingham, University, Birmingham, England). *Ergonomics,* vol. 15, Nov. 1972, p. 633-643. 28 refs.

The experiments were obtained from step-input tracking experiments designed originally to investigate certain aspects of the psychological refractory period. However, the experiments permitted the relation between reaction times to be obtained and discussed in terms of the models of error correction described by Rabbitt (1967, 1968). In addition, because a relatively sensitive response device was used in this study, more realistic values of error correcting reaction time (ECRT) could be obtained. Many characteristics of the direction errors show similarities with those errors obtained from keyboard tasks. F.R.L.

A73-18471 **The biodynamic aspects of low altitude, high speed flight.** C. F. Gell and G. Moeller (U.S. Naval Material Command, Naval Medical Research Laboratory, Groton, Conn.). *Ergonomics,* vol. 15, Nov. 1972, p. 655-670. 50 refs.

Attention is given to those stressors and problems in research methodology considered to be especially relevant to understanding the biodynamics of low altitude high speed (LAHS) flight. These are: sources of LAHS flight stress, biological effects of vibration and buffeting, problems in simulation of LAHS flight, and means for alleviation of in-flight stress. The biological systems of the pilot most prominently reactive in the LAHS flight profile are cardiovascular, respiratory, neuroendocrine, labyrithine, visual, and skeletal. Simulator and flight experiments indicate that the present LAHS profile can be successfully flown by operational pilots. A well designed aircraft with good crew accomodation, restraints, and harnesses can do much to improve the physiological responses of the pilot. F.R.L.

A73-18472 **Correlational v ratio adjustments of body weight in exercise-oxygen studies.** V. Katch (California, University, Santa Barbara, Calif.). *Ergonomics,* vol. 15, Nov. 1972, p. 671-680. 26 refs.

The relationships between maximum oxygen consumption in l/min, ml/kg/min and two endurance performance measures were investigated. The data indicated that endurance performance and maximum oxygen consumption were to a large extent task specific. Use of the ratio ml/kg/min was shown to result in spurious correlations between that measure and work performance. Use of partial correlations to statistically remove the spurious influence of heterogeneity in body weight was demonstrated. (Author)

A73-18473 **Effects of heat stress on performance.** N. Z. Azer, P. E. McNall, and H. C. Leung (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.). *Ergonomics,* vol. 15, Nov. 1972, p. 681-691. 10 refs. Contract No. F44620-68-C-0020. Project THEMIS.

Three groups of subjects, seven subjects each, were required to perform a central tracking task and simultaneously respond to peripheral stimuli, while being exposed to heat stress environments. One group was exposed to a 95 deg F and 50% RH environment, the second group was exposed to a 95 deg F and 75% RH environment, and the third group was exposed to a 100 deg F and 50% RH environment. The performance results showed that there was a significant deterioration in tracking and increase in reaction time only when the subjects were exposed to the 95 deg F and 75% RH environment. The peripheral field of awareness was not significantly affected by any of the three environments. (Author)

A73-18474 **Redintegrated somatotyping.** T. A. Preston and M. Singh (Alberta, University, Edmonton, Alberta, Canada). *Ergonomics,* vol. 15, Nov. 1972, p. 693-700.

Redintegrated somatotyping is a photographic procedure for measuring physique in which measurements are obtained for all diameters rather than a few selected ones. By using the photographs in conjunction with a photoelectric cell and electronic apparatus it is possible to describe the cumulative sums of all photographic diameters in one plane of a leg, the trunk, and an arm with hand in one or more views without any manual measurement and to present these data in graph form. From these, ratios can be obtained to indicate cross sectional areas and other mathematical functions. F.R.L.

A73-18475 **A method for the investigation of interpolated information and time effects in short term retention.** J. B. Peacock and P. Davies (Birmingham, University, Birmingham, England). *Ergonomics,* vol. 15, Nov. 1972, p. 701-704.

A method has been developed in which the subject performs a paced task with the object of recalling information presented earlier in the task at some later stage; both the intersignal interval variable and also the number of interpolated steps are manipulated. Regression analysis is then applied to the results in order to demonstrate the relative effects of interpolated activity, pacing and the interaction between these two, which is equivalent to interpolated time, on short term retention. (Author)

A73-18546 * **Effects of aircraft noise on human sleep.** J. S. Lukas (Stanford Research Institute, Menlo Park, Calif.). *American Industrial Hygiene Association Journal,* vol. 33, May 1972, p. 298-303. 15 refs. Contracts No. NAS1-6193; No. NAS1-7592; No. NAS1-9286.

Under controlled conditions in two test rooms, studies were made of the response of sleeping subjects to the stimuli of simulated sonic booms and subsonic jet aircraft noise. Children were relatively nonresponsive to the stimuli. In general, the older the subject, the more likely is behavioral awakening. The response rates to the two types of stimuli were essentially the same. The stimulus intensity had little, if any, effect on frequency of arousal, although other degrees of response did increase. (Author)

A73-18547 **Surface contaminants.** H. V. Anthony, M. B. Congdon, M. W. McKenzie, R. R. Orrell, and D. B. Selbie (Martin Marietta Corp., Aerospace Div., Denver, Colo.). *Contamination Control/Biomedical Environments,* vol. 11, Nov.-Dec. 1972, p. 12-15, 18-21, 29.

Superficial organic contaminants that are soluble in halogenated solvents can be quantitatively evaluated by a method originally developed for detecting contaminants on Martian landers. The method does not require solvent drenching or immersion of the hardware being evaluated, and solvent extraction of the sampled surface is accomplished by means of porous, solvent-wetted non-organic disks. The method lends itself well to IR absorption spectrophotometry by direct insertion of the disk into (and extraction and analysis within) the analytical cell. It is claimed that the technique will detect in the range of one-half microgram of contaminant per square centimeter. T.M.

A73-18575 * **Comparative anatomy of the vestibular nuclear complex in submammalian vertebrates.** W. R. Mehler (NASA, Ames Research Center, Experimental Pathology Branch, Moffett Field, Calif.). In: Basic aspects of central vestibular mechanisms. Amsterdam, Elsevier Publishing Co., 1972, p. 55-67. 51 refs.

A synopsis of the literature on the natural history of the vestibular nuclear complex (VNC) in lower vertebrates is presented in an attempt to assess the knowledge available. The review discloses that there is considerable descriptive information that is widely dispersed in the literature. However, information about the topology, number, and cellular composition of the cell groups that compose the VNC is sketchy. Major cytological and hodological information is still needed to establish which parts of the VNC actually are homologous. M.V.E.

A73-18577 **Blue-green algae - Why they become dominant.** J. Shapiro (Minnesota, University, Minneapolis, Minn.). *Science,* vol. 179, Jan. 26, 1973, p. 382-384. NSF Grant No. GB-15675.

Experimental study of the effect of nutrient concentration, carbon dioxide concentration, and pH on the relative abundances of blue-green and green algae in lakes. It is found that the addition of carbon dioxide or the lowering of the pH stimulated a shift from blue-green to green algae, especially when nutrients were supplied simultaneously, while the addition of nutrients alone resulted in the appearance of more blue-green algae. It is concluded that King's (1970) hypothesis regarding the formation of blue-green algae is correct. A.B.K.

A73-18624 **Tilt discrimination and aftereffect with stroboscopic display of contours.** R. Over and J. Broerse (Queensland, University, St. Lucia, Queensland, Australia). *Psychonomic Science,* vol. 29, Dec. 25, 1972, p. 337, 338. 6 refs. Research supported by the Australian Research Grants Commission.

Previous studies have shown that motion perception is degraded when the visual stimulus is stroboscopically illuminated. The present experiment indicated that the accuracy in discrimination of the orientation of an intermittently presented stationary grating is unaffected by flicker rate. In addition, the orientation aftereffect induced by successive display of a tilted and vertical grating is independent of the flicker rate of each stimulus. These results indicate that mechanisms engaged in neural representation of contour information are not conjointly sensitive to the rate of temporal intermittency within the visual display. (Author)

A73-18625 **The effect of accessory auditory stimulation upon detection of visual signals.** D. M. Maloney and R. B. Welch (Kansas, University, Lawrence, Kan.). *Psychonomic Science,* vol. 29, Dec. 25, 1972, p. 345-347. 16 refs.

The study examined the effect of a continuous 1,000-Hz 80-dB accessory tone upon the detectability of a visual stimulus presented to the peripheral retina. All Ss received the primary visual stimulus both with and without an accessory auditory stimulus. Detection of the visual stimulus was measured by means of a forced-choice indicator. The presence of the accessory tone significantly decreased the percentage of light detections. An unexpected finding was that incorrect responses were unequally distributed among the four observation intervals. It was concluded that continuous intense accessory auditory stimulation inhibits visual sensitivity. (Author)

A73-18673 **The control of sensitivity in the retina.** F. S. Werblin (California, University, Berkeley, Calif.). *Scientific American,* vol. 228, Jan. 1973, p. 70-79.

Discussion of the function of the retina-controlled optic nerve visual information processing mechanism. It is shown that interactions among nerve cells keep the response range of the system in register with ambient illumination, enabling the retina to form a high-contrast neutral image over a wide range of light conditions.
V.Z.

A73-18815 **Compact digital coding of electrocardiographic data.** J. R. Cox, Jr. and K. L. Ripley (Washington University, St. Louis, Mo.). In: Hawaii International Conference on System Sciences, 6th, Honolulu, Hawaii, January 9-11, 1973, Proceedings. North Hollywood, Calif., Western Periodicals Co., 1973, p. 333-336.

A modified Huffman coding technique has been applied to electrocardiographic (ECG) data for efficient digital storage and transmission. The ECG is filtered, digitized at 250 samples/sec, and a second difference obtained which in turn is converted into code words of variable length. The source words are partitioned into a frequent and an infrequent set. Huffman coding of the frequent source words leads to a code table of moderate size. Infrequent source words outside the code table are encoded by a simple rule yielding code words of fixed length. Bounds on average code word length are calculated and shown to be similar to the bounds given by the Shannon source coding theorem for efficient uniquely decodable codes. (Author)

A73-18816 **Mechanical modeling of eye muscle dynamics.** E. L. Keller (California, University, Berkeley, Calif.). In: Hawaii International Conference on System Sciences, 6th, Honolulu, Hawaii, January 9-11, 1973, Proceedings. North Hollywood, Calif., Western Periodicals Co., 1973, p. 337-339. 9 refs. Grant No. NIH-EY-09955-01.

A further refinement to previous models of eye muscle mechanics is presented which contains separate subsystems representing the fast and slow muscle fibers present in the extraocular muscles. Both subsystems have identical topology but different parameters defining the viscoelastic elements in the system. Simulation with the model is used to study the possible role of the slow muscle fibers during normal eye movements. Possible explanations for the extremely high firing rate of oculomotor neurons are explored with the aid of the model. In addition, discrepancies in the match of motoneuron firing rate and experimentally observed muscle mechanics are tested on the model. (Author)

A73-18870 **Geometry of left ventricular contraction in the systolic click syndrome - Characterization of a segmental myocardial abnormality.** A. J. Liedtke, J. H. Gault, D. M. Leaman, and M. S. Blumenthal (Milton S. Hershey Medical Center, Hershey, Pa.). *Circulation,* vol. 47, Jan. 1973, p. 27-35. 18 refs.

A73-18871 **Long-term observations in patients with angina and normal coronary arteriograms.** C. R. Bemiller, C. J. Pepine, and A. K. Rogers (U.S. Navy, Naval Hospital, Philadelphia, Pa.). *Circulation,* vol. 47, Jan. 1973, p. 36-43. 16 refs. Navy-supported research. Navy Project MR041-20-01-0132A.

Observations of 37 patients over 4.1 years showed that angina pectoris decreased in 80% and was stable in the remaining cases, with one patient having died of an apparently unrelated cause. Subsequent observations of seven patients for 4.5 more years showed no changes in their previously documented hemodynamic abnormalities and normal coronary arteriograms. Angina pectoris responded to nitrate and propranolol therapy, and prognosis appeared to be favorable.
V.Z.

A73-18872 **Anatomy of the conduction system.** J. L. Titus (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Circulation,* vol. 47, Jan. 1973, p. 170-177. 31 refs.

Some, but not all, cardiac arrhythmias are related to pathologic lesions of the cardiac conduction system. Common atrial dysrhythmias and first-degree atrioventricular (A-V) block rarely are explained on the basis of anatomic lesions in specific sites of the conduction system or its blood supply. Second-degree A-V block of Mobitz type II, which may be a precursor of complete (third-degree) heart block, commonly is associated with fibrotic lesions of uncertain etiology in the branching part of the bundle of His or the bundle branches. Ischemic lesions are found less often, and other pathologic processes rarely are present. Chronic complete heart block most often results from nonspecific, fibrotic interruption of the distal bundle of His, or of the first parts of the bundle branches after their origins. Ischemic lesions are uncommonly the cause of chronic block. High-grade A-V block complicating acute myocardial infarction may be associated with infarction of the A-V conduction system, but often morphologic evidence of ischemia cannot be identified. (Author)

A73-18873 **Ultrastructure of the atrial, ventricular, and Purkinje cell, with special reference to the genesis of arrhythmias.** M. J. Legato (Roosevelt Hospital; Columbia University, New York, N.Y.). *Circulation,* vol. 47, Jan. 1973, p. 178-189. 29 refs. Research supported by the New York Heart Association.

An examination of the anatomy of the atrial, ventricular, and Purkinje cells reveals that the internal composition of all cardiac myofibers is qualitatively the same: all have a single nucleus, sarcomeric and mitochondrial units, and a well-developed sarcoplasmic reticulum. There are important differences, however, in the extent and distribution of the cell membrane and its derivatives in the myofiber. The presence or absence of a transverse tubular system and the variation in the number and type of intercellular linkages explain at least some of the characteristic electrical and functional properties of individual types of cells. The overall pattern of cellular organization in working atrial, ventricular, and conducting tissue is reviewed, and possible anatomic bases for current theories of normal and abnormal impulse generation and conduction in the heart are discussed. (Author)

A73-18874 **Genesis of cardiac arrhythmias.** P. F. Cranefield, A. L. Wit, and B. F. Hoffman (Rockefeller University; Columbia University, New York, N.Y.). *Circulation,* vol. 47, Jan. 1973, p. 190-204. 48 refs. Grants No. NIH-HL-11994; No. NIH-HL-14899; No. NIH-HL-08508.

Review of published studies dealing with the causes of cardiac arrhythmia. Depressed excitability, concealed conduction of impulses, reentrant excitation, summation, inhibition and parasystole, and the causes of one-way block and of very slow impulse conduction are covered. V.Z.

A73-18875 # **Antiradial properties of DNA and of its denaturation products (Antipromenevi vlastivosti DNK i produktiv ii denaturatsii).** E. Z. Riabova (Akademiia Nauk Ukrains'koi RSR, Institut Mikrobiologii i Virusologii, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 34, Oct. 1972, p. 943-946. 10 refs. In Ukrainian.

Investigation of the antiradial action of exogenous DNA of heterogenous and homologous origins in experimental animals irradiated by fast neutrons. The results indicate that the protective effect of this DNA depends on the dose and time of its introduction into the organism. No differences in the protective effect of DNA of heterogenous and homologous origins were observed. M.V.E.

A73-18889 **Spline function interpolation in interactive hemodynamic simulation.** D. Ting and H. Greenfield (Utah, University, Salt Lake City, Utah). *International Journal of Man-Machine Studies,* vol. 4, Oct. 1972, p. 425-438. 11 refs.

A computer graphics system is being employed to simulate blood movement in several hemodynamic studies. Of particular interest is the representation of flow velocity profiles in an arterial channel past a lesion. The profiles are represented by smoothed curves as formed by spline function approximations. Resulting graphics displays show the advantages of spline functions in comparison to other approximation methods for fitting smooth curves to data. In turn, the interpolation of surfaces to boundary values by spline functions is studied. Such interpolation, in combination with certain advanced simulation equipment, is shown to be useful for studying the interim phases in the initiation and formation of atherosclerotic lesions. (Author)

A73-18890 **Structural models of simple sensory motor co-ordination.** R. L. Didday (Colorado State University, Fort Collins, Colo.). *International Journal of Man-Machine Studies,* vol. 4, Oct. 1972, p. 439-457. 16 refs.

A popular view of simple nervous systems is that a sensory input serves to select (release) one of a collection of prewired motor programs which in turn directs a motor response. The present study examines requirements for and possible implementations of the process of making such a selection. The approach is to study machines which will select an appropriate subset of spatially arrayed output lines when presented with an input spatial array of information. Several schemes are compared which can not only select an appropriate class of prewired responses, but which can also make a selective response directed at only one of several objects present. A classification of layered, spatially arrayed nerve networks is used to constrain possible implementations of this selection function. T.M.

STAR ENTRIES

N73-14069*# Texas Univ., Houston. School of Public Health.
PUBLIC HEALTH APPLICATIONS OF REMOTE SENSING OF THE ENVIRONMENT, AN EVALUATION
Jan. 1972 158 p refs
(Contract NAS9-11522)
(NASA-CR-129822) Avail: NTIS HC $10.00 CSCL 06E

The available techniques were examined in the field of remote sensing (including aerial photography, infrared detection, radar, etc.) and applications to a number of problems in the wide field of public health were determined. The specific areas of public health examined included: air pollution, water pollution, communicable disease, and the combined problems of urban growth and the effect of disasters on human communities. The assessment of the possible applications of remote sensing to these problems was made primarily by examination of the available literature in each field, and by interviews with health authorities, physicists, biologists, and other interested workers. Three types of programs employing remote sensors were outlined in the air pollution field: (1) proving ability of sensors to monitor pollutants at three levels of interest - point source, ambient levels in cities, and global patterns; (2) detection of effects of pollutants on the environment at local and global levels; and (3) routine monitoring. Author

N73-14070# National Research Council of Canada, Ottawa (Ontario).
MATERIALS OF THE SECOND ALL-UNION CONFERENCE ON THE STUDY OF THE EFFECTS OF MAGNETIC FIELDS ON BIOLOGICAL ORGANISMS, 24-26 SEPTEMBER 1969
1972 251 p refs Transl. into ENGLISH of the publ. "Nauchnyi Sovet po Kompleksnoi Probleme Kibernetika, Minsterstvo Zdravookhraneniya SSSR" Moscow, Akad. Nauk SSSR 281 p
(NRC-TT-1545) Avail: NTIS HC $4.75

Articles delivered to the conference on the biological effects of magnetic fields are presented. The effects discussed include: growth of experimental tumors, blood plasma, microbes, rhythm of cardiac contractions, seed germination, histological reactions of glial formations in cerebral cortex of rabbits, changes in lungs and liver, contracting action of the uterus and the course of pregnancy in white rats, and insect behavior. F.O.S.

N73-14071# Environmental Protection Agency, Research Triangle Park, N.C. Div. of Health Effects Research.
TOXICOLOGY OF ATMOSPHERIC SULFUR DIOXIDE DECAY PRODUCTS
Trent R. Lewis, Mary O. Amdur, Martin D. Fritzhand, and Kirby I. Campbell Jul. 1972 47 p refs
Avail: NTIS HC $4.50

A literature survey is presented on the toxicology of some of the sulfur dioxide decay products along with the comparative toxicity of these decay products. Data also cover the threshold concentrations of oxides of sulfur that elicit certain sensory responses in humans and animals. Other factors that affect the toxicity of particulate oxidation products of sulfur dioxide, such as retention, site of deposition, hygroscopic nature of the products, and the subject's breathing pattern are discussed. Author

N73-14072# Lockheed Missiles and Space Co., Palo Alto, Calif.
ON THE INFLUENCE OF INDIVIDUAL ELASTIC PROPERTIES OF THE HUMAN BODY ON THE RESULTS OF ARTERIAL PRESSURE MEASUREMENT
W. Olsczak and E. Zawidski [1972] 5 p refs Transl. into ENGLISH from the publ. "Problemy Mekhaniki Tverdogo Deformirovannogo Tela" Leningrad, Sudostr., 1970 p 309-313
Avail: NTIS HC $3.00; National Translations Center, John Crerar Library, Chicago, Ill. 60616

A qualitative analysis is presented of the deviations in instrument readings from the actual arterial pressure using the Riva Rocci method for measuring the arterial blood pressure. It is shown that the deviation of measurement from the actual pressure is greater, the greater the coefficient of muscle elasticity, and the smaller the artery cross section compared to the arm cross section, for the same elastic properties. F.O.S.

N73-14073*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.
APOLLO 14 MICROBIAL ANALYSES
Gerald R. Taylor Nov. 1972 114 p
(NASA-TM-X-58094; MSC-07475) Avail: NTIS HC $7.75 CSCL 06M

Extensive microbiological analyses that were performed on the Apollo 14 prime and backup crewmembers and ancillary personnel are discussed. The crewmembers were subjected to four separate and quite different environments during the 137-day monitoring period. The relation between each of these environments and observed changes in the microflora of each astronaut are presented. Author

N73-14074# Johns Hopkins Univ., Baltimore, Md. Dept. of Radiology.
ENVIRONMENTAL RADIOACTIVITY: RADIATION EFFECTS AT THE CELLULAR LEVEL
Jacob I. Fabrikant [1972] 71 p refs
(Contract AT(30-1)-3970)
(NYO-3970-29) Avail: NTIS

The effects of internally deposited radioisotopes on man are not well understood, primarily because of the nonuniformity of dose distribution throughout the body, the heterogenous composition of the various energies from radiations of different LET, and the biological variability in the rate of excretion of the radioisotopes and their daughter products. Data are reviewed from laboratory studies on mammals, primarily on mice, on the effects of internal irradiation on cells in various tissues. These studies provide evidence that during protracted radiation exposure the cells in rapidly renewing cell populations, such as bone osteoblasts, hematopoietic tissues, and epithelial linings of periosteal and endosteal membranes, are subject to radiation injury, depopulation, and regeneration and those cells with the greatest proliferative potential are most subject to radioinduced neoplasia. NSA

N73-14075# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
DECOMPRESSION EXPERIMENTS WITH ANIMALS AS A FUNCTION OF THE WATER BALANCE OF THE ORGANISM Ph.D. Thesis - Bonn Univ. [TIEREXPERIMENTELLE DEKOMPRESSIONSVERSUCHE IN ABHAENGIGKEIT VOM WASSERHAUSHALT DES ORGANISMUS]
Klaus-Peter Muenchen Mar. 1971 45 p refs In GERMAN; ENGLISH summary
(DLR-FB-71-20) Avail: NTIS HC $4.25; DFVLR, Proz, West Ger.: 13 DM

The responses of the organism to decompression as a function of water balance were investigated. Experiments were conducted on 842 guinea pigs with diuretic Lasix. There was an increased mortality rate after treatment with different doses of Lasix compared with nontreated animals. The hematocrit increased after treatment with Lasix as well as after high pressure exposure. The results are discussed and an attempt is made to elucidate the factors possible influencing these results. Author (ESRO)

N73-14076# Randomline Inc., Willow Grove, Pa.
A PSYCHOPHYSICAL STUDY OF THE RF SOUND PHENOM-

ENON Final Report, Feb. 1971 - Apr. 1972
Allan H. Frey, R. Messenger, and E. Eichert Jun. 1972 32 p refs
(Contract DAAK02-71-C-0213)
(AD-747684) Avail: NTIS CSCL 05/10

Additional data on the RF sound phenomenon are reported. This phenomenon is the perception of what is reported to be a sound when the head is illuminated with RF energy of particular characteristics. In the first phase of the experimentation, a portable RF sound demonstration unit was assembled. This was successfully used to demonstrate the phenomenon and its characteristics. In phase two, RF parameters relevant to generating the perception of RF sounds of significance were determined. In phase three, the possibility of determining if the perception of speech could be induced was explored. It was found that aspects of vocoder technology could not be used to generate speech. It was also found that perceived RF sound can not be generated using the rules of the periodicity pitch phenomenon.
Author (GRA)

N73-14077# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
THE ROLE OF AMMONIA IN THE METABOLIC EFFECTS OF HYDRAZINE
William Floyd Aug. 1972 21 p refs
(AF Proj. 7222)
(AD-749519; AMRL-TR-72-41) Avail: NTIS CSCL 06/20

The acute effects of administration of hydrazine on plasma ammonia, blood urea nitrogen, pH, pCO2, and respiratory rate were studied in dogs. In various experiments, various doses of hydrazine were given. The dogs given high doses developed hyperammonemia, respiratory alkalosis, coma and convulsions. Relatively little change in blood urea nitrogen was found. Since brain function is adversely affected by hyperammonemia and alkalosis, it is concluded that ammonia plays an important role in the toxicity of hydrazine. Observations would suggest that hydrazine could competitively inhibit the formation of urea by competitively combining with carbamyl phosphate and or glutamic acid and in turn releasing a stoichometric amount of ammonia. Hydrazine and ammonia could compete with the citric acid cycle for alpha ketoglutaric acid via the conversion to glutamic acid. This could disrupt oxidative metabolism, manifested by coma and convulsions. Author (GRA)

N73-14078# Naval Postgraduate School, Monterey, Calif.
A HYBRID COMPUTER TECHNIQUE FOR MEASURING HUMAN DESCRIBING FUNCTIONS AND REMNANT IN CLOSED LOOP TRACKING TASKS M.S. Thesis
Roy Dale Warren Jun. 1972 67 p refs
(AD-748659) Avail: NTIS CSCL 05/10

The measurement of the human describing function and remnant in a compensatory tracking task is undertaken. These measurements are obtained through the application of the fast Fourier transform technique on a hybrid (analog-digital) computer. This method processes the data in real time with minimal core storage and the results are available immediately upon completion of the tracking run. Author (GRA)

N73-14079# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
EVIDENCE FOR ACTIVATED INTERFACIAL CHARGE TRANSPORT IN LOW-G ACCELERATION STRESS Interim Report
Freeman W. Cope 30 Dec. 1971 16 p refs
(AD-749338; NADC-CS-7136) Avail: NTIS CSCL 06/19

The distribution of survival times of rats subjected to acceleration stress of -20 G(z) conforms to the Roginsky-Zeldovich or Elovich equation. This equation is derived from the hypothesis of electron or ion conduction across an activation energy barrier at the surface of a cell or subcellular particle, which suggests that tolerance to this acceleration stress is dependent upon such a biophysical process. Author (GRA)

N73-14080# Defense Documentation Center, Alexandria, Va.
PERFORMANCE MEASUREMENT Report Bibliography, Jun. 1948 - Mar. 1972
Sep. 1972 268 p refs
(AD-749100; DDC-TAS-72-7) Avail: NTIS CSCL 05/10

The annotated bibliography contains studies which aid in measuring and assessing data relevant to human performance. Training devices, aptitude and achievement tests, special clothing and equipment are all employed to establish the criteria used in these studies. There are also references on the environmental, physical and stress factors, which not only evaluate performance, but under certain conditions may predict it. A Subject Index is included. Author (GRA)

N73-14081# Naval Postgraduate School, Monterey, Calif.
PUPIL DIAMETER AND THE CROSS-ADAPTIVE CRITICAL TRACKING TASK: A METHOD OF WORKLOAD MEASUREMENT M.S. Thesis
Thomas Edward McFeely Jun. 1972 55 p refs
(AD-749075) Avail: NTIS CSCL 05/10

Two new applications of established techniques for measuring an individual's level of stress (workload) in tracking tasks are presented. An indirect technique of measuring reserve capacity is utilized in a two-axis cross-coupled compensatory tracking task. A direct psychophysiological measurement is made by recording time histories of operator pupil diameter. The level of instability in the second axis of the cross-adaptive method is shown to be related to the level of workload in the primary axis. Increased pupil diameter is shown to be similarly related to operator workload. GRA

N73-14082# Navy Experimental Diving Unit, Washington, D.C.
PULMONARY MECHANICAL FUNCTIONS IN MAN BREATHING DENSE GAS MIXTURES AT GREAT DEPTHS
W. Brandon Wright, R. Peterson, and C. J. Lambertsen Jul. 1972 15 p refs
(AD-749028; NEDU-14-72) Avail: NTIS CSCL 06/19

The high density of breathing gas at great depths may impair a diver's performance by mechanical overload of his respiratory system. In order to describe this phenomenon and to search for a respiratory limit to deep diving pulmonary mechanical functions were measured at 19 different breathing gas densities ranging from 0.4 to 25 gms/L. (equivalent to helium at sea level to helium at 150 Ata). The results of these studies showed that function at rest is not severely affected by the great density increase. Respiratory limits to forced or exercising ventilation do appear, but useful function persists even to the maximum density studied and can be predicted to persist to even much greater densities. Author (GRA)

N73-14083# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.
ACCURACY OF THE MEAN THRESHOLD IN THE PSYCHOPHYSICAL METHOD OF LIMITS Interim Report
Robert M. Herrick 21 Apr. 1972 14 p refs
(MF12524004)
(AD-749334; NADC-72-64-CS) Avail: NTIS CSCL 06/16

Human factors specialists and engineers frequently employ the psychophysical method of limits to evaluate experimental variables in sensory areas. Textbooks list rules for data collection and data treatment with the method of limits which vary somewhat, but have considerable consistency. Analysis indicates, however, that most of the rules are arbitrary, and that they lead to an inefficient use of resources. The present report analyzes the problem of step size, i.e., the spacing between successive stimuli, in the method of limits. Author (GRA)

N73-14084# Harvard School of Public Health, Boston, Mass.
STUDIES OF THE VISUAL PERCEPTION OF SUBSTANCE Final Report
Ronald M. Pickett 14 Aug. 1972 33 p refs
(Contract N00014-67-A-0298-0021; NR Proj. 142-247)
(AD-749372) Avail: NTIS CSCL 05/10

The aim of the research was to study man's ability to sense substantive properties of objects and materials just by looking at them. The results from three areas of study give no evidence that the perceptual process involved in substantive analyses of optical designs is any different from the process involved in

abstract analyses. Apparently only a crude analysis is performed sufficient to name the object or material. Visual abstraction of fine substantive information may require textured displays.
Author (GRA)

N73-14085# Army Medical Research Lab., Fort Knox, Ky.
VISION: MONOCULAR, BI-OCULAR, BINOCULAR Interim Report
George S. Harker 5 Jun. 1972 14 p refs
(DA Proj. 3A0-61102-B-71P)
(AD-749450; USAMRL-984) Avail: NTIS CSCL 05/10

Psycho-visual problems associated with utilization of monocular, bi-ocular, and binocular visual systems are reviewed in the context of present knowledge. It is noted that simply because an instrument has been designed to be binocular, it is not necessarily so used by an observer. A binocular is frequently a binocular and is often a monocular as it is employed. The ultimate variable that determines which mode of functioning is used lies within the visual system and has not as yet been identified. It is concluded that the design of binocular optical instruments with specificity to their mode of use cannot be achieved until basic research has identified this aspect of the visual system and the variables which control its function.
Author (GRA)

N73-14086# Naval Submarine Medical Research Lab., Groton, Conn.
APPARENT OBJECT MOVEMENT PRODUCED BY HEAD MOVEMENT UNDER WATER Medical Research Progress Report No. 8
Steven H. Ferris 14 Jan. 1972 11 p refs
(AD-749319; NSMRL-694) Avail: NTIS CSCL 06/16

It was predicted that due to the optical distortion produced by wearing a facemask, the constancy of visual position would not be maintained under water, i.e., stationary objects should appear to move when the head is moved. Subjects made magnitude estimates of object movement in both air and water. Twice as much movement occurred in water as in air. Two underwater activities, head rotation while observing vertical stripes, and practice in hand-eye coordination, produced a small reduction in object movement. The results indicate that apparent object movement (loss of position constancy) should be added to the list of visual problems which confront the diver. Author (GRA)

N73-14087# Texas A&M Univ., College Station. Dept. of Industrial Engineering.
THE ROLE OF HELICOPTERS IN EMERGENCY MEDICAL CARE SYSTEMS M.S. Thesis
David P. Skogman 1971 48 p refs Sponsored in part by Army
(AD-748695) Avail: NTIS CSCL 06/5

The major purpose of this paper is to contribute toward improved emergency medical care. The results of helicopter performance in civilian air rescue operations are presented. Suggestions as to the future role of helicopters within the emergency care system are discussed. The other major components of the emergency care system are examined and recommendations have been offered to aid in their improvement.
Author (GRA)

N73-14088# Naval Aerospace Medical Research Lab., Pensacola, Fla.
A NEW TECHNIQUE FOR MEASURING SCOTOPIC CRITICAL FLICKER FREQUENCY TO INDICATE PSYCHOPHYSIOLOGICAL STRESS
James D. Grissett 1 Jun. 1972 16 p refs
(MF12524015)
(AD-748193; NAMRL-1052) Avail: NTIS CSCL 05/10

The technique for measuring scotopic critical flicker frequency (SCFF) that has been described in this report was used primarily to study the effects of a simulated lunar magnetic environment on human subjects; no changes in SCFF occurred that could be attributed to the magnetic environment. The large volume of data accumulated clearly shows that SCFF can be measured with good reproducibility by this method. GRA

N73-14089 National Lending Library for Science and Technology, Boston Spa (England).
CALCULATION OF THE THERMAL RESISTANCE OF THE AIR LAYERS IN AIR-PERMEABLE CLOTHING
V. I. Yankelevich 27 Jul. 1972 9 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Tekhnol. Tekstiln. Prom. (Ivanovo), v. 2, 1971 p 111-115
(NLL-DRIC-Trans-2717-(3623.66)) Avail: Natl. Lending Library, Boston Spa, Engl.: 1 NLL photocopy coupon

A numerical analysis of the thermal resistance of the air layers in air permeable clothing is presented. A formula based on the equivalent coefficient of thermal conductivity is developed. It is stated that when the layer width is significant and an adequate temperature differential exists, directional air currents arise due to free convection. Heat transfer by radiation is allowed for by the radiation transfer coefficient. The application of the data to the design of suitable clothing is discussed. Author

N73-14090*# Beckman Instruments, Inc., Anaheim, Calif. Advanced Technology Operations.
PREPARATIVE ELECTROPHORESIS EXPERIMENT DESIGN Final Report
Allen Thiehler Oct. 1972 26 p
(Contract NAS8-28474)
(NASA-CR-123972; FR-2631-101) Avail: NTIS HC $3.50 CSCL 06B

A multifaceted study supporting the NASA programs to develop a space electrophoresis capability has been conducted. The study involved principally the technique of continuous free electrophoresis. It comprised a critical review of the art, study of new techniques for enhancing resolution and stability, and construction and initial testing of a high resolution cell. The effort resulted in a significant advance in free electrophoresis technique. It has provided also a much improved base for developments exploiting the added advantages of a zero-gravity environment. Author

N73-14091# Japanese Air Self-Defense Force, Tokyo.
ANTHROPOMETRY OF JASDF PERSONNEL AND ITS APPLICATION FOR HUMAN ENGINEERING
1972 104 p refs In JAPANESE
Avail: NTIS HC $7.25

Tabulated anthropometric data of Japanese air defense personnel are presented and their applications for human factors engineering are described. The general areas of measurements include heights of parts of the body, arm and leg lengths, torso measurements, head data, palm and finger data, and foot and ankle data. N.E.N.

N73-14092*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PROGRAMMABLE PHYSIOLOGICAL INFUSION Patent Application
Wayne H. Howard, Donald R. Young, and Richard R. Adachi, inventors (to NASA) Filed 1 Dec. 1972 13 p
(NASA-Case-ARC-10447-1; US-Patent-Appl-SN-311175) Avail: NTIS HC $3.00 CSCL 06B

A programmable physiological infusion device which is particularly applicable for dispensing calcium in a variety of waveforms. The device utilizes a program source such as a paper tape together with an automatically actuated infusion pump. The device provides for testing physiologic systems to develop functional relationships and thus a true picture is obtained of the mechanism under study such as the urinary disposal and tissue distribution of calcium. NASA

N73-14093*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MINIATURE INGESTIBLE TELEMETER DEVICES TO MEASURE DEEP BODY TEMPERATURE Patent Application
Jack M. Pope and Thomas B. Fryer, inventors (to NASA) Filed 27 Oct. 1972 11 p
(NASA-Case-ARC-10583-1; US-Patent-Appl-SN-301418) Avail: NTIS HC $3.00 CSCL 06B

A pill-size ingestible transmitter is reported that is capable of transmitting a signal modulated by deep-body temperature information. NASA

N73-14094# Civil Aeromedical Inst., Oklahoma City, Okla.
BINAURAL PROCESSING OF SPEECH IN LIGHT AIRCRAFT
Jerry V. Tobias Sep. 1972 6 p refs
(FAA-AM-72-31) Avail: NTIS HC $3.00

Laboratory studies show that the human binaural auditory system can extract signals from noise more effectively when the signals (or the noise) are presented in one of several interaurally disparate configurations. Questions arise as to whether these laboratory studies in anechoic or semi-anechoic spaces can be generalized to more reverberant listening conditions. Tests were conducted in the cabin of a light airplane, in flight. For symmetrical signal sources, loudspeaker transmissions of intelligibility-test materials produce higher intelligibility scores for speakers out-of-phase than for speakers in-phase. Author

N73-14095# Utah Univ., Salt Lake City. Dept. of Surgery.
BIOMEDICAL ENGINEERING SUPPORT Progress Report
W. J. Kolff and F. M. Donovan, Jr. 15 Apr. 1972 42 p refs
(Contract AT(11-1)-2155)
(COO-2155-4) Avail: NTIS

Results of research on power requirements for artificial hearts for humans, efficiencies of artificial hearts, and aspects of mating these hearts to nuclear power sources are reported. One animal experiment is described in which a Kwan-Gett heart made of silastic was implanted in a bovine calf. NSA

N73-14096# Ohio State Univ., Columbus. Computer and Information Science Research Center.
PATTERN RECOGNITION BY RETINA-LIKE DEVICES Ph.D. Thesis
Carl F. R. Weiman and Jerome Rothstein Jul. 1972 165 p refs
(Grant NSF GN-534.1)
(PB-211238; OSU-CISRC-TR-72-8) Avail: NTIS HC $3.00 CSCL 06D

The study has investigated some pattern recognition capabilities of devices consisting of arrays of cooperating elements acting in parallel. The problem of recognizing straight lines in general position on the quadratic lattice has been completely solved by applying parallel acting algorithms to a special code for lines on the lattice. The relation of the code to Farey series and continued fractions and the effects on the code of a line when the line is subjected to affine transformations were studied in detail. Algorithms for reducing straight line codes to a standard form were developed and made the basis of a line recognition process. Cellular automata were designed to carry out line recognition. Other cellular automata were designed to recognize topological connectedness, detect boundaries and approximate curves by straight line segments. Author (GRA)

N73-14097# Illinois Univ., Savoy. Aviation Research Lab.
DETECTING SLOW CHANGES IN SYSTEM DYNAMICS
Fuat Ince and Robert C. Williges Apr. 1972 22 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-748243; ARL-72-4/AFOSR-72-2; AFOSR-72-1663TR)
Avail: NTIS CSCL 05/10

Two experiments were performed under laboratory conditions to study the human operator's adaptive behavior in manual control of slowly changing system dynamics. In the first experiment, the dynamics changed from rate to acceleration control. In the second experiment, the control stick sensitivity either slowly increased or decreased from a standard level. Four subjects participated in each experiment. Tracking performance on a compensatory task demonstrated that the human operator lags in adapting to the changing system dynamics, but he does adapt when given sufficient time. As the rate of change increases, the human operator needs a larger change for detection and a decreasing judgment time to detect the changing system dynamics. Author (GRA)

N73-14098# Illinois Univ., Savoy. Aviation Research Lab.
ENHANCEMENT OF HUMAN EFFECTIVENESS IN SYSTEM DESIGN, TRAINING, AND OPERATION Annual Progress Report, 1 Jun. 1971 - 31 May 1972
Charles O. Hopkins 15 Jul. 1972 13 p refs
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-748239; ARL-72-17/AFOSR-72-7; AFOSR-72-1670TR)
Avail: NTIS CSCL 05/10

Progress is reported on the following research tasks: Radar signal detection through real-time visual time compression; All-weather landing enhancement through display frequency separation; Reorganization of manual flight control dynamics; Target acquisition in real-time aerial reconnaissance; Residual attention and risk-taking behavior under operational stress; Essential visual cues for contact flight operations; Predictive validity of ground-based flight checks; Transfer effectiveness functions for ground and airborne flight trainers. Author (GRA)

N73-14099# Illinois Univ., Savoy. Aviation Research Lab.
RESPONSE SURFACE METHODOLOGY DESIGN VARIANTS USEFUL IN HUMAN PERFORMANCE RESEARCH
Christine Clark and Robert C. Williges Oct. 1971 28 p refs
Presented at the Ann. Meeting of the Human Factors Society (15th), New York
(Contract F44620-70-C-0105; AF Proj. 9778)
(AD-748236; ARL-71-21/AFOSR-71-7; AFOSR-72-1667TR)
Avail: NTIS CSCL 05/10

Selected Response Surface Methodology (RSM) designs that are viable alternatives in human performance research are discussed. Two major RSM designs that are variations of the basic, blocked, central-composite design were selected for consideration: central-composite designs with multiple observations at only the center point, and central-composite designs with multiple observations at each experimental point. Designs of the latter type are further categorized as: designs which collapse data across all observations at the same experimental point; between-subjects designs in which no subject is observed more than once, and observations at each experimental point may be multiple and unequal or multiple and equal; and within-subject designs in which each subject is observed only once at each experimental point. The ramifications of these designs are discussed in terms of various criteria such as rotatability, orthogonal blocking, and estimates of error. Author (GRA)

N73-14100# Massachusetts Univ., Amherst. Dept. of General Business and Finance.
MODELING FOOD PREFERENCES OVER TIME
Joseph L. Balintfy, William J. Duffy, and Prabhakant Sinha Jul. 1972 40 p refs
(Contract N00014-67-A-0230-0006; NR Proj. 047-100)
(AD-749079; TR-3) Avail: NTIS CSCL 06/8

The paper reports the results of experiments designed to establish the nature of the functional relations between the measure of preference for a menu item and the time elapsed since the item was eaten last and/or on previous occasions. Experimental data support the hypothesis that such a relation indeed exists and a mathematical representation of the phenomenon is feasible. Evidence is presented that the preference-time function is conceived by most people as being monotonically increasing and concave. There is a distinction, however, between preference measures defined on relative and absolute time scales, with the latter one accounting for the effect of repetitiveness and providing a link between the interpretation of food preference and frequency ratings of individuals. The experimental data indicate that the preferred frequency of serving is the locus of the maximum of a function which expresses the realization of the time averaged value of preference over absolute time. Methods are outlined for the routine estimation of these functions from the results of simple questionnaires involving only three or four questions per item. Author (GRA)

N73-14101# Naval Medical Research Inst., Bethesda, Md.
EVALUATION OF MARINE CORPS BATTERY POWERED ELECTRICALLY HEATED DIVING DRESS Progress Report

William Moritz and Henry Langworthy 22 Jun. 1972 25 p refs
(AD-749847; PR-1) Avail: NTIS CSCL 06/17

In order for Marine Reconnaissance Divers to perform their tasks with safety and efficiency, a supplemental heat source is required. It must be compact in size, lightweight, capable of providing adequate power for the lowest water temperatures a diver will encounter, and be so designed as not to interfere with the diver's mobility. A test and evaluation program was conducted to determine if this battery system was capable of providing a diver with a sufficient amount of heat, while motionless, in 1-3C water for a period of 2 hours at depths less than 100 feet. Author (GRA)

N73-14102# Dunlap and Associates, Inc., Santa Monica, Calif.
EFFECT OF A PREDICTOR DISPLAY ON CARRIER LANDING PERFORMANCE. PHASE B: DISPLAY MECHANIZATION AND PRELIMINARY EVALUATION
Daniel J. Prosin, William J. Burger, and Joseph W. Wulfeck Aug. 1972 30 p refs
(Contract N00014-71-C-0252; NR Proj. 196-106)
(AD-750294) Avail: NTIS CSCL 05/5

Phase B mechanized a unique six degree-of-freedom, fast-time, predictor model of the F-4 aircraft and a six degree-of-freedom, forward-looking, predictor cockpit display, based upon the requirements established in Phase A. A base-line display for comparison with the predictor was mechanized as a closed-circuit, gantry-driven, TV system viewing a scale model of a carrier with deck and edge lights, and FLOLS, illuminated in scale to appear as they would at night. The displays of both systems were mounted in the cockpit of a static simulator at Point Mugu programmed for F-4 flight and control dynamics. Informal trials were run with research staff and carrier-qualified pilots to evaluate realism of the displays; amount of training required; sensitivity and reliability of simulation and measurement systems; and recording systems, including a computer program to reduce the data. Author (GRA)

N73-14103# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE HUMAN ENGINEERING DIVISION, APRIL 1946 - DECEMBER 1970
Sandra A. Stevenson May 1972 190 p refs
(AF Proj. 7183; AF Proj. 7184)
(AD-749933) Avail: NTIS CSCL 05/5

The bibliography contains the titles, authors and publication/source information for the technical reports and articles published by the Human Engineering Division of the Aerospace Medical Research Laboratory between April 1946 and December 1970. The bibliography is divided into 16 technical areas: Guides and handbooks applicable to system development; Physical anthropology; Apparatus; Control design and arrangement; Environmental stress, vigilance, and work/rest cycles; Human engineering applications, descriptions, and evaluations; Maintenance; Methodology and statistics; Personnel and manning requirements; Presentation and information; Simulation techniques; Systems research; Tracking and servo analysis; Training and learning; Zero-G studies; Miscellaneous. Author (GRA)

N73-14104# Navy Experimental Diving Unit, Washington, D.C.
THE CALCULATION OF MINIMUM SAFE INSPIRED GAS TEMPERATURE LIMITS FOR DEEP DIVING
W. R. Braithwaite Jul. 1972 20 p refs
(AD-748197; NEDU-RR-12-72) Avail: NTIS CSCL 06/19

Loss of body heat through the lungs of divers breathing cold gas at depths greater than 600 feet can be lethal; no adequate guidelines to safe inspired gas temperature are currently available. Review of the recent research in hyperbaric respiratory heat loss has allowed the development of a rational method of calculating the minimum safe inspired gas temperatures for deep diving. In the report, the recent respiratory heat loss research is summarized, the rationale and calculations of safe breathing gas temperatures are presented, and minimum safe inspired gas temperature limits for depths from 600 to 1000 feet are proposed. Author (GRA)

N73-14105# Naval Aerospace Medical Research Lab., Pensacola, Fla.
EFFECTS OF SOME ANTIMOTION SICKNESS DRUGS AND SECOBARBITAL ON POSTURAL EQUILIBRIUM FUNCTIONS AT SEA LEVEL AND AT 12,000 FEET SIMULATED
Alfred R. Fregly, Margaret J. Smith, Charles D. Wood, and D. Bryant Crame 31 May 1972 19 p refs
(AD-748192; NAMRL-1005) Avail: NTIS CSCL 06/15

The study was undertaken to determine the effects of six antimotion sickness drugs, three placebos, and secobarbital on postural equilibrium functions at sea level and at 12,000 feet (chamber simulated). These effects, as defined by performance on a quantitative ataxia test battery, were investigated on nine normal men. Analysis of variance revealed that, relative to the other drugs and placebos, only secobarbital had a deleterious effect on the performance skills studied--both at sea level and at 12,000 feet--whereas none of the antimotion sickness drugs alone or in combination differed significantly from placebos in having such an effect in either environment. This finding was highly consistent and in keeping with the known depressant effects of secobarbital on CNS activity. Among the antimotion sickness drugs, only the combination of d-amphetamine (10 mg) plus scopolamine (0.6 mg) at altitude had a significant enhancing effect on performance relative to the reverse (depressing) effect found at sea level. Author (GRA)

N73-14106# Northeastern Univ., Boston, Mass.
OXYGEN METABOLISM: METABOLIC IMPLICATIONS IN HYPERBARIC SYSTEMS Final Report
A. H. Soloway 27 Sep. 1972 7 p
(Contract N00014-68-A-0207-0001)
(AD-749381) Avail: NTIS CSCL 06/19

There is the potentiality that hyperbaric oxygen systems accentuate the production of certain oxygenated metabolites and their precursors and these compounds per se may be noxious and capable of causing pathological changes. Certain metabolic pathways have been examined to establish whether in these sequences labile oxygen intermediates such as peroxides and epoxides are formed. This research would serve as the basis for determining whether hyperbaric conditions promote elevated amounts of such compounds. Such a finding would raise distinct long term hazards to hyperbaric conditions in view of the fact that peroxides and epoxides have been shown to be mutagenic and even carcinogenic. GRA

N73-14107# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.
PERFORMANCE, RECOVERY AND MAN-MACHINE EFFECTIVENESS Semiannual Progress Report, 1 Mar. - 31 Aug. 1972
Richard A. Dudek 15 Sep. 1972 26 p refs
(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81A; Proj. Themis-603)
(AD-750176) Avail: NTIS CSCL 05/8

The basic purpose of the program continues to be the determination of optimal or near optimal work/rest schedules for individuals and crews to yield high performance with minimal decrement over time followed by recovery (after rest) to an acceptable high performance. The experimentation is further aimed at consideration of various task levels and differing conditions of environment. Experimentation in progress continues to focus attention on the assessment of human performance under continuous operations or relatively long term activity (2 hours or more of activity). GRA

N73-14108# Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE RELATIONSHIP BETWEEN HABITUATION TO VESTIBULAR STIMULATION AND VIGILANCE: INDIVIDUAL DIFFERENCES AND SUBSIDIARY PROBLEMS

Robert S. Kennedy 3 Jul. 1972 213 p refs
(AD-749352; NAMRL-Mono-20) Avail: NTIS CSCL 05/10

It has been shown that a subject's mental state is an important variable when recording vestibular nystagmus. This experiment is in three parts. In the first part the relationship of one form of mental work (vigilance scored in percent correct) to vestibular nystagmus habituation and eye movement phase relationships recorded during prolonged cyclic oscillation was studied. In the second part individual differences (personality, hours sleep, etc.) were related to vigilance performance and nystagmus habituation. In the third part the interaction of subject variables with vigilance tasks of differing complexity is reported. In addition, methodological studies are appended to the main body of this monograph. These include: (1) a bibliography and experiments concerning effects of luminance on electro oculographic potentials; (2) normative data for a vigilance task; (3) correlations between personality (extraversion, field independence) and success in aviation training and (4) reliability and validity of a scoring method for nystagmus habituation. Author (GRA)

N73-14109# Army Medical Research Lab., Fort Knox, Ky.
BRIGHTNESS OF A CAPACITOR DISCHARGE LAMP: BLOCH'S LAW FOR BRIEF FLASHES Interim Report
William W. Dawson, Joseph Harrison, and George S. Harker 20 Jun. 1972 17 p refs
(DA Proj. 3A0-61102-B-71P)
(AD-749452; USAMRL-987) Avail: NTIS CSCL 05/10

Brightness of a capacitor discharge lamp (tc, 16-25 microsec) has been extrapolated from determinations of the subjective attenuation of comparable durations upon square wave flashes from a glow modulator tube (R1131C). For the large field (61 degrees) and high adaptation state (273 td), psychophysical integration of time and intensity (Bloch's Law) was found to hold only at durations less than 1.5 x 1000 microsec. Examination of the manufacturer's data on lamp candlepower converted to trolands encourages the conclusion that large errors occur when the troland and other photometric quantities remain uncorrected for Bloch's Law effects which are found at short durations. A correct troland or adequate troland is described. Author (GRA)

N73-14110# Texas Technological Univ., Lubbock. Center of Biotechnology and Human Performance.
EFFECTS OF CYCLICAL TEMPERATURE ON VIGILANCE PERFORMANCE
Jerry D. Ramsey, Charles G. Halcomb, and Margaret Kassouny May 1972 27 p refs
(Contract DAAD05-69-C-0102; DA Proj. 1T0-14501-B-81A)
(AD-748451) Avail: NTIS CSCL 05/10

Vigilance performance has been shown to be enhanced by numerous types of environmental changes. The study evaluates the effects of a cyclically changing temperature on monitoring behavior and physiological responses of man. Vigilance performance was not enhanced by the use of variable temperature conditions of the study. Rather, the variable temperature in conjunction with a heavy food intake was shown to adversely affect both heart rate and vigilance task performance measures. Author (GRA)

N73-14111# Naval Aerospace Medical Research Lab., Pensacola, Fla.
A NEW APPROACH TO CRITERION DEVELOPMENT IN THE REPLACEMENT AIR GROUP
Richard H. Shannon, Wayne L. Waag, and John C. Ferguson Jul. 1972 12 p refs
(MF12524002)
(AD-748195; NAMRL-1158) Avail: NTIS CSCL 05/10

The investigation attempted to isolate the most critical skills and procedures within each of the stages comprising replacement air group (RAG) training in the F-4 aircraft. For each of the stages analyzed, a small set of graded items were selected on the basis that they could adequately discriminate among replacement pilots categorized as above average, or below average, according to their final overall RAG grade. Such items were found to be highly predictive of the stage grade from which they were obtained. A multiple R of .839 was obtained, predicting the final RAG grade when only five of the selected maneuvers were entered into the equation. These findings indicate the feasibility of isolating a small set of skills and procedures which will be highly predictive of pilot performance in the RAG. It is suggested that such critical items should form the basis from which an adequate measure of fleet performance might be developed. Author (GRA)

N73-15090*# Smithsonian Institution, Washington, D.C.
SATELLITE (IRLS) TRACKING OF ELK Final Report
Helmut K. Buechner 11 Oct. 1972 21 p refs
(Contract NASw-1983)
(NASA-CR-130301) Avail: NTIS HC $3.25 CSCL 06C

The practicability of tracking free roaming animals in natural environments by satellite systems is reported. Satellite systems combine continuous tracking with simultaneous monitoring of physiological and environmental parameters through a combination of radio tracking and biotelemetric ground systems that lead to a better understanding of animal behavior and migration patterns. G.G.

N73-15091*# BioTechnology, Inc., Arlington, Va.
BIOASTRONAUTICS DATA BOOK, SECOND EDITION
James F. Parker, Jr., ed. and Vita R. West, ed. Washington NASA 1973 938 p refs Sponsored in part by NASA and ONR
(Contract N00014-67-C-0526)
(NASA-SP-3006; AD-749887; LC-72-600293) Avail: NTIS MF $0.95; SOD HC $7.50 CSCL 06P

The effects of atmospheric pressure and temperature and sustained and rotary acceleration on human performance are examined. Stress effects on various body systems are emphasized, including the respiratory, vestibular, visual, and auditory systems. The environmental control of closed ecological systems is also investigated. For individual titles, see N73-15092 through N73-15111.

N73-15092* Ohio State Univ., Columbus.
BAROMETRIC PRESSURE
Charles E. Billings *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 1-34 (For availability see N73-15091 06-04)
CSCL 06S

The effects of alterations in barometric pressure on human beings are described. Human tolerances for gaseous environments and low and high barometric pressure are discussed, including effects on specific areas, such as the ear, lungs, teeth, and sinuses. Problems due to trapped gas within the body, high dynamic pressures on the body, and blasts are also considered. J.A.M.

N73-15093* Ohio State Univ., Columbus.
ATMOSPHERE
Charles E. Billings *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 35-63 refs (For availability see N73-15091 06-04)
CSCL 06S

Properties of elements and compounds are considered which make up or may be added to a gaseous environment suitable for humans. Oxygen and carbon dioxide are emphasized; nitrogen and the noble gases are also cited. Other gaseous compounds, such as carbon monoxide, methane, and sulfur hexafluoride, are briefly mentioned. J.A.M.

N73-15094* AiResearch Mfg. Co., Los Angeles, Calif.
TEMPERATURE
P. J. Berenson and W. G. Robertson *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 65-148 refs (For availability see N73-15091 06-04)
CSCL 06S

The problems in human comfort in heat stress are emphasized, with less emphasis placed upon cold exposure problems. Physiological parameters related to human thermal interactions are discussed, as well as data concerning thermal protective

clothing. The energy balance equation, heat transfer equation, thermal comfort, heat stress, and cold stress are also considered. A two node model of human temperature regulation in FORTRAN is appended. J.A.M.

N73-15095* Waterloo Univ. (Ontario).
SUSTAINED LINEAR ACCELERATION
T. Morris Fraser *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 149-190 refs (For availability see N73-15091 06-04)
CSCL 06S

The subjective effects of sustained acceleration are discussed, including positive, negative, forward, backward, and lateral acceleration effects. Physiological effects, such as retinal and visual response, unconsciousness and cerebral function, pulmonary response, and renal output, are studied. Human tolerance and performance under sustained acceleration are ascertained. J.A.M.

N73-15096* Waterloo Univ. (Ontario).
ROTARY ACCELERATION
T. Morris Fraser *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 191-219 refs (For availability see N73-15091 06-04)
CSCL 06S

Rotary acceleration is found to be a manifestation of angular acceleration, and is always present during steady state spinning or tumbling, even when the angular velocity is constant. Subjective reactions and tolerances, performance, physiological effects, and pathological effects are reviewed for rotary acceleration. Thresholds for stimulation perception by angular acceleration in man are presented in tabular form. J.A.M.

N73-15097* Michigan Univ., Ann Arbor.
IMPACT
Richard G. Snyder *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 221-295 refs (For availability see N73-15091 06-04)
CSCL 06S

Impact, emergency escape and crash survival protection are studied. Accleration, the G system of units, data interpretation, and human tolerance limits are summarized, along with physiological and biochemical response to impact. Biomechanical factors of impact are also cited. J.A.M.

N73-15098* Litton Systems, Inc., Beverly Hills, Calif.
VIBRATION
Richard J. Hornick *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 297-348 refs

CSCL 06S

Man's reactions to vibration are emphasized rather than his reactions to the vibrational characteristics of vehicles. Vibrational effects studied include: performance effects reflected in tracking proficiency, reaction time, visual impairment, and other measures related to man's ability to control a system; physiological reactions; biodynamic responses; subjective reactions; and human tolerance limits. Technological refinements in shaker systems and improved experimental designs are used to validate the data. J.A.M.

N73-15099* National Aeronautics and Space Administration, Washington, D.C.
WEIGHTLESSNESS
Charles A. Berry *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 349-415 refs

CSCL 06S

Weightlessness effects on physiological systems are summarized, including cardiovascular responses, hematological effects, work capacity (exercise tolerance), respiratory responses, skeletal responses, neuromuscular changes, vestibular responses, metabolism, endocrine and electrolyte responses, and weight loss. The nature of the adaptive response to space flight and microbial changes are also discussed. The effects of zero gravity upon performance are ascertained, and the physiological effects of weightlessness are counteracted. J.A.M

N73-15100* New England Deaconess Hospital, Boston, Mass.
IONIZING RADIATION
Shields Warren and Douglas Grahn (ANL) *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 417-454 refs

CSCL 06R

The penetrating ionizing space radiations are found to be extremely diverse in the energy range of both their particulate and their electromagnetic components. Radiation terms and measures and ionizing radiation classes and sources are presented. Whole body radiation effects are examined, including radiation intensity and rate effectiveness factors. Radiation effects on specific body systems, such as blood, skin, visual, and reproductive systems are also discussed. J.A.M.

N73-15101* SysteMed Corp., Dayton, Ohio.
TOXICOLOGY
J. W. MacEwen *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 455-487 refs

CSCL 06T

Oxygen toxicity is examined, including the effects of oxygen partial pressure variations on toxicity and oxygen effects on ozone and nitrogen dioxide toxicity. Toxicity of fuels and oxidizers, such as hydrazines, are reported. Carbon monoxide, spacecraft threshold limit values, emergency exposure limits, spacecraft contaminants, and water quality standards for space missions are briefly summarized. J.A.M.

N73-15102* International Business Machines Corp., New York.
RESPIRATORY SYSTEM
Roscoe G. Bartlett, Jr. *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 489-531 refs

CSCL 06P

The general anatomy and function of the human respiratory system is summarized. Breathing movements, control of breathing, lung volumes and capacities, mechanical relations, and factors relevant to respiratory support and equipment design are discussed. J.A.M.

N73-15103* Naval Aerospace Medical Research Lab., Pensacola, Fla.
THE VESTIBULAR SYSTEM
Ashton Graybiel *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 533-609 refs

CSCL 06P

The end organs, central nervous system connections, and static and dynamic characteristics of the vestibular system are presented. Vestibular servation in man and vestibular side effect prevention from space missions involving artificial gravity generation are also considered. Vestibular models and design criteria for rotating space vehicles are appended. J.A.M.

N73-15104* California Univ., San Diego.
VISION
John H. Taylor *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 611-665 refs

CSCL 06P

Some data on human vision, important in present and projected space activities, are presented. Visual environment and performance and structure of the visual system are also considered. Visual perception during stress is included. J.A.M.

N73-15105* Illinois Univ., Urbana.
AUDITORY SYSTEM
Harlow W. Ades *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 667-691 refs

CSCL 06P

The physical correlations of hearing, i.e. the acoustic stimuli, are reported. The auditory system, consisting of external

ear, middle ear, inner ear, organ of Corti, basilar membrane, hair cells, inner hair cells, outer hair cells, innervation of hair cells, and transducer mechanisms, is discussed. Both conductive and sensorineural hearing losses are also examined. J.A.M.

N73-15106* Aberdeen Proving Ground, Md.
NOISE AND BLAST
David C. Hodge and Georges R. Garinther *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 693-750 refs

CSCL 06S
Noise and blast environments are described, providing a definition of units and techniques of noise measurement and giving representative booster-launch and spacecraft noise data. The effects of noise on hearing sensitivity and performance are reviewed, and community response to noise exposure is discussed. Physiological, or nonauditory, effects of noise exposure are also treated, as are design criteria and methods for minimizing the noise effects of hearing sensitivity and communications. The low level sound detection and speech reception are included, along with subjective and behavioral responses to noise. J.A.M.

N73-15107* Massachusetts Inst. of Tech., Cambridge.
HUMAN CONTROL CAPABILITIES
Laurence Retman Young *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 751-806 refs

CSCL 05E
The capabilities and limitations of man as an element in a closed loop control system under normal environmental conditions are described. Controller characteristics are enumerated, using manual control, quasilinear models, pilot opinion and ratings, compensatory tracking, optimum control models, motion cues, multiple input tracking, multiple loop tracking, transmission delays, and adaptive manual control. Various controls, manipulators, and displays are also considered. J.A.M.

N73-15108* National Aeronautics and Space Administration, Washington, D.C.
ATMOSPHERE CONTROL
Walton L. Jones and A. L. Ingelfinger *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 807-845 refs

CSCL 06K
Atmospheric control studies emphasized the carbon dioxide problem. Trace contaminants are removed by solid adsorbents and by catalytic oxidation. Humidity control and storage systems for atmospheric constituents are briefly summarized. J.A.M.

N73-15109* Webb Associates, Yellow Springs, Ohio.
WORK, HEAT, AND OXYGEN COST
Paul Webb *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 847-879 refs

CSCL 05E
Human energy is discussed in terms of the whole man. The physical work a man does, the heat he produces, and the quantity of oxygen he takes from the air to combine with food, the fuel source of his energy, are described. The daily energy exchange, work and heat dissipation, oxygen costs of specific activities, anaerobic work, and working in space suits are summarized. J.A.M.

N73-15110* Indiana Univ., Bloomington. School of Medicine.
COMBINED ENVIRONMENTAL STRESSES
Raymond H. Murray and Michael McCally (AMRL) *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 881-914 refs
CSCL 06S
Tolerance levels, physiological effects, and performance degradation during simultaneous or sequential exposures to two environmental stresses, and also three or more simultaneous stresses are described. Environmental stress combinations are characterized by four descriptors: order of occurrence, duration of exposure, severity of exposure, and type of interaction. Combined stress data and facilities for combined stress study are briefly mentioned. J.A.M.

N73-15111* National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE VEHICLE WATER-WASTE MANAGEMENT

Joseph N. Pecoraro *In* BioTechnol., Inc. Bioastronaut. Data Book, 2d Ed. 1973 p 915-930 refs

CSCL 06I
The collection and disposal of human wastes, such as urine and feces, in a spacecraft environment are performed in an aesthetic and reliable manner to prevent degradation of crew performance. The waste management system controls, transfers, and processes materials such as feces, emesis, food residues, used expendables, and other wastes. The requirements, collection, transport, and waste processing are described. J.A.M.

N73-15112# National Research Council of Canada, Ottawa (Ontario).
RESEARCH AND DEVELOPMENT OF RADIATION-PROTECTIVE AGENTS (NOW BECOMING AVAILABLE AS ORAL DRUGS)
Sanya Akaboshi 1972 15 p refs Transl. into ENGLISH from Genshiryoky Kogyo (Tokyo), v. 17, no. 2, 1971 p 51-54
(NRC-TT-1609) Avail: NTIS HC $3.00
The research on the protection of humans from radiation injuries by chemical means is reported. An outline to a previously published guide to radiation agents is included, and the oral administration of radiation protective drugs is discussed. F.O.S.

N73-15113# Joint Publications Research Service, Arlington, Va.
PSYCHOLOGICAL COMPATIBILITY IN INTERPLANETARY FLIGHT
A. A. Leonov and V. I. Lebedev 2 Jan. 1973 20 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 9, 1972 p 14-27
(JPRS-57878) Avail: NTIS HC $3.00
The problems of achieving harmony in the work of crews in running spaceships and their systems during lengthy stays of small groups of men within the limited confines of spaceships on interplanetary flights are discussed. Author

N73-15114*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
WIND TUNNEL INVESTIGATION OF THE EFFECT OF HIGH RELATIVE VELOCITIES ON THE STRUCTURAL INTEGRITY OF BIRDS
Donald L. Bresnahan Dec. 1972 18 p refs
(NASA-TM-X-68163; E-7272) Avail: NTIS HC $3.00 CSCL 06C
An experimental investigation was conducted in a supersonic wind tunnel to determine the effect a sudden high velocity headwind had on the physical deformation and structural breakup characteristics of birds. Several sizes of recently killed birds were dropped into the test section at free-stream Mach numbers ranging from 0.2 to 0.8 and photographed with high-speed motion-picture cameras. These conditions simulated flow conditions encountered when birds are ingested into the inlets of high speed aircraft, thereby constituting a safety hazard to the aircraft and its occupants. The investigation shows that, over the range of headwind conditions tested, the birds remained structurally intact and did not suffer any appreciable deformation or structural breakup. Author

N73-15115*# Louisiana State Univ., Baton Rouge. Dept. of Chemical Engineering.
SINGLE-CELL PROTEIN FROM WASTE CELLULOSE Final Report
C. E. Dunlap and C. D. Callihan Jan. 1973 81 p refs
(Grant NGL-19-001-024)
(NASA-CR-130300) Avail: NTIS HC $6.25 CSCL 06M

The recycling, reuse, or reclamation of single cell protein from liquid and solid agricultural waste fibers by a fermentation process is reported. It is shown that cellulose comprises the bulk of the fibers at 50% to 55% of the dry weight of the refuse and that its biodegradability is of prime importance in the choice of a substrate. The application of sodium hydroxide followed by heat and pressure serves to de-polymerize and disrupt lignin structure while swelling the cellulose to increase water uptake and pore volume. Some of the lignin, hemi-celluloses, ash, and cellulose of the material is hydrolized and solubilized. Introduction of microorganisms to the substrate fibers mixed with nutrients produces continuous fermentation of cellulose for further protein extraction and purification. G.G.

N73-15116*# National Aeronautics and Space Administration, Washington, D.C.
EVOLUTION, GRAVITATION, WEIGHTLESSNESS
P. A. Korzhuyev Jan. 1973 121 p refs Transl. into ENGLISH of the book "Evolyutsiya, Gravitatsiya, Nevesomodt" Moscow, Nauka Press, 1971
(NASA-TT-F-730) Avail: NTIS HC $3.00 CSCL 06P

Evidence is presented that prolonged weightlessness during space flights will have very harmful effects on the human body. Since passive adaptation to weightlessness is impossible for man, methods must be found to prevent those effects. Author

N73-15117*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EFFECT OF PROLONGED BEDREST AND PLUS Gz ACCELERATION ON PERIPHERAL VISUAL RESPONSE TIME
Richard F. Haines Washington Jan. 1973 66 p refs
(NASA-TN-D-7161; A-4566) Avail: NTIS HC $3.00 CSCL 06S

Peripheral visual response time changes during +G sub z acceleration following fourteen days of bedrest are considered as well as what effect prolonged bedrest has upon this response. Eighteen test lights, placed 10 deg apart along the horizontal meridian of the subject's field of view, were presented in a random sequence. The subject was instructed to press a button as soon as a light appeared. Response time testing occurred periodically during bedrest and continuously during centrifugation testing. The results indicate that: (1) mean response time is significantly longer to stimuli imaged in the far periphery than to stimuli imaged closer to the line of sight; (2) mean response time at each stimulus position tends to be longer at plateau g than during the preacceleration baseline period; (3) mean response time tends to lengthen as the g level is increased; (4) peripheral visual response time during +G sub x acceleration at 2, 3.2, and 3.8 g was not a reliable advanced indicator that blackout was going to occur; and (5) the subject's field of view collapsed rapidly just before blackout. Bedrest data showed that the distribution of response times to stimuli imaged across the subject's horizontal retinal meridian remained remarkably constant from day to day during both the bedrest and recovery periods. Author

N73-15118*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIOLOGICAL EFFECTS OF FUEL AND EXHAUST COMPONENTS FROM SPACECRAFT DESCENT ENGINES EMPLOYING HYDRAZINE
M. E. Lehwalt, F. H. Woeller, and V. I. Oyama Washington Jan. 1973 29 p refs
(NASA-TM-X-2714; A-4279) Avail: NTIS HC $3.00 CSCL 06P

The effect of the products of the Viking terminal descent engine fuel upon possible extraterrestrial life at the Martian landing site is examined. The effects of the engine exhaust, the hydrazine fuel, and the breakdown products of the latter on terrestrial microorganisms have been studied. The results indicate that the gaseous exhaust products would probably not be hazardous to microorganisms, but that liquid hydrazine would be lethal. Author

N73-15119# Oak Ridge National Lab., Tenn.
EFFECTS OF WEIGHTLESSNESS ON SIMPLE LIFE FORMS IN BIOSATELLITE 2
F. J. deSerres 1972 8 p Presented at 56th Ann. Meeting of the Federation of Am. Soc. for Exptl. Biol., Atlantic City, N. J., 9 Apr. 1972 Sponsored by AEC
(Conf-720441-1) Avail: NTIS

Biosatellite 2 experiments, designed to measure the effects of weightlessness and weightlessness in combination with known doses of radiation on biological processes, are presented. Attempts were made to determine if weightlessness affected all organisms in the same manner and which, if any, would not function properly. E.H.W.

N73-15120# Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
HUMAN RESPONSES TO MICROWAVE IRRADIATION: A REVIEW AND EVALUATION OF PUBLISHED REPORTS
William M. Houk 1972 22 p refs Presented at Aerospace Med. Association Meeting, Bal Harbour, Fla., 8 May 1972 Sponsored by AEC
(UR-3490-29; Conf-720542-1) Avail: NTIS

The biological effects of microwave irradiation on man discussed include: neurasthenic responses to apparent low exposure levels and suspected behavioral changes (as reported in Soviet literature); neuroendocrine effects; cataractogenesis (developed in literature from the United States); cardiovascular changes; and other effects. Reports on the human subject are comparatively few, are usually conflicting, statistical methods employed are often dubious or non-existent, and relation to control populations are most often not evident. The need for a unified continuing compilation of occupational health data, as well as the need for appropriately defined and conducted retrospective and prospective epidemiological studies is recognized and discussed. Further, the need for identifying and clinical monitoring of higher at risk exposure groups with suggested modes of accomplishing this is presented. Author (NSA)

N73-15121# Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
THEORETICAL AND EXPERIMENTAL MODELS FOR DUST DEPOSITION AND RETENTION IN MAN
Paul E. Morrow 1972 33 p refs Sponsored by AEC
(UR-3490-169) Avail: NTIS

A review is presented of respiratory models used in studying the hazards of air pollution. The models discussed include nasal deposition and retention, tracheobronchial deposition and retention, parenchymal deposition and retention, and respiratory system. F.O.S.

N73-15122# Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
THYROID PATHOPHYSIOLOGY OF MICROWAVE RADIATION
William C. Milroy and Sol M. Michaelson 1972 22 p refs Presented at the Aerospace Med. Assoc. Meeting, Bal Harbour, Fla., 8-11 May 1972 Sponsored by AEC
(VR-3490-149; Conf-720542-3) Avail: NTIS

A wide variety of biological effects of microwave radiation were reported. One interesting effect which was noted but which is neither well understood nor well investigated is alteration in the neuroendocrine response of exposed organisms, both humans and laboratory animals. This study was designed to investigate the response of the pituitary-thyroid axis to microwave radiation. Rats exposed to various regimens of microwave radiation were evaluated in terms of their thyroid and thyrotropic acitivity. No alterations in structure or function were noted which could be attributed to a specific effect of microwave radiation. Those alterations which were detected were felt to represent nonspecific reactions of age, heat, and stress. Author

N73-15123# Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
RELEVANCY OF EXPERIMENTAL STUDIES OF MICROWAVE INDUCED CATARACTS TO MAN

Sol M. Michaelson 1972 36 p refs Sponsored by AEC (UR-3490-103) Avail: NTIS

An extensive literature review is presented of studies which have attempted to assess the relationship of exposure to microwaves and the subsequent development of cataracts. The studies include numerous investigations in animals and several surveys among human populations. On the basis of these studies the following conclusions are made: (1) The estimated exposure levels with which clinically significant cataracts have been associated have generally been quite high and well above 100 mW/sq cm. (2) In general the studies are only qualitative and do not give any relation between the actual power level and pathology. (3) The individuals studied in the surveys could have been exposed to ionizing radiation just as well as microwaves. (4) The health hazard posed by the possibility of microwave induced cataract formation would appear minor because the power densities required for opacification are seven to eight times the maximum permissible exposure levels suggested for human exposure (10 mW/sq cm). D.L.G.

N73-15124# Defence Research Information Centre, Orpington (England).

CHEMICAL PROTECTION IN MIXED GAMMA-NEUTRON IRRADIATION WITH DIFFERENT NEUTRON CONTRIBUTIONS IN THE ABSORBED DOSE

M. V. Vasin, V. A. Kozlov et al Nov. 1972 9 p refs Transl. into ENGLISH from Probl. of Cosmic Biol. (Moscow) p 132-136 (DRIC-Trans-2961; BR-30325) Avail: NTIS HC $3.00

The effectiveness of pharmacochemical protective substances (AET, cystalos, 5-MOT and cysteamine) as the neutron component increases was investigated. Experiments were carried out on non-pedigree female white mice weighing from 19 to 22 g kept under normal animal-house conditions and fed on a standard diet. The animals were subjected to mixed gamma-neutron radiation, first with the neutron contribution in the absorbed dose about 90%, the dose rate being 12 rad/min and the dose 260 to 290 rad; and then with the neutron component about 35%, the dose rate being 30 rad/min and the dose 560 rad. The radioprotective effect of the substances was assessed from the chemical picture of radiation damage, mortality, and the mean survival time of the animals which died. Author (ESRO)

N73-15125# Defence Research Information Centre, Orpington (England).

A STUDY OF THE RADIOPROTECTIVE ACTION OF A POLYMER SALT OF CYSTAMINE AND SULPHOPROPYL ESTER OF DEXTRAN

M. N. Trushina, K. P. Khomyakov et al Nov. 1972 8 p refs Transl. into ENGLISH from Vopr. Med. Khim. (Moscow), vol. 4, no. 9, 1969 p 195-198

(DRIC-Trans-2963; BR-30327) Avail: NTIS HC $3.00

The addition of cysteamine to a sulfopropyl ester of dextran gives increased protection to irradiated mice especially if doses of 500 mg/kg are administered 10 to 15 minutes before irradiation. It was also found that the polymer complex based on dextran and cysteamine has a further advantage in that the duration of its effect is more prolonged than that of cysteamine dihydrochloride since it could be administered up to one hour before irradiation. Author (ESRO)

N73-15126# Defence Research Information Centre, Orpington (England).

MUTE GAS BUBBLES AND THEIR ROLE IN DECOMPRESSION PATHOLOGY

M. P. Elinskii Jul. 1972 8 p refs Transl. into ENGLISH from Tr. Voenno-Med. Akad. (Moscow), no. 9, 1969 p 56-59

(AD-748229; DRIC-TRANS-2789; BR-30160) Avail: NTIS CSCL 06/19

The presented data shows that in the absence of clinically expressed signs of decompression sickness in the nervous system, definite morphological changes can result from gas forming in the body after decompression. From this it follows that the body possesses a definite degree of tolerance in relation to the post-decompression aeroembolism whose excess leads to an expressed disease. When a person feels unwell, or when there is an excess of local sensations of sickness in people subjected the day before to the influence of increased or lowered atmospheric pressure, it is essential that careful and thorough research be carried out to expose effaced forms of decompression sickness, provoked by mute gas bubbles. GRA

N73-15127# Naval Submarine Medical Research Lab., Groton, Conn.

VISUAL EVOKED RESPONSES FOR DIVERS BREATHING VARIOUS GASES AT DEPTHS TO 1200 FEET Medical Research Progress Report No. 3

Jo Ann S. Kinney, Christine L. McKay, and S. M. Luria 23 Mar. 1972 18 p refs

(AD-749325; NSMRL-705) Avail: NTIS CSCL 06/19

Visual evoked responses were recorded from men subjected to hyperbaric conditions simulating 400, 700, 900, and 1200 ft of seawater in a saturation dive conducted at the Institute for Environmental Medicine, University of Pennsylvania, Philadelphia, Pa. Various breathing mixtures were used. At any given depth the VERs were the same for helium-oxygen and neon-oxygen but were sizeably reduced with nitrogen-oxygen, both in amplitude and in regularity. The possibility of an overall loss in VER amplitude with depth deserves further study since one subject did show such a decrement while the other did not. Author (GRA)

N73-15128# School of Aerospace Medicine, Brooks AFB, Tex.

CYTOLOGIC ASPECT OF RF RADIATION IN THE MONKEY, PART 1

John E. Prince, Llewellyn H. Mori, James W. Frazer, and John C. Mitchell 1972 5 p refs

(AD-749583; SAM-TR-71-445-PT-1) Avail: NTIS CSCL 06/18

A circulating lymphocytoid cell having a high mitotic potential was obtained from monkeys (M. mulatta) 71 hrs after exposure to 10-27 MHz electromagnetic radiation for 30 min. at a power density of 1.32 w/cm2. Exposure was made in a coaxial guide powered by a 50 KWP transmitter operated in a pulsed mode (duty cycle of 17%). Author (GRA)

N73-15129# Army Aeromedical Research Lab., Fort Rucker, Ala.

[RESEARCH IN SUPPORT OF AVIATION MEDICINE] Annual Progress Report, 1 Jul. 1971 - 30 Jun. 1972

Robert W. Bailey Jul. 1972 106 p

(DA Proj. 3A062110-A-819)

(AD-749456) Avail: NTIS CSCL 06/5

Contents: Technical and administrative support to Army aeromedical research; Direct field research support to immediate Army aeromedical problems; Medical research applied to the problems in Army aviation; Research of visual problems medically significant to Army aviation; Research of psycho-acoustical problems medically significant to Army aviation; Research psychology applied to medically significant problems in Army aviation; Research of bioengineering problems medically significant to Army aviation; The investigation of new generation microphones for the improvement of military voice communication systems. GRA

N73-15130# Army Medical Research Lab., Fort Knox, Ky.

[RESEARCH IN SUPPORT OF MILITARY MEDICINE] Annual Progress Report, 1 Jul. 1971 - 30 Jun. 1972

30 Jun. 1972 111 p refs

(AD-749440) Avail: NTIS CSCL 06/18

The research and development effort is concerned with studies in sensory psychophysiology, the biological effects of laser radiation, and methodology related to the preservation, transfusion, collecting, processing, and shipment of human blood. The progress during fiscal year 1972 and the current status of the various work units are reported herein. Author (GRA)

N73-15131# Naval Medical Research Inst., Bethesda, Md.

BIBLIOGRAPHY OF REPORTED BIOLOGICAL PHENOMENA

'EFFECTS' AND CLINICAL MANIFESTATIONS ATTRIBUTED TO MICROWAVE AND RADIO-FREQUENCY RADIATION Interim Report
Zorach R. Glaser 20 Apr. 1972 106 p refs Revised (MF12524015)
(AD-750271; IR-2-Rev) Avail: NTIS CSCL 06/18

More than 2300 references on the biological responses to radio frequency and microwave radiation, published up to April 1972, are included in this bibliography of the world literature. Particular attention has been paid to the effects on man of non-ionizing radiation at these frequencies. The citations are arranged alphabetically by author, and contain as much information as possible so as to assure effective retrieval of the original documents. Soviet and East European literature is included in detail. An outline of the effects which have been attributed to radio frequency and microwave radiation is included as Chapter 1. The revised report (which supersedes DDC report (AD-734391)) is updated with the inclusion of three supplementary listings, and has incorporated many corrections and additions to the original 2100 citations. Author (GRA)

N73-15132# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE FUNCTIONAL STATE OF THE VISUAL AND VESTIBULAR ANALYZERS OF THOSE WHO WORK WITH SMALL DOSES OF IONIZING EMISSIONS
Ts. P. Medvedovskaya and V. N. Shepelev 2 Aug. 1972 10 p refs Transl. into ENGLISH from Gig. Tr. Prof. Zabol. (Moscow), no. 9, 1970 p 44-46
(AD-750499; FTD-MT-24-99-72) CSCL 06/18

A study of 199 persons working with the VVP-M research reactor integral operator dose 15 to 20 rem is reported. No significant changes in functional state of the visual and vestibular analyzers were detected. Reversible changes such as reduced sensitivity to red and green, enlarged blind spot, depression of vestibular function, and reduced size and altered blood pressure in vessels of the fundus oculi reflect changes in the functional state of the higher nervous system, and of the cerebral cortex in particular. Author (GRA)

N73-15133# Naval Medical Research Inst., Bethesda, Md.
A BIBLIOGRAPHY OF THE ROLE OF THE VESTIBULAR APPARATUS UNDER WATER AND PRESSURE: CONTENT-ORIENTED AND ANNOTATED Progress Report
Robert S. Kennedy 10 Aug. 1972 136 p refs
(AD-750686; PR-1) Avail: NTIS CSCL 06/19

The report contains approximately 965 references dealing with the role of the vestibular apparatus in compressed air work. The references are sorted by subject matter into six categories: Vestibular symptomatology as a sign of decompression sickness; Clinical investigation of vestibular symptomatology; Tests of positive function of vestibular apparatus; Perceptual illusions occasioned by the environment; The use of the vestibular system as an inertial guidance system; and auditory studies which have relevance for understanding vestibular function underwater. Author (GRA)

N73-15134# Armed Forces Radiobiology Research Inst., Bethesda, Md.
BLOOD PO2 AND pH IN MONKEYS AFTER INCAPACITATING DOSES OF IONIZING RADIATION
J. W. Thorp Jun. 1972 19 p refs
(DNA Proj. NWER-XAXM)
(AD-750681; AFRRI-TN72-3) Avail: NTIS CSCL 06/18

Aortic blood PO2 and pH and internal jugular blood PO2 were measured continuously in monkeys (Macaca mulatta) that received a 3000-rad midline tissue dose pulse of mixed gamma-neutron radiation. Immediately after irradiation the aortic blood PO2 and pH increased slightly (5 to 10 torr and 0.05 pH unit, respectively); these changes were consistent with earlier reports that monkeys hyperventilated after similar irradiation. Venous blood PO2 did not change after irradiation. It was concluded that lack of oxygen in the blood does not contribute to radiation-induced early transient incapacitation (ETI). If brain hypoxia does cause ETI, it must result from inadequate blood supply to all or part of the brain. Author (GRA)

N73-15135*# Southwest Research Inst., San Antonio, Tex.
ASSISTANCE TO NASA IN BIOMEDICAL AREAS OF THE TECHNOLOGY UTILIZATION PROGRAM Monthly Report, 1-30 Nov. 1972
Nov. 1972 108 p
(Contract NASw-1867; SwRI Proj. 13-2538)
(NASA-CR-129998) Avail: NTIS HC $7.50 CSCL 06B

The activities of the applications team are reported for November 1972. Summaries are included of problems, problem statements, searches, application engineering, and technology application. F.O.S.

N73-15136# Defence Research Board, Ottawa (Ontario).
DRB AVIATION MEDICAL RESEARCH UNIT REPORTS, VOLUME 1, 1964-1968
Geoffrey Melvill Jones, comp. May 1971 206 p refs Prepared jointly with McGill Univ.
(DR-208-Vol-1) Avail: NTIS HC $12.50

Physiological research on sensory responses to visual stimuli and on neural control of functional muscle movements during space flight is reported.

N73-15137 Defence Research Board, Ottawa (Ontario).
DYNAMICS OF THE SEMICIRCULAR CANALS COMPARED IN YAW, PITCH AND ROLL
Geoffrey Melvill Jones, W. Barry, and N. Kowalsky *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 1-11 refs Submitted for publication
06-05)

Treating the semicircular canal system as a 3-D sensing device, experiments were performed to compare the patterns of response to rotational stimuli in the yaw, pitch and roll planes of the head. The method of post-rotational stimulation on an electronically controlled turntable was used, both subjective cupulometry and objective measurement of slow phase eye angular velocity being employed to measure the time course of decay in response. The yaw-pitch and yaw-roll differences were highly significant (P less than 0.001). It is concluded that the effective time constants of post rotational decay in the planes of pitch and roll are considerably shorter than in yaw. In the context of aviation this implies a considerably greater rate of development of error in response to rotational stimuli in pitch and roll than in yaw. Author

N73-15138 Defence Research Board, Ottawa (Ontario).
PREDOMINANCE OF ANTI-COMPENSATORY OCULOMOTOR RESPONSE DURING RAPID HEAD ROTATION
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 12-19 refs Submitted for publication

Experiments with human subjects are described which show that when the head is jerked with high angular velocity, say to the right, large anti-compensatory flicks drive the eyes well over in the leading direction, in this case to the right, where they remain until the head slows down. Then the expected compensatory response to the left begins to appear. If the high head angular velocity is artificially maintained, as on a turntable, the expected compensatory response may be virtually eliminated for several seconds, presumably owing to prolonged action of a strongly maintained anti-compensatory response. This phenomenon can occur in the rolling plane and has been demonstrated during flight in the initial stages of a rapid rolling manoeuvre. Presumably consequent failure of retinal image stabilisation could cause serious impairment of visual acuity at this critical moment. Author

N73-15139 Defence Research Board, Ottawa (Ontario).
THE CRITICAL DEPENDENCE OF SEMI-CIRCULAR CANAL FUNCTION UPON ITS PHYSICAL DIMENSIONS

Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 20-25 refs Submitted for publication

The main functional role of the canals is seen as one of angular velocity transduction, with this particular capability being critically dependent upon the actual canal dimensions. It seems that natural selection has nicely adapted these dimensions by very small, but altogether appropriate changes in canal size, such that the frequency range of velocity transducing characteristics of the canal is always matched to the likely range of frequencies to which the head will be exposed in natural life. It seems as if the evolutionary process has preferred to employ mechanical, rather than neural, integration of head angular acceleration, and that this capability has been largely brought about by precise adjustment of critical canal dimensions. Author

N73-15140 Defence Research Board, Ottawa (Ontario).
DISTURBANCE OF OCULOMOTOR CONTROL IN FLIGHT
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 26-34 refs Submitted for publication

An over-all analysis of the physiological processes contributing to stabilization of the retinal image reveals four main sensory and three main motor information channels. The three motor outputs operate on three discrete anatomical platforms described as the eye-in-skull, the skull-on-body and the body-in-space. Detailed considerations of the visual tracking and vestibulo-ocular mechanisms disclose a number of limitations imposed on the over-all system by the flight environment. Specifically, those here considered are the limited frequency response of visual tracking, virtual absence of visual tracking in the roll plane, the vestibular errors introduced by prolonged turning and the predominance of an anti-compensatory vestibulo-ocular response during rapid head rotation. Author

N73-15141 Defence Research Board, Ottawa (Ontario).
SPATIAL AND DYNAMIC ASPECTS OF VISUAL FIXATION
Geoffrey Melvill Jones and J. H. Milsum *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 35-51 refs Submitted for publication

The physiological processes concerned with the difficult dynamic task of fixating the retinal image during normal body and head movement are examined with a control engineering perspective. Spatial relationships between the two main system inputs (visual and vestibular) and three main outputs (operating on the eye-in-skull, skull-on-body, and body-in-space platforms) are examined in the context of the geometry of the environment with the aid of an information flow diagram. From dynamic considerations a picture emerges in which the visual tracking system has adequate accuracy and dynamic range for following most naturally moving objects when the head is still. But with head free, the added perturbations of natural movement exceed these tracking capabilities. However, over the frequency range 0.1-5.0 c/s the semicircular canal subsystem then provides angular velocity information for powerful complementary servostabilization. Author

N73-15142 Defence Research Board, Ottawa (Ontario).
THEORETICAL MAN-MACHINE INTERACTION WHICH MIGHT LEAD TO LOSS OF AIRCRAFT CONTROL
J. F. Martin and Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 52-59 refs Submitted for publication

A theoretical model of a pilot-aircraft interaction wherein the pilot relies entirely upon his sense of the relative gravity vector for orientation information is developed. It is shown that the illusory effects arising from motions could cause him to operate the aircraft controls in a diametrically opposite manner to what would be appropriate. This model may serve as a basis to account for otherwise unexplained losses of control in jet transport aircraft. Author

N73-15143 Defence Research Board, Ottawa (Ontario).
INFLUENCE OF EYE LID MOVEMENT UPON ELECTRO-OCULOGRAPHIC RECORDING OF VERTICAL EYE MOVEMENTS
W. Barry and Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 60-66 refs Submitted for publication

The cause of an EOG artifact noted during vertical saccadic eye movements has been investigated. Records of eye movements were simultaneously obtained from electro-oculography and a movie photographic method in response to intermittent vertical saccadic changes in visual fixation. The artifact was found to run the same time course as the upper eye lid movement and is probably directly attributable to this. An argument is advanced suggesting that changes in the relative position of the eyelid and eyeball are responsible for the artifact and a simplified model of the electrical setup by which the eyeball, lids and electrodes might function is presented. Author

N73-15144 Defence Research Board, Ottawa (Ontario).
THE VESTIBULAR CONTRIBUTION TO STABILIZATION OF THE RETINAL IMAGE
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 67-78 refs Submitted for publication

The vestibulo-ocular reflex system is examined in the context of an essential backup to the visual fixation reflex. The vestibular stimulus (in this case, mainly the semicircular canal) is seen as the output from an angular velocity transducing hydrodynamic system, feeding the central nervous system with angular velocity modulated information, provided the mechanical stimulus is confined within a specified frequency range. It appears that the dynamic response of the vestibulo-ocular system improves as that of the visual tracking systems fails. The overall system is apparently superimposed by a pattern of response which insures that compensating eye muscles are stretched on average by an amount directly related to the compensatory eye angular velocity required for image stabilization at every instant. Author

N73-15145 Defence Research Board, Ottawa (Ontario).
THE INTERDEPENDENCE OF CLINICAL NEUROLOGY AND NEUROPHYSIOLOGY: AN HISTORICAL REVIEW OF THE VESTIBULO-OCULAR REFLEX
Seymour Mishkin *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 79-91 refs Submitted for publication

The historical development of the vestibulo-ocular reflex is used to indicate how major advances in neurophysiology have contributed to clinical neurology. Early advances, made within the framework of the scientific method, permitted the incorporation of empirical data into working hypotheses which could be tested at the bedside as well as in the laboratory. Author

N73-15146 Defence Research Board, Ottawa (Ontario).
VESTIBULAR INAPTITUDE IN THE ENVIRONMENTS OF FLIGHT AND SPACE
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 92-105 refs Submitted for publication

The vestibular system has become highly adapted to the particular patterns of head movement normally associated with the environment in which it has evolved. But in flight and space, totally different patterns of movement are encountered and serious mis-matching can arise between this sensory system and the new environment. The nature of such inaptitude is examined in terms of current physiological understanding of the otolith organs, semicircular canals, associated central neural mechanisms and the vestibulo-ocular reflex. Applied consequences are considered in the contexts of flight in the atmosphere and in space. Author

N73-15147 Defence Research Board, Ottawa (Ontario).
INTERACTIONS BETWEEN OPTOKINETIC AND VESTIBULO-OCULAR RESPONSES DURING HEAD ROTATION IN VARIOUS PLANES

Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 106-117 refs Submitted for publication

Subjects were accelerated on an electronically controlled turntable to a chosen angular velocity which was then maintained constant for three minutes and finally decelerated to a standstill. They either had their heads tilted backwards, or sideways, at 45 deg to the vertical axis of the turntable. Thus they were simultaneously exposed to equal angular velocity stimuli in the skull planes either of yaw and roll, or of yaw and pitch. Measurement of compensatory eye angular velocities in the relevant planes with a movie-photographic technique revealed very poor optokinetic following in the roll plane and hence wide dissociation of oculomotor responses in yaw and roll. In yaw and pitch the components of eye angular velocity were always equal to one another, despite failure (often gross) to reach the numerical value required for visual fixation. Author

N73-15148 Defence Research Board, Ottawa (Ontario).
PREDOMINANT DIRECTION OF GAZE DURING SLOW HEAD ROTATION
S. Mishkin and Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 118-125 refs Submitted for publication

When the head is rotated slowly a vestibulo-ocular response acts in a compensatory direction and is usually manifest as ocular nystagmus having a slow compensatory phase interspersed with quick fly-backs in the opposite, or leading, direction. Experiments with human subjects oscillated sinusoidally about a vertical axis have shown that superimposed on this familiar nystagmoid pattern of response there tends to be a slow waveform of change in the average eye position relative to the skull. This waveform had the same frequency as the oscillatory motion of the head but was approximately 90 deg phase advanced with respect to the wave form of head position. This implies that during the sinusoidal head motion the waveform defining averaged eye position relative to the skull was approximately in phase with head angular velocity. It is inferred that the observed waveform of averaged eye displacement probably derived in the main from this vestibular source. Author

N73-15149 Defence Research Board, Ottawa (Ontario).
DEPENDENCE OF VISUAL TRACKING CAPABILITY UPON STIMULUS PREDICTABILITY
Joel A. Michael and Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 126-137 refs Submitted for publication

Variable, narrow bandwidths of random noise were used to determine the ability of the human visual tracking system to maintain fixation on moving visual stimuli of various degrees of predictability. The results indicate that there is a continuous relationship between stimulus predictability and tracking capability; the less predictable the stimulus motion the greater the phase shift between stimulus and response at a given frequency. Thus, a predictive component in the system seems to compensate for the relatively poor performance capabilities of the system operating in the unpredictive mode and permits maximally accurate following with the patterns of head and target movements encountered in real life. Author

N73-15150 Defence Research Board, Ottawa (Ontario).
NEURAL REFLECTION OF VESTIBULAR MECHANICS
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 138-151 refs Submitted for publication

The response of canal-dependent units to rotation of a linear acceleration vector without rotation of the animal appears to be relatively uniform and of significant magnitude. This suggests that the latter mode of stimulus may normally generate a meaningful component of information in the central nervous system during angular head movement in vertical planes, since such movement introduces rotation of the gravitational acceleration vector relative to the head. In the zero gravity environment of space flight this component would be absent, thus introducing the potential hazard of discordant information in the central nervous system. Author

N73-15151 Defence Research Board, Ottawa (Ontario).
THE PHYSIOLOGICAL ADAPTATION TO UNILATERAL SEMICIRCULAR CANAL INACTIVATION
Hyman Zuckerman *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 152-157 Submitted for publication

Physiological adaptation in the cat of plugging of one horizontal semicircular canal as manifest by the oculomotor response to rotational stimulation is studied. Normal unanaesthetized cats were subjected to a range of oscillatory rotational stimuli, their heads fixed to the rotating platform, with the horizontal canals in the plane of rotation. The same cats were then subjected to similar simuli at intervals after unilateral obstruction of the canal. The main feature of the results was a consistent fall in gain of the overall vestibulo-ocular response by a factor of two in post operative animals. Over the three to four weeks required for functional post operative adaptation of the animal, there was no significant corresponding change in the oculomotor response to vestibular stimulation. Author

N73-15152 Defence Research Board, Ottawa (Ontario).
SOME AVIATION MEDICAL ASPECTS OF FLIGHT CREW FATIGUE
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 158-170 refs Submitted for publication

Quantitative measurements on the time course of decrement in skilled pilot performance for a specific environment as a result of performing that task are reported. Numerical data specify how decrement takes place, and on the basis of results obtained from an adequately representative population it is possible to predict the human operator function and to set time limits for the particular circumstances of the specific conditions. It is shown that subjective changes go hand in hand with objectively demonstrated performance decay. Sensible criteria for rest periods, aircrew accomodations in low noise environments, physiological observations of body responses are all measures to control operator fatigue. G.G.

N73-15153 Defence Research Board, Ottawa (Ontario).
A DYNAMIC MODEL OF THE SEMICIRCULAR CANAL
Robert F. Stevenson *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 171-174 refs Submitted for publication

A semicircular canal model with a flow visualization chamber was constructed and used to record particle movements in the canal fluid in a simulated response to angular velocity. Refinement of the recording technique allows a frame-by-frame analysis of the fluid, so that the canal velocity profile may be plotted and a comparison made with the flow patterns predicted by Newman. It is shown that the principle utilized in this experiment, maintenance of geometrical similarity and Reynold's number, can be used to advantage in other research problems in physiology. Author

N73-15154 Defence Research Board, Ottawa (Ontario).
FROM LAND TO SPACE IN A GENERATION: AN EVOLUTIONARY CHALLENGE
Geoffrey Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 1 May 1971 p 175-198 refs Submitted for publication

Evolutionary barriers associated with human exposure to prolonged zero gravity flight are outlined. It is shown that much of human movement is conducted by accurately time-programmed neural messages and that human adaptation to the space environment requires the release of stored messages and the production of new programs on the basis of on-going feedback from the actual event. G.G.

N73-15155*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ASRDI OXYGEN TECHNOLOGY SURVEY. VOLUME 2: CLEANING REQUIREMENTS, PROCEDURES, AND VERIFICATION TECHNIQUES
H. Bankaitis and Carl F. Schueller 1972 80 p

(NASA-SP-3072) Avail: NTIS HC plus microfiche supplement $3.95 CSCL 06K

The oxygen system cleaning specifications drawn from 23 industrial and government sources are presented along with cleaning processes employed for meeting these specifications, and recommended postcleaning inspection procedures for establishing the cleanliness achieved. Areas of agreement and difference in the specifications, procedures, and inspection are examined. Also, the lack of clarity or specificity will be discussed. This absence of clarity represents potential safety hazards due to misinterpretation. It can result in exorbitant expenditures of time and money in satisfying unnecessary requirements. Author

N73-15156*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

METABOLIC ANALYZER Patent Application

Cortes L. Perry and John A. Rummel, inventors (to NASA) Filed 26 Dec. 1972 35 p

(NASA-Case-MFS-21415-1; US-Patent-Appl-SN-318152) Avail: NTIS HC $3.75 CSCL 06B

An apparatus is reported for the measurement of metabolic rate and breathing dynamics in which inhaled and exhaled breath are sensed by sealed, piston-displacement type spirometers. These spirometers electrically measure the volume of inhaled and exhaled breath. A mass spectrometer analyzes simultaneously for oxygen, carbon dioxide, nitrogen and water vapor. Computation circuits responsive to the outputs of the spirometers, mass spectrometer, temperature, pressure and timing signals compute oxygen consumption, carbon dioxide production, minute volume and respiratory exchange ratio. A selective indicator provides for read-out of these data at predetermined cyclic intervals. NASA

N73-15157# Civil Aeromedical Inst., Oklahoma City, Okla.

A PRELIMINARY STUDY OF MAXIMAL CONTROL FORCE CAPABILITY OF FEMALE PILOTS

Bonne Karim (Okla. Univ., Norman), Karl H. Bergey (Okla. Univ., Norman), Richard F. Chandler, A. Howard Hasbrook, Jerry L. Purswell (Okla. Univ., Norman), and Clyde C. Snow Jul. 1972 19 p refs

(FAA-AM-72-27) Avail: NTIS HC $3.00

The growing number of female pilots entering the field of civil aviation has suggested the need for a study of the maximum allowable forces which should be specified for operating aircraft controls. Therefore, a study was made of the maximal voluntary forces which a sample of 25 female pilots could exert on each flight control. Further, the percent of maximal strength versus endurance relationship reported by other investigators was studied for this population in operating each control. The percent of maximal strength versus endurance relationship was established and compared with the results of other investigators. The results obtained indicate a need for further study of the subject in simulated and actual flight. Author

N73-15158*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CARDIAC R-WAVE DETECTOR WITH AUTOMATIC SENSITIVITY CONTROL

Vernon D. Gebben and John A. Webb, Jr. Washington Jan. 1973 21 p refs

(NASA-TN-D-7152; E-7216) Avail: NTIS HC $3.00 CSCL 06B

An electronic circuit that automatically changes its sensitivity was developed for detecting the bioelectric signal resulting from activation of the heart's ventricles. Regulation of sensitivity was accomplished with two feedback channels that maintain the sensitivity level between an upper and a lower limit. These limits are proportional to the R-wave amplitude. Tests on an experimental circuit demonstrated a capability to reject unwanted signal noise, illustrated difficulties encountered without sensitivity control, and presented closed loop transients which occurred for step changes in R-wave amplitude. Author

N73-15159*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

THE DEVELOPMENT OF A NON-CRYOGENIC NITROGEN/OXYGEN SUPPLY SYSTEM

B. M. Greenough 1 Dec. 1972 183 p refs

(Contract NAS9-10405)

(NASA-CR-128688; MSC-07384) Avail: NTIS HC $11.25 CSCL 06K

Development of the hydrazine/water electrolysis process in a manned spacecraft to provide metabolic oxygen and both oxygen and nitrogen for cabin leakage makeup was studied. Electrode development efforts were directed to stability, achieved with catalyst additives and improved processing techniques, and a higher hydrazine conversion efficiency, achieved by reducing catalyst loading on the cathodes. Extensive testing of the one-man breadboard N2/02 system provided complete characterization of cabin atmosphere control aspects. A detailed design of a prototype modular N2/02 unit was conducted. The contact heat exchanger which is an integral component of this design was fabricated and sucessfully design-verification tested. Author

N73-15160*# Lockheed Missiles and Space Co., Sunnyvale, Calif.

WATER ELECTROLYSIS SYSTEM REFURBISHMENT AND TESTING

B. M. Greenough 1 Dec. 1972 181 p refs

(Contract NAS9-11848)

(NASA-CR-128687; MSC-07383) Avail: NTIS HC $11.25 CSCL 06K

The electrolytic oxygen generator for the back-up water electrolysis system in a 90-day manned test was refurbished, improved and subjected to a 182-day bench test. The performance of the system during the test demonstrated the soundness of the basic electrolysis concept, the high development status of the automatic controls which allowed completely hands-off operation, and the capability for orbital operation. Some design improvements are indicated. Author

N73-15161*# Advanced Rocket Technology, Irvine, Calif.

INVESTIGATION OF BIOWASTE RESISTOJETS FOR SPACE STATION APPLICATION

Carl R. Halbach, Russell J. Page, Owen J. McCaughey, and Robert A. Short Jul. 1972 158 p refs

(Contract NAS1-10934)

(NASA-CR-112159) Avail: NTIS HC $10.00 CSCL 06I

The feasibility of using electrically conducting ceramics to heat biowaste propellants to 2000 K in resistojet thrustors was demonstrated. These thrustors are being developed for use on the space station. Among the candidate ceramic heater materials, zirconia and thoria are chemically resistant to the biopropellants, and they are also sufficiently conductive at high temperatures to make them suitable for the heater elements in these thrustors. A proof of concept thrustor design is presented, incorporating a multiple passage cylindrical heater made of zirconia ceramic which is capable of operating at 2000 K wall temperature with CO2 and H2O biopropellants. For the 25 mlb size thrustor, specific impulses of 200 seconds for CO2 and 275 seconds for H2O biopropellants are predicted. Author

N73-15162*# Space Age Control, Inc., Palmdale, Calif.

HIGH PRESSURE SPACE SUIT GLOVE

2 Jan. 1972 15 p ref

(Contract NAS2-7009)

(NASA-CR-114532; SAC-100218) Avail: NTIS HC $3.00 CSCL 06Q

A description is given of a prototype full pressure glove that will allow maximum dexterity, tactility and stability at an operating pressure of psi. Author

N73-15163# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

OXYGEN THERAPY. OBSERVATIONS ON THE BEHAVIOR OF ENZYME ACTIVITIES IN PLASMA AFTER BREATHING

OXYGEN AT HIGH PRESSURE [ZUR SAUERSTOFF-THERAPIE. BEOBACHTUNGEN UEBER DAS VERHALTEN EINIGER ENZYMAKTIVITAETEN IM PLASMA NACH REINER SAUERSTOFFATMUNG IM UEBERDRUCK]
Helge Paulmann Aug. 1971 67 p refs In GERMAN; ENGLISH summary
(DLR-FB-71-96) Avail: NTIS HC $5.50; DFVLR, Porz, West Ger. 17,60 DM

The behavior of enzyme activities in blood plasma was examined to establish the pulmonary cellular damage of young men exposed to oxygen at high pressure. A correlation was found between the extent of the stress reaction and the stress intensity. Pulmonary damage caused by oxygen poisoning could not be determined by the enzyme diagnosis. Author (ESRO)

N73-15164# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Abteilung Mechanische Hoehenwirkung und Caissonforschung.
PRESSURE GRADIENT MEASUREMENTS IN THE BODIES OF ANIMALS WITH AIR BLAST INJURIES [DRUCKVERLAUFSMESSUNGEN IM TIERKOERPER BEI LUFTSTOSSVERLETZUNGEN]
Otto Wuensche and Gerhard Scheel E Jul. 1971 26 p refs In GERMAN; ENGLISH summary
(DLR-FB-71-72) Avail: NTIS HC $3.50; DFVLR, Porz, West Ger. 9 DM

Pressure pulse experiments were conducted and intracorporeal pressures were measured in miniature pigs and albino rats using a previously validated technique and specially selected pressure probes. These were localized for the miniature pigs in the esophagus, the rectum, and in the musculature of the back and the thigh, and for the albino rats, in the rectum. The clinical symptoms caused by pressure pulse and the detected morphological findings, are demonstrated and verified by macro- and microscopical photographs. The variations in the results of these experiments are discussed. Author (ESRO)

N73-15165# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
TARGET ACQUISITION FOR PICTURE TRANSMISSION USING A TV SYSTEM [ZIELENTDECKUNG BEI DER BILDUEBERTRAGUNG DURCH EIN TV-SYSTEM]
Udo Miller Sep. 1972 26 p refs In GERMAN Presented at the 5th DGLR Ann. Meeting, Berlin, 4-6 Oct. 1972
(MBB-UFE-892-72-O; DGLR-Paper-72-099) Avail: NTIS HC $3.50

The target acquisition time was measured for test subjects observing a TV image, as a function of transmission bandwidth (of the video signal), the contrast, and several image enhancement possibilities. The results show that target acquisition can be improved, especially for bad meteorological conditions (fog, mist, rain), by contrast variation, contrast harmonization using a masking image, and noise filtering. Author (ESRO)

N73-15166# Defence Research Information Centre, Orpington (England).
ASSESSMENT OF THERMAL INSULATION PROPERTIES OF CLOTHING
V. I. Vankelevich Nov. 1972 9 p refs Transl. into ENGLISH from Tekhnol. Legkoj. Prom. (Kiev), vol. 1, 1972, p 88-92
(DRIC-Trans-2921) Avail: NTIS HC $3.00

To assess the degree of difference between conditions for testing thermal insulation properties of materials in models and conditions for testing air-penetrable clothing in wind, as well as the authenticity of the results, an examination is made of the physical processes governing the transfer of heat through air-penetrable clothing in wind. It is found that in wind, filtration of air takes place through the material of air-penetrable clothing as a result of the difference in dynamic pressures on the surface of the clothing. When there is an air layer under the material, air filtration through the clothing and the associated heat transfer is significantly greater than when the clothing is tight fitting. Author (ESRO)

N73-15167# Informatics, Inc., Rockville, Md.
SOVIET BIOCYBERNETICS BIBLIOGRAPHY, JANUARY MAY 1972
Stuart G. Hibben Jul. 1972 36 p refs
(Contract F44620-72-C-0053; ARPA Order 1622-3)
(AD-750129; AFOSR-72-1961TR) Avail: NTIS CSCL 06/4

A bibliographic listing is given of all material relating to Soviet biocybernetic studies, received in the January - May 1972 interval. The report represents the optional fifth subject for the May monthly report, issued under separate cover. Author (GRA)

N73-15168# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE QUESTION OF GROUND TRAINING OF FLYING PERSONNEL
V. Ya. Gilinskii 28 Jul. 1972 7 p Transl. into ENGLISH from the publ. "Moskovskoye Fiziologicheskoye Obshchestvo Sektsiya Aviatsionnoy i Kosmicheskoy Meditsiny, Aviakosmicheskaya Meditsina, Trudy" Moscow, 1967 p 226-227
(AD-749621; FTD-MT-24-280-72) Avail: NTIS CSCL 05/9

The article confirms the validity of that point of view according to which ground training should be provided for in the programs of flight training, retraining, and maintenance of flying skill. Author (GRA)

N73-15169# Naval Medical Research Inst., Bethesda, Md.
A STUDY OF A CUTANEOUS CODE APPLIED TO THE COMMUNICATION NEEDS OF THE WORKING DIVER
Medical Research Progress Report
Joseph Diachenko 15 Aug. 1972 24 p refs
(AD-750268; PR-2) Avail: NTIS CSCL 05/10

As an initial study into the applicability of cutaneous communication for divers, a series of sixteen discrete, left-right (L-R) vibrotactile stimulus patterns was delivered to the lower abdomen of six divers whose task it was to correctly identify the spatio-temporal sequency of each pattern. Correlation analysis of the results showed that older subjects made significantly more errors, and complex code patterns containing the L-R changes in direction contributed significantly to subject error. However, the overall design of L-R patterns was found to be basically satisfactory as a framework on which to build an optimal cutaneous code. Further development of code design and hardware are suggested. Author (GRA)

N73-15170# Naval Training Equipment Center, Orlando, Fla.
AN EVALUATION OF THE TRAINING EFFECTIVENESS OF DEVICE 2F90, TA-4J OPERATIONAL FLIGHT TRAINER. PART 1: THE B STAGE Final Report
Leonard E. Ryan, Joseph A. Puig, Gene S. Micheli, and James C. Clarke Aug. 1972 59 p refs
(AD-750248; NAVTRAEQUIPCEN-IH-207-PT-1) Avail: NTIS CSCL 05/9

The training effectiveness of the TA-4J advanced jet trainer (Device 2F90) was evaluated by measuring transfer of training from the trainer to the operational situation. Comparisons were made among three experimental and a control group (which received the normal syllabus training). Of the experimental groups, one received training in flight, another group only in the trainer, and the third received only academic training on related principles of the basic instrument portion of the syllabus. Following training, all groups were given a checkride in the aircraft. The relative benefits of the different types of training were evaluated to determine the effectiveness of the trainer in training advanced naval aviation students in the B stage (Basic Instruments) of the NAVJIT (Naval Jet Instrument Trainer) syllabus for the TA-4J aircraft. The study demonstrated that 4.4 hours of aircraft flight time per student could be saved by substituting trainer time for aircraft time in the B stage; a significant cost savings when considering the 450 students that are processed through the school annually. Author (GRA)

N73-15171# Washington Univ., St. Louis, Mo.
THE EFFECT OF FATIGUE ON VISUAL SEARCH ACTIVITY Final Report
John A. Stern 1 Jul. 1972 42 p refs
(Contract DA-49-193-MD-2715)
(AD-750097) Avail: NTIS CSCL 05/10

The report reviews work on the development of recording techniques for obtaining outputs from the manipulanda of helicopters (UH-1D) and automobiles as well as techniques for processing such data. The majority of the report deals with the recording and utilization of measures of visual search activity for the assessment of pilot performance as a function of such variables as level of training, time on task, and sleep deprivation. Necessary hardware for electrooculographic recording of visual search activity was developed, as well as computer techniques for abstracting relevant information from these records. Two published studies utilizing these procedures are included. The report details some further development of the application of analytic programs to the evaluation of reading activity.
Author (GRA)

N73-15172# Army Tank-Automotive Command, Warren, Mich.
THE EFFECTS OF VIBRATION ON VISION AS APPLIED TO MILITARY VEHICLES
Richard A. Lee 1972 16 p refs
(AD-750345) Avail: NTIS CSCL 06/19

The objective of the study was to quantify the loss of visual acuity during whole-body vibration of a seated human. To obtain accurate measurements of eye motion during whole-body vibration, a target was set up in front of a vibration simulator.
GRA

N73-15173# Frankford Arsenal, Philadelphia, Pa.
SPECTRAL DEFICITS IN VISUAL ACUITY DUE TO LASER IRRADIATION
Harry Zwick, R. Bruce Bedell, and Kenneth Bloom 1972 12 p refs
(AD-750394) Avail: NTIS CSCL 06/18

The increased use of lasers and laser devices has made it essential to determine the potential kinds of visual deficits associated with accidental laser exposure. Maximal visual acuity and normal color vision are closely associated with foveal receptor function. When the fovea is destroyed by laser irradiation, severe and permanent losses in visual acuity ensue. The purpose of the study was the determination of permanent photopic or color deficits in animal subjects following foveal injury produced by ruby laser irradiation.
GRA

N73-15174# Human Factors Research, Inc., Goleta, Calif.
ACTIVE SONAR TARGET DETECTION AND REPORTING: PERCEIVED CONSEQUENCES AND THEIR EFFECTS ON PERFORMANCE
C. Dennis Wylie and Robert R. Mackie Jun. 1972 176 p refs
(Contract N00014-71-C-0257; NR Proj. 196-104)
(AD-750761; Rept-1721-1) Avail: NTIS CSCL 05/9

The objective of the research was to examine the effects of operational situations upon sonar operator's contact reporting behavior. An attitude survey involving fleet sonar operators and destroyer officers was conducted to determine the subjective values of five decision-making variables with respect to seventeen scenarios depicting peacetime and wartime tactical situations. It was found that sonar contact reporting thresholds were principally determined by the perceived consequences of missed contacts and of delay in contact reporting. It was also found that the assessments of false contact consequences were very inconsistent, unlike the judgments with respect to the other decision variables. The second phase of the research consisted of a sonar detection experiment, in which the influence of the variable command attention on performance was measured to give an objective evaluation of the effects of psychological variables.
Author (GRA)

N73-15175# Navy Experimental Diving Unit, Washington, D.C.
DIVER ANTHROPOMETRICS Final Report
Hugh T. Beatty and Thomas E. Berghage 1 Jun. 1972 150 p refs
(AD-748627; NEDU-RR-10-72) Avail: NTIS CSCL 05/5

To aid the design engineer in the development of future U. S. Navy diving systems and equipment a comprehensive anthropometric study was undertaken. Fifty-four anthropometric measures, two pulmonary function measures, and three derived body measures were obtained on 100, 41, and 100 U. S. Navy divers respectively. Descriptive statistics and measures of interrelationship are given for each measured and derived variable. The minimum number of anthropometric variables needed was determined by factor analysis. The measures obtained on the U. S. Navy divers were compared with anthropometric data available for the male aviation populations.
Author

Subject Index

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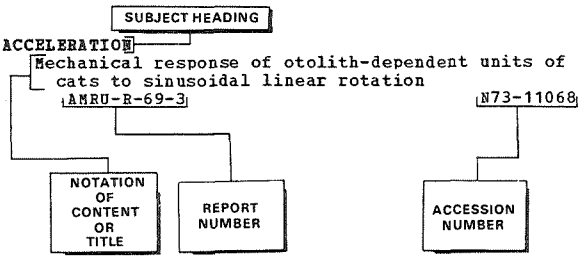

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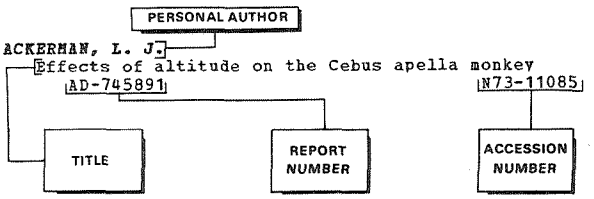

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