NASA SP-7011 (118)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 118)

AUGUST 1973

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011 (118)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 118)

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 July 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 338 reports, articles and other documents announced during July 1973 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes—subject and personal author—are included.

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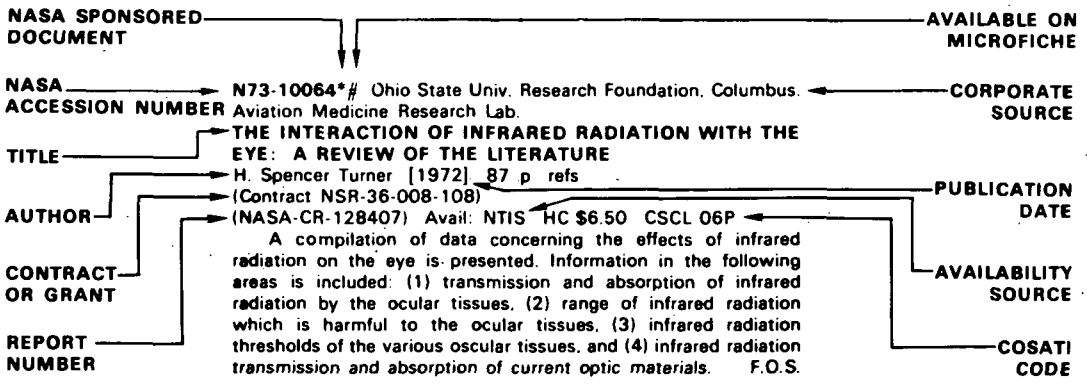

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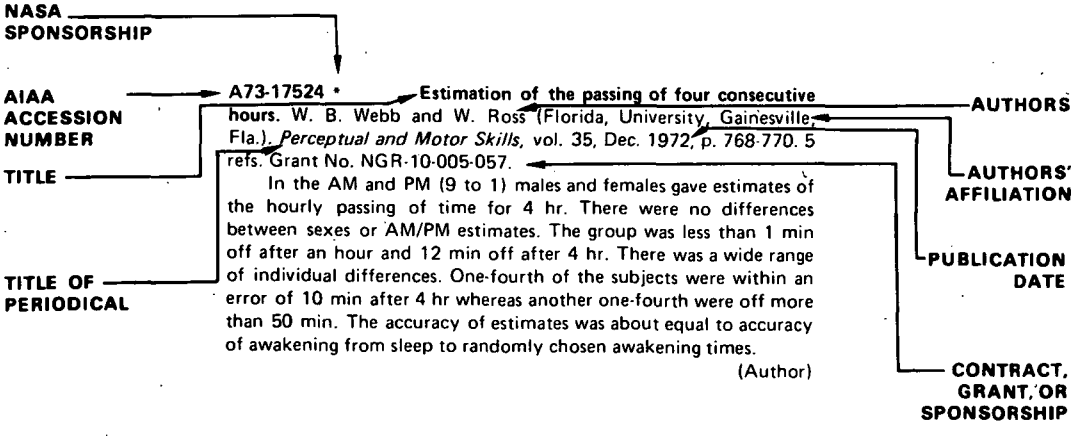

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 118) AUGUST 1973

IAA ENTRIES

A73-27996 # **Study of the relations between various mechanical properties and biochemical composition of bone tissues in man (Issledovanie zavisimostei mezhdu razlichnymi mekhanicheskimi svoistvami i biokhimicheskim sostavom kostnoi tkani cheloveka).** Iu. Zh. Saulgozis, L. I. Slutskii, I. V. Knets, and Kh. A. Ianson (Akademiia Nauk Latviiskoi SSR, Institut Mekhaniki Polimerov, Riga, Latvian SSR). *Mekhanika Polimerov,* Jan.-Feb. 1973, p. 138-145. 31 refs. In Russian.

A73-28091 **Visual perception of motion in depth - Application of a vector model to three-dot motion patterns.** E. Borjesson and C. von Hofsten (Uppsala, Universitet, Uppsala, Sweden). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 169-179. 12 refs. Research supported by the Statens Rad for Samhallsforskning and Tricentennial Fund of the Bank of Sweden.

The aim of the present study was to identify spatial properties of three-dot motion patterns yielding perceived motion in depth. A proposed vector model analyzed each pattern in terms of common and relative motion components of the moving parts. The dots moved in straight paths in a frontoparallel plane. The subjects reported verbally what they perceived. The common motion dit not affect the kind of perceived event (translation or rotation in depth). Relative motions toward or away from a common point - i.e., concurrent motions, yielded perceived translatory motion in depth. Parallel relative motions toward or away from a common line generally yielded perceived rotation in depth. Complex motion patterns, consisting of concurrent and parallel relative motion components combined, evoked simultaneously perceived translation and rotation in depth under certain phase conditions of the components. Some limitations of the model are discussed, and suggestions are made to widen its generality. (Author)

A73-28092 **Implications of measurement of eye fixations for a psychophysics of form perception.** M. A. Baker (Indiana University, Jeffersonville, Ind.) and M. Loeb (Louisville, University, Louisville, Ky.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 185-192. 28 refs. Grant No. DAHL19-69-C-0009. Project THEMIS.

It was suggested that insights into feature analysis of processes involved in form identification might be gained from an analysis of eye movements made by Ss as they identified patterns. Fixations were measured during identifications of histoforms, polygons, and Vargus 10 figures. Eye fixations were measured, and Ss rated sections of the figures in terms of their importance. Eye fixations were measured in terms of number of changes and duration of fixations. The number of changes in fixation were found to reflect only individual differences. Duration of fixation was found to vary significantly with location within figures, with fixations being longest where changes of contour occurred. There was also a tendency to look longer at the top of polygons and Vargus 10 figures and at the center of histoforms. Ratings of importance were highest for sections of figures fixated for longer duration - generally areas in which changes of contour were present. (Author)

A73-28093 **Apparent motion of stimuli presented stroboscopically during pursuit movement of the eye.** A. E. Stoper (California State University, Hayward, Calif.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 201-211. 42 refs. Contract No. Nonr-4102(01).

A73-28094 **Constancy and illusion of apparent direction of rotary motion in depth - Tests of a theory.** R. P. Power (Belfast, Queen's University, Belfast, Northern Ireland) and R. H. Day (Monash University, Clayton, Victoria, Australia). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 217-223. 21 refs.

An explanation of apparent direction of rotary motion in depth derived from a general theory of perceptual constancy and illusion is proposed with experimental data in its support. Apparent direction of movement is conceived of as exhibiting perceptual constancy or illusion as a function of apparent direction of orientation in depth for plane objects and apparent relative depth for three-dimensional objects. Apparent reversals of movement direction represent either regular fluctuations between constancy and illusion of direction as a function of valid and invalid stimuli for orientation, or irregular and random fluctuations in their absence. In three preliminary experiments, the apparent movement direction of plane ellipses was investigated as a function of surface pattern information for orientation, and in experiment I apparent reversals during 20-revolution trials were studied. In experiment II, apparent movement direction of 3D elliptical V shapes as a function of surface pattern information for relative depth was investigated. In addition to supporting the explanation proposed, the data offer a resolution of a conflict between different theories of apparent reversal of motion in depth. (Author)

A73-28095 **Temporal and spatial features in detecting one- and two-dimensional constraints in complementary visual displays.** I. Pollack (Michigan, University, Ann Arbor, Mich.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 241-246. 7 refs. NSF Grant No. GB-14036X.

A73-28096 **Absolute motion parallax and the specific distance tendency.** W. C. Gogel and J. D. Tietz (California, University, Santa Barbara, Calif.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 284-292. 20 refs. Grant No. PHS-NS-08883.

In the absence of definitive cues to distance, the perceived distance of an object will be in error in the direction of the object appearing at a distance of about 2 m from the object. This tendency to perceive an object at a relatively near distance is termed the specific distance tendency. Also, it has been found that an error in perceiving the distance of an object will result in an apparent movement of the object when the head is moved. From these two results, it was expected that the direction of the apparent movement

of a stationary point of light resulting from head movement would vary predictably as a function of the physical distance of the point of light from the object. This expectation was confirmed in an experiment in which both the perceived motion and perceived distance of the point of light were measured. The consequences of the study for the role of motion parallax in the perception of distance and for the reafference principle in the perception of object motion with head motion are discussed. (Author)

A73-28097 Visual temporal integration for threshold, signal detectability, and reaction time measures. G. E. Bruder (New York State, Dept. of Mental Hygiene, Brooklyn, N.Y.) and M. L. Kietzman (Brooklyn State Hospital, Brooklyn; New York, City University, Flushing, N.Y.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 293-300. 32 refs. Grant No. PHS-MH-18191.

A comparison was made of temporal integration for three different response measures in a visual detection task: (1) response frequency, (2) signal detectability as measured for rating ROC curves, and (3) simple reaction times (RTs). These measures were obtained on the same trials, to the same stimuli-orange (581 nm) light pulses of 50 min of visual angle fixated foveally and presented to dark-adapted objects in a monocular Maxwellian view. All three response measures showed a period of luminance-duration reciprocity (Bloch's law), followed by a period of partial integration. The end points of luminance-duration reciprocity (critical duration) and partial integration (utilization time) were shorter for RTs than for the response frequency and signal detectability measures. Neurophysiological implications of differences in time constants of integration for RT and psychophysical measures are discussed. (Author)

A73-28098 Autokinesis direction during and after eye turn. J. Levy (Columbia University, New York, N.Y.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 337-343. 14 refs.

The aftereffect (AE) of eye turn on autokinesis direction is usually, but not always, opposite to the inducing turn direction. During four experiments, a model predicting the aftereffect's time course and a new measure utilizing the concept of the position of random autokinetic movement were developed. They showed that aftereffect direction alternates during dissipation and that its first direction is not a simple function of previous eye position, but of the process by which that position is achieved, suggesting that at least two processes are involved. In one subject, versions produced the usual AE, while, after vergences, the AE was in the same direction as the inducing turn. Differential recruiment of these systems in monocular fixation could account for individual differences in the AE. (Author)

A73-28099 Probability summation model for heterochromatic luminance additivity failure at absolute visual threshold. R. W. Massof (Indiana University, Bloomington, Ind.). *Perception and Psychophysics,* vol. 13, no. 2, Apr. 1973, p. 349-355. 14 refs.

Vos and Walraven recently derived a new set of foveal primaries. These primaries, in conjunction with the revised zone fluctuation theory of color vision, account for more psychophysical color vision data than any other model to date. The new primaries depend heavily on Abney's law, and their success has been challenged by Guth's observations of additivity failure at absolute threshold. The present paper develops a probability summation model which accounts for threshold additivity failure within the framework of Vos's and Walraven's assumptions. (Author)

A73-28100 Brightness functions for a complex field with changing illumination and background. H. R. Flock (York University, Toronto, Canada) and K. Noguchi (Chiba University, Chiba, Japan). *Canadian Journal of Psychology,* vol. 27, Mar. 1973, p. 16-38. 19 refs. National Research Council of Canada Grant No. APA-143.

Brightness contrast perception was tested in 10 subjects who observed a cross formed by seven black-to-white test-field areas on a black, gray or white background during stepwise illumination variations. The behavior of the mean exponents of the 240 brightness contrast functions obtained is analyzed vs various combinations of test area and background brightness levels. V.Z.

A73-28176 Scalar perceptions with binocular cues of distance. W. C. Gogel (California, University, Santa Barbara, Calif.). *American Journal of Psychology,* vol. 85, Dec. 1972, p. 477-497. 27 refs. Grant No. PHS-NS-08883.

Under reduced conditions of observation, the perception of egocentric distance is determined by a composite of the tendency to see objects as near (the specific-distance tendency) and residual oculomotor cues of distance. The resulting perceived distance - the egocentric reference distance - was found to affect the perceived relative depth produced by binocular disparity between two points of light: the more distant light was positioned in apparent depth near the egocentric reference distance, with the scalar perception of the depth between the lights related to the magnitude of the reference distance. Implications for the scaling of relational perceptions are discussed. (Author)

A73-28283 # Time zone entrainment and flight stressors as interactants. H. B. Hale, B. O. Hartman, D. A. Harris, E. W. Williams, R. E. Miranda, and J. M. Hosenfeld (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 43, Oct. 1972, p. 1089-1094. 24 refs.

Physiologic responsiveness to flying was studied, using the members of a double-crew of a C-141 aircraft during six flights, each of which lasted 54 hours and involved bi- or tri-directional transmeridian flying. Responsiveness was quantified by means of endocrine-metabolic indices (urinary epinephrine, norepinephrine, 17-hydroxycorticosteroids, urea, sodium and potassium), using urine specimens which were collected at 4-hour intervals during the flights. Physiologic entrainment was shown to be a factor contributing to responsiveness, for there was rhythmic variability which related to time of day at the crews' home base. (Author)

A73-28294 # Changes caused by illumination in the Na+, K+ adenosine-triphosphatase and n-nitrophenyl-phosphatase activities of the external segments of the retina (Ob izmeneniiakh Na+, K+-ATFaznoi i n-nitrofenilfosfataznoi aktivnostei naruzhnykh segmentov setchatki pri osveshchenii). A. Sobota, I. B. Ostretsova, M. P. Rychkova, and R. N. Etingof (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 208, Feb. 11, 1973, p. 1242-1245. 22 refs. In Russian.

A73-28295 # Effect of adaptation to cold on the energy characteristics of muscular activity (Vliianie adaptatsii k kholodu na energetiku myshechnoi deiatel'nosti). Iu. I. Bazhenov (Akademiia Nauk SSSR, Institut Tsitologii i Genetiki, Novosibirsk, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 208, Feb. 11, 1973, p. 1250-1252. 10 refs. In Russian.

Oxygen metabolism vs muscle contraction rates was studied in albino rats kept at 2 to 4 deg C for 6 to 8 weeks. The energy output was determined by measurement of oxygen uptake per unit muscle contraction when the test rats were running on treadmills in small cages. The amounts of energy per unit muscle contraction in test rats were almost twice as great as in control rats kept at about 23 deg C. V.Z.

A73-28296 # Autoradiographic study of protein synthesis in perikaryons and of nitrogen migration into the axons of hypertrophic sympathetic neurons (Avtoradiograficheskoe issledovanie sinteza belka v perikarionakh i migratsii ego v aksony gipertrofirovannykh simpaticheskikh neironov). V. N. Iarygin (II Moskovskii Gosudarstvennyi Meditsinskii Institut, Moscow, USSR) and B. V. Ionov (Akademiia Nauk SSSR, Institut Biologii Razvitiia, Moscow, USSR). *Akademiia Nauk SSSR, Doklady,* vol. 208, Feb. 11, 1973, p. 1253-1256. 20 refs. In Russian.

A73-28338 **Digital temperature-measuring device for medical applications (Digitales Temperaturmessgerät für medizinische Anwendungen).** R. H. Germann, H. J. Marsoner, and F. M. Wageneder (Universitätsklinik für Chirurgie, Graz, Austria). *Internationale Elektronische Rundschau,* vol. 27, Apr. 1973, p. 83-86. 6 refs. In German.

Description of an electronics temperature-measuring device for body temperature measurements in medical practice. At an accuracy of plus or minus 0.1 K, the measured variable appears on a digital display ranging from 30 to 49 C. The only control consists of a single operating key, and maximum measuring time amounts to 20 sec. The thermistors employed as temperature sensors are interchanegeable without recalibration. M.V.E.

A73-28350 # **Hemodynamics alteration caused by acute hypoxia in animals with denervated carotid sinuses (Zmini gemodinamiki pri gostrii gipoksii u tvarin z denervovanimi karotidnimi sinusami).** S. A. Bershtein (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Akademiia Nauk Ukrains'koi RSR, Dopovidi, Seriia B - Geologiia, Geofizika, Khimiia i Biologiia,* vol. 35, Feb. 1973, p. 181-184. 13 refs. In Ukrainian.

Arterial and peripheral blood tension, heart beat rates, and ventricular indices were measured in 12 anesthetized cats with denervated carotid sinuses when the cats were kept in nitrogen containing 7.5% oxygen. The cardiovascular system was found to sustain higher stresses in test cats than in intact control cats during hypoxia. V.Z.

A73-28351 **The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971.** Symposium sponsored by the International Society for Clinical Electroretinography and International Union of Physiological Sciences. Edited by G. B. Arden (London, University, London, England). New York, Plenum Press (Advances in Experimental Medicine and Biology. Volume 24), 1972. 327 p. $17.50.

Phototransduction mutants of Drosophila melanogaster are discussed together with the effects of intracellular divalent calcium ions on the light response and on light adaptation in Limulus ventral photoreceptors, observations on the structure of receptor outer limbs, and light-induced conductance changes in rod outer segments. Other subjects considered include the effect of aspartate on the ERG of the isolated rabbit retina, electrophysiological studies of the living extracorporeal bovine eye, directionally selective units in the cat's lateral geniculate nucleus, and the retinal sensibility to drugs in normal rats and carriers of inherited retinal degeneration. The luminance-duration relationship in the human ERG is also explored along with changes in the oscillatory potential in relation to different features of diabetic retinopathy.

G.R.

A73-28352 **Light adaptation of the late receptor potential in the cat retina.** B. Sakmann and M. Filion (Max-Planck-Institut für Psychiatrie, Munich, West Germany). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 87-93. 14 refs.

The rise in increment threshold of the late receptor potential in nine retinas is measured and compared with the rise in increment threshold of the ganglion cell response of twelve on-center ganglion cells. It is shown that the ganglion cells of the cat retina receive input from rods and cones. The increment threshold of the ganglion cell response is rod dependent up to a certain background illumination. If it is assumed that the late receptor potential reflects the influence of the receptors on second order cells then, in the cat retina the major part of light adaptation in the scotopic range occurs proximal to the receptors. G.R.

A73-28353 **Electrical and metabolic manifestations of receptor and higher-order neuron activity in vertebrate retina.** W. Sickel (Köln, Universität, Cologne, West Germany). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 101-118. 27 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A73-28354 **Theoretical models of the generation of steady-state evoked potentials, their relation to neuroanatomy and their relevance to certain clinical problems.** B. A. Milner, D. Regan, and J. R. Heron (Keele, University, Keele; North Staffardshire Royal Infirmary, Stoke-on-Trent, Staffs., England). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 157-169. 14 refs.

Clinical applications of steady-state scalp evoked responses are discussed. A large body of data is obtained regarding the ways in which lesions in different areas have different effects on the low-frequency, medium-frequency, and high-frequency evoked potentials (EP's) to unstructured fields and to pattern reversal EP's. It is found that a restricted lesion can affect the medium frequency EP's while leaving the alpha-range EP's unaffected. This suggests that the ways in which different frequency components of EP's are affected by a lesion, could be used to locate and possibly estimate the size of the lesion. G.R.

A73-28355 **Evoked potentials to changes in the chromatic contrast and luminance contrast of checkerboard stimulus patterns.** D. Regan (Keele, University, Keele, Staffs., England). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 171-187. 28 refs. Research supported by the Medical Research Council.

A73-28356 **Scotopic visibility curve in man obtained by the VER.** C. Huber and E. Adachi-Usami (Max-Planck-Gesellschaft zur Förderung der Wissenschaften, Kerckhoff-Herzforschungsinstitut, Bad Nauheim, West Germany). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 189-198. 19 refs.

Luminance response curves were constructed on the basis of latency measurements of VER. The peaks selected for the latency measurements under dark and light adapted conditions are shown in a graph. In both cases an increase in test light luminance resulted in an earlier appearance of the VER. Latency has been defined as the time interval between the onset of the light stimulus and the selected peak of the VER. The action spectrum is discussed together with aspects of dark adaptation, and temporal summation. G.R.

A73-28357 **A clinical method for obtaining pattern visual evoked responses.** J. Behrman, S. Nissim, and G. B. Arden (London, University; Moorfields Eye Hospital, London, England). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 199-206.

The apparatus used for the method makes use of a screen which is viewed through an eye-piece mounted in a wheel. Rotation of the wheel produces a continuously reversing checker-board pattern of white and black squares. The visual evoked response is recorded from an electrode. There is an oscilloscope display for monitoring the input signal and the running average. The results of a number of experiments are discussed, giving attention to tests conducted with normal subjects and with patients. G.R.

A73-28358 **Cone spectral sensitivity studied with an ERG method.** D. V. Norren (Central Organization for Applied Scientific Research in the Netherlands TNO, Institute for Perception TNO,

Soesterberg, Netherlands). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 207-212. 7 refs.

The method of chromatic adaptation was used in the studies. It was tried to suppress selectively one or more of the systems in favor of the others by an approach including high-intensity colored backgrounds of suitably chosen spectral compositions. Macaque (rhesus) monkeys were used as subjects during the main part of the studies. The results obtained were compared with data from experiments with human subjects. Three different types of adaptation conditions were employed. G.R.

A73-28359 Monocular contribution to binocular vision in normals and amblyopes. N. W. Perry, Jr. and D. G. Childers (Florida, University, Gainesville, Fla.). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 213-222. 6 refs.

The experiments reported were conducted in an attempt to obtain both electrophysiological and behavioral measures which would allow a quantitative assessment of ocular dominance with fused pattern stimuli in normals and amblyopes. Accordingly, alphabetical, numerical, or geometrical stimuli were manipulated so that information to a given eye was either identical, irrelevant, or competing with that to the contralateral eye. The irrelevant or competing information was also presented to noncorresponding retinal areas. G.R.

A73-28360 A comparison of electrophysiological and psychophysical temporal modulation transfer functions of human vision. C. R. Cavonius (München, Universität, Munich, West Germany) and C. E. Sternheim (Maryland, University, College Park, Md.). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 223-236. 40 refs. NSF Grant No. GB-4260; Grant No. NIH-NS-06877.

A73-28361 Local scotopic responses in ERG and VER. G. van Lith and H. E. Henkes (Eye Clinic, Rotterdam, Netherlands). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 237-247. 23 refs.

The results obtained with red or blue adaptive illumination differ mainly in their quantitative characteristics. In the case of a red background the luminance of the blue stimulus has to be lowered by about one log unit in order to produce retinal responses of the same height as obtained with the blue background. The investigation shows that it is possible to obtain local scotopic responses in ERG and VER with a dim background illumination. It is found that a check for the presence of stray light responses stimulation of the blind spot is probably preferable to parafoveal stimulation. G.R.

A73-28362 New method of stimulation for the study of photoreceptors. J. C. Hache, P. Dubois, G. Bertolacci, E. Vetu, and N. Malvache (Lille, Université, Lille, France). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 273-276.

The new light stimulation method of the retina makes it possible to excite the same retinal point even when the eye moves. In the case of very low intensity stimulation, a great number of responses must be averaged in order to characterize the ERG response. Thus, because of the patient's eye movements, it is difficult to get a true focal response from the macular or paramacular regions, particularly if the patients have a central scotoma. A servomechanism which makes the simulation spot follow the eye movements was built in order to overcome these difficulties. G.R.

A73-28363 Luminance-duration relationship in the human ERG. Y. Tsuchida, K. Kawasaki, and J. H. Jacobson (Cornell University, New York, N.Y.). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 277-285. 14 refs. Research supported by the Samuel Bronfman Foundation; Grant No. NIH-EY-00264.

An adapting light effect caused by the stimulus flash was utilized as an indicator in order to overcome certain limitations inherent in the employment of the amplitude of ERG waves as indicators of stimulus effects. The light used as stimulus was obtained from a tungsten lamp. After passing through a series of heat and neutral density filters, the light beam was focused on a magnetic shutter. Square-wave flashes were delivered from the shutter which was driven by an electronic pulse generator. Adapting light was provided by another tungsten lamp. G.R.

A73-28364 The macular and paramacular local electroretingrams of the human retina and their clinical application. M. Nagata and Y. Honda (Tenri Hospital, Tenri, Japan). In: The visual system: Neurophysiology, biophysics, and their clinical applications; Proceedings of the Ninth Symposium, Brighton, England, July 1971. New York, Plenum Press, 1972, p. 309-322. 6 refs.

A modification of the technique originated by Arden and Bankes (1966) is used in the investigation. The study was undertaken to determine the parameters which are suitable for the clinical recording of the response from a focal retinal area. The action spectra of macular responses were examined in several subjects with normal color vision. Some typical examples of the ERGs produced by a series of monochromatic light fluxes of equal quanta with blue background illumination are shown in a graph. G.R.

A73-28476 # A method for calculating the sedimentation characteristics of particles in linear dextrane-density gradients and its application to the separation of red blood cells according to the sedimentation rate (Eine Methode zur Berechnung des Sedimentationsverhaltens von Partikeln in linearen Dextran-Dichtegradienten und ihre Anwendung auf die Trennung roter Blutzellen nach der Sedimentationsgeschwindigkeit). L. Botscharowa (Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 30, no. 1, 1973, p. 1-12. 12 refs. In German.

A73-28501 Effects of ethyl alcohol on pilot performance. C. E. Billings, R. L. Wick, Jr., R. J. Gerke, and R. C. Chase (Ohio State University, Columbus, Ohio). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 379-382. 5 refs. Contract No. DOT-FA68AC-6089-2.

Sixteen instrument-rated pilots flew instrument landing system (ILS) approaches at night in a light airplane while under the influence of 0, 0.04, 0.08 and 0.12% blood concentrations of ethyl alcohol. Tracking data in two axes were recorded continuously from the pilot's cross-pointer instrument; procedural errors were recorded by an experienced safety pilot. Procedural errors increased significantly in frequency and potential seriousness with each increase in blood alcohol level. At the highest level, the subjects lost control of the aircraft 16 times in 30 flights. Tracking error and variability also increased with alcohol levels; the tracking decrements were much more pronounced in less experienced pilots. The data suggest that even very low blood concentrations of alcohol cause significant performance decrements in flights. (Author)

A73-28502 Frequency content of nystagmus. M. Cheng (McGill University, Montreal, Canada), R. P. Gannon (Vancouver General Hospital, Vancouver, Canada), and J. S. Outerbridge (Royal Victoria Hospital, Montreal, Canada). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 383-386. 9 refs.

A simple, practical method is described to estimate the frequency content of the waveform of a nystagmus beat. Theoretical

consideration of an idealized nystagmus waveform shows that the width of its harmonic spectrum for a given fidelity of transmission depends on (1) the ratio of fast-phase and slow-phase speed, and (2) the basic period of the nystagmus beat. Equations and a table of results are presented which provide a rational basis for specifying the bandwidth required for clinical recording of electronystagmograms where the primary interest is in measuring the slow-phase speed. The theoretical conclusions are confirmed by digital computer spectral analysis of clinical records of caloric nystagmus. (Author)

A73-28503 **Effect of lithium on acute oxygen toxicity and associated changes in brain gamma-aminobutyric acid.** M. W. Radomski and W. J. Watson (Defence and Civil Institute of Environmental Medicine, Toronto, Canada). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 387-392. 31 refs.

A73-28504 ***Some effects of cooling and heating areas of* the head and neck on body temperature measurement at the ear.** P. Marcus (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 397-402.

A73-28505 **Flashblindness recovery following exposure to constant energy adaptive flashes.** G. Chisum (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 407-413.

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

A73-28506 * **Some aversive characteristics of centrifugally generated gravity.** F. Altman (Kentucky, University, Lexington, Ky.). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 418-421. 9 refs. Grant No. NGL-18-001-003.

The effective weight of rats was manipulated by centrifugation. Two effective weight levels were obtained. In three escape avoidance conditions a lever press produced a change from a base level of 2.1 g to a response level of 1.1 g. In a punishment condition a response produced a change from a 1.1 g level to a 2.1 g level and in an extinction condition responses had no effect on the 2.1 g effective weight level present. All changes took 30 sec and were maintained for an additional 10 sec before a return to base level was initiated. When responses occurred closer together than the 40 sec, they delayed the return to base level by 40 sec. This 40 sec interval is referred to as response-contingent-time. The response rate and amount of response-contingent-time served as the data. The results confirmed previous data that centrifugation is aversive. The results are interpreted as indicating that the aversiveness is attributable to the increase in effective weight, and that rats can discriminate the different angular velocity-radius of rotation combinations used. (Author)

A73-28507 **Hyperbaric oxygen and alveolar surfactants.** D. L. Beckman (Wayne State University, Detroit, Mich.) and R. T. Houlihan (Michigan State University, East Lansing, Mich.). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 422-424. 12 refs. Contract No. N00014-70-A-0159-0001.

Gross lung damage was previously found in rats exposed to mechanical head injury similar to that which occurs during exposure of rats to oxygen at high pressure (OHP). The pulmonary effects from this CNS injury and OHP exposure were blocked by sympatholytic and antiepinephrine agents. In monkeys CNS injury altered the alveolar surfactants in the absence of any immediate gross lung damage. Surfactant changes were also produced by electrical stimulation of the pulmonary sympathetics in monkeys and cats. The present experiments were performed in order to determine whether OHP also could alter the alveolar surfactants before the occurrence of any gross lung damage. The results indicate that while rats exposed to minimal OHP have both altered surfactants and gross lung damage, that cats had altered surfactants without the attendant gross lung damage; lung weight/body weight ratios were normal in the cat. (Author)

A73-28508 **Retinal damage from repeated subthreshold exposures using a ruby laser photocoagulator.** G. L. M. Gibson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 433-437. 9 refs. USAF-supported research. AF Task 630105.

A73-28509 **Effects of flying and of time changes on menstrual cycle length and on performance in airline stewardesses.** F. S. Preston, S. C. Bateman, R. V. Short, and R. T. Wilkinson (Air Corporations Joint Medical Service, London; Cambridge University, Cambridge; Medical Research Council, Applied Psychology Unit, Cambridge, England). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 438-443. 21 refs.

A73-28510 **Persistence of response in the caloric test.** J. D. Hood (Medical Research Council, Institute of Neurology, London, England). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 444-449. 17 refs.

The nystagmic responses to conventional Fitzgerald-Hallpike caloric tests were recorded with eyes open in total darkness. Upon the cessation of the response the subject was turned to the prone position when it was found that a resurgence of the nystagmus in a reversed direction appeared and persisted for as long as the original response. Repeated rotations of the subject at shorter intervals provide strong evidence of the persistence of the caloric stimulus for periods in excess of 10 minutes. These findings can be interpreted in terms of a directional specificity of the cupular receptors and adaptation of their response to sustained cupular deflections in one or other direction. The practical and theoretical implications are discussed. (Author)

A73-28511 **Incidence and severity of altitude decompression sickness in Navy hospital corpsmen.** D. E. Furry (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 450-452. 7 refs.

A73-28512 **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 Center, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aerospace Medicine,* vol. 44, Apr. 1973, p. 453-455.

Review of research efforts aimed at developing a method of qualitative fleet squadron replacement pilot discrimination according to individual pilot ratings in a small number of critical skills and procedures singled out from among those making up the post-graduate phase of a replacement pilot's aircraft fleet operation training. The described investigation performed upon an F-4 west coast squadron represents an attempt to replicate the findings obtained in a similar study of an F-4 east coast squadron. The replicated findings are encouraging. M.V.E.

A73-28533 **Changes in blood-flow distribution during acute emotional stress in dogs.** E. Caraffa-Braga, L. Granata, and O. Pinotti (Torino, Università, Turin; Bari, Università, Policlinico, Bari, Italy). *Pflügers Archiv,* vol. 339, no. 3, 1973, p. 203-216. 28 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Investigation of the changes in mesenteric, renal and hindlimb circulation caused in dogs by emotional stresses. The heart rates rose markedly in most experiments but tended to recover more rapidly than the blood pressure. The mesenteric and renal vascular re-

sistances were also higher. Vasoconstriction was less constant and generally less pronounced in the kidneys than in splanchnic viscera. V.Z.

A73-28534 Threshold Pco2 as a chemical stimulus for ventilation during acute hypoxia in dogs. T. Natsui (Ruhr-Universität, Bochum, West Germany; Nijmegen, Universiteit, Nijmegen, Netherlands). *Pflügers Archiv*, vol. 339, no. 3, 1973, p. 217-224. 18 refs.

A73-28535 Step-wise changes in thermoregulatory responses to slowly changing thermal stimuli. E. R. Adair (John B. Pierce Foundation, New Haven, Conn.) and R. O. Rawson (Yale University, New Haven, Conn.). *Pflügers Archiv*, vol. 339, no. 3, 1973, p. 241-250. 30 refs. Grants No. NIH-HE-12038; No. PHS-ES-00354.

Description of experiments on two species (sheep and squirrel monkeys) in which one local body temperature was slowly raised, while temperatures in the rest of the body were maintained as closely as possible to a steady state. The appropriate physiological or behavioral thermoregulatory response to the thermal stimulus often changed to new levels in discrete steps. When the stimulus changed at higher rates, the phenomenon was not observed. A step change in the responses of both animal species occurred after a 0.8 to 1.0 C increase in the thermal stimulus. The results obtained indicate that the occurrence of the step response phenomenon depends upon a slow rate of change in one neural input to the central nervous system. Thus the basic step function response could be masked in more typical (normal) stimulus-response relationships, because several neural inputs vary concomitantly. (Author)

A73-28575 Circuit technology of a temperature-measurement transmitter for biotelemetric applications (Schaltungstechnik eines Temperaturmesssenders für biotelemetrische Anwendungen). R. Wenger. *Internationale Elektronische Rundschau*, vol. 27, Mar. 1973, p. 71, 72. In German.

The information obtained by the temperature sensor modulates the output of an HF transmitter. The data regarding the temperature are indicated by changes in the interval length between two successive pulses. Problems in the design of the transmitter were connected with the small volume available for the device for biological reasons. Other difficulties were related to the provision of a suitable battery as power supply for the transmitter. A circuit diagram of the device is presented. G.R.

A73-28581 Multi-information recording and reproduction in the ultrasono-cardio-tomography. Y. Kikuchi, D. Okuyama, C. Kasai, T. Ebina, M. Tanaka, Y. Terasawa, and R. Uchida (Tohoku University, Sendai, Japan). In: International Symposium on Acoustical Holography, 4th, Santa Barbara, Calif., April 10-12, 1972, Proceedings. New York, Plenum Press, 1972, p. 113-126. 10 refs.

Description of a multichannel video and audio magnetic recording and reproduction system designed to reduce data sampling durations required to obtain ultrasonic tomograms of the heart. This diagnostic procedure employs the patient's ECG current as a source of trigger signals to either (1) synchronize the ultrasonic scanner at any desired phase of heart pulsation or (2) synchronize CRT blanking circuitry in a pattern display mode. Clinical examination is usually prolonged by intermittent use of echo information, and the present system minimizes disturbance of the patient by recording complete ultrasonic echo information along with the ECG for subsequent reconstruction. T.M.

A73-28861 # Determination of the information-forecasting indices of biometeorological phenomena (Ob opredelenii informatsionno-prognosticheskikh pokazatelei biometeorologicheskikh iavlenii). K. S. Voichishin. *Otbor i Peredacha Informatsii*, no. 33, 1972, p. 16-23. 12 refs. In Russian.

Consideration of the possibility of using a parameter which characterizes the change in the periodic structure of biometeorological processes as an information-forecasting index of these processes. On the basis of an analysis of the results of biometeorological and physiological studies, it is recommended that the information-forecasting index of the change in the periodic structure of rhythmic biometeorological processes in response to changes in the weather be taken in the form of an estimate of the variance of the zero correlation component. A method of calculating this index is presented. Experimental confirmation of the informativeness of the proposed index is provided by the results of an analysis of recordings of the bioactivity of a species of fish and recordings of atmospheric pressure. A.B.K.

A73-29073 # Late visual cortical region reactions during the convergence of light stimulation and electrocutaneous stimulation (Pozdnie reaktsii zritel'noi oblasti kory golovnogo mozga pri konvergentsii svetovogo i elektrokozhnogo vozbuzhdeniia). A. I. Shumilina (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) and Zh. B. Burza (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 75, Feb. 1973, p. 3-6. In Russian.

A73-29074 # Changes in cerebral circulation under the influence of vasodilating agents (Izmeneniia mozgovogo krovoobrashcheniia pod vliianiem sosudorasshiriaiushchikh veshchestv). R. S. Mirzoian and Iu. M. Varentsov (Akademiia Meditsinskikh Nauk SSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 75, Feb. 1973, p. 46-48. 11 refs. In Russian.

Cerebral volumetric circulation rates measured in dogs with the aid of radioactive Xe-133 show that papaverin and intensain produce a substantial rise in cerebral circulation. Separate bilateral perfusion of internal maxillary and vertebral arteries show that the observed changes in intracranial circulation are caused by the direct action of these agents on the cerebral vessels. T.M.

A73-29075 # Method of PaCO2 determination in men with functional disorders of external respiration (Metodika opredeleniia PaCO2 u liudei s narusheniiami funktsii vneshnego dykhaniia). B. E. Votchal. *Biulleten' Eksperimental'noi Biologii i Meditsiny*, vol. 75, Feb. 1973, p. 121, 122. 10 refs. In Russian.

A73-29123 Visual pattern matching - An investigation of some effects of decision task, auditory codability, and spatial correspondence. R. S. Nickerson (Bolt Beranek and Newman, Inc., Cambridge, Mass.) and R. W. Pew (Michigan, University, Ann Arbor, Mich.). *Journal of Experimental Psychology*, vol. 98, Apr. 1973, p. 36-43. 10 refs. Contract No. F44620-69-C-0115.

A73-29124 Properties of human visual orientation detectors - A new approach using patterned afterimages. J. Atkinson (Cambridge University, Cambridge, England). *Journal of Experimental Psychology*, vol. 98, Apr. 1973, p. 55-63. 15 refs.

The orientation, size, shape, and spacing of two small bars are studied with respect to their effects on the synchronous visibility of their afterimages. The effects found are similar for monocular and dichoptic viewing conditions and suggest the involvement of central contour detectors in the visual cortex. M.V.E.

A73-29125 Eye movements during visual search and memory search. J. D. Gould (IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y.). *Journal of Experimental Psychology*, vol. 98, Apr. 1973, p. 184-195. 28 refs. Research supported by IBM Corp.; Grant No. NIH-MH-07722.

Nine subjects first fixated a set of 1, 2, or 3 standard (memory) alphabetic characters and then scanned 12 comparison characters for one that matched a standard. Fixation durations on comparison characters increased when the subjects had to search for more than one standard. Memory search rate was about the same on each successively fixated comparison character. M.V.E.

A73-29174 **Motor functions and control of sensorial messages of somatic origin (Fonctions motrices et contrôle des messages sensoriels d'origine somatique).** J.-M. Coquery (CNRS, Institut de Neurophysiologie et Psychophysiologie, Marseille, France). *Journal de Physiologie,* vol. 64, Apr. 1973, p. 533-560. 127 refs. In French.

Following a brief review of the paths of somatic sensitivity, the alteration which the sensorial messages undergo at different stages of these paths during motions, or during the activation of various motor structures, are examined. The motor influences on the evoked cortical potentials of somatic origin, the modulation of somatic afferences at different stages of the lemniscal and extralemniscal paths are studied. It appears to be established that at the first stages of their centripetal paths, the afferences of somatic origin, and especially their cutaneous afferences, undergo influences on the part of motor structure which are principally depressive. F.R.L.

A73-29175 **Intranuclear organization of the center median nucleus of the thalamus.** M. Bénita and H. Condé (Paris XI, Université, Laboratoire de Physiologie Générale, Orsay, Essonne, France). *Journal de Physiologie,* vol. 64, Apr. 1973, p. 561-582. 33 refs.

The thalamic centrum medianum (CM) was examined by electrophysiological methods, studying intranuclear connections by means of interactions between the different afferents of single cells. The cells were excited or inhibited by stimulation of regions which, on anatomical grounds, might be expected to project monosynaptically to the cells of the CM. The sources tested were the reticular formation, the tectum, and the cerebellum. Using extracellular recordings of single units or evoked potentials, the excitatory or inhibitory convergent pathways were established on the cells of the CM. The tests were performed on cats anesthetized with chloralose. A study of the spatial arrangement of the cells as a function of their electrophysiological properties made it possible to propose a hypothesis pertaining to the outline and intranuclear organization of the CM. F.R.L.

A73-29185 **Detection of informational constraints related to multi-variate visual displays.** I. Pollack (Michigan, University, Ann Arbor, Mich.). *Acta Psychologica,* vol. 37, Apr. 1973, p. 107-115. NSF-supported research.

Sequences of dots and no-dots obtained by translation of computer-generated binary-coded sequences were displayed on a fast-display surface with a phosphor in tests for determining the discriminable limits of visual displays with binary-coded information. The observer was instructed to identify the one odd matrix present among the four matrices shown on display. The results have suggested that the limiting factor for the detection of multi-variate constraints may have been the mean constraint level averaged over all display elements. V.Z.

A73-29211 **Overview of the biological effects of electromagnetic radiation.** P. E. Tyler (U.S. Navy, Naval Bureau of Medicine and Surgery, Washington, D.C.). *IEEE Transactions on Aerospace and Electronic Systems,* vol. AES-9, Mar. 1973, p. 225-228. 21 refs.

A brief review is given of some of the problems concerning the interactions of electromagnetic radiation with biological systems. It is emphasized that we cannot continue to expand the use and power of the electromagnetic spectrum without adequate consideration of its possible biological effects. New research efforts must be started in this area, utilizing a strong and well-coordinated interdisciplinary approach. (Author)

A73-29278 # **Investigations regarding auditory depth perception and the problem of in-head localization of acoustic events (Untersuchungen zum Entfernungshören und zum Problem der Im-Kopf-Lokalisiertheit von Hörereignissen).** P. Laws. Aachen, Rheinisch-Westfälische Technische Hochschule, Fakultät für Elektrotechnik, Dr.-Ing. Dissertation, 1972. 187 p. 154 refs. In German.

The studies reported provide information regarding the relation between the perceived distance of an auditory event and specific aural signal characteristics. The transmission characteristics of customary auditory reproduction systems are investigated, taking into account a loudspeaker in front of the subject and earphones. The data indicate that, in the case of a broadband electric signal at the input of the auditory reproduction system, the sonic pressure signal appearing at the ear drums will show attenuation and transit time distortions which are characteristic for the reproduction system employed. Auditory events reproduced by means of earphones are relatively often perceived as originating close behind the head or within the head. G.R.

A73-29283 # **Investigation concerning a consideration of the human circadian rhythm by means of a variable working time (Untersuchung zur Berücksichtigung der menschlichen Tagesrhythmik durch eine variable Arbeitszeitregelung).** W. Hildebrandt. Aachen, Rheinisch-Westfälische Technische Hochschule, Fakultät für Maschinenwesen, Dr.-Ing. Dissertation, 1972. 182 p. 141 refs. In German.

Studies of the human circadian rhythm are considered together with approaches to adapt working schedules to this rhythm. The adaptations can include operational adjustments within the framework of a fixed working time and an adoption of a variable working-time schedule. The origin of variable working-time arrangements are discussed along with details concerning working-time schedules, advantages and drawbacks of a variable working time, the present use of a variable working time in the economy, and problems connected with the introduction of a variable working time. The employment of the Pauli test in a modified form provides information in investigations regarding a quantification of the circadian rhythm. Results obtained regarding fixed and variable working-time schedules are compared, taking into account data obtained in a statistical analysis. G.R.

A73-29409 # **Procedure for preparing an oxygen-nitrogen gas mixture for respiration in a pressure chamber (Metodika prigotovleniia kislorodno-azotnoi gazovoi smesi dlia dykhaniia v barokamere).** I. V. Maksimov, V. V. Ritter, and I. N. Cherniakov. *Voenno-Meditsinskii Zhurnal,* Feb. 1973, p. 65-68. In Russian.

Description of a system for adding oxygen or nitrogen to natural air in order to obtain desirable oxygen-nitrogen mixtures for pressure chamber respiration tests. Formulas are given and diagrams are plotted to control oxygen or nitrogen admission in creating prescribed hyperoxic or hypoxic conditions in a pressure chamber by using this technique. V.Z.

A73-29410 # **Prophylaxis and treatment of the motion sickness syndrome (Profilaktika i lechenie simptomokompleksa ukachivaniia).** I. A. Esipov. *Voenno-Meditsinskii Zhurnal,* Feb. 1973, p. 69-71. In Russian.

Two preparations containing various proportions of spasmolytin, thiamine bromide, phenamine, scopolamine, and some other drugs are proposed for prophylaxis and treatment of motion sickness symptoms. Tests on 60 subjects under Coriolis accelerations proved the effectiveness of the preparations. V.Z.

A73-29414 * # **On the physical basis of a theory of human thermoregulation.** A. S. Iberall and A. M. Schindler (General Technical Services, Inc., Upper Darby, Pa.). *(American Society of Mechanical Engineers, Paper 73-Aut-J, 1973.) ASME, Transactions, Series G - Journal of Dynamic Systems, Measurement, and Control,* vol. 95, Mar. 1973, p. 68-75. 52 refs. Army-supported research; Contract No. NASw-1815.

Theoretical study of the physical factors which are responsible for thermoregulation in nude resting humans in a physical steady state. The behavior of oxidative metabolism, evaporative and convective thermal fluxes, fluid heat transfer, internal and surface

temperatures, and evaporative phase transitions is studied by physiological/physical modeling techniques. The modeling is based on the theories that the body has a vital core with autothermoregulation, that the vital core contracts longitudinally, that the temperature of peripheral regions and extremities decreases towards the ambient, and that a significant portion of the evaporative heat may be lost underneath the skin. A theoretical basis is derived for a consistent modeling of steady-state thermoregulation on the basis of these theories. V.Z.

A73-29418 # Ergatic modeling (Ob ergaticheskom modelirovanii). V. L. Baranov (Akademiia Nauk Ukrainskoi SSR, Institut Kibernetiki, Kiev, Ukrainian SSR) and G. L. Baranov (Akademiia Nauk Ukrainskoi SSR, Institut Elektrodinamiki, Kiev, Ukrainian SSR). *Problemy Tekhnicheskoi Elektrodinamiki*, no. 36, 1972, p. 71-81. 7 refs. In Russian.

Ergatic modeling is defined as a dynamic goal-oriented process of studying physical phenomena, based on heuritic autonomous organization of a system comprised by a human operator and a regulated model. The solution of scientific and engineering problems as a result of dynamic interaction between the human and the models is accomplished by bringing information-structured dynamic models (arising in the human mind as a consequence of intellectual and physical model experiments) into correspondence with objective reality. Ergatic modeling stipulates the presence of active explicit dynamic interaction between the human and the models. Formalized descriptions of ergatic modeling procedures and requirements are provided, and relevant applications are outlined. T.M.

A73-29572 Effect of free fatty acid on myocardial function during hypoxia. A. S. Most, P. A. Szydlik, and K. R. Sorem (Rhode Island Hospital; Brown University, Providence, R.I.). *Cardiology*, vol. 57, no. 6, 1972, p. 322-332. 23 refs.

The influence of exogenous free fatty acid (FFA) on hypoxic myocardial function was studied in isolated, isometric rat papillary muscles. In 95% O2, no difference in developed tension was noted between muscles in glucose (5 mM) or FFA (oleic acid 1,800 micromoles) buffer. During hypoxia (20% O2), muscles in FFA or no substrate buffer developed less tension and in subsequent reoxygenation, recovered less function than muscles in glucose buffer (with or without added FFA). Prior stabilization in glucose eliminated these differences for muscles supplied with FFA or no substrate during hypoxia, although recovered function for muscles with no substrate remained deficient. Muscle thickness correlated inversely with control developed tension, but did not correlate with per cent depression during hypoxia. This study failed to demonstrate a depressant effect of exogenous FFA on the mechanical performance of rat myocardium during hypoxia. (Author)

A73-29649 * The evolution of lignin - Experiments and observations. S. M. Siegel, P. Carrol, I. Umeno, and C. Corn (Hawaii, University, Honolulu, Hawaii). In: Recent advances in phytochemistry. Volume 4. New York, Appleton-Century-Crofts, 1972, p. 223-238. 20 refs. Grant No. NGR-12-001-053.

A73-29723 * Late Precambrian microfossils - A new stromatolitic biota from Boorthanna, South Australia. J. W. Schopf and T. R. Fairchild (California, University, Los Angeles, Calif.). *Nature*, vol. 242, Apr. 20, 1973, p. 537, 538. 10 refs. NSF-NASA-supported research.

A73-29724 * Responses of indigenous microorganisms to soil incubation as viewed by transmission electron microscopy of cell thin sections. H. C. Bae and L. E. Casida, Jr. (Pennsylvania State University, University Park, Pa.). *Journal of Bacteriology*, vol. 113, Mar. 1973, p. 1462-1473. 13 refs. NSF Grant No. GB-14487; Grant No. NGR-39-009-180.

Indigenous soil microorganisms were cultivated in their soil habitat with 50% moisture capacity at 30 C for two weeks. Changes in microorganism cells were studied by electron microscopy during incubation, with particular attention to the dormant cell growth and to the ability of cystlike cells to germinate and reencyst. The responses of various cell species to incubation conditions are described and illustrated by photomicrographs. V.Z.

A73-29751 * Human hematologic responses to 4 hr of isobaric hyperoxic exposure /100% oxygen at 760 mm Hg/. E. C. Larkin, W. T. Williams, and F. Ulvedal (Texas, University, Galveston; USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 34, Apr. 1973, p. 417-421. 24 refs. NASA-supported research. NASA Order T-74401-G.

A73-29752 Posthyperventilation breathing - Different effects of active and passive hyperventilation. F. L. Eldridge (Stanford University; U.S. Veterans Administration Hospital, Stanford, Calif.). *Journal of Applied Physiology*, vol. 34, Apr. 1973, p. 422-430. 27 refs. Research supported by the U.S. Veterans Administration Hospital; Grant No. PHS-NS-09390.

Posthyperventilation breathing patterns after passive hyperventilation in anesthetized cats are compared to those after active hyperventilation produced by carotid sinus nerve stimulation of calf muscle squeezing. The results indicate that a process connected with active breathing supplies sufficient neural facilitation to prevent the apnea associated with a simple decrease in chemical stimulation. M.V.E.

A73-29753 Effects of acute alterations of maximum oxygen consumption on endurance capacity of men. M. A. Gleser and J. A. Vogel (U.S. Army, Military Stress Laboratory, Natick, Mass.). *Journal of Applied Physiology*, vol. 34, Apr. 1973, p. 443-447. 34 refs.

Investigation of endurance time, i.e. the maximum length of time an individual could work at a given intensity, under conditions of altered inspired O2. It is found that the endurance time remains a function of relative load. The attempt is made to explain this on the basis of the regulation of blood flow and O2 delivery to the working muscles. M.V.E.

A73-29754 # Effect of the Valsalva maneuver on tolerance to +Gz acceleration. S. J. Shubrooks, Jr. and S. D. Leverett, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Journal of Applied Physiology*, vol. 34, Apr. 1973, p. 460-466. 9 refs.

Systemic arterial pressure (Psa) response to the Valsalva maneuver and its effects on acceleration tolerance were studied in 10 healthy men during exposure to positive (+Gz) radial acceleration. For rapid onset (1 G/sec) exposures of both 15 sec and 45 sec duration, large increases in +Gz tolerance were found to occur during performance of a Valsalva maneuver accompanied by vigorous voluntary muscular tensing, either with or without use of an anti-G suit. This effect was seen with single prolonged maneuvers as well as with repeated maneuvers. Systolic, diastolic, and pulse pressures were in all cases maintained at levels far greater than those which would have occurred during acceleration without the Valsalva. (Author)

A73-29755 Oscillations in oxygen consumption of man at rest. D. Bailey, D. Harry, R. E. Johnson, and I. Kupprat (Illinois, University, Urbana, Ill.). *Journal of Applied Physiology*, vol. 34, Apr. 1973, p. 467-470. 14 refs.

Review of the results of experiments designed to test the hypothesis that there is an intrinsic rhythm in the variation of human oxygen consumption at rest. The results obtained suggest that the oxygen consumption of men and women resting comfortably in an postabsorptive state is not constant, but subject to cyclic variations superimposed on a gradually rising baseline. M.V.E.

A73-29850 # Interaction of haemoglobin with ions - Binding of inorganic phosphate to human oxyhaemoglobin. G.-R. Jaenig, G.

Gerber, and W. Jung (Deutsche Akademie der Wissenschaften, Zentralinstitut für Molekularbiologie; Berlin, Humboldt-Universität, Berlin, East Germany). *Acta Biologica et Medica Germanica,* vol. 30, no. 2, 1973, p. 171-175. 17 refs.

A73-29867 # **Radiation doses during a prolonged orbital space flight about the earth (Dozy radiatsii pri dlitel'nom orbital'nom polete v okolozemnom prostranstve).** S. N. Vernov, I. A. Savenko, O. I. Savun, I. N. Senchuro, and P. I. Shavrin. *Kosmicheskie Issledovaniia,* vol. 11, Mar.-Apr. 1973, p. 321-328. 27 refs. In Russian.

Radiation penetrating into the interior of long-lived earth orbiters is discussed on the basis of data from a large number of Soviet earth orbiters collected since the early 1960's. It is found that the radiation safety requirements are met adequate with radiation shields of 3 g/sq cm for an orbiting time of about one year when the apogee is not above 300 km and the angle of inclination is not above 65 deg. The same conditions are generally valid up to an apogee of 400 km in the absence of artificial charged particle injection (from a high altitude nuclear explosion), while at altitudes of 500 km, the principal contributors to the absorbed radiation doses are the radiation belts. V.Z.

A73-29875 # **The centrifugal control of retinal function.** P. van Hasselt (Laboratory of General Neurophysiology, Nijmegen, Netherlands). *Ophthalmic Research,* vol. 4, no. 5, 1972-1973, p. 298-320. 93 refs.

The literature concerning the centrifugal control of retinal function and the presence of centrifugal fibers in the optic nerve has been extensively reviewed. An attempt has been made to discern possible sources of artefacts and misinterpretations which are responsible for the controversions in the literature. (Author)

A73-29989 Behavioral and electrophysiological correlates during flash-frequency discrimination learning in monkeys. H. Saito, M. Yamamoto, E. Iwai, and H. Nakahama (Tohoku University, Sendai; Fukushima Medical College, Fukushima, Japan). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 449-460. 41 refs.

A73-29990 Distribution of the human average movement potential. L. K. Gerbrandt, W. R. Goff, and D. B. Smith (U.S. Veterans Administration Hospital, West Haven; Yale University, New Haven, Conn.). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 461-474. 23 refs. U.S. Department of Health, Education, and Welfare Contract No. PH-43-66-59; NSF Grants No. GB-3919; No. GB-5782; Grant No. PHS-MH-05286.

The average movement potential (AMP) topography considered in the discussion is based on the data of five normal male subjects ranging in age from 24 to 32 years. Three of the subjects were left-handed, two were right-handed. The subject was instructed to fixate a spot at eye level and to avoid movements other than a specified voluntary movement for a period from two to three seconds before and after the onset of index finger dorsiflexion. The wave form and measurement of AMP components are discussed, together with the relationship of forearm EMG to an observed abrupt negative shift and the asymmetry and location of maximum amplitude. The evidence that any AMP components are generated exclusively by motor neurons is found to be unconvincing. G.R.

A73-29991 Effect of stimulus uncertainty on the pupillary dilation response and the vertex evoked potential. D. Friedman, S. Sutton, J. L. Fleiss (New York State, Dept. of Mental Hygiene, New York, N.Y.), and G. Hakerem (New York State, Dept. of Mental Hygiene, New York; Queens College, Flushing, N.Y.). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 475-484. 17 refs. Research supported by the General Motors Co.; Grant No. PHS-MH-14580.

A73-29992 Conditioned alpha blocking re-examined with the measurement of individual wave amplitudes. R. T. Putney (Missouri, University, Columbia, Mo.). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 485-493. 24 refs.

In the experiment discussed the quantification problem was met by measuring the peak amplitudes of filtered alpha waves in order to explore differences in the pattern of blocking following stimulation during pseudoconditioning, conditioning, and extinction. The results of the habituation-pseudoconditioning procedure produced an obvious difference in the patterns of blocking when compared to paired presentation in conditioning. G.R.

A73-29993 On the functional significance of subcortical single unit activity during sleep. P. L. Parmeggiani and C. Franzini (Bologna, Università, Bologna, Italy). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 495-508. 41 refs. Research supported by the Consiglio Nazionale delle Ricerche.

Experiments were performed on 18 unanaesthetized, unrestrained adult rats carrying chronically implanted electrodes and transducers. The unit activity of subcortical structures has been studied at 22 C and under thermal loads eliciting panting or shivering. The results show that it is possible to find statistically significant changes in unit activity which are primarily related to sleep, irrespective of environmental temperature. This conclusion, however, applies only to changes occurring with fast wave sleep, which in terms of unit discharge is characterized by a stereotyped resetting of activity. G.R.

A73-29994 A vecto-oculographic approach to fast sleep eye movements in man. P. Salzarulo, M.-G. Pêcheux, and G. C. Lairy (Hôpital Henri Rousselle, Paris, France). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 539-542. 6 refs.

All night sleep was recorded for two consecutive nights in two young normal adults. Eight fast sleep phases, representing 180 min of fast sleep, have been analyzed. The vecto-oculograms of an entire phase of fast sleep indicated activity in all four quadrants of the spatial field, within a radius of approximately 40 deg. Eye movements occurring during five consecutive minutes of fast sleep, taken at random, showed the same distribution over the four quadrants. G.R.

A73-29995 Simultaneous recording of acceleration and brain waves. F. Buchthal, K. Dahl, and W. Trojaborg (Rigshospitalet, Copenhagen, Denmark). *Electroencephalography and Clinical Neurophysiology,* vol. 34, May 1973, p. 550-552. Research supported by the Danish Medical Research Council.

When electroencephalograms are recorded at high gain from unconscious patients phenomena arising from mechanical disturbances are often difficult to identify. Studies were, therefore, conducted involving the recording of mechanical vibrations together with the EEG. A transducer responding only to mechanical changes was used in the investigation. Acceleration was recorded directly and after single and double integration in order to evaluate acceleration effects in relation to effects produced by rate of movement and displacement by the movement. G.R.

A73-30022 # **Features of the influence of hypergravitation on the motor activity of the chicken embryo amnion developing under normal conditions and under conditions of constant rotation (Osobennosti vliianiia gipergravitatsii na dvigatel'nuiu deiatel'nost' amniona kurinogo embriona, razvivaiushchegosia v obychnykh usloviiakh i v usloviiakh postoiannogo vrashcheniia).** A. S. Dmitriev and T. F. Mikhniuk (Akademiia Nauk Belorusskoi SSR, Institut Fiziologii, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady,* vol. 16, Oct. 1972, p. 962-965. 7 refs. In Russian.

A73-30051 Relationship between ventricular premature contractions on routine electrocardiography and subsequent sudden death from coronary heart disease. F. D. Fisher and H. A. Tyroler (North Carolina, University, Chapel Hill, N.C.). *Circulation,* vol. 47, Apr. 1973, p. 712-719. 15 refs.

A73-30052 **Immediate and remote prognostic significance of fascicular block during acute myocardial infarction.** R. A. Waugh, G. S. Wagner, T. L. Haney, R. A. Rosati, and J. J. Morris, Jr. (Duke University, Durham, N.C.). *Circulation,* vol. 47, Apr. 1973, p. 765-775. 28 refs. Grants No. NIH-HL-4807; No. NIH-PH-43-NHLI-67-1440.

The use of a 12-lead electrocardiogram is described that was obtained during the acute phase of myocardial infarction to identify risk groups for sudden death in follow-up after myocardial infarction. The use of the electrocardiogram as a predictor of type-II atrioventricular block during acute infarction is also reported, along with the intimate relation of acute type-II block to sudden death in follow-up. M.V.E.

A73-30053 **Newer aspects of echocardiography.** H. Feigenbaum (Indiana University; Marion County General Hospital, Indianapolis, Ind.). *Circulation,* vol. 47, Apr. 1973, p. 833-842. 13 refs. Research supported by the Herman C. Krannert Fund and Indiana Heart Association; Grants No. PHS-HE-09815-08; No. PHS-HE-6308; No. PHS-HTS-5363; No. PHS-HE-5749.

Review of the status, potentialities, and requirements of echocardiography in its various applications to the diagnosis of congenital heart disease. Special attention is given to the feasibility of using echocardiography to evaluate left ventricular performance in a noninvasive manner. M.V.E.

A73-30061 **The effect of iontophoretically applied acetylcholine upon the cat's retinal ganglion cells.** M. Straschill and J. Perwein (Max-Planck-Institut für Psychiatrie, Munich, West Germany). *Pflügers Archiv,* vol. 339, no. 4, 1973, p. 289-298. 18 refs. Research supported by the Deutsche Forschungsgemeinschaft.

A73-30063 **A rapid method for frontal plane axis determination in scalar electrocardiograms.** S. Laiken, N. Laiken, R. A. O'Rourke (California, University, La Jolla, Calif.), and J. S. Karliner (California, University, La Jolla; San Diego County, University Hospital, San Diego, Calif.). *American Heart Journal,* vol. 85, May 1973, p. 620-623. 5 refs.

A73-30065 **Prevention of atherosclerosis.** S. Blumenthal (Miami, University, Miami, Fla.). *American Journal of Cardiology,* vol. 31, May 1973, p. 591-594. 26 refs. Grant No. PHS-1-P17-HE-1414-01.

Atherosclerosis appears to begin in chilhood. The clinical application of preventive measures is discussed, giving attention to risk factors, the recognition of hyperlipidemia, and the identification of hypertension. There is an established relation between cigarette smoking and the development of coronary atherosclerosis. Persons who have stopped smoking have a decreased mortality from coronary artery disease. The identification of 'high risk' children is considered. G.R.

A73-30066 * **Influence of flow and pressure on wave propagation in the canine aorta.** M. B. Histand and M. Anliker (Colorado State University, Fort Collins, Colo.; Zürich, Universität; Eidgenössische Technische Hochschule, Zurich, Switzerland). *Circulation Research,* vol. 32, Apr. 1973, p. 524-529. 9 refs. Grant No. NGL-05-020-223.

Data on wave speed acquired from 20 anesthetized dogs showed that the thoracic aorta was essentially nondispersive for small artificially generated pressure waves traveling in the downstream or the upstream direction and having frequencies between 40 and 120 Hz. The amplitude of these waves decayed exponentially with the distance traveled. Theoretical studies are cited which have shown that changes in wave speed due to variations in pressure and flow produce marked nonlinear effects in hemodynamics. F.R.L.

A73-30130 **Carbonaceous meteorites - Possible sites of extraterrestrial life.** D. P. Mellor. In: Chemistry in space research. New York, American Elsevier Publishing Co., Inc., 1972, p. 83-103. 44 refs.

Carbonaceous meteorites are a subclass of aerolites, although they are in some respects unlike any other kind of meteorite. These remarkable bodies are usually black or dark gray in appearance. They are among the rarest of recorded meteorites. Details regarding the falls of twenty-five carbonaceous meteorites are summarized in a table. Substances discovered in carbonaceous meteorites include porphyrins, optically active substances, and isoprenoid hydrocarbons. Studies of the insoluble amorphous residue are also discussed together with alternative theories regarding the origin of the compounds detected. G.R.

A73-30137 * **Spacecraft sterilization.** S. H. Kalfayan (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). In: Chemistry in space research. New York, American Elsevier Publishing Co., Inc., 1972, p. 599-653. 23 refs.

Spacecraft sterilization is a vital factor in projects for the successful biological exploration of other planets. The microorganisms of major concern are the fungi and bacteria. Sterilization procedures are oriented toward the destruction of bacterial spores. Gaseous sterilants are examined, giving attention to formaldehyde, beta-propiolactone, ethylene oxide, and the chemistry of the bactericidal action of sterilants. Radiation has been seriously considered as another method for spacecraft sterilization. Dry heat sterilization is discussed together with the effects of ethylene oxide decontamination and dry heat sterilization on materials. G.R.

A73-30276 **Foundations of modern auditory theory. Volume 2.** Edited by J. V. Tobias (FAA, Oklahoma City, Okla.). New York, Academic Press, Inc., 1972. 508 p. $24.

Information on the function, structure, and response of the auditory system is provided in sections dealing with the perception of speech, signal detection, psychoacoustics, the anatomy and operation of the middle ear, bone conduction, neuroanatomy of the auditory system, and binaural phenomena. The historical development of theoretical models for various auditory processes is traced to the present concepts resulting from improved research techniques and equipment. Results of experiments are quoted in support of extensive descriptions of the interconnected functions of the auditory system. T.M.

A73-30277 **Speech perception.** K. N. Stevens (MIT, Cambridge, Mass.) and A. S. House (Institute for Defense Analyses, Princeton, N.J.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 3-62. 134 refs. USAF-NIH-supported research.

The acoustic properties of speech signals and the linguistic categories and rules available to users of language are discussed as an initial topic in this study of the speech perception process. Perception at the level of phonetic segments is then treated, and the role of syntactic, lexical, and semantic factors in speech perception is explored. The published literature on these topics is reviewed along with models of the speech perception process which have been proposed to account for the experimental data. A proposed revised model is based on the premise that there exist close ties between the process of speech production and speech perception. T.M.

A73-30278 **The theory of signal detectability.** W. P. Tanner, Jr. (Michigan, University, Ann Arbor, Mich.) and R. D. Sorkin (Purdue University, Lafayette, Ind.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 65-98. 20 refs. Contract No. AF 49(638)-1233.

A theory of signal detectability in application to psycho-

acoustics is developed as a mathematical model of the mapping of a set of inputs (arising either from noise alone or from signal plus noise) into a two-point decision space comprising a negation or affirmation of the presence of the signal at the input. A descriptive model of the human observer is further explained as a mathematical statement describing the mapping from input to output as it is observed in human performance. Relevant psychophysical experiments are outlined to illustrate the construction of a descriptive model. The role of memory in the human auditory system is considered, and experiments with learning are reviewed. T.M.

A73-30279 **The middle ear.** A. R. Moller (Kungl. Karolinska Institutet, Stockholm, Sweden). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 135-194. 104 refs.

The normal functional characteristics of the middle ear and of the middle-ear reflex are discussed on the basis of available experimental data obtained with human subjects, human cadaver ears, and anesthetized animals. Topics covered include the behavior of the middle ear as an impedance transformer, the vibration mode of the ossicles, the acoustic impedance of the ear and of various ear structures, the frequency-domain transfer function, the impulse response, the influence of sound diffraction by structures before the eardrum, the effects of the ear canal, the role of air pressure, the influence of middle-ear cavities, the anatomy of the arc through which the middle ear reflexes, the nature of the reflex, sensitivity of the middle-ear reflex, and movement of the eardrum. T.M.

A73-30280 **Neuroanatomy of the auditory system.** R. R. Gacek (Massachusetts Eye and Ear Infirmary, Boston, Mass.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 241-262. 33 refs.

Structural and functional aspects of the ascending and descending auditory neural pathways are described on the basis of discoveries obtained with new neuroanatomical techniques, the retrograde cell-change method, electron microscopy, and histochemistry. Attention is given to the cochlea and the cochlear nerve, the cochlear nucleus, superior olivary complex, inferior colliculus, nuclei of the lateral lemniscus, medial geniculate body, auditory cortex, higher descending neurons, the olivocochlear bundle, innervation of the organ of Corti, nerve endings, and outer hair cells. T.M.

A73-30281 **Processing of auditory information by medial superior-olivary neurons.** G. Moushegian, A. Rupert (Callier Hearing and Speech Center, Dallas, Tex.), and M. A. Whitcomb (National Academy of Sciences - National Research Council, Washington, D.C.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, 1972, p. 265-299. 32 refs. U.S. Office of the Surgeon General Contract No. MRD-5-65; Contract No. NIH-NB-03950-03.

A73-30282 **Auditory localization.** A. W. Mills (Tufts University, Medford, Mass.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 303-348. 62 refs.

Presently available information about the manner in which the orientation, position, and distance of sound sources are determined is reviewed in a conceptual description of the auditory localization system. The two ears sample the acoustic field on either side of the head, picking up a pair of waveforms that differ significantly in time at low frequencies, in amplitude at higher frequencies, and in the angle of incidence to the outer ear at very high frequencies. Movement of the head provides two series of samples of the acoustic field; these series define a set of more-or-less unvarying relations that specify uniquely the direction of a stationary source. The angles of incidence upon each outer ear also provide information about the direction of a source, and perhaps also about its distance from the listener. T.M.

A73-30283 **Binaural signal detection - Vector theory.** L. A. Jeffress (Texas, University, Austin, Tex.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 351-368. 37 refs.

A side effect of the binaural ability to judge the direction of a sound source is the ability to pick sounds from one direction as more worthy of attention than sounds from another direction. A model of the manner by which such acoustic discrimination is performed in the human auditory system is developed on the basis of a vector description of the correlation process involved. Participating central and peripheral neural mechanisms are described along with relevant binaural stimulus conditions. T.M.

A73-30284 * **Binaural signal detection - Equalization and cancellation theory.** N. I. Durlach (MIT, Cambridge, Mass.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 371-462. 95 refs. NSF Grant No. GP-2495; Grants No. NIH-MH-04737-5; No. NsG-496; Contract No. DA36-039-AMC-03200(E).

The improvement in masked-signal detection afforded by two ears (i.e., binaural unmasking) is explained on the basis of a descriptive model of the processing of binaural stimuli by a system consisting of two bandpass filters, an equalization and cancellation mechanism, and a decision device. The main ideas of the model are initially explained, and a general equation is derived for the purpose of making quantitative predictions. Comparisons are then made between various special cases of this equation and experimental data. Failures of the preliminary model in predicting the data are considered, and possible revisions are discussed. T.M.

A73-30285 **Curious binaural phenomena.** J. V. Tobias (FAA, Oklahoma City, Okla.). In: Foundations of modern auditory theory. Volume 2. New York, Academic Press, Inc., 1972, p. 465-486. 99 refs.

Research on the ability of the human ear to analyze signals that do not exist in the normal acoustic environment can provide data defining otherwise undisclosed physiological systems. The limits of perception of unusual binaural signals have been the subject of recent studies, and the present work surveys current concepts of minimum and maximum interaural differences, the fusion of dissimilar signals, binaural summation, binaural beats, short-term auditory memory, binaural learning processes, stereophony, and correlation. T.M.

A73-30289 # **Periodic conditions in artificial-muscle autopulsators (Periodichni rezhimi v avtopul'satorakh na shtuchnikh m'iazakh).** R. V. Beliakov. *Avtomatika,* vol. 17, Sept.-Oct. 1972, p. 66-75. 7 refs. In Ukrainian.

Consideration of the problem of finding precise (by means of alignment) and approximate (by means of harmonic linearization) auto-oscillation amplitude and frequency values for artificial-muscle autopulsators. It is shown that nonlinearity, delay, and self-control characteristics determine the occurrence of periodic oscillation behavior in these devices. M.V.E.

A73-30351 **Predicting coronary heart disease.** A. Keys (Minnesota, University, Minneapolis, Minn.). In: Preventive cardiology; Proceedings of the International Symposium, Skovde, Sweden, August 21, 1971. Symposium sponsored by the Statens Medicinska Forskningsrad and National Association against Heart and Lung Disease. Stockholm, Almqvist and Wiksell Forlag AB; New York, Halsted Press, 1972, p. 21-32. 5 refs. Grant No. NIH-04697.

The study considers results from six countries on over 11,000 men who were judged to be free of coronary heart disease (CHD) at the entry examination, and deals with some new multivariate analyses. The multiple logistic equation has proved to be extremely useful in the multivariate analyses of the data from the International Cooperative Study on Cardiovascular Epidemiology. Mathematically the equation has advantages and the method of Truett and Cornfield (1967) provides a convenient method of solution without great

demand for computer power and time. There is not considered to be any theoretical reason why other models might not do as well or even better in describing the multivariate situation. F.R.L.

A73-30352 **Risk factors for developing myocardial infarction and other diseases - The 'Men born in 1913' study.** G. Tibblin (Sahlgren's Hospital, Goteborg, Sweden). In: Preventive cardiology; Proceedings of the International Symposium, Skovde, Sweden, August 21, 1971. Symposium sponsored by the Statens Medicinska Forskningsrad and National Association against Heart and Lung Disease. Stockholm, Almqvist and Wiksell Forlag AB; New York, Halsted Press, 1972, p. 33-42. 6 refs.

A way of improving knowledge about the etiology and natural history of myocardial infarction is to perform a prospective population study. This approach allows identification of risk factors which can be used to construct hypotheses and may give guidelines for preventive interventions studies which, if positive, can support different hypotheses constructed. The report is part of a long term study attempting to investigate the development of myocardial infarction in a series selected so as to avoid the influence of the age factor. All the participants are men born in 1913 and living in Goteborg, Sweden. Major attention is given to the questions of whether the usual 'risk factors' are specific for the development of myocardial infarction, or whether the common risk factors are also precursors of other diseases, identifying individuals or groups with high overall morbidity and mortality. F.R.L.

A73-30358 **Echocardiography.** H. Feigenbaum (Indiana University; Krannert Institute of Cardiology, Indianapolis, Ind.). Philadelphia, Lea and Febiger, 1972. 243 p. 157 refs. $11.00.

The history of echocardiography is discussed together with questions of instrumentation, the echocardiographic examination, the mitral valve, and the aortic valve. Other subjects considered include the tricuspid and pulmonic valves, the left ventricle, the right ventricle, the left atrium, atrial tumors, pericardial effusion, and congenital heart disease. Applications of echocardiography in cases of coronary artery disease are also examined, giving attention to the detection of akinetic and dyskinetic myocardial segments, the assessment of left ventricular function in patients with coronary artery disease, the differentiation between cardiomyopathy and coronary artery disease, and some technical limitations. G.R.

A73-30381 # **Effect of stimulation of the mesencephalic reticular formation on the convulsive electrical activity of the brain (Vliianie razdrazheniia mezentsefalicheskoi retikuliarnoi formatsii na sudorozhnuiu elektricheskuiu aktivnost' mozga).** Z. I. Nanobashvili and T. K. Ioseliani (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 69, Feb. 1973, p. 429-432. In Russian.

A73-30387 # **Automatic methods for smoothing and separation of characteristic points in an electrocardiographic signal (Avtomaticheskie metody sglazhivaniia i vydeleniia kharakternykh tochek iz elektrokardiograficheskogo signala).** G. Sh. Vasadze, E. S. Kubaneishvili, and G. T. Mamaladze (Ministerstvo Zdravookhraneniia Gruzinskoi SSR, Institut Eksperimental'noi i Khimicheskoi Khirurgii and Institut Klinicheskoi i Eksperimental'noi Kardiologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia,* vol. 69, Mar. 1973, p. 733-735. In Russian.

A73-30388 **Influence of the dazzling of an eye on the state of adaptation of the congeneric eye in a normal subject (Influence de l'éblouissement d'un oeil sur l'état d'adaptation de l'oeil congénère chez le sujet normal).** G. Meur and L. Conreur (Hôpital Universitaire Saint-Pierre, Brussels, Belgium). *Vision Research,* vol. 13, June 1973, p. 1005-1008. 13 refs. In French.

A73-30389 **Some observations concerning saccadic eye movements.** M. K. Komoda, L. Festinger, L. J. Phillips, R. H. Duckman, and R. A. Young (New School for Social Research, New York, N.Y.). *Vision Research,* vol. 13, June 1973, p. 1009-1020. 19 refs. Grant No. NIH-16327.

Investigation of some of the characteristics of the saccadic control system using three human subjects whose eye movements in response to a twice displaced target (pulse-step stimuli) were recorded. Five types of pulse-step stimuli were randomly presented. The results indicate that observers did not always respond to the initial target displacement and sometimes responded only to the final target position. The number of instances in which the observers responded to the pulse increased as the pulse duration was extended from 50 to 200 msec. These and the other results obtained suggest that there is continuous input of information into the saccadic control system. M.V.E.

A73-30390 **Accuracy of saccadic eye movements and maintenance of eccentric eye positions in the dark.** W. Becker and H.-M. Klein (Ulm, Universität, Ulm, West Germany). *Vision Research,* vol. 13, June 1973, p. 1021-1034. 26 refs. Research supported by the Deutsche Forschungsgemeinschaft.

Review of some investigation results on two aspects of oculomotor system behavior in the dark. One is the finding that an eye position during fixation of a visible target is stabilized against drift by a continuous control loop, and, as a possible source of drift, a leaky integrating controller is discussed. The other aspect concerns saccades between given targets involving angular displacements between 5 and 70 deg. In trying to reproduce these saccades a number of times from memory and in the dark, the first attempts deviate by about 5 deg from the appropriate angle. The amplitudes of successive repetitions deviate increasingly from the desired angle. They increase if the angle to be reproduced is below 50 deg, and they decrease if this angle exceeds 60 deg. If no angular displacement had previously been practised, voluntary saccades in the dark start with an angle of 50 deg and tend to 60 deg as repetitions continue. M.V.E.

A73-30391 **Accommodation of the eye during sleep and anesthesia.** G. Westheimer and S. M. Blair (California, University, Berkeley, Calif.). *Vision Research,* vol. 13, June 1973, p. 1035-1040. 13 refs. Grants No. PHS-EY-00220; No. PHS-EY-00592.

Review of three resting levels of accommodation of the eye during sleep and anesthesia exhibited by emmetropic monkeys having a full range of accommodation. The possible neural substrate of these accommodation levels is discussed, and examples are given of discharge patterns of a single neuron in the brainstem whose characteristics may be related to them. M.V.E.

A73-30392 **The Mach-Dvorak phenomenon and binocular fusion of moving stimuli.** G. S. Harker (U.S. Army, Medical Research Laboratory, Fort Knox, Ky.). *Vision Research,* vol. 13, June 1973, p. 1041-1058. 32 refs.

Discussion of experiments involving the Mach-Dvorak phenomenon that may be used for marking the location in time of the 'disparate contour' in the neural processing of sequential, dichoptic stimulation. The phenomenon involves repetitive, sequential, intermittent views of a moving stimulus by the two eyes. The resulting perception is that of depth displacement of the moving stimulus as a function of delay of the eye views. Following a review of the experimental results obtained, it is concluded that at least two neural mechanisms are needed to explain the results. M.V.E.

A73-30393 **The oscillatory waves of the primate electroretinogram.** T. E. Ogden (Utah, University, Salt Lake City, Utah). *Vision Research,* vol. 13, June 1973, p. 1059-1074. 38 refs. Grants No. MIH-EY-00530; No. NIH-NS-08493.

Description of several studies of the oscillatory waves of the intraretinal electroretinogram (ERG) of the monkey: (1) variation of wavelet amplitude with depth of an electrode within the retina; (2) effect of stimulus duration and intensity, and background illumination, on the oscillatory waves; (3) effect of anesthesia and

tetrodotoxin on the wavelets; and (4) relation of the intraretinal ERG to potential optic-tract oscillations. M.V.E.

A73-30394 The smallest voluntary saccade - Implications for fixation. G. M. Haddad and R. M. Steinman (Maryland, University, College Park, Md.). *Vision Research,* vol. 13, June 1973, p. 1075-1086. 22 refs. Grant No. NIH-EY-00325.

It is shown that subjects can make voluntary saccades as small as fixation saccades if there is a visible target. These saccades were made away from the preferred fixation position showing that a visual error signal is not necessary, whereas a visible target is. M.V.E.

A73-30395 * Pupil movements to light and accommodative stimulation - A comparative study. J. Semmlow and L. Stark (California, University, Berkeley, Calif.). *Vision Research,* vol. 13, June 1973, p. 1087-1100. 18 refs. Grants No. NIH-R01-NB-08546-01; No. NGR-05-003-355; Contract No. N00014-67-A-0114-0022.

Isolation and definition of specific response components in pupil reflexes through comparison of the dynamic features of light-induced and accommodation-induced pupil movements. A quantitative analysis of the behavior of the complex nonlinear pupil responses reveals the presence of two independent nonlinear characteristics: a range-dependent gain and a direction dependence or movement asymmetry. These nonlinear properties are attributed to motor processes because they are observable in pupil responses to both light and accommodation stimuli. The possible mechanisms and consequences of these pupil response characteristics are quantitatively defined and discussed. M.V.E.

A73-30396 The Stiles-Crawford effect - Explanation and consequences. A. W. Snyder (Australian National University, Canberra, Australia) and C. Pask. *Vision Research,* vol. 13, June 1973, p. 1115-1137. 52 refs.

Review of the results of a complete electromagnetic theory analysis of a foveal cone photoreceptor, including the effects of the tapered inner segment (or ellipsoid) and the absorbing photopigment in the outer segment. It is shown that an isolated individual foveal cone can produce the Stiles-Crawford (1933) effect in all its detail. The dependence of the phenomenon on changes in the diameter and index of refraction of the inner and outer segments is pointed out. It is also shown that the variation of this effect with wavelength is due to diffraction and interference associated with dielectric waveguide mode propagation on the outer segments. Direct psychophysical evidence of mode propagation in the human retina is thus provided in addition to a detailed description of the Stiles-Crawford effect. M.V.E.

A73-30397 Retinal receptive fields - Correlations between psychophysics and electrophysiology. C. R. Ingling, Jr. and B. A. Drum (Ohio State University, Columbus, Ohio). *Vision Research,* vol. 13, June 1973, p. 1151-1163. 22 refs. Grant No. PHS-EY-00148.

Two types of ganglion cell receptive fields reported by Gouras (1968) are used to predict responses to hue and brightness edges. These predictions are correlated with the results of psychophysical experiments on heterochromatic brightness matches, minimum border matches, chromatic gratings of uniform luminance, and chromatic gratings with high achromatic contrast. M.V.E.

A73-30398 Brightness additivity for a grating target. K. J. Myers, C. R. Ingling, Jr., and B. A. Drum (Ohio State University, Columbus, Ohio). *Vision Research,* vol. 13, June 1973, p. 1165-1173. 13 refs. Grant No. PHS-EY-00148.

Whereas, as is already known, brightness measured by heterochromatic brightness matching or by threshold determinations is not additive and for measurements performed by flicker and minimum border matches is additive, it is shown that it is also additive when the metric for brightness is determined by an acuity criterion. However, brightness determined by an acuity criterion is probably additive for a different reason from that advanced to explain the additivity of flicker and minimum border matches. M.V.E.

A73-30399 A simple simulator of the pupil. S. M. Anstis (York University, Toronto, Ontario, Canada). *Vision Research,* vol. 13, June 1973, p. 1183-1185. Science Research Council Grant No. B/H/182.

Description of a simple photoelectric servo device that is useful as a teaching aid for giving students a qualitative idea of how the pupil works. A photocell simulates the retina, and when light is shone on it, it generates a current that drives the needle of a meter. A black paper vane stuck on the needle simulates the iris of the eye. It is positioned so as to shade off the photocell progressively as more current is passed. The merits of the device are discussed, along with its limitations. M.V.E.

A73-30400 A visual stimulator employing a T.V. raster display. A. Hughes and G. R. Snow (Oxford University, Oxford, England). *Vision Research,* vol. 13, June 1973, p. 1187-1193. Research supported by the Medical Research Council.

Description of a visual stimulator that generates a great variety of visual stimuli on the screen of a standard 625 line TV raster for the exploration of receptive field properties in experiments with animals. The device enables the experimenter to perform manually controlled investigations of receptive fields with as great a variety of stimuli as cards can provide, while enjoying the added advantages of continuously variable size, instant contrast reversal, brightness and contrast control, and immediate transfer to automatically controlled movement of the stimulus at a preset velocity, along a selected path, at a variable repetition rate. M.V.E.

A73-30401 Servo-controlled moving stimulus generator for single unit studies in vision. S. B. Leighton and B. M. Dow (National Institutes of Health, Bethesda, Md.). *Vision Research,* vol. 13, June 1973, p. 1195-1198. 7 refs.

Description of a device for generating moving stimuli that can be projected directly on the retina by Maxwellian view. The accuracy of the device permits quantitative determination of the effects of stimulus size, orientation, velocity, color, and intensity on single retina cells, because each of these stimulus parameters can be independently varied and repeatedly returned to any previous setting. M.V.E.

A73-30402 Psychophysical estimates of optical density in human cones. V. C. Smith and J. Pokorny (Eye Research Laboratories, Chicago, Ill.). *Vision Research,* vol. 13, June 1973, p. 1199-1202. 16 refs. Grant No. PHS-EY-00523.

Review of the conflicting results produced by two studies of luminosity at bleaching intensities in dichromats performed by Mitchell and Rushton (1971), on the one hand, and by Miller (1972), on the other. The discrepancy between the two studies is shown to have important implications for the use of psychophysical data in estimating optical density in human cones. M.V.E.

A73-30430 Effects of altitude stress on mitochondrial function. A. J. Gold, T. F. Johnson, and L. C. Costello (Howard University, Washington, D.C.). *American Journal of Physiology,* vol. 224, Apr. 1973, p. 946-949. 15 refs. Grant No. DAHC19-71-G-0022.

An investigation has been conducted regarding the responses of cellular metabolic processes to hypoxic stress, giving particular attention to mitochondrial respiratory capacity and efficiency of the coupled phosphorylating system. Exposure to simulated altitude was selected as the means of inducing hypoxia. Groups of four growing adult male Wistar rats were used in the tests. It was found that altitude stress has a marked effect on the respiratory capacities of rat liver and kidney mitochondria. G.R.

A73-30497 Application of human engineering principles and techniques in the design of electronic production equipment. M. Rosenthal (Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.).

Human Factors, vol. 15, Apr. 1973, p. 137-148. 5 refs.

A73-30498 **Lighting for difficult visual tasks.** T. W. Faulkner and T. J. Murphy (Eastman Kodak Co., Rochester, N.Y.). *Human Factors,* vol. 15, Apr. 1973, p. 149-162. 34 refs.

Experience gained in design of lighting systems for inspection work indicates that the quantity of light directed upon a difficult visual task is less important than the type of light selected. The specific characteristics of a task must be considered in the selection of optimal lighting, and this basic rule is expounded by describing the properties and typical applications of different types of illumination. These include colored lighting, transillumination, crossed polarization, polarized light, shadow-graphing, spotlighting, brightness patterns, diffuse reflection, edge lighting, dark-field illumination, convergent light, stroboscopic lighting, moving light images, surface shadowing, ultraviolet light, moire patterns, and combinational lighting. T.M.

A73-30499 **Manipulating the response criterion in visual monitoring.** R. C. Williges (Illinois, University, Urbana, Ill.). *Human Factors,* vol. 15, Apr. 1973, p. 179-185. 13 refs. Research supported by the University of Illinois.

Subjects were required to detect long-duration brightness changes (signals) and to ignore short-duration changes (nonsignals) occurring on an electroluminescent panel during a 60-min monitoring session. Signal-to-nonsignal ratios (i.e., relative frequency of signal-to-nonsignal events chosen as constant 1/9, changing 1/9 to 1/1, and constant 1/1) and signal detectability (0.3 or 0.6 sec difference between signal and nonsignal duration) were combined factorially in a between-subject design. The changing signal-to-nonsignal ratio resulted in an intermediate level of signals correctly detected. The classical decrease in percentage of signals detected over time occurred in the constant 1/9 ratio condition under both levels of signal detectability. Signal detection theory analyses were restricted to low detectable signals. A marked increase in the response criterion (beta) over the monitoring session occurred in the constant 1/9 ratio condition, whereas beta remained low and relatively constant in the other signal-to-nonsignal ratio conditions. T.M.

A73-30511 **Inversion illusion in the so-called zero-gravity conditions of parabolic flight.** T. D. M. Roberts (Glasgow, University, Glasgow, Scotland). *Aerospace Medicine,* vol. 44, May 1973, p. 484-487.

The notion of 'weightlessness' is examined and it is shown that it is usually preferable to think in terms of 'free fall.' The inversion illusion experienced in an aircraft on entering the unsupported phase of parabolic flight is accounted for in terms of the external forces applied to the observer's skull as signalled by the otolith organs. It is pointed out that these organs are not stimulated by the force of gravity itself. (Author)

A73-30512 **Circadian rhythm of urinary calcium excretion during immobilization.** M. C. Moore (Guy's Hospital Medical School, London, England) and R. G. Burr (Stoke Mandeville Hospital, Aylesbury, Bucks., England). *Aerospace Medicine,* vol. 44, May 1973, p. 495-498. 15 refs. Research supported by Syntex Pharmaceuticals, Ltd.

Ten healthy subjects were studied during 2 days of normal activity and 2-4 days of strict bedrest. Urinary calcium excretion was raised during bedrest, but the increase was not uniformly distributed over each 24 hr. Instead the incremental calcium excretion showed a marked circadian rhythm with 61% excreted between 09.00 and 15.00 hr. A similar pattern of calcium excretion was seen in four immobilized patients with recent-onset traumatic paraplegia. However two chronic paraplegics without hypercalciuria did not have such an excretory rhythm. Circadian rhythms of bone resorption appear to account for the observed rhythm of urinary calcium excretion. (Author)

A73-30513 **Need satisfaction in the identification of the DOR.** S. F. Bucky and J. Burd (U.S. Naval Aerospace Medical Center, Aerospace Medical Institute, Pensacola, Fla.). *Aerospace Medicine,* vol. 44, May 1973, p. 513-515.

The purpose of this study was to determine whether (1) student pilots who voluntarily drop from the program (DORs) and those who successfully complete training enter the flight program with different needs, and (2) whether DORs and completers differ in their evaluation of the program's ability to satisfy their needs. The needs that were explored were those of the Maslow hierarchy, including physiological, safety, and security, social, self-esteem, and self-actualization needs. Eighty-seven aviation officer candidates were given a questionnaire designed to measure optimism, relevance, and importance in terms of the five needs described above. The results indicate that DORs differ from completers in their evaluation of how well their needs are satisfied. Within the first nine weeks of training, DORs indicated that meeting their needs was more 'important,' although they were less satisfied and optimistic than completers, particularly with regard to the self-actualization need. (Author)

A73-30514 **Effect of mild acute hypoxia on a decision-making task.** J. P. Frisby, R. F. Barrett, and J. A. Thornton (Sheffield, University, Sheffield, England). *Aerospace Medicine,* vol. 44, May 1973, p. 523-526. 5 refs.

An experiment is described which investigated the effect of mild acute hypoxia on a decision-making task. This task required subjects to sample numbered cards one at a time from a large pack and to arrive at a decision about whether or not the mean of the whole pack was greater or less than 74. Subjects sampled as many cards as they felt they needed to given that a price of five pounds was to be awarded to the subject who was most accurate and took fewest cards. The results showed that subjects sampled significantly (p less than 0.01) more cards when breathing an hypoxic mixture than when breathing normal air. On the other hand, the subjects' confidence in their decisions was not significantly affected by hypoxia. These findings are interpreted as showing that hypoxia disturbed the subjects' numerical processing abilities without making them more prepared to take risks. (Author)

A73-30515 **Towards an objective assessment of cockpit workload. I - Physiological variables during different flight phases.** C. H. J. M. Opmeer and J. P. Krol (Central Organization for Applied Scientific Research in the Netherlands TNO, Laboratory for Ergonomic Psychology, Amsterdam, Netherlands). *Aerospace Medicine,* vol. 44, May 1973, p. 527-532. 17 refs.

The work-load concept is discussed in connection with the flight task, which is considered to lead primarily to mental load. Experiments in a DC-7 simulator and an AT-100 (Beachcraft) simulator, in which an attempt was made to validate heart rate (HR), heart rate irregularity (HI), and respiratory rate (RR) as indicators of mental load are described. As a criterion the following scale was used, from least to most difficult task: rest; level flight; take off; approach. The overall differences proved to be significant at the 0.1% level. The changes in physiological variables from phase to phase showed a correlation of 0.80 with the predicted direction. The highest discriminating power according to the omega squared criterion was shown by RR, followed by HI and HR, in this order. During an experiment with parachute jumpers, in which an anxiety scale was used as a criterion, the reverse order was found. (Author)

A73-30516 **Development and reversibility of pulmonary oxygen poisoning in the rat.** M. Valimaki and J. Niinikoski (Turku, University, Turku, Finland). *Aerospace Medicine,* vol. 44, May 1973, p. 533-538. 18 refs. Grant No. DAJA37-72-C-1573.

A73-30517 **Sensory versus perceptual isolation - A comparison of their electrophysiological effects.** E. A. Serafetinides, J. T. Shurley, R. Brooks, and W. P. Gideon (Oklahoma, University; U.S. Veterans Administration Hospital, Oklahoma City, Okla.). *Aerospace Medicine,* vol. 44, May 1973, p. 539-541. 9 refs. Research supported

by the U.S. Veterans Administration.

Sixteen volunteer normal females, ages 18-19, were randomly assigned to Condition A (water-tank type of sensory isolation) or Condition B (bed-type of perceptual isolation). Each subject experienced both Condition A and B with an interval of 1 month and order effects were controlled for. A battery of concurrently taken electrophysiological measurements revealed significantly higher values in Condition A (water-tank) for EEG frequency, eye movements, heart rate and some - but not all - of electrodermal events. The differences are discussed in terms of varying input of different sensory modalities and degree of stimulus familiarity involved in the two experimental conditions under study. (Author)

A73-30518 Prevention of the atherosclerotic diseases - Opportunities for military medicine. V. F. Froelicher, Jr. and M. C. Lancaster (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aerospace Medicine,* vol. 44, May 1973, p. 542-548. 42 refs.

Atherosclerotic cardiovascular disease (ASCVD) is the primary health problem in the United States. Extensive studies have demonstrated three major risk factors or contributing causes of this disease: hypercholesterolemia, cigarette smoking, and hypertension. There is evidence that these risk factors can be modified and that their modification will reduce the mortality and morbidity from ASCVD. A preventive medicine program is presented based upon a three-fold approach which includes medical screening for risk factor identification and intervention, education of both laymen and medical personnel, and direct actions to help individuals eliminate the risk factors. (Author)

A73-30519 Should air hostesses continue flight duty during the first trimester of pregnancy. R. G. Cameron (CIBA-Geigy, Ltd., Basel, Switzerland). *(International Meeting on Aerospace Medicine, 2nd, Melbourne, Australia, Oct. 30-Nov. 2, 1972.) Aerospace Medicine,* vol. 44, May 1973, p. 552-556. 17 refs.

Although much is known about the physiological effects of high altitude, relatively little is known about any possible deleterious effects in the case of pregnant passengers or air hostesses exposed to the cabin altitude of modern jet transport aircraft. Possibly because of this lack of knowledge, there appears to be uncertainty regarding the advisability of pregnant women flying. The author examines those physiological factors in flying which could conceivably have an adverse effect in such cases, in particular the blood gas values quoted by various authors in normal crews as well as in pregnant women and the foetus. The method of nutrition of the developing embryo is discussed. The conclusion is drawn that there is no evidence that either flying per se or the hypoxia induced at a cabin altitude of 5,000 to 7,000 ft has any deleterious effect on mother, embryo, or foetus. Air hostesses should therefore be permitted to continue flight duty during the first trimester of pregnancy. (Author)

A73-30567 # Conditional reflex switching (Uslovno-reflektornoe perekliuchenie). L. P. Rudenko (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 4, Apr.-June 1973, p. 7-25. 132 refs. In Russian.

The reaction of the nervous system is dependent not only on the stimulus but also on various mediating factors comprising a functional background for the stimulus. A conditional stimulus may correspond to several signal meanings depending on conditions under which they are elaborated, and the factors affecting the signal meaning of the stimulus are treated as switching elements. The present study provides a survey of published data on conditional reflex switching and on related problems in physiology and psychology (i.e., predisposition, readiness for action, pre-reactive state of enhanced awareness, and warning stimuli). While based on simple unconditional reflexes (the ability to switch as a function of the initial functional background), the effect of conditional reflex switching in man and higher-order animals involves a universal principle of higher nervous activity providing dynamism, flexibility, and appropriateness of the reaction relative to the external circumstances and requirements of the organism. T.M.

A73-30568 # Forward and backward conditional connections (Priamye i obratnye uslovnye sviazi). M. I. Struchkov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 4, Apr.-June 1973, p. 26-41. 113 refs. In Russian.

Published studies of other workers and original experimental results obtained by the author on the formation of forward and backward conditional connections are examined. The physiological mechanism of the formation of a conditional connection is considered to involve the simultaneous formation of forward and backward conditional links. The role of the backward conditional connection in the conditional reflex activity of animals is emphasized, including its function in the organization and control of motivational behavior. T.M.

A73-30569 # Circulation of nervous impulses in the cerebral cortex (O tsirkuliatsii nervnykh impul'sov v mozgovoi kore). Zh. P. Shuranova, Iu. M. Burmistrov, Z. M. Gvozdikova, and G. A. El'kina (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 4, Apr.-June 1973, p. 42-54. 49 refs. In Russian.

Description of the characteristics of multiple discharges arising due to circulation of the stimulus through a system of crayfish lateral giant axons representing a closed chain of a limited number (4 to 12) of neurons. An attempt is made to use these observations as a basis for interpreting certain aspects of the electrical activity of neurons in the cerebral cortex of rabbits. It is concluded that available data are insufficient to either negate or accept the assumption that reverberation processes participate in the genesis of the background activity of cortical neurons. The contribution of these processes to the organization of a neuronal response to direct electrical stimulation is improbable under conditions of an intact cortex. T.M.

A73-30570 # Neurophysiological characteristics of isolated structures of the cerebral cortex (Neirofiziologicheskaia kharakteristika izolirovannykh struktur kory bol'shikh polusharii). M. M. Bogoslovskii, M. M. Khananashvili, and E. G. Zarkeshev (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 4, Apr.-June 1973, p. 55-100. 276 refs. In Russian.

Survey of published literature on methods of preparation, morphological characteristics, and electrical activity of isolated human and animal cerebral cortex preparations and isolated cortical slabs. Studies with isolated cortical slabs show that the metabolic processes in an isolated section of the cortex differ significantly from those in an intact cortex, resulting in substantial differences between contents of most examined substances. The electrical activity in isolated cortical slabs depends strongly on metabolic factors. Data on background and evoked electrical activity measured with micro- and macroelectrode methods are given along with results of biochemical and pharmacological studies. T.M.

A73-30571 # Central mechanisms of the action of electromagnetic fields (Tsentral'nye mekhanizmy deistviia elektromagnitnykh polei). K. V. Sudakov and G. D. Antimonii (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk,* vol. 4, Apr.-June 1973, p. 101-135. 220 refs. In Russian.

Survey of published research concerning the influence of electromagnetic fields on the central nervous system. Various aspects of the problem are considered, including the role of natural electromagnetic fields in evolutionary processes, their participation in the activity of the central nervous system, the perception of these fields by living organisms, the effects exerted by electromagnetic fields on the behavior of man and animals, and current concepts on the neurophysiological mechanisms by which the fields act on higher-order organisms. Original experimental data are used to consider possible selective sensitivity of limbic structures to the action of electromagnetic fields. T.M.

A73-30669 # **Comparative investigations regarding the phenomenon of force potentiation in the case of the heart muscle of cold-blooded and warm-blooded animals (Vergleichende Untersuchungen zum Phänomen der Kraftpotenzierung des Herzmuskels von Kalt-und Warmblütern).** E. Retzlaff. Hamburg, Universität, Dr. Dissertation, 1971. 71 p. 61 refs. In German.

The investigation was conducted in connection with questions regarding the degree to which the dependence of the contraction amplitude of the heart on the excitation frequency is determined by the function of the sarcoplasmic reticulum. Experiments were conducted with papillary muscles of the guinea pig heart and ventricular sections of frog and tortoise. The specimens were excited and the contractions were isometrically measured. It was found that within a wide range the contraction amplitude is correlated with the intracellular action potential in the case of cold-blooded animals. There is no such correlation in the case of warm-blooded animals. G.R.

A73-30825 # **Loss of information during central summation of local postsynaptic potentials (Poteria informatsii pri tsentral'noi summatsii lokal'nykh postsinapticheskikh potentsialov).** A. N. Radchenko (Leningradskii Politekhnicheskii Institut, Leningrad, USSR). *Neirofiziologiia,* vol. 5, Mar.-Apr. 1973, p. 186-192. 12 refs. In Russian.

Study of the functional role of a cumulative postsynaptic potential in information transport to a neuron, assuming that the weighted sum of local postsynaptic potentials forms a depolarizing potential. It is found that algebraic summation of postsynaptic potentials involves a substatial information loss while information entrained in variations of the cumulative postsynaptic potential is generated by spurious input information. It is theorized that a cumulative postsynaptic potential cannot perform information transport to a neuron and that signals of a different physical type, undamped by dendrites, can possibly be responsible for information transport. V.Z.

A73-30840 # **Role of peripheral chemoreceptors in reactions of rats to short and lasting hypoxia (O roli perifericheskikh khemoretseptorov v reaktsiiakh krys na kratkovremennuiu i dlitel'nuiu gipoksiiu).** N. A. Agadzhanian, I. S. Breslav, E. A. Konza, N. A. Usakova, and A. I. Elfimov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Oct. 1972, p. 11-15. 13 refs. In Russian.

A73-30841 # **Diurnal rhythm of a corticosteroid reaction to ACTH and physical load (Sutochnyi ritm kortikosteroidnoi reaktsii na AKTG i fizicheskuiu nagruzku).** M. G. Kolpakov, E. M. Kazin, G. G. Avdeev, N. G. Blinov, and N. N. Vinogradova (Akademiia Nauk SSSR, Institut Fiziologii, Novosibirsk; Kemerovskii Pedagogicheskii Institut, Kemerovo, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Oct. 1972, p. 15-18. 11 refs. In Russian.

In the absence of physical load, the content of oxycorticosteroids in the peripheral blood of rats showed a minimum during the morning hours and a maximum at about 3 p.m. The strongest reaction of rats to ACTH was observed in late afternoon hours. A substantial increase in blood oxycorticosteroid contents was observed at 3 a.m. in rats subjected in daytime to physical load (swimming). V.Z.

A73-30842 # **RNA and DNA of internal organs during a remote postreanimation period in animals with complete and incomplete functional recovery of the central nervous system (RNK i DNK vnutrennikh organov v otdalennom postreanimatsionnom periode u zhivotnykh s polnym i nepolnym vosstanovleniem funktsii tsentral'noi nervnoi sistemy).** V. L. Kozhura (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 74, Oct. 1972, p. 37-39. In Russian.

A73-30843 # **Electrical activity of the external ear muscles in man /at rest and during identification of acoustic signals/ (Elektricheskaia aktivnost' vneshnikh ushnykh myshts cheloveka /v pokoe i pri raspoznavanii akusticheskikh signalov/).** E. A. Iurkianets and D. P. Matiushkin (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 16-19. 12 refs. In Russian.

In experiments with healthy human subjects, electromyograms (EMGs) of ear muscles were studied. Intense listening during attempts to identify acoustical signals was found to give rise to a characteristic reaction involving activation of the upper ear muscle and inhibition of the posterior ear muscle. The magnitude of this reaction was found to be in a definite correlation with the difficulty (error occurrence rate) of the given acoustic signal identification task. M.V.E.

A73-30844 # **Characteristics of spontaneous oxygen tension variations in human brain structures (K kharakteristike spontannykh kolebanii napriazheniia kisloroda v strukturakh golovnogo mozga cheloveka).** V. B. Grechin and E. I. Krauz (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 20-22. 7 refs. In Russian.

Spontaneous variations in partial oxygen pressure in the brain of patients afflicted by parkinsonism were detected by means of electrodes that had been implanted for prolonged time periods in brain cell formations and white matter for the treatment of these patients. Correlation analyses made possible the identification of three types of processes and differing durations in the periodic component of the detected partial oxygen pressure variations, with definite peculiarities within the various brain structures. M.V.E.

A73-30845 # **Influence of increased air atmosphere pressure on the excitability of the neuro-motor apparatus in man (Vliianie povyshennogo davleniia vozdushnoi sredy na vozbudimost' neiromotornogo apparata u cheloveka).** A. V. Syrovegin (Ministerstvo Zdravookhraneniia SSSR; Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 23-26. 19 refs. In Russian.

In pressure chamber experiments with human subjects, an increase in ambient air pressure to 6 atm is shown to cause a reduction in the reflex excitability of the motor neurons in the spinal cord, as well as an increase in the activity of the neuromuscular apparatus. A continuous 18-min exposure to this pressure does not stop the processes that cause changes in the reflex excitability of the motor neurons in the spinal cord and neuromuscular system during a short-duration exposure to this pressure increase. A pressure reduction to 2.2 atm during decompression does not significantly change the excitability of the neuromuscular apparatus recorded during the 18th minute of exposure to the pressure of 6 atm. M.V.E.

A73-30846 # **Emotional overstress effects on the indices of the blood coagulation system in monkeys (Vliianie emotsional'nogo perenapriazheniia na sostoianie pokazatelei sistemy svertyvaniia krovi u obez'ian).** S. V. Chernigovskaia, G. M. Cherkovich, and L. A. Uzunian (Akademiia Meditsinskikh Nauk SSSR, Sukhumi, Georgian SSR; Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 29-32. 15 refs. In Russian.

Prolonged emotional stress is shown to result in a considerable fibrinogen level rise in the blood of healthy monkeys as well as of monkeys fed cholesterol with their food for a period of three years. Changes in several other blood coagulation indices were found to be independent of the emotional state of the animals and might possibly be attributable to seasonal variations. M.V.E.

A73-30847 # **Hypothalamo-adenohypophysio-adrenal neurosecretory system under hyperthermia (Gipotalamo-adenogipofizarno-nadpochechnikovaia neirosekretornaia sistema v usloviiakh gipertermii).** A. I. Degonskii (Donetskii Meditsinskii Institut, Donetsk, Ukrainian SSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 32-34. 17 refs. In Russian.

In experiments with albino rats, a significant rise in the functional activity of the hypothalamo-adenohypophysio-adrenal neurosecretory system is shown to occur under exogenous hyperthermia. Production by the hypothalamus of the corticotrophin-secretion stimulating factor and the ACH output of the hypophysis are found to be higher in thermal-stroke survivor rats than in succumbed ones. M.V.E.

A73-30848 # **Analysis of the mechanism of the therapeutic action of pressurized oxygen in organic phosphorus poisoning (Analiz mekhanizma lechebnogo deistviia kisloroda pod davleniem pri otravleniiakh fosfororganicheskimi soedineniiami).** N. V. Savateev, V. D. Tonkopii, L. M. Brestkina, and A. E. Gromov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 51-53. 11 refs. In Russian.

A73-30849 # **Determination of diffusive capacity components in lungs and of alveoloarterial oxygen gradients for the estimation of oxygen transport conditions in lungs (Opredelenie komponentov diffuzionnoi sposobnosti legkikh i al'veolo-arterial'noi raznitsy po kislorodu dlia otsenki uslovii perenosa kisloroda v legkikh).** A. A. Markosian and R. S. Vinitskaia (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 115-117. In Russian.

A73-30850 # **Decatron indicator for a micromanipulator controlled by a stepping motor (Dekatronnyi indikator dlia mikromanipuliatora, upravliaemogo shagovym dvigatelem).** V. P. Lebedev, K. A. Shirnov, and V. V. Chirkov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Biulleten' Eksperimental'noi Biologii i Meditsiny,* vol. 75, Mar. 1973, p. 117-119. In Russian.

Description of a four-digit, decimal, reversible, numerical, counting-display device. A basic circuit and block diagram of the device are presented for illustration. The device can be used as a location-pinpointing coordinate indicator when electrodes are inserted in brain tissues. M.V.E.

A73-30876 **Heart rate variability and the measurement of mental load; Proceedings of the Symposium, London, England, October 1971.** Symposium sponsored by the Ergonomics Research Society. *Ergonomics,* vol. 16, Jan. 1973. 134 p.

The relationship between heart rate variability and the mental work load in man is considered in papers describing attempts to quantify the changes in cardiac response and to relate these changes to a specific task. Topics considered include the development and use of cardiac arhythmia as an index of mental workload, contributions of major physiological originating factors in spontaneous variability of the heart rate, mathematical and statistical techniques for analytical evaluation of heart rate variability, and the relative merits of various data sampling procedures.

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

A73-30877 **Psychological factors influencing the relationship between cardiac arrhythmia and mental load.** P. A. Firth (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 5-16. 35 refs.

This paper examines the development and use of cardiac arrhythmia as an index of mental workload in terms of several issues. These include the relevance of autonomic response to the measurement of task difficulty and the implications of general principles of psychophysiology to the application of cardiac arrhythmia as an applied measure. In addition the complexity of the psychological factors which may influence task difficulty is discussed with particular reference to second-by-second changes in heart rate variability. In conclusion it is suggested that the usefulness of global concepts of task difficulty such as mental load may be questionable. (Author)

A73-30878 **Analysis of heart rate variability.** B. M. Sayers (Imperial College of Science and Technology, London, England). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 17-32.

Spontaneous variability of heart-rate has been related to three major physiological originating factors: quasi-oscillatory fluctuations thought to arise in blood-pressure control, variable frequency oscillations due to thermal regulation, and respiration: frequency selective analysis of cardiac interbeat interval sequences allows the separate contributions to be isolated. Using this method, a laboratory and field study of the effects of mental work load on the cardiac interval sequence has been carried out. Results suggest that mean heart rate and variance are unreliable measures, but that consistent changes in interval spectrum occur; these have been traced to alterations mainly in the 0.1 Hz region, perhaps originating with changes in the patterns of respiration which interact with the 0.1 Hz vasomotor activity. (Author)

A73-30879 **Heart rate variability and work-load measurement.** W. Rohmert, W. Laurig, U. Philipp, and H. Luczak (Darmstadt, Technische Universität, Darmstadt, West Germany). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 33-44. 9 refs.

Heart rate variability is a result of the superimposition of different sources of variation which are systemized. Three parameters are used to describe the phenomenon of heart rate variation. The range of variation of these parameters is discussed using examples from both laboratory and field investigations. Analyses demonstrate a correlation between heart rate and their variability. Discussion of the variation of the chosen parameters suggests that, when heart rate variability is used as a measure of strain in field research, strain might be under-assessed. (Author)

A73-30880 **Motor, thermal and sensory factors in heart rate variation - A methodology for indirect estimation of intermittent muscular work and environmental heat loads.** J. J. Vogt, M. T. Meyer-Schwertz, B. Metz, and R. Foehr (CNRS, Centre d'Etudes Bioclimatiques, Strasbourg, France). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 45-60. 27 refs. Research supported by the European Coal and Steel Community; Délégation Générale à la Recherche Scientifique et Technique Contract No. 68,01,206.

A73-30881 **Mental load and the measurement of heart rate variability.** G. Mulder and W. Mulder-Hajonides van der Meulen (Groningen, Rijksuniversiteit, Groningen, Netherlands). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 69-83. 16 refs.

A review of research on the correlation between heart rate variability and mental load leads to the conclusion that in paced choice reaction tasks the number of reversal points in the cardiotachogram is the most sensitive measure of the load of the task. This measure was strongly correlated with respiration. Spectral analysis of heart rate variability revealed the existence of a frequency component at about 0.10 Hz, a respiration frequency, and sometimes a task frequency. T.M.

A73-30882 **An analysis of heart rate variability.** H. Luczak and W. Laurig (Darmstadt, Technische Universität, Darmstadt, West Germany). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 85-97. 12 refs.

Proceeding from a formal definition of heart rate variability, some mathematical and statistical techniques from sampling statistics and time series analysis for the analytical evaluation of heart rate variability for ergonomics purposes are presented and compared. The concept of sampling statistics gives a measure of heart rate variability, arrived at by combining two measures, which were chosen according to a definite criterion. The applicability of this measure is discussed, especially with respect to serial correlation influences when using statistical tests. The two main methods of spectral analysis - the calculation of the transformed autocovariance function and of harmonic analysis - are presented. The influences of interpolations, algorithms and physiological effects are discussed.
(Author)

A73-30883 **The information content of successive RR-interval times in the ECG - Preliminary results using factor analysis and frequency analysis.** C. H. J. M. Opmeer (Central Organization for Applied Scientific Research in the Netherlands TNO, Laboratory for Ergonomic Psychology, Amsterdam, Netherlands). *(Ergonomics Research Society, Symposium on Heart Rate Variability and the Measurement of Mental Load, London, England, Oct. 1971.) Ergonomics,* vol. 16, Jan. 1973, p. 105-112. 17 refs.

A73-30910 **Myoglobin distribution in the heart of growing rats exposed to a simulated altitude of 3500 m in their youth or born in the low pressure chamber.** Z. Turek, B. E. M. Ringnalda, M. Grandtner, and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv,* vol. 340, no. 1, 1973, p. 1-10. 20 refs.

A73-30911 **Hypoxic pulmonary steady-state diffusing capacity for CO and cardiac output in rats born at a simulated altitude of 3500 m.** Z. Turek, M. Grandtner, B. E. M. Ringnalda, and F. Kreuzer (Nijmegen, Katholieke Universiteit, Nijmegen, Netherlands). *Pflügers Archiv,* vol. 340, no. 1, 1973, p. 11-18. 9 refs.

A73-30912 **Differential thermal sensitivity in the human skin.** E. R. Nadel, J. W. Mitchell, and J. A. J. Stolwijk (John B. Pierce Foundation; Yale University, New Haven, Conn.). *Pflügers Archiv,* vol. 340, no. 1, 1973, p. 71-76. 7 refs. Grant No. NIH-ES-00354.

Thermal irradiation was applied to selected skin areas to determine whether particular areas demonstrate a greater thermal sensitivity than others in determination of a physiological thermoregulatory response. Modifications in thigh sweating rate were related to the change in temperature of the irradiated skin and the area of skin irradiated by computing a sensitivity coefficient for each skin area. Thermal sensitivity of the face, as measured by its effect on sweating rate change from the thigh, was found to be approximately three times that of the chest, abdomen and thigh. Lower legs were found to have about one-half the thermal sensitivity of the thigh. A table of weighting factors for calculation of physiological mean skin temperature, based upon thermal sensitivity and area, is presented.
(Author)

A73-30937 **Man in rarefied atmospheres.** R. A. McFarland. *Technology Review,* vol. 75, May 1973, p. 14-22. 12 refs.

The major concern of the life scientist is the effects of high altitude on crews and passengers. Human factors analysis suggests that the comfort and well being of airline passengers would be greatly benefited by having as near sea level conditions as possible, with cabin altitudes of 3000 to 5000 ft not exceeded. Early balloon ascents which demonstrated some of the dangers of high altitude are reviewed, as well as preliminary experiments with pressurized aircraft. Some World War II studies on the effects of altitude are discussed. Attention is given to the correlation of vision and oxygen, the danger of decompression, depressurization incidents, and the use of cylinders and masks. F.R.L.

A73-30959 * **Survival of soil bacteria during prolonged desiccation.** M. Chen and M. Alexander (Cornell University, Ithaca, N.Y.). *Soil Biology and Biochemistry,* vol. 5, 1973, p. 213-221. 18 refs. Grant No. NGR-33-010-013.

A determination was made of the kinds and numbers of bacteria surviving when two soils were maintained in the laboratory under dry conditions for more than half a year. Certain non-spore-forming bacteria were found to survive in the dry condition for long periods. A higher percentage of drought-tolerant than drought-sensitive bacteria was able to grow at low water activities. When they were grown in media with high salt concentrations, bacteria generally became more tolerant of prolonged drought and they persisted longer. The percent of cells in a bacterial population that remained viable when exposed to drought stress varied with the stage of growth.
(Author)

STAR ENTRIES

N73-21976 Drexel Univ., Philadelphia, Pa.
CONTROL ANALYSIS AND DESIGN OF DEMAND REGULATED LIQUIDS BREATHING SYSTEMS Ph.D. Thesis
Thomas Hillard Shaffer, III 1972 114 p
Avail: Univ. Microfilms Order No. 72-26959

A demand regulated liquid breathing system was developed which will compensate for increases in respiratory work and provide a means for prolonged periods of liquid ventilation. The basis for demand regulation is to employ the animal's internal respiratory controller and sensory mechanisms to determine his own physiological needs such as flow rate, tidal volume and breathing frequency. The system then senses incipient respiratory excursions by the animal and provides him with his anticipated demand. Studies on the systems included engineering performance tests, simulated animal tests, analysis of controllability and stability, and in-vivo animal tests. Results from engineering tests and in-vivo animal experiments indicate that demand regulation in liquid breathing provides an effective method for delivering oxygenated liquid to an animal while maintaining physiologically safe blood CO2 and O2 levels. Dissert. Abstr.

N73-21977# National Bureau of Standards, Washington, D.C. Technical Analysis Div.
PROJECT SOAP: A SYSTEMS APPROACH TO BIOMEDICAL RESEARCH PROGRAM MANAGEMENT, A CASE STUDY Final Report
Robert S. Cutler Apr. 1973 74 p refs
(NBS Proj. 4310900)
(NBS-TN-761) Avail: SOD $0.95 domestic postpaid or $0.70 GPO Bookstore as C13.46:761

A description is made of the activities of an interagency task group that applied systems analysis to improve management controls within a biomedical research agency of the federal government. The results were the formulation and implementation of a discipline for program management which explicitly makes use of multiple criteria in arriving at resource allocation decisions. The text details the necesssry preliminary analysis describing operational activities, information flows, and key decision points within the organization. It goes on to identify the techniques employed and the difficulties encountered while attempting to improve the decision-making process for selecting research projects, under conditions of reduced funding. A procedure which organizes relevant information for research program planning and evaluation is presented, and extension of this recommended *procedure to wider use by science administrators elsewhere in* government is discussed. Author

N73-21978# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
CORRELATION OF IN SITU FLUORESCENCE AND BIOLUMINESCENCE WITH BIOTA IN THE NEW YORK BIGHT
W. G. Egan and J. M. Cassin Feb. 1973 26 p refs Submitted for publication Prepared in cooperation with Adelphi Inst. of Marine Sciences
(RM-568J) Avail: NTIS HC $3.50

A series of measurements emphasizing the in situ aspects of bioluminescence and fluorescence photometric observations are described. Observations indicate that the causative organisms may be inferred by comparing their in situ bioluminescence, *short-wavelength ultraviolet-produced fluorescence, and long-*wavelength ultraviolet-produced fluorescence with the laboratory determined biota distribution. Using this approach, it was found that strong bioluminescence occurs above the thermo/halicline and appears to be caused mainly by Peridiniaceae and Gymnodiniaceae. Furthermore, the approach used is neither handicapped by collection nor time lapse problems: It is well suited to long-term monitoring of estuarine areas. Author

N73-21979*# Catholic Univ. of America, Washington, D.C. Dept. of Biology.
GENETIC AND METABOLIC VARIABILITY IN AUTOTROPHIC AND HETEROTROPHIC BACTERIA Final Report, 1 May 1965 - Oct. 1972
B. T. DeCicco Oct. 1972 5 p refs
(Grant NGR-09-005-022)
(NASA-CR-130807) Avail: NTIS HC #.00 CSCL 06M

The studies to evaluate an organism's ability to maintain normal physiological activities over a long period of time in a bioregenerative system are presented. Studies reviewed include: heat tolerant mutants of Pseudomonas fluorescens, virulence factors of the Staphylococci, and the effect of mutations on the virulence for man in common and ubiquitous microorganisms. F.O.S.

N73-21980*# University of Southern Calif., Los Angeles. Environmental Physiology Labs.
OBSERVATION OF ARTERIAL BLOOD PRESSURE OF THE PRIMATE Final Report
J. P. Meehan and J. P. Henry 9 Jan. 1973 77 p refs
(Contract NSR-05-018-087)
(NASA-CR-131890; USC-53-5137-1449) Avail: NTIS CSCL 06C

The developments are reported in physiological instrumentation, surgical procedures, measurement and data analysis techniques, and the definition of flight experiments to determine the effects of prolonged weightlessness on the cardiovascular system of subhuman primates. The development of an implantable telemetric data acquisition system is discussed along with cardiovascular research applications in renal hemodynamics. It is concluded that the implant technique permits a valid interpretation, free of emotional response, for the manipulated variable on physiological functions. It also allows a better definition of normal physiological baseline conditions. F.O.S.

N73-21981*# Techtran Corp., Glen Burnie, Md.
PROBLEMS OF AVIATION MEDICINE
G. L. Komendantov, ed. Washington Mar. 1973 177 p refs Transl. into ENGLISH of the Journal "Voprosy Aviatsionnoy Meditsiny" Moscow, v. 143, 1970 177 p NASA
(Contract NASw-2037)
(NASA-TT-F-687) Avail: NTIS HC $3.00 CSCL 06E

Functional physiological diagnostic methods to detect pathological processes that affect flight fitness and selection of flying personnel are reported. Considered are effects of acceleration, barotrauma, aging, hypoxia, and biorhythm disturbances.

N73-21982* Techtran Corp., Glen Burnie, Md.
ANALYSIS OF THE MECHANISM OF INTEROCEPTIVE REFLEXES IN ALTITUDE METEORISM
M. D. Chirkin *In its* Probl. of Aviation Med. Mar. 1973 p 1-14 refs
CSCL 06E

Mechanisms of interoceptor reflexes during high altitude meteorisms are analyzed. The effects of pharmaceutical preparations on these mechanisms are discussed in detail, together with the EKG findings pertinent to these mechanisms and the conditions associated with them under the effect of extremal actions. Both respiratory and circulatory manifestations in the major organs (hollow organs) are considered. Author

N73-21983* Techtran Corp., Glen Burnie, Md.
THE EFFECT OF INCREASED PRESSURE IN THE CAVITIES OF THE ALIMENTARY TRACT ON EVOKED REFLEXES. REPORT 1: THE EFFECT ON CALORIC NYSTAGMUS
G. L. Komendantov *In its* Probl. of Aviation Med. Mar. 1973 p 15-24 refs
CSCL 06P

The effect of increased pressure in the alimentary tract on evoked reflexes is considered. High altitude meteorisms are investigated using rabbits or tests by surgical severing of the ocular muscles in these animals, coupled with myograph investigations while the animals are maintained in a pressure chamber. The findings indicate that with an increase in pressure in the alimentary tract to 40 - 50 mm Hg, there is a clearly defined decrease in the caloric nystagmus, with a change in the amplitude ratio of the primary antagonistic muscles of the eyes. Author

N73-21984* Techtran Corp., Glen Burnie, Md.
THE EFFECT OF INCREASED PRESSURE IN THE CAVITIES OF THE ALIMENTARY TRACT ON EVOKED REFLEXES. REPORT 2: THE EFFECT ON PROPRIOCEPTIVE CERVICAL AND LUMBAR COMPENSATORY REFLEXES
G. L. Komendantov *In its* Probl. of Aviation Med. Mar. 1973 p 25-30 refs
CSCL 06P

Changes occurring in the cervical ocular reflexes and in the lumbar ocular reflexes following an increase in gastric pressure were studied. The lumbar reflexes were subject to the most pronounced after effect. The pressure increase caused greater changes in the cervical ocular reflexes. It was concluded that all reflexes were affected to some extent. Author

N73-21985* Techtran Corp., Glen Burnie, Md.
CHANGES OF THE AUTOMATISM, EXCITABILITY AND CONDUCTIVITY OF THE MYOCARDIUM IN HYPOXIC HYPOXIA
V. I. Alifanov *In its* Probl. of Aviation Med. Mar. 1973 p 31-38 ref
CSCL 06P

Myocardial changes in hypoxic hypoxia are studied, primarily with regard to automatism, excitability and conductivity. The WPW syndrome in healthy persons subjected to hypoxia is discussed as it is manifested at various altitude levels. EKG and graphic studies illustrate the physiological changes in otherwise normal persons. Author

N73-21986* Techtran Corp., Glen Burnie, Md.
THE KINEMATICS OF CARDIAC CONTRACTIONS IN HEALTHY PERSONS AND PATIENTS DURING HYPOXIC HYPOXIA
V. I. Alifanov *In its* Probl. of Aviation Med. Mar. 1973 p 39-43
CSCL 06P

The kinematics of the cardiac systole in otherwise healthy and ill persons during hypoxic hypoxia are discussed. 1,882 persons were investigated at an altitude of 5,000 meters and 264 persons while breathing an hypoxic atmosphere. The Blumberger polycardiographic method was used. Findings indicate regular systolic changes in both groups. EKG recordings appear in photographs. Author

N73-21987* Techtran Corp., Glen Burnie, Md.
VISCOELASTIC PROPERTIES OF ARTERIES IN CONDITIONS OF REDUCED PARTIAL OXYGEN PRESSURE IN THE INHALED AIR
V. M. Murayenko *In its* Probl. of Aviation Med. Mar. 1973 p 44-51 refs
CSCL 06P

Flight personnel falling into three groups: healthy, ill with hypertonic disease in the 1st stage, and ill with arteriosclerosis of the coronary artery (1st stage) was examined. It was found that changes in these groups were basically within the elastic properties of both types of arteries in that the elasticity coefficient changed only in the elastic arteries in the ill subject. Author

N73-21988* Techtran Corp., Glen Burnie, Md.
THE EARLY RECOGNITION OF LATENT CORONARY INSUFFICIENCY IN FLIGHT PERSONNEL WITH THE AID OF COMBINED FUNCTIONAL LOADING
L. M. Lemesheva *In its* Probl. of Aviation Med. Mar. 1973 p 52-55 refs
CSCL 06P

Early recognition of latent coronary insufficiency in flight personnel during combined functional loading in a pressure chamber is reported. EKG results indicate that the function loading EKG analysis method is useful in identifying LCI. Author

N73-21989* Techtran Corp., Glen Burnie, Md.
CHANGES IN VECTOR CARDIOGRAMS AFTER GLUCOSE TESTS IN CIVIL AVIATION FLIGHT PERSONNEL WITH ATHEROSCLEROSIS
Ye. I. Kuznetsova *In its* Probl. of Aviation Med. Mar. 1973 p 56-58 refs
CSCL 06P

Changes which occur in vector cardiograms after glucose testing of flight personnel are reported. Findings on the EKG are that glucose testing causes changes in the vector cardiograms. Author

N73-21990* Techtran Corp., Glen Burnie, Md.
METHOD OF TONE AND SPEECH AUDIOMETRY IN THE MEDICAL EXAMINATION OF FLIGHT PERSONNEL
V. M. Kozin *In its* Probl. of Aviation Med. Mar. 1973 p 59-78 refs
CSCL 06E

A method of tone and speech audiometry in the medical examination of flight personnel is reported that utilizes audiometers to test subthreshold audio values as well as audibility boundary sounds. Channel audiometers and important test conditions such as room acoustics and masking are discussed. The method discussed is not new, but rather a combined application of several previously used techniques. Audiograms are included. Author

N73-21991* Techtran Corp., Glen Burnie, Md.
MEDICAL OBSERVATIONS OF FLIGHT PERSONNEL SUFFERING FROM MANIFESTATIONS OF ARTERIAL HYPERTENSION
V. Z. Mokhov *In its* Probl. of Aviation Med. Mar. 1973 p 79-84
CSCL 06E

Symptoms of arterial hypertension in flight personnel are discussed. Findings indicate that 5% of flight personnel aged 39-49 suffer from arterial hypertensions. A group aged 29 to 37 was investigated. All were overweight and all had arterial hypertension; one horizontal coronary axis and three insignificant ventricular myocardial changes were found. Pulse and arterial pressure changes in various flight conditions are shown. Author

N73-21992* Techtran Corp., Glen Burnie, Md.
CHANGES OF COMPENSATORY PROPRIOCEPTIVE EVOKED REFLEXES DURING HYPOXIA
G. L. Komendantov *In its* Probl. of Aviation Med. Mar. 1973 p 85-96 refs
CSCL 06P

The ocular and third eyelid muscles of rabbits were the subjects of the investigation. 68 rabbits were tested in a pressure chamber at an altitude of up to 11,000 meters for 1 to 58 minutes. It was found that the evoked reflexes were highly resistant to hypoxically caused changes; restoration of altered reflexes occurred. Hypoxic ocular nystagmus was registered in high altitude conditions. Author

N73-21993* Techtran Corp., Glen Burnie, Md.
PROBLEMS OF BLOOD CIRCULATION BIOPHYSICS DURING HYPERBARIC OXYGEN BREATHING
V. N. Alifanov *In its* Probl. of Aviation Med. Mar. 1973 p 97-105 refs
CSCL 06P

Changes in the blood circulation (biophysical) during oxygen breathing at high altitudes were investigated in 418 persons of

various ages and states of health. Changes were found in the peripheral vascular resistance primarily. It was concluded that constant oxygen percentage up to 200 mm Hg can be safely used as a diagnostic test of flight personnel. Author

N73-21994* Techtran Corp., Glen Burnie, Md.
CONDITIONED-REFLEX MOTION SICKNESS AS A METHOD OF EVALUATING THE STATOKINETIC RESISTANCE OF THE FLIGHT PERSONNEL
V. S. Kompanets *In its* Probl. of Aviation Med. Mar. 1973 p 106-110 refs
CSCL 06P

A criterion of conditioned reflex motion sickness is considered for evaluating statokinetic resistance in flight personnel. Findings indicate that conditioned reflex motion sickness is a valid criterion in testing for air sickness. Author

N73-21995* Techtran Corp., Glen Burnie, Md.
ACCELERATION DURING DOUBLE ROTATION IN THE BARANY CHAIR
N. A. Razsolov and A. M. Rukavishnikov *In its* Probl. of Aviation Med. Mar. 1973 p 111-116 refs

CSCL 06P

Acceleration during double rotation in a Barany chair for eliminating unsuitable applicants from flight and spaceflight duty is considered. Formulae accompany the text, as do illustrations, to indicate method and parameters. Effects of rotation on the semicircular canal and the vestibular apparatus in a rolling sensation was experienced by some subjects. Author

N73-21996* Techtran Corp., Glen Burnie, Md.
MECHANISMS OF DISTURBANCE OF THE THERMOREGULATING FUNCTION OF THE ORGANISM UNDER REDUCED BAROMETRIC PRESSURE
I. I. Antonov *In its* Probl. of Aviation Med. Mar. 1973 p 117-122 refs
CSCL 06P

Disturbances of the thermo-regulating function of an organism in conditions of reduced barometric pressure are analyzed. It is concluded that hypothermia results from an inbalance of heat production and heat dissipation. Author

N73-21997* Techtran Corp., Glen Burnie, Md.
A STUDY OF THE DIURNAL FLUCTUATIONS IN THE CARDIAC RHYTHM AS ONE OF THE EARLY SYMPTOMS OF FUNCTIONAL INSUFFICIENCY OF THE CARDIOVASCULAR SYSTEM
M. S. Kaybyshev *In its* Probl. of Aviation Med. Mar. 1973 p 123-131 refs
CSCL 06P

Diurnal fluctuations of the cardiac rhythm are considered symptomatic of functional insufficiency of the cardic vascular system in flight personnel. It is concluded that the entire syndrome of functional changes need be evaluated to diagnose early functional insufficiency on this basis. Author

N73-21998* Techtran Corp., Glen Burnie, Md.
THE EXPERIMENTAL TREATMENT OF POISONINGS WITH A NEW ORGANOPHOSPHORIC INSECTICIDE (METHYLNITROPHOS) WITH THE USE OF CHOLINESTERASE REACTIVATORS
V. N. Razsudov *In its* Probl. of Aviation Med. Mar. 1973 p 132-138 refs
CSCL 06E

An experimental treatment of poisoning (a new insecticide: methylnitrophos) using cholinesterase reactivators is reported. Two types of reactivators were tested; 2-PAM-chloride and TMB-4 in various doses. TMB-4 was the more effective, even in smaller doses. Tables and graphs are included. Author

N73-21999* Techtran Corp., Glen Burnie, Md.
AGE RESTRICTIONS IN CIVIL AVIATION
V. P. Yerokhin *In its* Probl. of Aviation Med. Mar. 1973 p 139-156 refs
CSCL 06P

Electrocardiograms and other physical tests were made on flight personnel in order to study age restrictions in civil aviation. It was found that of the two groups tested, the elder performed at a higher level of efficiency and with acceptable physiological parameters. Author

N73-22000* Techtran Corp., Glen Burnie, Md.
ON THE PROBLEM OF BAROTRAUMA OF THE MIDDLE EAR
R. A. Medvezhova *In its* Probl. of Aviation Med. Mar. 1973 p 157-161 refs
CSCL 06P

Pressure damage to the middle ear in 74 cases of pressure trauma was studied. It was found that pressure trauma can be most serious with respect to reducing work capability of personnel in flight, and that pressure trauma of the middle ear developed with acute rhinitis. Author

N73-22001* Techtran Corp., Glen Burnie, Md.
SOME PHYSIOLOGICAL REACTIONS IN PILOTS DURING TRAINING AND DURING FLIGHT
V. P. Yerokhin and V. F. Ostrovskiy *In its* Probl. of Aviation Med. Mar. 1973 p 162-167

CSCL 06P

The physiological reactions of pilots in training and during flight are studied. It is found that the vegetative indicators are identical in real and simulated flight and that flight training can be used to spot pilots who are unfit for duty. Author

N73-22002# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND MEDICINE, VOLUME 6, NO. 4, 1972
29 Sep. 1972 152 p refs Transl. into ENGLISH of the periodical "Kosmicheskaya Biologiya i Meditsina, Vol. 6, No. 4, 1972" Moscow, Meditsina Publishing House
(JPRS-57139) Avail: NTIS HC $9.75

The safety of long space flight for humans is studied by evaluating environmental effects on the physiological responses of man. Stresses induced by weightlessness, controlled atmospheres and hypokenesia are emphasized.

N73-22003 Joint Publications Research Service, Arlington, Va.
MORPHOLOGICAL CHANGES IN THE SUPRARENALS OF RATS DURING HYPOKINESIA
I. L. Yurgens and O. I. Kirillov *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 1-6 refs

Male rats of the Wistar strain weighing 95-100 g were kept in boxes. Control and experimental animals were killed 12 hours, 2, 5, 9, 14 and 19 days after their enclosure. Under hypokinetic conditions the weight of the suprarenals increased due to an enlargement of the fascicular zone. At later experimental times hypertrophy of the suprarenals decreased whereas dystrophy developed. The size of the nuclei increased in all zones in the experimental rats. This was very distinct in animals killed 12 hours and 2 days after the beginning of the experiment. As dystrophy increased, hypertrophy of the nuclei decreased, the dropoff being greater in the inner than in the outer parts. Author

N73-22004 Joint Publications Research Service, Arlington, Va.
EFFECT OF A HIGH OXYGEN CONTENT ON THE INTENSITY OF FORMATION AND ELIMINATION OF SOME GASEOUS PRODUCTS OF VITAL FUNCTIONS BY RATS
B. I. Abidin, V. V. Kustov, T. A. Lekareva, K. P. Bugar, L. T. Poddubnaya, and V. I. Belkin *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 7-11 refs

It was demonstrated that 2-day exposure of albino male rats to a hyperoxic atmosphere at normal barometric pressure increased the formation and elimination of carbon monoxide and decreased the elimination of ammonia. Author

N73-22005 Joint Publications Research Service, Arlington, Va.
THE MECHANISM OF ADAPTATION TO HYPOXIC HYPOXIA
V. I. Dedukhova, Ye. V. Loginova, V. B. Malkin, Ye. N. Mokhova, and N. A. Roshchina *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 12-19 refs

A comparison is presented of the indices of tissue respiration and cerebral morphology with physiological indices characterizing the degree of altitude adaptation in rats. Hemoglobin concentration, the number of erythrocytes in peripheral blood, changes in tolerance to acute hypoxia, and oxygen consumption are observed under conditions of normal and reduced barometric pressure.
G.G.

N73-22006 Joint Publications Research Service, Arlington, Va.
TIME OF RETENTION OF INCREASED RESISTANCE TO HYPOXIA IN RELATION TO DIFFERENT PATTERNS OF HIGH MOUNTAIN ACCLIMATIZATION
M. M. Mirrakhimov, A. A. Aydaraliyev, and M. D. Dzhunushev *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1973 p 20-26 refs

The altitude ceiling of albino rats was investigated in relation to their acclimatization in mountains. The animals were kept 15, 30, 45 and 60 days in the mountains and their altitude ceiling was estimated on the 3d, 10th, 20th, 30th, 40th and 60th days. This altitude ceiling reached the maximum level by the 45th to 60th day. Following 15- and 30-day acclimatizations, increased resistance to acute hypoxia persisted for 20 to 30 days and approximated the background level by the 40th day. The animals which were acclimatized for 45 and 60 days retained increased resistance to acute hypoxia during 60 days in lower altitudes.
Author

N73-22007 Joint Publications Research Service, Arlington, Va.
EFFECT OF PRELIMINARY EXPOSURE TO CARBON MONOXIDE ON DEVELOPMENT OF HYPOKINETIC DISORDERS IN WHITE RATS
V. V. Kustov, B. I. Abidin, V. I. Belkin, and L. T. Poddubnaya *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1973 p 27-32 refs

It was demonstrated physiologically and biochemically that preliminary exposure of albino rats to carbon monoxide with a concentration of 0.6 plus or minus 0.02 mg/liter insignificantly enhanced the development of hypokinetic disturbances.
Author

N73-22008 Joint Publications Research Service, Arlington, Va.
EFFECT OF X-RADIATION IN A DOSE OF 25 AND 250 R ON TRANSPLANTATION IMMUNITY IN MICE CHARACTERIZED BY WEAK AND STRONG HISTOINCOMPATIBILITY SYSTEMS
P. Cherski, P. Korda, V. Kurnatovski, V. Novakovski, T. Obara, and Ya. Vengel *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 33-36 refs

Histocompatibility of mice skin transplants was improved by X-ray irradiation dose of 25 R. It was concluded that reactions of the regional lymph note and the duration of the viability of the skin transplant provide a good model for studying the influence of low ionizing radiation doses on cell immunity.
G.G.

N73-22009 Joint Publications Research Service, Arlington, Va.
EVALUATION OF THE FUNCTIONAL STATE OF GRANULOCYTOPOIESIS USING A PYROGENAL TEST
E. S. Zubenkova and B. A. Markelov *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 37-41 refs

The response of healthy dogs to intramuscular injection of pyrogenal in a dose of 1 microgram/kg of body weight is described. The response is characterized by transient leukopenia, followed by marked leukocytosis because of ejection of granulocytes from the bone marrow. It is simultaneously accompanied by an insignificant absolute and relative lymphopenia and eosinopenia.
Author

N73-22010 Joint Publications Research Service, Arlington, Va.
THIRTY DAY EXPERIMENT WITH SIMULATION OF THE PHYSIOLOGICAL EFFECTS OF WEIGHTLESSNESS
A. M. Genin and L. I. Kakurin *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 42-44

The use of a hypodynamic weigthlessness model with an antiorthostatic position of the human body is reported. The weightlessness effect is expressed in the appearance of blood flow sensations to the head, hyperemia and some pastiness of the face, and appearance of the illusion of an overturned position when the eyes are closed. These phenomena are accompanied by changes in blood redistribution.
G.G.

N73-22011 Joint Publications Research Service, Arlington, Va.
ORGANIZATION OF THE EXPERIMENTS AND OVERALL CONDITION OF THE SUBJECTS
A. D. Voskresenskiy, B. B. Yegorov, I. D. Pestov, S. M. Belyashin, V. M. Tolstov, and I. S. Lezhin *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 45-51 refs

Changes in health of 15 male test subjects confined to a rigorous bed rest regime were studied. During a 30-day experiment six subjects remained in a recumbent position and nine remained in an antiorthostatic position. Daily application of 6-hour negative pressure on the lower part of the body during recumbent bed rest was followed by the appearance of overtraining symptoms, decrease of tolerance and distinct general asthenization. Application of negative pressure on the lower part of the body during only the 26th-30th days in a recumbent position affected the test subjects favorably. During the first hours of hypokinesia the subjects who were in an antiorthostatic position developed symptoms associated with blood rushing to the head. The adaptation took place over a period of 2 days, although some symptoms persisted for 2 weeks.
Author

N73-22012 Joint Publications Research Service, Arlington, Va.
CHANGES IN CEREBRAL, PULMONARY AND PERIPHERAL BLOOD CIRCULATIONS
Kh. Kh. Yarullin, T. N. Krupina, T. D. Vasilyeva, and N. N. Buyvolova *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 52-61 refs

The state of cerebral, pulmonary and peripheral circulation was examined rheographically in nine test subjects during a 30-day bed rest experiment in which the head was tipped downward at an angle of 4 deg. Certain phases in changes of regional circulation were detected. Rheographic symptoms of increased arterial influx and venous congestion in the brain and lungs observed during the first experimental week were accompanied by feelings of blood rushing to the head, heaviness in the head, and facial reddening. Later the symptoms of arterial and venous hypotension decreased, especially in the brain, but increased in the shin.
Author

N73-22013 Joint Publications Research Service, Arlington, Va.
VARIATIONS IN CARDIAC OUTPUT AND GAS EXCHANGE AT REST DURING HYPOKINESIA
Yu. D. Pometov and B. S. Katkovskiy *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 62-73 refs

A 30-day bed rest experiment was carried out during which six healthy male test subjects remained in a horizontal position and nine rest subjects were in an antiorthostatic position. Variations in hemodynamics and gas exchange as related to basal metabolism were studied. The subjects who were confined strictly to bed revealed a significant decrease in gas exchange, regardless of whether they were horizontal or antiorthostatic. Subjects who performed physical exercises or underwent electric muscle stimulation exhibited a smaller dropoff of the parameters.
Author

N73-22014 Joint Publications Research Service, Arlington, Va.
STATE OF THE VISUAL ANALYZER UNDER HYPOKINETIC CONDITIONS

N. T. Drozdova and Ye. P. Grishin *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 74-78

During a 30-day bed rest experiment close and distant visual acuity was measured and ophthalmoscopic, photocalibrometric and ophthalmodynamometric examinations were performed with subjects who were in an antiorthostatic position. Beginning with the fourth to fifth day of hypokinesia their visual acuity, especially at close range, decreased substantially. Hemodynamic shifts were more distinct in those test subjects who were subjected to no preventive measures. In two cases perivasal and peripapillary edema of the retina was found. The mentioned changes exerted no significant effect on visual performance of the subjects. The above mentioned shifts disappeared when they started to work actively. Author

N73-22015 Joint Publications Research Service, Arlington, Va.
STUDY OF REACTIONS OF HUMAN OTORHINOLARYNGOLOGICAL ORGANS DURING HYPOKINESIA
I. Ya. Yakovleva, V. P. Baranova, L. N. Kornilova, and M. V. Nefedova *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 79-87 refs

The functional state of otorhinolaryngological organs during a 30-day antiorthostatic bed rest experiment was studied on three groups of three men each. The subjects in the first group performed physical exercises while remaining in bed, those in the second group were used as controls and the subjects in the third group were subjected to electric muscle stimulation. Dynamic rhinopneumomentry revealed increased blood filling of the vessels in the nasal mucosa and lability of their tone in the test subjects of all three groups, the highest level being noted in the controls. Audiometric examinations revealed similar changes in the functions of loudness and ototopics in all test subjects. Test subjects exhibited the greatest errors in spatial perception during the first hours of hypokinesia. Author

N73-22016 Joint Publications Research Service, Arlington, Va.
PULMONARY VOLUMES OF HUMAN SUBJECTS RESTRICTED TO AN ANTIORTHOSTATIC POSITION WITH APPLICATION OF DIFFERENT COUNTERACTING AGENTS
B. S. Katkovskiy and V. A. Andretsov *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 88-94 refs

Total lung capacity (TLC) and other pulmonary volumes of nine test subjects were studied during a 30-day bed rest experiment. The subjects were fixed in their beds with the foot end being lifted at an angle of 4 deg to the horizontal. During the first experimental days all the parameters declined appreciably in the test subjects of all three groups. The TLC of test subjects who performed physical exercises remained decreased until the end of the experiment; that of the second control group approximated the pretest level only on the 17th day, remaining still higher to the end of the experiment, and the TLC of test subjects who underwent electric muscle stimulation exceeded the pretest value on the fifth experimental day and continued to increase by the end of the experiment. Author

N73-22017 Joint Publications Research Service, Arlington, Va.
NEGATIVE PRESSURE ON THE LOWER PART OF THE BODY AS A METHOD FOR PREVENTING SHIFTS ASSOCIATED WITH CHANGE IN HYDROSTATIC BLOOD PRESSURE
I. D. Pestov and B. F. Asyamolov *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 95-102 refs

Four runs of 18-hour (eight test subjects) and 30-day (nine test subjects) simulated weightlessness tests were used to study the relationship between changes in water balance and orthostatic stability, on the one hand, and the degree of decrease in blood hydrostatic pressure. It is shown that it is possible to prevent shifts caused by pressure decrease by means of application of lower body negative pressure. Author

N73-22018 Joint Publications Research Service, Arlington, Va.
PHYSICAL TRAINING AS A METHOD FOR PREVENTING THE HYPODYNAMIC SYNDROME
V. I. Stepantsov, M. A. Tikhonov, and A. V. Yeremin *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 103-109 refs

During a 30-day bed rest period an evaluation was made of physical training apparatus and methods used for preventing hypodynamic disturbances. Described is a trainer for simulating a weight load upon the horizontal body and different physical exercises. The efficiency of the physical exercises was evaluated using biomechanical and physiological indices. Calculations of the energy expenditures involved in the physical exercises are included. Author

N73-22019 Joint Publications Research Service, Arlington, Va.
EFFECT OF PHYSICAL TRAINING AND ELECTRIC STIMULATION ON METABOLISM
I. S. Balakhovskiy, V. T. Bakhteyeva, R. V. Beleda, Ye. I. Biryukov, L. A. Vinogradova, A. I. Grigoryev, S. I. Zakharova, I. G. Dlusskaya, R. K. Kiselev, and T. A. Kislovskaya *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 110-116 refs

Metabolic changes developing during bed rest and the possibility of preventing these changes by the use of physical exercises and electric muscle stimulation were investigated. The tested program of physical exercises and electric muscle stimulation were shown to eliminate partially unfavorable bed rest effects. Author

N73-22020 Joint Publications Research Service, Arlington, Va.
CEREBRAL HEMODYNAMICS DURING 120 DAY CLINOSTATIC HYPOKINESIA
A. Ya. Tizul, B. V. Kozlov, and G. V. Ananyev *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 117-123 refs

Rheoencephalography and occlusion orbital and temporal plethysmography are used to examine cerebral hemodynamics in test subjects during 120-day clinostatic bed rest and a 20-day recovery periods. The prolonged bed rest experiment resulted in phasic changes in cerebral circulation which included a reduction in blood filling and a decrease in the tone of cerebral vessels. The peculiar feature of the cerebral circulation parameters was their instability and a wide scatter of their individual variations. The mentioned changes occurred due to lability of nerve centers which control the functioning of the systems responsible for its adaptive dynamics and rearrangement to meet the requirements of a new environment. Author

N73-22021 Joint Publications Research Service, Arlington, Va.
JOINT EFFECT OF STIMULATORS AND TRANQUILIZERS ON PERFORMANCE OF A MAN-OPERATOR
G. D. Glod, V. Ye. Belay, P. V. Vasilyev, and T. A. Orlova *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 124-133 refs

The influence of centerdrine (0.02 g), trioxazine (0.3 g) and their combination on human performance during continuous 2-hour stressful work was studied. It was demonstrated that both drugs improved the performance indices (reaction time, quality of compensatory tracking). The combined use of the drugs yielded a greater effect than the use of either of them separately. The role of emotional reactions in the course of man's professional activity and the mechanism of the favorable effect of drugs on performance are examined. Author

N73-22022 Joint Publications Research Service, Arlington, Va.
DETERMINING COPPER, IRON, COBALT, NICKEL AND MANGANESE IN BIOLOGICAL SAMPLES OF PLANT ORIGIN
N. B. Krotova and A. P. Tereshchenko *In its* Space Biol. and Med., Vol. 6, No. 4, 1972 29 Sep. 1972 p 134-142 refs

The creation of life support systems based on the biological cycling of matter provides for obtained analytical chemistry data on microelements. Direct spectrometric methods are used extensively for determining the content of these elements. Hexamethylenedithiocarbaminate of ammonium hexamethylene

(HMA) is recommended as an effective extraction reagent for a quantitative determination of copper, iron, cobalt, nickel and manganese. The extraction of copper (II), iron (II, III), cobalt (II), nickel (II) and manganese (II) in the form of complexes with HMA, as well as a method for extracting and determining these elements in biological objects are described. Author

N73-22023*# Techtran Corp., Glen Burnie, Md.
MECHANISMS OF SLEEP
A. N. Shepovalnikov, ed. Washington NASA Apr. 1973 128 p refs Transl. into ENGLISH of the book "Mekhanizmy Sna" Leningrad, Nauka Press, 1971 Proc. a Symp. held at Leningrad, 14-16 Dec. 1971
(Contract NASw-2037)
(NASA-TT-F-740) Avail: NTIS HC $3.00 CSCL 06P

Electrophysiological recordings of brain waves during the various phases of sleep in man and animals are reported. Dynamic reactivities of the somatosensory cortex during neurotic sleep disruptions, hypnotherapy, vestibular activity, dream sequencies, and neuropathological disorders are observed in sleep and wakefulness states.

N73-22024* Techtran Corp., Glen Burnie, Md.
PATHOLOGY OF THE BRAIN AND THE STRUCTURE OF NOCTURNAL SLEEP
A. M. Veyn *In its* Mech. of Sleep Apr. 1973 p 1-8

CSCL 06P

An electropolygraphic comparison series of the nocturnal sleep of 126 patients with neurological disorders and 10 persons who were normally healthy is reported. Perturbations in sleep duration are noted in various neurological disorders, with alteration in the length of sleep, however, insignificant. In narcolepsy, stage perturbation is noted. Author

N73-22025* Techtran Corp., Glen Burnie, Md.
SEVERAL METHODS FOR COMPARATIVE PHYSIOLOGICAL STUDY OF THE STAGES OF NATURAL SLEEP AND WAKEFULNESS
I. G. Karmanova *In its* Mech. of Sleep Apr. 1973 p 9-12

CSCL 06P

A comparative study of several of the stages and phases of sleep in fish, amphibians, birds, and reptiles is presented. It was found that the forebrain EEG in birds and mammals differs markedly from that of the other experimental animals. A close functional interrelationship was found between slow wave and paradoxical sleep. Author

N73-22026* Techtran Corp., Glen Burnie, Md.
ELECTROPHYSIOLOGICAL INDICES OF SLEEP IN THE CEREBRAL CORTEX
A. B. Kogan and G. L. Feldman *In its* Mech. of Sleep Apr. 1973 p 13-18
CSCL 06P

An electrophysiological investigation of the nerve structures in which sleep inhibition develops is discussed. Twenty-four points of the cat's brain were selected for recordings. It was found that the anterior cortex produced delta waves in the initial period of sleep. The waves subsequently spread over the entire cortex. Subsequent investigation reveals similar facts pertinent to other waves in subsequent stages. Author

N73-22027* Techtran Corp., Glen Burnie, Md.
SEVERAL ASPECTS OF THE FUNCTIONAL INTERDEPENDENCE OF DELTA SLEEP AND RADIO SLEEP
K. P. Latash *In its* Mech. of Sleep Apr. 1973 p 19-26

CSCL 06P

The functional interdependence of delta sleep and rapid sleep was studied; special experiments were performed on animals and people to compare the various stages of deep and slow sleep. It was established that rapid sleep is dependent on a precursor stage of slow sleep. Author

N73-22028* Techtran Corp., Glen Burnie, Md.
SUBCELLULAR CHANGES IN THE MOTOR REGION OF THE CORTEX DURING SLEEP
A. A. Manina and R. P. Kucherenko *In its* Mech. of Sleep Apr. 1973 p 27-30
CSCL 06P

Subcellular changes in the cortical region of the analyzers during sleep are studied. Neuronal changes under the effect of nembutal and phenobarbital are observed. In this way it is determined that metabolic activities during sleep are the same as during wakefulness. Author

N73-22029* Techtran Corp., Glen Burnie, Md.
THE ORGANIZATION OF THE PROCESS OF SLEEP IN MAN ACCORDING TO THE DATA OF ELECTROPHYSIOLOGICAL INVESTIGATION OF THE DEEP STRUCTURES OF THE BRAIN
N. I. Moiseyeva, Z. A. Aleksanyan, V. V. Belyayev, V. A. Ilyukhina, V. A. Kolesova, and Yu. K. Matveyev *In its* Mech. of Sleep Apr. 1973 p 31-38
CSCL 06P

The organization of human sleep processes is studied pertinent to the deep structures of the brain. Fifteen patients with implanted electrodes were studied. These patients suffered various neurological disorders. Mapping of somnofunctional regions of the brain resulted from the study. Author

N73-22030* Techtran Corp., Glen Burnie, Md.
THE IMPULSE ACTIVITY OF THALAMIC CELLS IN VARIOUS PHASES OF SLEEP AND WAKEFULNESS
L. M. Mukhametov and Dzh. Rotstsolatti *In its* Mech. of Sleep Apr. 1973 p 39-45
CSCL 06P

The impulse activity of the thalamic cells in various phases of sleep and wakefulness is reported based on a study of the lateral corpus geniculatum and the caudal part of the reticular nucleus. In the LCG, a realiable variation was found which was absent in the RN. Author

N73-22031* Techtran Corp., Glen Burnie, Md.
THE EFFECTS OF ELECTRICAL ACTIVITY AND EXCITABILITY OF CERTAIN LIMBIC AND MID-BRAIN STRUCTURES DURING VARIOUS PHASES OF SLEEP
T. N. Oniana, Ye. V. Abzianidze, Kapanadze T. K., and M. G. Kavkasidze *In its* Mech. of Sleep Apr. 1973 p 46-52

CSCL 06P

Mapping of mid-brain and limbic structures in response to excitability during various phases of sleep is reported. Findings with regard to structures and phases are presented in detail. Electrical stimulation is used to rate excitability. Author

N73-22032* Techtran Corp., Glen Burnie, Md.
MATURATIONAL CHANGES IN THE BIOELECTRICAL ACTIVITY OF THE BRAIN IN SLEEPING CHILDREN
A. N. Shepovalnikov and A. A. Savich *In its* Mech. of Sleep Apr. 1973 p 53-57
CSCL 06P

The maturational physiology of sleep is studied pertinent to changes which occur in the sleep structures and patterns of children in various age and sex groups. The study indicates that the adult type sleep patterns take some months to become established, following birth, and that changes continue to progress well into old age. Author

N73-22033*# Scientific Translation Service, Santa Barbara, Calif.
PROBLEMS OF SPACE BIOLOGY. VOLUME 17: PATHOPHYSIOLOGICAL BASES OF AVIATION AND SPACE PHARMACOLOGY
P. V. Vasilyev, V. Ye. Belay, G. D. Glod, and A. N. Razumeyev Washington NASA Apr. 1973 514 p refs Transl. into ENGLISH of the publ. "Problemy kosmicheskoy biologii. Tom 17: Patofiziologicheskiye Osnovy Aviatsionnoy i kosmicheskoy Farmakologii" Moscow, Nauka, 1971 p 5-323
(Contract NASw-2035)
(NASA-TT-F-736) Avail: NTIS HC $6.00 CSCL 06C

Data on the question of using drugs to increase resistance to the extreme effects of air and space flights are generalized. The possibilities and prospects of using drugs to decrease nervous and emotional tension and fatigue and to increase the work efficiency of pilots and astronauts under specific conditions are discussed. Data are included on the characteristics of the pharmacological effect of drugs during and after the influence of flight factors. Pathophysiological justifications are given for using drugs in aerospace medicine. Author

N73-22034# Webb Associates, Yellow Springs, Ohio.
ANTHROPOMENTRY OF AIR FORCE WOMEN
Charles E. Clauser (AMRL), Pearl E. Tucker (AMRL), Joan A. Reardon (AMRL), John T. McConville, E. Churchill, and Lloyd L. Laubach Wright-Patterson AFB, Ohio AMRL Apr. 1972 1164 p refs
(Contracts F33615-67-C-1772; AF Proj. 7184)
(AD-743113; AMRL-TR-70-5; LC-72-600027) Avail: NTIS HC $60.00 CSCL 05/5

The results are presented of an anthropometric survey of United States Air Force women carried out during 1968. Included in the report are a description of the methods and techniques used in the survey, descriptions--visual as well as verbal--of the measuring techniques used, and both uni- and bi-variate statistical summaries. A total of 137 anthropometric dimensions were measured on a sample of 1,905 U.S. Air Force women: 548 officers or officer trainees and 1,357 enlisted women. This anthropometry included 5 measures of weight and fat thickness, 30 measures of body height and length, 26 measures of body girths, 15 measures of body breadths and depths, and 12 measures of body surface distance. There were, in addition, 30 measures of the head and face, 3 of the hand, and 2 of the feet. Thirteen measurements were remeasures of the subject while she was wearing a foundation garmet. Background data gathered included age, rank, military occupation, birthplace, blood type, and age at menarche. Author

N73-22035# Naval Submarine Medical Center, Groton, Conn.
STUDIES OF CALCIUM AND INORGANIC PHOSPHORUS LEVELS IN PLASMA AND ERYTHROCYTES DURING ACUTE AND CHRONIC HYPERCAPNIA
Elly Heyder 29 Feb. 1972 31 p refs
(AD-749323; SubMedCenter-702; Rept-73-00835) Avail: NTIS HC $3.75 CSCL 06/19

To ascertain the effects of acute and chronic hypercapnia on blood levels of calcium and inorganic phosphorus, guinea pigs were exposed to 1%, 3% and 15% CO2 for various periods up to seven days. Plasma and erythrocyte calcium and inorganic phosphorus and serum ionized calcium were determined. Blood from submariners on FBM patrol, exposed to up to 1% CO2 for three weeks and followed by one week recovery, was analyzed for plasma electrolytes and erthyrocyte calcium. The serum ionized calcium of guinea pigs during acute exposure to each concentration of CO2 shows a pH dependent inverse relationship of a 4.5 to 5% change per 0.1 unit pH change. During the chronic hypercapnia, elevation of total calcium and depression of inorganic phosphorus in these animals exposed to 3% to 15% CO2 would suggest increased parathyroid function. In those guinea pigs exposed to 1% CO2, a depressed total plasma calcium in the presence of increased serum ionized calcium is interpreted as suggesting a possible functional hypoparathyroidism. In the submariners exposed to up to 1% CO2, both total plasma calcium and inorganic phosphorus tended to decrease. Author

N73-22036*# Kanner (Leo) Associates, Redwood City, Calif.
RENIN-ANGIOTENSIN SYSTEM IN SIMULATED HYPERVOLEMIA INDUCED BY IMMERSION
R. Korz, F. Fischer, and C. Behn Washington NASA Apr. 1973 17 p refs Transl. into ENGLISH from Klin. Wochschr. (West Berlin), v. 47, no. 23, 1969 p 1263-1268
(Contract NASw-2481)
(NASA-TT-F-14885) Avail: NTIS HC $3.00 CSCL 06S

The relationship between plasma renin activity, sodium and potassium excretion, and plasma volume was studied during a control period and after immersion in neutral-temperature water (34-34 5 C) for 6 hours. Plasma renin activity decreased by 28%, and the Na/K ratio increased, possibly reflecting decreased aldosterone secretion. Plasma volume decreased by 14.1%; no inverse relationship to plasma renin activity is found. The early natriuretic effect of immersion is concluded to be independent of aldosterone secretion. The early increase in tubular sodium load is considered to cause the decreased renin activity, inducing a reduction in aldosterone secretion, in turn responsible for altered electrolyte excretion after prolonged immersion. Author

N73-22037*# Duke Univ., Durham, N.C. Dept. of Ophthalmology and Psychology.
EFFECT OF ELIMINATION OF NITROGEN AND/OR HYPOXIA OR RESTRICTED VISUAL ENVIRONMENT ON COLOR VISION AND RANGE OF ACCOMMODATION Final Report
Myron L. Wolbarsht, Charles W. White, and W. Banks Anderson, Jr. 28 Feb. 1973 55 p refs
(Contract NAS9-11994)
(NASA-CR-128896) Avail: NTIS HC $4.75 CSCL 06S

The effects upon range of accommodation and color vision of reduced atmospheric pressure, at partial and complete elimination of nitrogen, of hypoxia, and of exposure for varying periods of time to restricted visual environment, have been studied alone or in various combinations. Measurements were made on the electroretinogram, the electrooculogram, and the diameter of the retinal vessels as an indicator of blood flow to the retina at the time of total elimination of nitrogen. An objective method was used to test range of accommodation. In the color vision test the flicker colors of a Benham's top were matched with a colorimeter. Author

N73-22038*# George Washington Univ., Washington, D.C. Biological Sciences Communication Project.
BIBLIOGRAPHY OF SCIENTIFIC PUBLICATIONS AND PRESENTATIONS RELATING TO PLANETARY QUARANTINE: 1966 - 1971
Frank D. Bradley and Marcy R. Nadel Apr. 1973 219 p refs
(Contract NSR-09-010-027)
(NASA-CR-131889; GWU-BSCP-73-10P) Avail: NTIS HC $13.00 CSCL 06M

A bibliography, which is a compilation of citations relating to planetary quarantine, previously listed in similar publications since 1967, is presented to provide a reference for reviewing planetary quarantine research and development. Author

N73-22039*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
PLANETARY QUARANTINE. SPACE RESEARCH AND TECHNOLOGY Semiannual Review, 1 Jul. - 31 Dec. 1972
May 1973 95 p refs
(Contract NAS7-100)
(NASA-CR-131845; JPL-900-608) Avail: NTIS HC $6.75 CSCL 06M

Planetary quarantine strategies for advanced spacecraft consider effects of satellite encounter, Jupiter atmosphere entry, space radiation, and cleaning and decontamination techniques on microbiological growth probability. Analytical restructuring is developed for microbial burden prediction and planetary contamination. G.G.

N73-22040# Defence Research Information Centre, Orpington (England).
THE INFLUENCE OF SIMAZINE ON THE PHOTOSYNTHETIC PIGMENTS OF GREEN ALGAE
L. N. Paromenskeya et al Nov. 1972 12 p refs Transl. into ENGLISH from Fiziol. Rast. (Moscow), v. 15, no. 6, 1968 p 1002-1007
(DRIC-Trans-2992; BR-30358) Avail: NTIS HC $3.00

The amounts of chlorophylls a and b, carotin, lutein and violaxanthin and the chlorophyll luminescence spectra were determined after the incubation for 2, 7 and 17 days of three species of green algae in a medium which either did or did not contain simazine. The pigment content, particularly that of lutein, carotin and chlorophyll a, decreased in the cells of the herbicide sensitive species Chlorella vulgaris and Ankistrodesmus braunii. On the basis of the measurement of the chlorophyll

liminescence spectra in suspensions of algae, it was deduced that the observable decrease of chlorophyll with sensitive algae is not directly linked to the interaction of the pigment with simazine. Author (ESRO)

N73-22041# Defence Research Information Centre, Orpington (England).
DECOMPRESSION DISORDERS AFTER EXPOSURE TO SAFE PRESSURE OR SAFE ALTITUDE
M. P. Yelinskii Jan. 1972 9 p refs Transl. into ENGLISH from Voenna-Med. Zh. (USSR), Jul. 1970 p 60-63
(DRIC-Trans-3035) Avail: NTIS

The effects of decompression and altitude sickness on animals and humans are discussed. A review of the literature on the subject shows that the symptoms may occur at depths or altitudes normally considered safe. More detailed investigations are called for. ESRO

N73-22042# Dow Chemical Co., Midland, Mich.
TOXICOLOGICAL EVALUATION OF A BERYLLIUM MOTOR EXHAUST PRODUCT Final Report, 1 Jul. 1970 - 10 Jul. 1972
Howard C. Spencer, Susan B. McCollister, Richard J. Kociba, Charles G. Humiston, and Gary L. Sparschu Wright-Patterson AFB, Ohio AMRL Nov. 1972 109 p refs
(Contract F33615-70-C-1811; AF Proj. 6302)
(AD-756531; AMRL-TR-72-118) Avail: NTIS CSCL 06/20

A sample of an exhaust product collected from a beryllium-fueled NASA-JPL High Energy Upper Stage (HEUS) Motor has been evaluated for its physical and chemical characteristics and biological activity. The physical properties (surface area, crystallinity, average crystallite size, refractive index and density) of the BeO exhaust product more closely resemble those of the higher fired BeO samples than those of active BeO (calcined at 500C). The biological activity was evaluated during a 100-week period following intratracheal administration of the BeO exhaust product to groups of rats in single doses of 50, 10, and 2 mg/kg. Histopathological examination 25, 50, 75 and 100 weeks following treatment revealed a pulmonary response to the BeO exhaust product less severe than that induced by the BeO calcined at 500C, but with lesions similar in nature. Evaluation of tumorigenicity of the BeO exhaust product showed fewer tumors than were found in rats treated with the BeO calcined at 500C. Studies on translocation of beryllium to extrapulmonary tissues (liver, kidney, spleen and bone), conducted 25 and 100 weeks following treatment, showed tissue levels of beryllium from 50 mg/kg BeO exhaust product to be lower than those from 50 mg/kg BeO calcined at 500C. Author (GRA)

N73-22043# SysteMed Corp., Dayton, Ohio.
TOXIC HAZARDS RESEARCH UNIT ANNUAL TECHNICAL REPORT, 1972 Final Report, Jun. 1971 - May 1972
J. D. MacEwen and E. H. Vernot Wright-Patterson AFB, Ohio AFMRL Aug. 1972 166 p refs Sponsored in part by NASA
(Contract F33615-70-C-1046; AF Proj. 6302)
(NASA-CR-131675; AD-755358; W72003; AMRL-TR-72-62) Avail: NTIS HC $10.50 CSCL 06T

The activities of the Toxic Hazards Research Unit (THRU) for the period of June 1971 through May 1972 are reviewed in this report. Acute inhalation toxicity experiments were conducted on hydrogen chloride (HCl) gas and aerosol, ethyl bromide (C2H5Br), hydrogen bromide (HBr), hydrogen sulfide (H2S), ammonia (NH3), chlorine (CL2), and silane (SiH4). Subacute toxicity studies were conducted on chlorine pentafluoride (ClF5), dichloromethane (CH2Cl2) and coal tar volatiles. Further toxicity studies of subacute and chronic responses to inhaled monomethylhydrazine (MMH) are also described. Author (GRA)

N73-22044# Stanford Research Inst., Menlo Park, Calif.
AN INVESTIGATION OF ATMOSPHERIC EFFECTS ON LASER PROPAGATION AND THE IMPACT ON EYE SAFETY Final Report, Jun. 1971 - Oct. 1972
Walter F. Dabberdt Jun. 1972 118 p refs
(Contract F41609-71-C-0029; AF Proj. 7784; SRI Proj. 1341)
(AD-755405) Avail: NTIS CSCL 20/5

Results are presented from an experimental study of laser beam scintillation along a slant path in the atmospheric planetary boundary layer. The primary objective of this research is to determine the influence on eye safety of atmospheric thermal turbulence in causing locally high intensities of energy in laser beams. This work has resulted in the further development of a general eye-hazard evaluation procedure based on atmospheric effects and laser operating conditions. The present work has also resulted in the development of a simple, worst-case guide to estimate the maximum probability of eye damage. Author (GRA)

N73-22045*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MEDICAL SUBJECT MONITORING SYSTEMS Patent Application
Garry J. Cleveland (Lockheed Missiles and Space Co.), George M. Loh (Lockheed Missiles and Space Co.), Robert S. Luce (Lockheed Missiles and Space Co.), M. I. Lipanovich (Lockheed Missiles and Space Co.), Howard L. Petersen (Lockheed Missiles and Space Co.), Norman Belasco, Sam L. Pool, and Donald W. Mangold, inventors (to NASA) (Boeing Co.) Filed 25 Apr. 1973 24 p
(Contracts NAS9-10742; NAS9-11756)
(NASA-Case-MSC-14180-1; US-Patent-Appl-SN-354406) Avail: NTIS HC $3.25 CSCL 06B

Multichannel subject monitoring systems are described which allow monitored medical subjects freedom of movement. Many types of sensors may be employed and differently arranged. The outputs of the sensors are suitably amplified and conditioned to provide the necessary voltage levels for the multiplexers in the analog-to-digital converters. The measured phenomena are displayed at a remote monitoring and control station. The entire system includes a bio-belt linked by optically coupled transmission and reception links to a data acquisition unit having a central station function of controlling and displaying the output from the bio-belt. NASA

N73-22046*# Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
STUDY OF DESIGN AND CONTROL OF REMOTE MANIPULATORS. PART 1: SUMMARY AND CONCLUSIONS
Daniel E. Whitney 15 Feb. 1973 4 p ref
(Contract NAS8-28055)
(NASA-CR-124191; DSR-73784-4-Pt-1) Avail: NTIS HC $3.00 CSCL 05H

The long range objectives of the study of remote manipulators are discussed. The objectives discussed include: static and passive dynamic considerations in manipulator design; active control by man or man-computer combination; and integration of sensors, sensor control and displays. F.O.S.

N73-22047*# Society of Automotive Engineers, Inc., New York. Bioenvironmental Systems Group.
A STUDY OF ALTERNATIVE DESIGNS FOR A SYSTEM TO CONCENTRATE CARBON DIOXIDE IN A HYDROGEN-DEPOLARIZED CELL Final Report
Jan. 1973 26 p refs
(Contract NASw-2439)
(NASA-CR-131868) Avail: NTIS HC $3.50 CSCL 06B

Experimental results are presented on alternative designs for a hydrogen depolarized cell to concentrate CO2 in spacecraft atmospheric control systems. Data cover technical problems, methods for solving these problems, and the suitability of such a cell for CO2 removal and control of atmospheric humidity during the flight mode. E.H.W.

N73-22048*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CHROMATO-FLUOROGRAPHIC DRUG DETECTOR Patent Application
John A. Parker, John Dimeff, and Alvin H. Heimbuch, inventors

(to NASA) Filed 25 Apr. 1973 14 p
(NASA-Case-ARC-10633-1; US-Patent-Appl-SN-354611) Avail: NTIS HC $3.00 CSCL 06B

A drug detecting apparatus including a chromatographic system for separating a particular substance from sample solution passed therethrough, is reported. A source of radiation for irradiating the separated substance as it moves through the chromatographic system causes it to fluoresce and emit fluorescent radiation. An optical system spectrally separates the fluorescent radiation according to wavelength the focuses particular portions of the separated spectrum through an exit aperture onto a photodetector. The developed electrical signal commensurate with the intensity of radiation. A recorder responsive to the electrical signal provides an indication of certain characteristics of the substance. NASA

N73-22049# Defence Research Analysis Establishment, Ottawa (Ontario).
SOME RESULTS OF A TEST AT CANADIAN FORCES BASE UPLANDS OF A MEASURE OF WORK AND RESPONSIBILITY
D. R. Hansen Feb. 1973 33 p refs
(DRAE-M45) Avail: NTIS HC $3.75

A pilot study has shown time-span of discretion to be applicable as a measure of military work and responsibility. Based on this measure, the median value of work level for each military rank except three, showed a significant and systematic upward progression with increased rank. The three exceptions proved to be the ones which were either known or suspected to constitute anomalies in the rank structure. The uniformity of the progression of time-span with rank lends support to those who contend that time-span of discretion is the measure used intuitively by everyone to assess level of work. The results of the study indicate that more extensive testing of these methods is merited. Author

N73-22050# Joint Publications Research Service, Arlington, Va.
THE HUMAN FACTOR IN CONTEMPORARY TECHNOLOGY
V. M. Munipov and V. P. Zinchenko 19 Apr. 1973 17 p refs Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 11, 1972 p 43-55
(JPRS-58792) Avail: NTIS HC $3.00

An examination was made of the methodological problems of ergonomics. Author

N73-22051# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
THE EFFECT OF LOW VISIBILITY ON THE PERFORMANCE OF VEHICLE OPERATORS
Ronald Liston Aug. 1972 17 p
(AD-749248; CCRL-TR-237) Avail: NTIS HC $3.00 CSCL 05/9

An experimental program to identify the relationship between low visibility conditions and operator performance is discussed. Average speed in negotiating a controlled course is taken as the measure of operator performance. The method to measure visibility is discussed. It is shown that despite use of a contrived test course and artificially reduced visibility, the results appear valid. It is also shown that the relationship between visibility conditions and average speed can be represented with a simple, second order equation. Author

N73-22052# Human Engineering Labs., Aberdeen Proving Ground, Md.
SOME ASPECTS OF INDIVIDUAL DIFFERENCES IN SCHEMATIC CONCEPT FORMATION
Sam H. Lane and Selby H. Evans Mar. 1972 37 p refs
(AD-744781; HEL-TM-9-72; Rept-73-00839) Avail: NTIS HC $4.00 CSCL 05/10

A series of studies is presented in an inital attempt to address issues thought to be related to individual differences in schematic concept formation (SCF). The first two studies were concerned primarily with task development. It was found that a task which required the subject to distinguish pattern from noise demonstrated relatively clear individual differences in learning. The remainder of the studies sought to explore the potential relationship between SCF performance and the traditional individual differences variables of personality, intelligence and race. With regard to personality, no relationship was found between SCF performance and performance on Witkin's Embedded Figures Test. Consistent with previous work, SCF performance was found to be moderately related to traditonal measures of classroom performance (I.Q. and math achievement). It also appeared that some aspects of classroom behavior, as measured by teacher ratings, were related to SCF, but not to I.Q. With regard to the variable of race, preliminary data suggests that the SCF performance of lower socio-economic class black sixth-graders is comparable to that of their white, middle-class counterparts. Author

N73-22053# Human Engineering Labs., Aberdeen Proving Ground, Md.
THE EFFECT OF HELMET FORM ON HEARING: FREE-FIELD THRESHOLDS
R. Bradley Randall and Howard H. Holland Apr. 1972 19 p refs
(AD-745121; HEL-TM-5-72; Rept-73-00842) Avail: NTIS HC $3.00 CSCL 06/17

Audiometric thresholds were determined for 12 subjects under three head conditions: bareheaded, while wearing an M1 helmet, and wearing and experimental helmet. The thresholds were measured for seven tones: 125, 250, 500, 1000, 2000, 4000 and 8000 Hz, at each of five angular orientations. Statistically significant differences were found for all main effects and interactions. The experimental helmet was not significantly different from the bareheaded condition. The high-frequency attenuation characteristics of the M1 helmet were responsbile for the statistically significant differences between head conditions. The differences are of little practical significance, however, since they fall within the range of variation most people experience on a day-to-day basis. Author

N73-22054# Naval Submarine Medical Center, Groton, Conn.
STUDIES IN ENLISTED SUBMARINER MOTIVATION. 1: SOME ETIOLOGICAL FACTORS RELATED TO DEVOLUNTEERING OF SUBMARINE SCHOOL CANDIDATES
Ernest M. Noddin 2 Mar. 1972 14 p refs
(AD-749324; SubMedCenter-703; Rept-73-00836) Avail: NTIS HC $3.00 CSCL 05/10

Questionnaire data pertaining to the circumstances surrounding a submarine crewmember's decision to devolunteer were collected from 101 enlisted men following Submarine School graduation. Thirteen classes of motives resulted from a content analysis of these data. The four major motivational categories in descending order of incidence were: habitability factors, motivation deficiencies, maladjustive indices, and family problems. Habitability factors and motivation deficiencies account for most of the devolunteering of the lower paygrade men assigned to the diesel submarine fleet. In contrast, the higher-rated, nuclear-trained submariners appeared to have devolunteered largely because of problems related to family adjustment, and to a lesser extent, because of the perceived dangers of submarine duty. Across all subgroups within this sample, 25% or more apparently had some type of maladjustive trend associated with and probably casually related to the decision to devolunteer. Several approaches counteractive to the major causes of devolunteering delineated by this study were presented. Author

N73-22055*# Stanford Research Inst., Menlo Park, Calif.
STUDIES TO DESIGN AND DEVELOP IMPROVED REMOTE MANIPULATOR SYSTEMS
J. W. Hill and A. J. Sword Washington NASA Apr. 1973 165 p refs
(Contract NAS2-6680)
(NASA-CR-2238) Avail: NTIS HC $3.00 CSCL 05H

Remote manipulator control considered is based on several levels of automatic supervision which derives manipulator commands from an analysis of sensor states and task requirements. Principle sensors are manipulator joint position, tactile, and currents. The tactile sensor states can be displayed visually

in perspective or replicated in the operator's control handle of perceived by the automatic supervisor. Studies are reported on control organization, operator performance and system performance measures. Unusual hardware and software details are described. Author

N73-22056# Human Engineering Labs., Aberdeen Proving Ground, Md.
PERCEPTION OF SYMMETRICALLY DISTRIBUTED WEIGHT ON THE HEAD
R. Douglas Jones, Bernard M. Corona, Paul H. Ellis, R. Bradley Randall, and Hayden A. Scheetz Apr. 1972 13 p refs
(AD-748412; HEL-TN-4-72; Rept-73-00841). Avail: NTIS HC $3.00 CSCL 05/5

Thirty-eight enlisted men, 18 ordnance and 20 infantrymen, judged whether experimentally weighted helmets were heavier, lighter or the same weight as the reference M1 helmet. The findings indicate a lower difference threshold of 2.0 pounds and an upper difference threshold of 3.85 pounds for the combined groups. The Ordnance group's lower difference threshold was 2.25 pounds, while the Infantry group's lower threshold was 1.8 pounds. The upper threshold for the Ordnance group was calculated to be 3.9 pounds, while the Infantry group's upper threshold was 3.8 pounds. The differences were statistically significant. It was concluded that complaints about the present helmet being too heavy are not based on particularly accuracy perception of weight on head and that Infantrymen are not as accurate in their judgments of weight on the head as the soldier with less field experience with the M1 helmet. Author

N73-22057# American Optical Co., Southbridge, Mass. Research Div.
GLASS OCULAR LASER PROTECTIVE FILTERS Final Report, 1 Apr. 1971 - 1 Aug. 1972
Richard F. Woodcock Oct. 1972 35 p refs
(Contract F41609-71-C-0017; AF Proj. 7784)
(AD-755406; TR-619-F) Avail: NTIS CSCL 06/17

The report describes a research study to develop a filter material with an optical density of 4 or greater at 0.694, 1 to 6, and 6 to 10.6 micrometers, but maintaining a luminous transmittance of 50% or better. Prime emphasis was placed on meeting or exceeding the luminous transmittance requirement wherein lies the major benefits as well as the major technical problems. The research included an investigation of the effect on spectral properties of glass compositions prepared with CuO, FeO, rare-earth oxides, various host glass ingredients and various melt conditions; either singly or in combination. The 0.694 micrometer requirement was deleted following a review of the above research program. Melt conditions and composition were finalized for 5-7 kg sized melts and enough melts were made to fabricate 50 pairs of spectacles and 10 plates (6 in. x 6 in.) from this material. The spectacles had an optical density greater than 4 at the desired wavelengths and a luminous transmittance greater than 60%. Author (GRA)

N73-22058# Navy Experimental Diving Unit, Washington, D.C.
INFLUENCE OF INCREASED AMBIENT PRESSURE AND GAS DENSITY ON CARDIAC RATE IN MAN Final Report
Edward T. Flynn, Thomas E. Berghage, and E. Fisher Coil 1 Aug. 1972 40 p refs
(AD-755129; NEDU-4-72) Avail: NTIS CSCL 06/19

Heart rate was measured in ten normal male subjects in a hyperbaric chamber during a two phase study. In phase I graded exercise was performed at ambient pressures of 1.0, 3.27, and 5.45 Ata. At these depths, subject breathed a gas mixture having a density equal to that of the surface (1.0 Ata.) and then gas mixtures having greater densities. In phase II heart rate was recorded during an extended saturation dive. Graded exercise was performed at pressures of 1, 5.54, 10.09, 19.18, and 26.75 Ata. During all these exposures subjects breathed the ambient oxygen, helium, and nitrogen chamber atmosphere. The results of these studies suggest that both the increase in ambient pressure and the increase in inspired gas density contribute to the development of bradycardia under hyperbaric conditions. Author (GRA)

N73-22059# Indiana Univ., Bloomington. Dept. of Anatomy and Physiology.
PHYSIOLOGICAL ADJUSTMENTS TO ENVIRONMENTAL FACTORS Final Report, 1967 - 1972
Reynaldo S. Elizondo, Mukul R. Banerjee, Nelson E. Leatherman, Sherwin Mizell, J. Robert Hippensteele, James Heersma, and Howard H. Rostorfer 13 Dec. 1972 156 p refs
(Contract F44620-68-C-0014; AF Proj. 9562; Proj. THEMIS) (AD-753913; AFOSR-72-1453TR) Avail: NTIS CSCL 06/19

The report covers the entire scientific effort sustained by Project Themis Contract F44620-68-C-0014 over the 5-year period under the direction of Robert W. Bullard and the year following his death on June 24, 1971. With it are furnished the scientific publications by year, the meetings attended, the abstracts and the review article by Robert W. Bullard. The report also includes the advantages the project has given the department in creating a biophysical approach to physiology, and the advantage to general recruitment of physiologists. The 40 published scientific journal articles adequately summarize the scientific results of this project. Author (GRA)

N73-22924* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE EKG ISOLATOR AND CARDIOTACHOMETER SYSTEM
Hubert E. Smith *In its* Res. Achievements Rev., Vol. 4, Rept. No. 7 Feb. 1973 p 113-117

CSCL 06B

An electrocardiogram (EKG) isolator to protect test subjects from electric shock in event of malfunction is described. The hazards connected with the use of EKG equipment are discussed. The equipment and circuits which were developed to protect the patient from accidental electrocution are presented. The development of a cardiotachometer system for use with the EKG isolator to visually display the heart rate is presented. The cardiotachometer is a digital system which uses the time between two consecutive pulses to calculate and display the heart rate in beats per minute. Author

N73-22925* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FREE FLYING TELEOPERATOR
Herman T. Blaise *In its* Res. Achievements Rev., Vol. 4, Rept. No. 7 Feb. 1973 p 119-133

CSCL 05H

The development and evaluation of free flying teleoperators are discussed. The free flying teleoperators include a wide spectrum of manipulator and maneuvering devices ranging from those that are directly controlled by a human operator, through supervisory control, to relatively autonomous control. The factors influencing space teleoperator development are listed as: (1) terrestrial experience of operating mechanical/electrical devices in a hostile environment, (2) a need to extend human capability in space, (3) to reduce the space and planetary exploration costs, and (4) to contribute to astronaut safety. Author

N73-23022 Franklin Inst. Research Labs., Philadelphia, Pa.
COOPERATIVE INVESTIGATION OF THE CARIBBEAN AND ADJACENT REGIONS, CICAR. VOLUME 2: BIBLIOGRAPHY ON MARINE BIOLOGY
Rockville, Md. Natl. Oceanog. Data Center Aug. 1972 249 p refs Sponsored by Natl. Oceanog. Data Center.
Avail: Issuing Activity

An extensive compilation of literature on the marine biology of the Caribbean Sea, Gulf of Mexico, Greater and Lesser Antilles regions, and the adjacent areas of North, Central, and South America is reported. All references appear chronologically and are alphabetized by author within year. A subject matter index, an author index, and a geographic index are included. Author

N73-23023 Franklin Inst. Research Labs., Philadelphia, Pa.
COOPERATIVE INVESTIGATION OF THE CARIBBEAN AND ADJACENT REGIONS, CICAR. VOLUME 3: BIBLIOGRAPHY

ON MARINE GEOLOGY AND GEOPHYSICS
Rockville, Md. Natl. Oceanog. Data Center Aug. 1972 244 p refs Sponsored by Natl. Oceanog. Data Center
Avail: Issuing Activity

An extensive compilation of literature on the marine geology and geophysics of the Caribbean Sea, Gulf of Mexico, Greater and Lesser Antilles regions, and the adjacent regions of North, Central, and South America is reported. All references appear chronologically and are alphabetized by author within a year. A subject matter index, an author index, and a geographic index are included. Author

N73-23024# Joint Publications Research Service, Arlington, Va.
SPACE BIOLOGY AND MEDICINE, NO. 2, 1973
15 May 1973 145 p refs Transl. into ENGLISH of Kosmich. Biol. i Med. (Moscow), no. 2, Mar. - Apr. 1973
(JPRS-59015) Avail: NTIS HC $9.25

Research activities reported consider the selection and training of astronauts for space flight. Emphasis is placed on the physiological effects on the human component in the man-spaceship system, and environmental simulation of these effects.

N73-23025 Joint Publications Research Service, Arlington, Va.
MICROBIOLOGICAL INVESTIGATIONS DURING SPACE-FLIGHT
A. A. Lukin and G. P. Parfenov *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 1-15 refs

A review of the Soviet and foreign literature concerning microbiological investigations in space during the period 1930 - 1970 is presented. It covers the results of experiments carried out aboard balloons, high altitude rockets and earth satellites. It is concluded that weightlessness exerts no significant effect on the growth, development, cell and nuclear division and mutagenesis of microorganisms; it produces no modifying influence on the radiation effect. A number of contradictions in experimental findings are discussed and immediate tasks of microbiological investigations on future space missions are outlined. Author

N73-23026 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF SOME BLOOD INDICES IN WHITE RATS EXPOSED TO SIXTY DAY HYPOKINESIA
P. V. Vasilyev, N. N. Uglova, A. I. Volozhin, and V. Ye. Potkin *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 16-21 refs

The effect of 5, 10, 20, 40 and 60 days of hypokinesia on circulating plasma volume, red blood cell count, hemoglobin content and hematocrit index was studied using 100 white rats. Under the influence of prolonged hypokinesia the experimental animals developed insignificant changes in the total volume of circulating plasma and blood, a distinct increase in the hematocrit, red blood cell count and hemoglobin, and weight losses. The fact that the circulating plasma volume of hypokinetic animals remained unaltered suggests that the horizontal position of animals excludes the possibility of activating the Henry-Gauer reflex as the triggering mechanism bringing about a decrease in the circulating plasma volume. Author

N73-23027 Joint Publications Research Service, Arlington, Va.
CONTENT OF PROTEIN AND NUCLEIC ACIDS IN THE TISSUES OF ANIMALS DURING HYPOKINESIA
I. V. Fedorov and I. F. Shurova *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 22-28 refs

The protein and nucleic acid content and weight of the gastrocnemius muscles were determined in rats in the organs and tissues on the 15th, 20th, 30th and 60th days. It was established that the weight of the gastrocnemius muscles decreased by almost a factor of two, the protein content in them decreased substantially and the DNA and RNA quantity increased. The content of proteins also decreased in the tissues of the liver, kidneys and heart; the DNA quantity did not change, whereas the RNA quantity either did not change or in certain periods increased. Author

N73-23028 Joint Publications Research Service, Arlington, Va.
FUNCTIONAL STATE OF THE SKELETAL MUSCLES OF RATS DURING PROLONGED RESTRICTION OF MOBILITY (UP TO 120 DAYS)
V. S. Oganov and A. N. Potapov *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 29-36 refs

In acute experiments in situ, the state of the skeletal muscles of the lower leg in an isometric regime during the course of four month hypokinesia was studied. The depressing effect of hypokinesia on the functional state of the skeletal muscles was manifested in a slowing of the time of development and decrease in strength of the soleus muscle, a decrease in the frequency of fused tetanus and the strength of individual and tetanic responses of the investigated muscles. Author

N73-23029 Joint Publications Research Service, Arlington, Va.
EFFECT OF PROLONGED HYPOKINESIA ON SOME INDICES OF ENERGY METABOLISM IN THE SKELETAL MUSCLES AND IN SOME INTERNAL ORGANS
N. P. Rassolva, A. N. Potapov, I. M. Sapelkina, and I. I. Grebennikova *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 37-46 refs

Metabolic changes in the skeletal muscles, the heart and liver of rats exposed to 120-day hypokinesia were investigated. As the exposure continued, oxidative phosphorylation decreased and anaerobic oxidation increased. This was very clear in the skeletal muscles and less distinct in the myocardium and liver. The muscles also showed morphological signs of atrophy. These changes can be attributed to the cumulative effect of hypokinesia as such and chronic stress. Author

N73-23030 Joint Publications Research Service, Arlington, Va.
CEREBELLAR REACTIONS DURING DIFFERENT REGIMES OF ROTATION OF ANIMALS ON A CENTRIFUGE
L. D. Klimovskaya and N. P. Smirnova *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 47-54 refs

The possibility of modifying cerebellar responses of rats to centripetal accelerations was studied for different rotation regimes. It is shown that: (1) the level of inhibition of the induced potential has an insignificant dependence on the rate of acceleration increment from 4 to 10 g; (2) the acceleration effect increases noticeably with the duration of rotation even at low intensities; (3) the effect of an exposure to 10 g is not associated with preexposure to accelerations of 6 and 10 g; (4) the effect of an exposure to 10 g does not depend on preliminary daily exposures to accelerations of 2 to 8 g. The experiments with the mentioned accelerations reveal neither accumulation of the acceleration effect nor cerebellar adaptation to it. Author

N73-23031 Joint Publications Research Service, Arlington, Va.
ASYMMETRY OF OTOLITHIC REACTIONS IN FISH
G. I. Samarin and B. B. Yegorov *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 55-59 refs

Experiments were carried out using nine adult pikes. Eye tonic movement in response to displacement of the statolith of the left and right utriculus is referred to as the otolith reaction. A statistically significant asymmetry of the sensitivity of otolithic receptors was established. This asymmetry of the otolithic apparatus may possibly be one of the factors causing vestibular disturbances in cosmonauts during spaceflight. Author

N73-23032 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF THE EFFECT OF INCREASED OXYGEN CONCENTRATIONS ON CHLORELLA METABOLISM
G. I. Meleshko, A. A. Antonyan, A. I. Kazakov, and Ye. K. Lebedeva *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 60-65 refs

The intensity of Chlorella photosynthesis is linearly dependent on atmospheric oxygen concentration. In the range of 5-50 percent O2 an increase in the oxygen concentration by 10 percent decreases photosynthesis intensity on the average by 15 percent of the initial level. An increase in atmospheric oxygen concentra-

tion results in an increase in the content of biogenous elements in algal cells. An increase in the nitrogen content in cells was caused by the nonprotein fraction of organic nitrogen, whereas an increase in the quantity of phosphorus in cells occurs at the expense of the acid soluble fraction of organic phosphorus.
Author

N73-23033 Joint Publications Research Service, Arlington, Va.
EFFECT OF RADIOPROTECTANTS ON FUNCTIONAL STATE OF THE VESTIBULAR ANALYZER
L. N. Suslova, V. I. Yefimov, L. N. Kornilova, P. I. Kumets, and A. A. Losev *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 66-72 refs

The radioprotectants ambratine (cysteaminehydrotartrate with pyridoxine), mexamine (5-methyoxytryptamine) and vitamin-amino acid complex (amitetravite) in the tested doses produced no negative effect on the state of the vestibular analyzer and induced no decrease in vestibular stability of animals and humans. It is suggested that vestibular reactions be used in evaluating the effect of radioprotectants on the living organism. Author

N73-23034 Joint Publications Research Service, Arlington, Va.
EFFECT OF PERMANENT MAGNETIC FIELDS UP TO 4500 OE ON THE MITOTIC ACTIVITY OF CORNEAL EPITHELIAL CELLS IN MICE
G. V. Galaktionova and A. D. Strzhizhovskiy *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 73-77 refs

The biological affect of permanent magnetic fields of 1,000 and 4,500 oe on the physiological regeneration of corneal epithelial cells of mice is studied. It is shown that an exposure to these fields of 10 to 180 minutes in duration causes a reversible inhibition of mitotic activity, the level of which is related to field parameters. The exposure induces no changes in the frequency of aberrant mitoses and the number of cells in the microscope standard field of view. The exposure produces no effect on the rate of mitotic processes. Author

N73-23035 Joint Publications Research Service, Arlington, Va.
EFFECT OF PROTEIN QUALITY IN THE RATION OF RATS ON THEIR TOLERANCE OF ACUTE HYPOXIA
V. I. Fofanov, N. A. Agadzhanyan, G. I. Kozinets, and A. V. Sergiyenko *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 78-84 refs

The relationship between the quality of protein in the diet of rats and their tolerance to acute hypoxia has been studied. It was found that the lack of animal protein in the diet decreases substantially the altitude tolerance of sexually immature animals. The collected data indicate that the nutrient proteins are very important for the formation of the animal body. Author

N73-23037 Joint Publications Research Service, Arlington, Va.
CHANGE IN CARDIAC ACTIVITY AND ITS PHASE STRUCTURE DURING LOWER BODY DECOMPRESSION
V. G. Voloshin and L. Ya. Divina *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 91-97 refs

The phase structure of the cardiac cycle was studied during exposure of test subjects to lower body negative pressure of -40, -50 and -80 mm Hg. The following changes were observed: an increase in the periods of isometric contraction and tension, a decrease in the ejection phase and the mechanical systole, an increase in the index of myocardial tension and the systolic index, and an increase in heart rate. The level of these changes was related to the LBNP value. Alternations in the phase structure of the cardiac cycle induced by LBNP of -50 mm Hg were similar to those seen during a tilt test. The syndrome of myocardial hypodynamics that developed thereby may result from a decreased venous return to the heart. Author

N73-23038 Joint Publications Research Service, Arlington, Va.
REACTIONS OF EYE RETINAL VESSELS AND INTRAOCULAR PRESSURE DURING MAN'S 120 DAY RESTRICTION TO A HORIZONTAL POSITION
M. P. Kuzmin *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 98-104 refs

The results of measurements of diastolic pressure in the central retinal artery, blood pressure in the brachial artery, caliber of retinal vessels and intraocular pressure in 10 healthy male test subjects during a 120 day bed rest experiment are reported. Simultaneous phasic changes in the above indices giving evidence of a shift in the tone of retinal vessels were found. At the end of the bed rest experiment and during recovery these indices were similar to the reference levels. During the experiment the intraocular pressure increased, attaining the upper normal limit.
Author

N73-23039 Joint Publications Research Service, Arlington, Va.
WAYS TO INCREASE EFFECTIVENESS OF PHYSICAL TRAINING
V. A. Tishler, V. V. Bazhanov, N. I. Goltsman, L. S. Aleyev, S. G. Bunimovich, and B. Ya. Spichinetskiy *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 105-112 refs

The combined use of bioelectric monitoring and motion picture survey for optimal in-flight physical training of astronauts is outlined. A system for reproducing human movement is used to formulate the bioelectric monitoring program that includes participation of several muscles in the performance of a definite movement and adapts to the individual peculiarities of the human performer. It is concluded that astronaut physical training effectiveness increases substantially with use of the recorded stabilograms. G.G.

N73-23040 Joint Publications Research Service, Arlington, Va.
EFFECT OF VESTIBULAR ANALYZER IRRITATION UNDER HYPOXIC CONDITIONS ON SOME VISUAL ANALYZER FUNCTIONS
S. S. Markaryan, N. T. Drozdova, and I. A. Sidelnikov *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 113-119 refs

After irritation of the vestibular analyzer by the method of continuous accumulation of Coriolis accelerations (CACA), in the control and under hypoxic conditions a study was made of the dynamics of changes in the visual functions (acuity and field of view, caliber of retinal vessels). A definite dependence between changes in visual functions and the degree of vestibular stability was found: in vestibularly stable persons the visual acuity and field of view did not change; dilatation of the retinal vessels was noted. In persons with well expressed symptoms of vestibular-autonomic disorders one could observe spasm of the retinal vessels and a decrease in visual acuity and the field of view. With breathing of a hypoxic mixture the caliber of the retinal vessels increased but the visual acuity and field of view decreased. Author

N73-23041 Joint Publications Research Service, Arlington, Va.
INVESTIGATION OF CHROMOSOMAL ABERRATIONS IN LYMPHOCYTES OF HUMAN PERIPHERAL BLOOD WITH IN VITRO EXPOSURE TO 645-MeV PROTONS AND X-RAYS
N. I. Ryzhov, A. M. Totseva, R. D. Govorun, T. S. Malyutina, and V. N. Gerasimenko *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 120-127 refs

Lymphocytes of the human peripheral blood in the presynthetic phase of the mitotic cycle were irradiated in vitro by 645-MeV protons in doses of 25 to 400 rad. The tabulated data reveal no differences in the induction of chromosomal aberrations by protons and X-rays. Author

N73-23042 Joint Publications Research Service, Arlington, Va.
COMPUTATION OF THE CORIOLIS ACCELERATION ACTING ON RECEPTORS OF HUMAN SEMICIRCULAR CANALS IN ROTATING SYSTEMS
I. Yu. Sarkisov *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 128-132 refs

The general rules for determining the strength and directions of the Coriolis forces acting on the receptors of the semicircular

canals in tests used for the vestibular selection and training of flight personnel and cosmonauts are studied. Author

N73-23043 Joint Publications Research Service, Arlington, Va.
EFFECT OF RESTRICTION OF MOTOR ACTIVITY OF ANIMALS ON THEIR TOLERANCE TO AN ACUTE EXPOSURE TO CARBON MONOXIDE
B. I. Abidin, V. I. Belkin, L. T. Poddubnaya, and G. D. Yukhnovskiy *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 133-135 refs

The influence of hypokinesia on the tolerance of rats in acute exposure to carbon monoxide atmospheres was studied. Experimental data indicated that hypokinesia reduced rat tolerance to carbon monoxide poisoning. G.G.

N73-23044 Joint Publications Research Service, Arlington, Va.
NEW BOOK ON THE GRAVITATIONAL RECEPTOR
In its Space Biol. and Med., No. 2, 1973 15 May 1973 p 136-138 ref

As a result of the vigorous development of space technology and the increasing duration and range of flights the problem of the interaction between living organisms and the earth's gravitational field has become very timely. The reviewed monograph is devoted to one of the aspects of this problem: structural evolution of the vestibular apparatus. The book is based on experimental data; evolution of the organs sensing gravitation is traced, beginning with single-cell organisms and ranging through mammals. Author

N73-23045 Joint Publications Research Service, Arlington, Va.
FOURTH ALL-UNION CONFERENCE ON SPACE BIOLOGY AND AEROSPACE MEDICINE
M. I. Kozar *In its* Space Biol. and Med., No. 2, 1973 15 May 1973 p 139-140 Conf. held at Kaluga, USSR, 24-27 Oct. 1972

The conference on exobiology and aerospace medicine considers various problems of human exposure to space flight conditions. Special emphasis is given to the prevention of flight accidents, psychophysiological effects, life support systems, and instrumentation for conducting in-flight medical investigations. G.G.

N73-23046# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
LITERATURE REVIEW OF HUMAN MACULAR ABSORPTION IN THE VISIBLE AND ITS CONSEQUENCES FOR THE CONE RECEPTOR PRIMARIES
J. J. Vos 1972 17 p refs
(IZF-1972-17) Avail: NTIS HC $3.00

All major studies on the absorption of the human macular pigment are gathered and evaluated, and compared with a weighted mean curve. A new standard density spectrum is proposed, which slightly deviates in shape from this weighted mean curve, but has significantly lower peak value. This new density spectrum is used to correct the cone system action spectra to primaries at the receptor level. Author

N73-23047# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
CALCULATIONS ON THE OPTICAL MODULATION TRANSFER OF THE HUMAN EYE FOR WHITE LIGHT
A. VanMeeteren 1973 31 p refs
(A72/KL/075)
(IZF-1973-2) Avail: NTIS HC $3.75

Modulation transfer function of the dioptrics of the human eye for white light were calculated for different pupil sizes from experimental data on the aberrations. The largest aberration is the chromatic difference of focus. Since this is well known quantitatively and is subject to small individual differences the calculated modulation transfer functions are considered representative for human eyes in general. In present calculations, the funds reflection measurements of the line scattering confirm each other. Modulation transfer is worse in vision mediated by rods due to lack of the Stiles-Crawford apodization and because of more pronounced chromatic aberration in the scotopic spectral sensitivity range. In the relevant range of low spatial frequencies this difference is small however. Author

N73-23048# Medical Biological Lab. RVO-TNO, The Hague (Netherlands).
BIOLOGICAL EFFECTS OF MICROWAVE RADIATION. PART 1
H. Heering and P. M. M. VanOsch Nov. 1971 45 p refs
(MBL-1971-7-Pt-1) Avail: NTIS HC $4.25

The only biological effects of MWR that until now could be proved experimentally with certainty are purely thermal in nature: the heating and sometimes subsequent damaging of biological material due to absorption of high-intensity microwaves. Although not completely explained by theory, the mechanism of thermal effects of microwave exposure appears to be reasonably well understood. In practice the effects due to overheating can be prevented rather easily. Author

N73-23049# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
VISUALLY EVOKED CORTICAL POTENTIALS TO PATTERNED STIMULI IN MONKEY AND MAN
P. Padmos, J. J. Haaijman, and H. Spekreijse 1972 24 p refs
(IZF-1972-24) Avail: NTIS HC $3.25

Scalp responses evoked by patterned visual stimuli and by changes in luminance were recorded both from human subjects and monkeys. Three models are proposed to explain the observed stimulus-response relations: (1) Luminance detection by first order summing units; (2) a center-surround antagonistic mechanism which enhances responses to spatial patterning (3) contour detection by ordered arrays of overlapping receptive fields. Implications of the three hypotheses are discussed. Experimental evidence is presented which shows that a definite contour specific response component can be observed in most human subjects. Spatial frequency selectivity by center-surround antagonism seems in most plausible explanation of results in monkey. The difference between human and monkey stimulus-response relationships are tentatively explained by differences in cortical architecture assuming origination of the spatial frequency selectivity in striate cortex and a mainly extrastriate origin of the specific contour response. Author

N73-23050# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
PSYCHOPHYSICAL EXPERIMENTS ON TUNING CURVES AND TWO-TONE INHIBITION
T. Houtgast 1972 28 p refs
(IZF-1972-25) Avail: NTIS HC $3.50

Two characteristic features of the neural coding of acoustic stimuli: high frequency selectivity and an effect known as two tone inhibition were investigated by masking-like paradigms, in which a test tone is applied to study the internal representation of a stimulus (masker). In the main part of the experiments a paradigm was used in which masker and probe were presented in continuous alternation. Results on frequency selectivity and two tone inhibition obtained appeared to be in excellent agreement with primary neuron data. Additional experiments, with a number of more traditional masking paradigms, revealed that these results are typical for paradigms using a non-simultaneous probe; with a superimposed probe (direct masking) no effect of two tone inhibition could be demonstrated. Author

N73-23051# Joint Publications Research Service, Arlington, Va.
USE OF OXYGEN FOR REDUCING THE FATIGUE OF MAN IN FLIGHT
I. S. Tomarchenko 17 May 1973 9 p refs Transl. into ENGLISH from Nauch. Dokl. Vyssh. Shk., Biol. Nauka (Moscow), no. 2, 1973 p 31-34
(JPRS-59041) Avail: NTIS HC $3.00

An investigation is presented on the effect of periodic inspiration of oxygen on fatigue in man during an eight hour stay in a pressure chamber which has rarefied air and simulates an altitude of 2400 meters. Author

N73-23052*# Scientific Translation Service, Santa Barbara, Calif.
THE EFFECTS OF THE HYDROSTATIC PRESSURE OF THE WATER BATH ON THE CAPILLARY BLOOD PRESSURE AND ON THE DEHYDRATION OF THE CONNECTIVE TISSUE
H. VonDiringshofen Washington NASA May 1973 15 p refs Transl. into ENGLISH from Z. Kreislaufforsch. (Darmstadt), v 37, 1948 p 382-390
(Contract NASw-2483)
(NASA-TT-F-14894) Avail: NTIS HC $3.00 CSCL 06P

Schade's observations on water exchange between blood and connective tissue dehydration are used to study the effect of water bath hydrostatic pressure on blood pressure. It is found that increased water level in the bath shifts the fluid exchange between blood and connective tissues. Therapeutic possibilities are discussed. Author

N73-23053*# Techtran Corp., Silver Spring, Md.
MEDICAL-BIOLOGICAL PROBLEMS OF SPACEFLIGHT: AN INDEX TO THE RUSSIAN AND FOREIGN LITERATURE
Ye. A. Akhutin, Ye. I. Koltun, M. L. Shvarts, and M. E. Ekshteyn Washington NASA May 1973 501 p refs Transl. into ENGLISH of the book "Mediko-Biologicheskiye Problemy Kosmicheskikh Poletov: Ukazatel Otechestvennoy i Zarubezhnoy Literatury" Moscow, Nauka, 1972 304 p
(Contract NASw-2485)
(NASA-TT-F-14662) Avail: NTIS HC $27.25 CSCL 06S

A bibliography is presented that contains Russian and foreign scientific literature published in the period 1961-1965 concerning the entire complex of medical-biological problems related to man's conquest of space. There are 4724 entries and an author index. The following are the index sections: General problems; space flight and perpectives for conquering space; the influence of space flight factors on the organisms; psychophysiological problems; method of physiological investigations; life support systems; selection and preparation of cosmonauts; appendix: a list of technical reports listed in the index. Author

N73-23054*# Texas A&M Univ., College Station. Dept. of Plant Sciences.
CYTOLOGICAL STUDIES OF LUNAR TREATED TISSUE CULTURES Final Report
Robert S. Halliwell [1972] 53 p refs
(Contract NAS9-12671)
(NASA-CR-128914; BB32-79-217P) Avail: NTIS HC $4.75 CSCL 06A

An electron microscopic study was made of botanical materials, particularly pine tissues, treated with lunar materials collected by Apollo 12 quarantine mission. Results show unusual structural changes within several of the treated tissues. The bodies, as yet unidentified, resemble virus particles observed within infected plant cells. Although the size and shape of the structures are comparable to rod shaped virus particles such as Tobacco mosaic, the numerical distribution, affinity for stains, and intercellular location are different. Author

N73-23055# Joint Publications Research Service, Arlington, Va.
CRYOBIOLOGICAL STUDIES AND SPACE BIOLOGY PROBLEMS
L. K. Lozina-Lozinskiy 23 May 1973 28 p Transl. into ENGLISH from the book "Ocherki po Kriobiologii" Leningrad, Izd-vo Nauka, 1972 p 238-260
(JPRS-59129) Avail: NTIS HC $3.50

The adaptation and reactions of different living systems to low and ultralow temperatures of space are studied. The possibility of the existence of terrestrial organisms under conditions characteristics for the planet Mars is considered with emphasis on effects of radiation and low temperatures. It is shown that cold tolerances of living systems depend on their adaptation to environmental conditions and on the molecular structure and peculiarities of protein and other substances determining the strength of viable cell structures independently of adaptation processes. G.G.

N73-23056*# Department of Health, Education, and Welfare, Phoenix, Ariz. Environmental Microbiology Section.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS Report for Jan. - Mar. 1973
M. S. Favero Mar. 1973 11 p
(NASA Order W-13062)
(NASA-CR-132022; Rept-41) Avail: NTIS HC $3.00 CSCL 06M

The microbiological studies of the Apollo 17 command module pre- and postflight samples are reported. A total of 20 types of microorganisms were identified on preflight and 14 on postflight samples. Changes in biochemical character due to subculture and storage of Bacillus isolates are also reported. F.O.S.

N73-23057# Advisory Group for Aerospace Research and Development, Paris (France).
CURRENT STATUS IN AEROSPACE MEDICINE
Walton L. Jones, ed. (NASA, Washington, D. C.) Feb. 1973 77 p refs Presented at Aerospace Med. Panel Specialist Meeting, Glasgow, Scotland, 7-8 Sep. 1972
(AGARD-CP-110) Avail: NTIS HC $6.00

Proceedings from an aerospace medicine conference are presented, emphasizing human tolerances to various stress factors incurred during flight. The diseases, syringomyelia and hepatitis, are considered in terms of their effect on the flying fitness of personnel. Compound breeding of Rhesus monkeys is included.

N73-23058* National Aeronautics and Space Administration, Washington, D.C.
RECENT NASA AEROSPACE MEDICINE TECHNOLOGY DEVELOPMENTS
Walton L. Jones *In* AGARD Current Status in Aerospace Med. Feb. 1973 8 p refs
CSCL 06E

Areas of life science are being studied to obtain baseline data, strategies, and technology to permit life research in the space environment. The reactions of the cardiovascular system to prolonged weightlessness are also being investigated. Particle deposition in the human lung, independent respiratory support system, food technology, and remotely controlled manipulators are mentioned briefly. J.A.M.

N73-23059 Naval Aerospace Medical Research Lab., New Orleans, La.
NON-FATAL EJECTION VERTEBRAL FRACTURE AND ITS PREVENTION
Channing L. Ewing *In* AGARD Current Status in Aerospace Med. Feb. 1973 8 p refs

Several studies of the nature and extent of the problem were made. Jones et al showed that 21% of 165 U.S. Navy aviators suffered vertebral fracture using a gun-type ejection seat over a 4 1/4 year period 1958-1963. (2) Of these, six were retired on disability and one additional died. Fryer found a 19% incidence in 220 R.A.F. ejection using a similar seat. (3) Hirsch found a 25% incidence in 55 Swedish Air Force ejections using a different seat. (4) More recently, Shannon found that in the U.S.A.F. during CY 1967 and 1968, there were 390 noncombat ejections with 116 persons suffering major nonfatal injury. (5) Forty-one of the major injuries were fractures due to ejection force, and 97% of these were vertebral fractures. In the combat ejections, 89% of major injuries due to ejection force were vertebral fractures, and 80% of all vertebral fractures suffered were due to ejection force. In all, 31% of noncombat and 25% of combat major injuries on ejection were nonfatal ejection vertebral fractures. In both cases the ejection vertebral fractures were the largest single category of major injury. Author

N73-23060 Hellenic Air Force General Hospital, Athens (Greece).
MANAGEMENT OF ASYMPTOMATIC CARRIERS OF HEPATITIS-ASSOCIATED-ANTIGEN (HAA) IN HELLENIC AIR FORCE PERSONNEL
H. G. Vissoulis and C. E. Giannopoulos *In* AGARD Current Status in Aerospace Med. Feb. 1973 4 p refs

A large-scale investigation among Hellenic Air Force personnel was instituted in Jan. 1971 aiming at detecting the asymptomatic HAA carriers and recommending means of prevention, medical disposition and/or elimination from flying and certain specialties. This systematic screening is justified by a high correlation of positive HAA and cases of acute viral hepatitis. A disquieting incidence of 5.2% of asymptomatic HAA carriers was demonstrated. Author

N73-23061 Institute of Aviation Medicine, Fuerstenfeldbruck (West Germany).
SYRINGOMYELIA AND FLYING FITNESS
Guenter Apel *In* AGARD Current Status in Aerospace Med. Feb. 1973 3 p refs

The extent to which the existing syringomyelia had contribution to fatal accidents and the question of specific flying conditions being conducive to an exacerbation of syringomyelia are discussed. Histological examinations of organs of pilots involved in fatal accidents have often revealed diseases, in particular those involving the heart, which may have limited flying fitness.
Author

N73-23062 Johann-Wolfgang-Goethe-Universitat, Frankfurt am Main (West Germany). Arbeitsgruppe fuer Biophysikalische Weltraumforschung.
THE BIOSTACK EXPERIMENT ON APOLLO 16
H. Buecker *In* AGARD Current Status in Aerospace Med. Feb. 1973 6 p refs

The objective of the BIOSTACK experiment, flown onboard Apollo 16, is to study the combined action of individual heavy high energy loss nuclei of cosmic radiation and space flight factors on biological systems in resting state. The results will give information on the mechanism of heavy particles on biological matter. The BIOSTACK experimental package contains a series of monolayers of selected biological objects (Bacillus subtilis spores, Arabidopsis thaliana seeds, Vicia faba radiculae, Artemia salina eggs) with each layer sandwiched between several different physical track detectors (nuclear emulsions, cellulose nitrate, polycarbonate). Individual local evaluation methods were developed which identify each biological effective particle and correlate the individual hitting particle with the produced biological effect. A variety of biological effects due to a single penetrating particle is being analyzed: influence on cellular and tissue development, nuclear damages, and mutation induction. Author

N73-23063* Flugwissenschaftliche Forschungsanstalt, Munich (West Germany). Yerkes Primate Research Center.
BREEDING MONKEYS FOR BIOMEDICAL RESEARCH
Geoffrey H. Bourne, M. Nelly GolarzdeBourne, and Michale E. Keeling *In* AGARD Current Status in Aerospace Med. Feb. 1973 6 p refs
(NASA Order R-10-009-013; Grant RR-00165)
CSCL 06C

Captive bred rhesus monkeys show much less pathology than wild born animals. The monkeys may be bred in cages or in an outdoor compound. Cage bred animals are not psychologically normal which makes then unsuited for some types of space related research. Compound breeding provides contact between mother and infant and an opportunity for the infants to play with their peers which are important requirements to help maintain their behavioral integrity. Offspring harvested after a year in the compound appear behaviorally normal and show little histopathology. Compound breeding is also an economical method for the rapid production of young animals. The colony can double its size about every two and a half years. Author

N73-23065 School of Aerospace Medicine, Brooks AFB, Tex. Applied Physiology Branch.
AEROMEDICAL EVALUATION OF THE PHASED-DILUTION CONCEPT FOR OXYGEN BREATHING SYSTEMS
Robert W. Krutz, Jr., William J. Sears, Kenneth G. Gould, Jr., and Richard W. Bancroft *In* AGARD Current Status in Aerospace Med. Feb. 1973 7 p refs

This series of studies was designed to compare the relative effectiveness of phased-dilution with current demand-diluter oxygen delivery systems in artificially ventilated dogs and in seated, quietly breathing humans. The arterial oxygen tension approximately doubled in the canine model with the phased-dilution oxygen delivery when compared with comparable quantities of premixed oxygen at ground level and at simulated altitudes of 10,000 and 18,000 feet in a decompression chamber. Arterial oxygen tensions in humans breathing in a random fashion were higher with the phased-dilution oxygen delivery system than with comparable quantities of premixed oxygen. Human arterial oxygen tensions measured with the phased-dilution technique at ground level and in a chamber at subatmospheric pressures equivalent to altitudes of 10,000 and 18,000 feet were less than predicted from the canine work. It appears that this more limited effectiveness is closely related to a respiratory dead space effect and is influenced by frequency and depth of breathing with a fixed bolus. Author

N73-23066 Naval Aerospace Medical Research Lab., New Orleans, La.
SPECIALIZED ANTHROPOMETRY REQUIREMENTS FOR PROTECTIVE-EQUIPMENT EVALUATION
Daniel J. Thomas *In* AGARD Current Status in Aerospace Med. Feb. 1973 8 p refs

Anthropometry was considered from the point of view of its application to problems of protective-equipment evaluation, human impact-acceleration experiments, and flying personnel populations. The difficulties of supplying data for all three areas of endeavor are discussed. A three-dimensional anatomically referenced basis for recording anthropometric data is offered as an adequate approach. Coordinate systems for the head and the first thoracic vertebral body are described. Author

N73-23067 Office of the Air Force Surgeon General, Washington, D.C.
HUMAN EXPOSURE CRITERIA TO LASER ENERGY
Donald I. Carter, William E. Mabson, and James F. Culver *In* AGARD Current Status in Aerospace Med. Feb. 1973 5 p ref

The United States Air Force is adapting laser technology to many combat and combat support uses. Some of these uses include distance measuring to assist in aiming airborne guns in the AC-130 gunships, boresighting guns on fighter aircraft, and target marking for accurate aerial bombing. The number of different lasers and their uses are increasing. Since these high energy monochromatic light beams can produce biological damage, safe exposure criteria are needed to assist in developing safe exposure distances, protective devices, and medical surveillance programs. Author

N73-23068 Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome (Italy).
STUDY ON SOME AIR FORCE OPERATIONAL ACTIVITIES IN ITALY, WITH REFERENCE TO THERMAL CONDITIONS AND THEIR EFFECTS ON ACCELERATION TOLERANCE AND PSYCHOMOTOR PERFORMANCE
Paolo Rota *In* AGARD Current Status in Aerospace Med. Feb. 1973 10 p refs

Climate in Italy, in summer period, presents such characteristics that, in Air Force operational activities, performance of AF personnel can be affected. Because of this, a series of researches was carried out, in this field. After a brief survey on main features of Italian climate, and summer climatic conditions in some AF bases, the results are reported on microclimatic data recorded in the interior of the cockpit and inside motor vehicles cabins, while parking in summer daylight period. Physiological importance of these data, and the effects on working efficiency are discussed and evaluated by means of some heat stress indexes. Results of experimental parallel researches are also reported to assess the effects on acceleration tolerance and psychomotor performance, of situations simulating scramble take off. Author

N73-23069*# Wake Forest Univ., Winston-Salem, N.C. Bowman Gray School of Medicine.
FUNCTIONAL PRESERVATION OF VASCULAR SMOOTH MUSCLE TISSUE Final Report, 1 May 1971 - 31 Mar. 1973
W. C. Alexander, P. M. Hutchins, and S. L. Kimzey 30 Mar. 1973 16 p Submitted for publication
(Contract NAS9-11690)
(NASA-CR-128897) Avail: NTIS HC $3.00 CSCL 06P

The ionic and cellular feedback relationships operating to effect the vascular decompensatory modifications were examined to reveal procedures for implementing protective measures guarding against vascular collapse when returning from a weightless environment to that of the earth's gravity. The surgical procedures for preparing the rat cremaster, and the fixation methods are described. Abstracts of publications resulting from this research are included. F.O.S.

N73-23070*# Battelle-Northwest, Richland, Wash.
THE MEASUREMENT OF RADIATION EXPOSURE OF ASTRONAUTS BY RADIOCHEMICAL TECHNIQUES Quarterly Research Report, 3 Apr. - 2 Jul. 1972
R. L. Brodzinski 15 Jul. 1972 22 p refs Sponsored in part by NASA
(Contract AT(45-1)-1830)
(NASA-CR-131984; BNWL-1183-12) Avail: NTIS HC $3.25 CSCL 06R

Cosmic radiation doses to the crews of the Apollo 14, 15, and 16 missions of 142 + or - 80, 340 + or - 80, and 210 + or - 130 mR respectively were calculated from the specific activities of Na-22 and Na-24 in the postflight urine specimens of the astronauts. The specific activity of Fe-59 was higher in the urine than in the feces of the Apollo 14 and 15 astronauts, and a possible explanation is given. The concentrations of K-40, K-42, Cr-51, Co-60, and Cs-137 in the urine are also reported for these astronauts. The radiation doses received by pilots and navigators flying high altitude missions during the solar flare of March 27 to 30, 1972 were calculated from the specific activity of Na-24 in their urine. These values are compared with the expected radiation dose calculated from the known shape and intensity of the proton spectrum and demonstrate the magnitude of atmospheric shielding. The concentrations of Na, K, Rb, Cs, Fe, Co, Ag, Zn, Hg, As, Sb, Se, and Br were measured in the urine specimens from the Apollo 14 and 15 astronauts by neutron activation analysis. The mercury and arsenic levels were much higher than expected. Author (NSA)

N73-23071# Naval Aerospace Medical Inst., Pensacola, Fla.
A LIMITED REVIEW OF THE EFFECT OF CIGARETTE SMOKING ON PERFORMANCE WITH EMPHASIS ON AVIATION
Richard S. Gibson and William F. Moroney 22 Nov. 1972 14 p refs
(AD-754421; NAMI-SR-72-2) Avail: NTIS CSCL 05/10

Increased knowledge concerning the detrimental effects of smoking has created a desire to identify any adverse effects that smoking might have on aircrew performance. A limited review of the literature was undertaken to provide some perspective on the likely effects of smoking on variables related to aircrew performance. The authors concluded that cigarettes do significantly affect various sensory thresholds, but that the significance of these effects appears to be of little practical importance. They also noted that withdrawal does produce significant performance decrements. Author (GRA)

N73-23072# School of Aerospace Medicine, Brooks AFB, Tex.
RED BLOOD CELL DENSITY AND VOLUME CHANGES IN MAN EXPOSED TO HYPOBARIC HYPEROXIA Interim Report, 1 Jul. 1970 - 15 Dec. 1971
William T. Williams and Edward C. Larkin Dec. 1972 15 p refs
(AF Proj. 7930)
(AD-755783; SAM-TR-72-34) Avail: NTIS CSCL 06/19

Eight volunteers were exposed to 100% O2 at 258 mm Hg for 31 days. Blood samples were taken daily, and red cell (RBC) volume distributions were determined by Coulter counter--RBC density distributions, by the method of Danon and Marikovsky. RBC volume distribution varied in a cyclic fashion but exhibited no consistent, significant changes. After 4 to 6 days in the test environment, the RBC populations showed an increase in the proportion of dense cells; and a trend of increasing senescence was evident for the remainder of the exposure period. Postexposure changes indicated the formation of new red cells. Author (GRA)

N73-23073# University of Southern Calif., Los Angeles. Dept. of Medicine.
PHYSIOLOGICAL ADAPTATIONS TO CARBON MONOXIDE LEVELS AND EXERCISE IN NORMAL MEN
C. R. Collier, J. M. Workman, J. G. Mohler, J. Aaronson, and O. Cabula Jul. 1972 23 p refs
(Contract EPA-68-02-0334)
(PB-213834/1; EPA-RI-72-002) Avail: NTIS HC $3.00 CSCL 06P

Normal, young, non-smoking men were studied at rest and during submaximal exercise with carboxyhemoglobin (COHb) levels of about 1% and after breathing CO to raise the COHb level to 8 to 9%. Arterial and mixed venous blood was sampled. The CO caused an increase in minute volume and breathing frequency during exercise but not at rest. However, CO caused no changes in cardiac output, heart rate, lactate, lactate/pyruvate ratio, tidal volume, CO2 output or 2,3 DPG during rest or exercise. The CO caused a decrease in O2 consumption, in arterial-venous O2 content difference and in venous O2 content and venous Po2 during exercise and in the latter two also at rest. Changes in O2 affinity are still being calculated. (GRA)

N73-23074# National Center for Atmospheric Research, Boulder, Colo.
CLIMATE CHANGE AND THE INFLUENCE OF MAN'S ACTIVITIES ON THE GLOBAL ENVIRONMENT
William W. Kellogg Sep. 1972 31 p Presented at Symp. on Energy, Resources and the Environment, Kyoto, 11 Jul. 1972; sponsored in part by Mitre Corp., McLean, Va.
(PB-213676/2; MITRE-72-166; M72-166) Avail: NTIS HC $3.75 CSCL 04B

The history of changes in the earth's climate are traced from the earliest times to the present as recorded in the rocks and ice caps. Man's potential impact on the climate is discussed including the impact of carbon dioxide, particulate matters, albedo changes, irrigation, and the direct release of heat. Preliminary computer calculations indicate that man can influence the climate of the earth and that the direction of this influence in the decade to come must be that of a warming essentially in the Northern Hemisphere. The Arctic Ocean pack ice represents an unstable part of the ocean-atmosphere system in that a warming that would remove the pack ice would produce a major one-way transition. The impacts of such a transition would be very grave for some regions of the earth, but cannot be spelled out to become a disaster for mankind. Author (GRA)

N73-23075# Colorado Univ., Denver. Medical Center.
TIME COURSE OF RESPIRATORY ADAPTATION TO HIGH ALTITUDE Final Report, 1 Jul. 1967 - 30 Sep. 1968
Robert F. Grover, Jerome A. Dempsey, Hubert V. Forster, Marvin L. Birnbaum, William G. Reddan, J. S. Thoden, and J. Rankin Dec. 1972 13 p refs
(Contract DADA17-68-C-8013)
(AD-755192) Avail: NTIS CSCL 06/19

The investigation was undertaken to examine cardiopulmonary adaptations of man to moderately high altitude. Emphasis was placed upon defining the time course of adaptation by examining groups of individuals exposed to chronic hypoxia for periods ranging from 4 days to 31 years. During the first weeks of exposure to high altitude, adaptations in respiratory control are not adequately explained by the popular concepts of hypoxic stimulation of peripheral chemoreceptors, with the resultant hyperventilation causing respiratory alkalosis and a reduction in hydrogen ion concentration of the cerebrospinal fluid (CSF) which is subsequently restored. Rather, exercise plus hypoxia enhance to sensitivity of the peripheral chemoreceptors, while changes in

the pH of CSF are minimal and of little significance. With years of exposure to chronic hypoxia, there is a progressive diminution in the ventilatory response to hypoxic stimulation of the peripheral chemoreceptors. Consequently, the minimal ventilatory response to acute hypoxia seen in men native to high altitude is a trait acquired from many years of exposure to chronic hypoxia, rather than being dependent upon exposure to hypoxia continuously from the time of birth. Author (GRA)

N73-23076# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
ARE SUBJECTIVE PROBABILITIES PROBABILITIES?
G. DeZeeuw and W. A. Wagenaar 1973 35 p refs
(IZF-1973-3) Avail: NTIS HC $3.75

The determination of subjective probability as degree of felt certainty is considered. A detailed analysis is given of the problem of changes in feelings of uncertainty, defined as revisions of opinion. It appears that people seem to program their behavior on the basis of rules derived from computational structures. Such structures provide actions optimal and rational in most familiar situations, are apparently easy to handle, but are not necessarily probabilistic in nature, even where uncertainty prevails. Author

N73-23077# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
PACED AND SELFPACED WORK IN CONTINUOUS REACTION TIME TASKS
W. A. Wagenaar and H. Stakenburg 1973 12 p refs
(IZF-1973-5) Avail: NTIS HC $3.00

In the present experiment RT's were corrected for error rate by relating them to the speed accuracy tradeoff function, which was measured in each experimental session. In this way deciles of the RT distributions of paced and selfpaced conditions were compared, for eight subjects and four successive sessions. The task was a four choice continuous RT task, employing visual stimuli. The results show that RT distributions are wider in the paced conditions. RT's of the first deciles are faster for pacing whereas medians in paced and selfpaced conditions are about equal. The effect of pacing is independant of pacing rate, which suggests that change of RT distribution is not caused by time stress but rather by the paced task structure. Author

N73-23078# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
MUSICAL INTERVAL RECOGNITION WITH SIMULTANEOUS TONES
R. Plomp, W. A. Wagenaar, and A. M. Mimpen 1972 27 p refs
(IZF-1972-20) Avail: NTIS HC $3.50

The perceptual singularity of musical intervals consisting of two simultaneous tones with a simple frequency was studied. Musically sophisticated subjects were presented with the 12 intervals between minor second and octave (within the octave 261.7-523.3 Hz; presentation durations 120, 60, 30, and 15 msec, respectively) and were required to identify which interval had been presented. The experimental results showed clearly, both for simple tone and complex tone intervals, that the subjects confused the intervals in terms of their width rather than their frequency ratio simplicity. These results confirm the view that, for simple tones, tonal consonance is related to interval width. Author

N73-23079*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
OPHTHALMIC METHOD AND APPARATUS Patent Application
John C. Evvard, Donald J. Vargo, and William J. McGannon, inventors (to NASA) Filed 15 Nov. 1971 10 p
(NASA-Case-LEW-11669-1; US-Patent-Appl-SN-198885) Avail: NTIS HC $3.00 CSCL 06L

A method and apparatus for removing material and components such as the lens from an eye are described. High speed rotary cutting members at one end of a rod macerate the lens while an annular tubing disposed around the cutting members vibrates ultrasonically to coact with the cutting members in macerating the lens. At the same time, a liquid is supplied to the chamber behind the cornea of the eye. Spiral grooves extending along the rotating rod from the cutting members evacuate the liquid and the macerated material from the eye. An alternate design of the apparatus includes a tube through which liquid is supplied to the operative site of the ultrasonically vibrating tube and the cutting members in the area of the lens. NASA

N73-23080*# Technology, Inc., Houston, Tex. Life Sciences Div.
SKYLAB FOOD TEST AND INTEGRATION Final Report, 1 May 1971 - 31 Jan. 1973
Charles T. Bourland 31 Jan. 1973 216 p refs
(Contract NAS9-11843)
(NASA-CR-128910) Avail: NTIS HC $13.00 CSCL 06H

The foods and menus developed for the individual astronauts scheduled to participate in Skylab missions are listed. A.L.

N73-23081*# URS/Matrix Co., Houston, Tex. Life and Environmental Sciences Div.
APPLICATION OF EVA GUIDELINES AND DESIGN CRITERIA. VOLUME 1: EVA SELECTION/SYSTEMS DESIGN CONSIDERATIONS Final Report
Nelson E. Brown Apr. 1973 295 p refs 3 Vol.
(Contract NAS9-12997)
(NASA-CR-128926) Avail: NTIS HC $16.75 CSCL 05E

Parameters that require consideration by the planners and designers when planning for man to perform functions outside the vehicle are presented in terms of the impact the extravehicular crewmen and major EV equipment items have on the mission, vehicle, and payload. Summary data on man's performance capabilities in the weightless space environment are also provided. The performance data are based on orbital and transearth EVA from previous space flight programs and earthbound simulations, such as water immersion and zero-g aircraft. Author

N73-23082*# URS/Matrix Co., Houston, Tex. Life and Environmental Sciences Div.
APPLICATION OF EVA GUIDELINES AND DESIGN CRITERIA. VOLUME 2: EVA WORKSTATION CONCEPTUAL DESIGNS Final Report
Nelson E. Brown Apr. 1973 88 p refs 3 Vol.
(Contract NAS9-12997)
(NASA-CR-128927) Avail: NTIS HC $6.50 CSCL 05E

Several EV workstation concepts were developed and are documented. The workstation concepts were developed following a comprehensive analysis of potential EV missions, functions, and tasks as interpreted from NASA and contractor space shuttle and space station studies, mission models, and related reports. The design of a versatile, portable EVA workstation is aimed at reducing the design and development costs for each mission and aiding in the development of on-orbit serviceable payloads. Author

N73-23083*# URS/Matrix Co., Houston, Tex. Life and Environmental Sciences Div.
APPLICATIONS OF EVA GUIDELINES AND DESIGN CRITERIA. VOLUME 3: EVA SYSTEMS COST MODEL FORMATING Final Report
Nelson E. Brown Apr. 1973 75 p refs 3 Vol.
(Contract NAS9-12997)
(NASA-CR-128928) Avail: NTIS HC $5.75 CSCL 05E

The development of a model for estimating the impact of manned EVA costs on future payloads is discussed. Basic information on the EV crewman requirements, equipment, physical and operational characteristics, and vehicle interfaces is provided. The cost model is being designed to allow system designers to quantify the impact of EVA on vehicle and payload systems. Author

N73-23084*# Martin Marietta Corp., Denver, Colo.
REGENERATIVE PARTICULATE FILTER DEVELOPMENT Final Report
Victor A. DesCamp, Michael W. Boex, Michael W. Hussey, and

Thomas P. Larson May 1972 136 p refs
(Contract NAS9-11984)
(NASA-CR-115505; MCR-72-40) Avail: NTIS HC $9.00 CSCL 13K

Development, design, and fabrication of a prototype filter regeneration unit for regenerating clean fluid particle filter elements by using a backflush/jet impingement technique are reported. Development tests were also conducted on a vortex particle separator designed for use in zero gravity environment. A maintainable filter was designed, fabricated and tested that allows filter element replacement without any leakage or spillage of system fluid. Also described are spacecraft fluid system design and filter maintenance techniques with respect to inflight maintenance for the space shuttle and space station. Author

N73-23085*# Massachusetts Inst. of Tech., Cambridge. Dept. of Nutrition and Food Science.
MECHANISMS OF DETERIORATION OF NUTRIENTS PHASE 1 Annual Report
Marcus Karel and James M. Flink [1972] 159 p refs
(Contract NAS9-12485)
(NASA-CR-128915) Avail: NTIS HC $10.00 CSCL 06H

Experimental methods are studied by which freeze-dried foods of improved quality are produced. Considered are: (1) Factors effecting the loss of butanol from frozen aqueous food solutions during storage; (2) a freeze-drying microscope system for observing solidification processes in organic mixtures and aqueous inorganic salt solutions; (3) browning of high quality freeze-dried foods with minimal organoleptic and nutritional detoriation; (4) retention of PVP-n-propanol in freeze-dried food models; and (5) effects of freezing rate and sucrose immersion on taste and texture of freeze-dried apple slices. G.G.

N73-23086*# Boeing Co., Seattle, Wash.
DEGRADATION OF LEARNED SKILLS: EFFECTIVENESS OF PRACTICE METHODS ON VISUAL APPROACH AND LANDING SKILL RETENTION Technical Report, Jul. 1971 - Aug. 1972
Thomas E. Sitterley, Lawrence P. Zaitzeff, and Wayne A. Berge Oct. 1972 99 p refs
(Contract NAS9-10962)
(NASA-CR-128912; D180-15082-1) Avail: NTIS HC $7.00 CSCL 05E

Flight control and procedural task skill degradation, and the effectiveness of retraining methods were evaluated for a simulated space vehicle approach and landing under instrument and visual flight conditions. Fifteen experienced pilots were trained and then tested after 4 months either without the benefits of practice or with static rehearsal, dynamic rehearsal or with dynamic warmup practice. Performance on both the flight control and procedure tasks degraded significantly after 4 months. The rehearsal methods effectively countered procedure task skill degradation, while dynamic rehearsal or a combination of static rehearsal and dynamic warmup practice was required for the flight control tasks. The quality of the retraining methods appeared to be primarily dependent on the efficiency of visual cue reinforcement. Author

N73-23087# Naval Aerospace Medical Research Lab., Pensacola, Fla.
TOWARD THE DEVELOPMENT OF A CRITERION FOR FLEET EFFECTIVENESS IN THE F-4 FIGHTER COMMUNITY
Richard H. Shannon and Wayne L. Waag 5 Dec. 1972 13 p refs
(MF51524002)
(AD-755184; NAMRL-1173) Avail: NTIS CSCL 05/9

A recurring problem in naval aviation has been the lack of adequate criteria for pilot performance in fleet-type aircraft. In a previous investigation, an attempt was made to isolate the most critical skills and procedures within each of the stages comprising East Coast replacement air group (RAG) training in the F-4 aircraft. The present investigation attempted to replicate these findings from the East Coast RAG with data obtained from the West Coast RAG squadron. For each of the stages analyzed in the East Coast RAG squadron, a small set of graded items was selected on the basis that they could adequately discriminate among replacement pilots according to their final RAG grade. The resulting set of items was found to be highly predictive of both the stage grade from which they were obtained and the final RAG grade. Data were obtained from the West Coast RAG squadron in an attempt to replicate these findings. Author (GRA)

N73-23088# Ohio State Univ., Columbus. Dept. of Psychology.
MULTI-TASK TIME-SHARING REQUIREMENTS Final Report, Jun. 1969 - Jul. 1971
George E. Briggs, Ronald P. Fisher, Seth N. Greenberg, James J. Lyons, Gregory L. Peters, and David Shinar Wright-Patterson AFB, Ohio AMRL Aug. 1972 40 p refs
(Contract F33615-69-C-1663; AF Proj. 7183)
(AD-755363; AMRL-TR-71-105) Avail: NTIS CSCL 05/10

Ten laboratory experiments are reported on dual-task performance. A continuous tracking task and a discrete choice reaction time task were used as representative of the kinds of information processing required of an aircraft pilot. The research dealt with three major concerns: a demonstration of the time-sharing effect, an examination of the influence of auditory noise on time-sharing localizing the time-sharing effect in an input, an output or in a central stage of human information processing, and the influence of variations in the tracking task, variations in augmented feedback across tasks, and the influence of auditory noise on dual-task performance. GRA

N73-23089# Naval Postgraduate School, Monterey, Calif.
EFFECTS OF NEUROMUSCULAR TENSION IN THE USE OF AN ISOMETRIC HAND CONTROLLER M.S. Thesis
William Steele Smith, Jr. Dec. 1972 51 p refs
(AD-757252) Avail: NTIS CSCL 05/5

The effects of operator workload on average grip pressure and of neuromuscular tension on tracking performance were the objects of this research. In one experiment, a sub-critical tracking task was performed by the operator while measurements of grip pressure were taken. In a second experiment, the operator was required to maintain average grip pressure at specified levels during 100-second tracking tasks while his RMS tracking error was measured. The results clearly indicate that average grip pressure increases as the workload increases and that higher average grip pressures result in higher RMS tracking error values. Author (GRA)

N73-23090# Instrument Flight Center, Randolph AFB, Tex.
ATC ANGLE OF ATTACK TRAINING Final Report, 3 Sep. 1971 - 18 Jul. 1972
Max L. Odle Jul. 1972 92 p refs
(AD-757243; IFC-TR-72-3) Avail: NTIS CSCL 05/9

An evaluation and study was conducted of the Bendix Standardized Angle of Attack (AOA) System for its use in Air Training Command flying training programs. The Bendix AOA System was installed in T-38, S/N 70-1549 for engineering flight test. The aircraft was then flown to Randolph AFB for pilot factors evaluation and determination of exactly what flying maneuvers could be flown using AOA as the controlling parameter and how AOA should be used in these maneuvers. Subjective data on the procedures and techniques for AOA use were gathered from twelve T-38 instructor pilots from the Pilot Instructor Training (PIT) and Instrument Pilot Instructor School (IPIS) at Randolph AFB. The conclusions from the study are given. (Author Modified Abstract) GRA

N73-23714 Royal Air Force Inst. of Aviation Medicine, Farnborough (England).
HUMAN FACTORS PROBLEMS IN CONFLICT DETECTION AND RESOLUTION
V. D. Hopkin *IN* AGARD *Air Traffic Control Systems* Apr. 1973 6 p ref

Conflict detection and resolution as human factors problems in air traffic control are discussed. It is contended that this assumption is probably incorrect, primarily because of the large differences in urgency, information, procedures and facilities in

various phases of flight. The controller's responses depend on the confidence he has in the data available to him, and on his knowledge of how accurate it is likely to be. Automated aids may not be properly used if they include no indication of the accuracy, quality and comprehensiveness of the data on which automated computations are being made. Relevant research methods for human factors studies on conflict detection and resolution are indicated. Author

N73-23897 Systems Control, Inc., Palo Alto, Calif.
CURRENT STATUS OF MODELS FOR THE HUMAN OPERATOR AS A CONTROLLER AND DECISION MAKER IN MANNED AEROSPACE SYSTEMS
A. V. Phatak and D. L. Kleinman *In* AGARD Automation in Manned Aerospace Systems Mar. 1973 10 p refs

Mathematical models of human decision processes and adaptive behavior have been proposed for specific control situations. Accepted techniques and models for analyzing and predicting human performance in complex multi-control and multi-display situations commonly found in aerospace system are surveyed. The models have been developed or proposed for the related human functions of information processing, decision making and control. The relative advantages, disadvantages and limitations of each of the modeling schemes are discussed and prospects for mechanizing all or part of the decision functions performed by human operators are considered; specific examples being in the automation of human failure detection and adaptation to sudden changes in the system operating conditions. Author

N73-23899 Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
MONTE CARLO SIMULATION OF DEGRADED MAN-MACHINE PERFORMANCE
Gerald P. Chubb *In* AGARD Automation in Manned Aerospace Systems Mar. 1973 11 p refs

System vulnerability is a function of both human and hardware vulnerabilities to anticipated threat environments. The feasibility of considering the interaction of man and machine degradation under nuclear attack conditions has recently been demonstrated. It appears that the technique may be useful in identifying certain situations where automation may be particularly useful under these attack conditions, although the requirement is not obvious from analyses of system performance under nominal operating conditions. The approach taken appears generalizable to other degradation conditions, such as inflight malfunctions and conventional weapons battle damage. Given suggested changes in man-machine task sequencing, the model can aid in assessing how these changes may affect selected systems effectiveness measures. A number of refinements and extensions to the current capabilities of this model are envisioned and briefly discussed. Author

N73-23901 Hawker Siddeley Aviation, Ltd., Hatfield (England).
HUMAN FACTORS IN LOW WEATHER OPERATION OF TRANSPORT AIRCRAFT
J. W. Wilson *In* AGARD Automation in Manned Aerospace Systems Mar. 1973 5 p

Practical experience gained during the manufacturer's flight development testing and airline in-service operation of a failure-survival Category 3 automatic landing system is reviewed for indications of the extent to which human factors have affected the design of the system and the techniques used by the airline in order to reach the very high safety levels that are necessary. The important factors influencing the complexity of the task are: (1) Provision of adequate monitoring devices located in the optimum area of each crew member's primary visual scan, to enable the pilot to keep ahead of the operation of the automatic control systems; (2) application of identical procedures for use in Category 1, 2 or 3 weather; (3) design of the system and development of procedures such that the maximum number of manual and automatic functions that require action, checking or monitoring can be completed before the final stage of the approach to land; and (4) the decision to land should be made as low as possible, compatible with a go-around performance which will not normally result in touchdown. Author

N73-23904* National Aeronautics and Space Administration, Washington, D.C.
POTENTIAL TELEOPERATOR APPLICATIONS IN MANNED AEROSPACE SYSTEMS
Edwin G. Johnsen *In* AGARD Automation in Manned Aerospace Systems Mar. 1973 4 p refs

CSCL 05H

The trend of teleoperator development is toward digital computer controlled systems which utilize local sensor-computer-actuator loops to avoid obstacles and to sense manipulator grip-and-slip. The potential applications of advanced teleoperator technology to manned aerospace systems include long manipulator booms to be mounted on the shuttle. These can transfer cargo from the space shuttle and can acquire and retrieve objects in space. Free-flying teleoperators capable of acquiring, inspecting, repairing or refurbishing satellites in orbit are another space application. Another potential application of teleoperator technology is the concept of using an anthropomorphous teleoperator in lieu of man to control aircraft or spacecraft normally controlled by a human pilot. Author

N73-23905 Boeing Co., Seattle, Wash.
MAN-MACHINE CONSIDERATIONS IN THE DEVELOPMENT OF A COCKPIT FOR AN ADVANCED TACTICAL FIGHTER
S. Joel Premselaar and D. E. Frearson (AFFDL) *In* AGARD Automation in Manned Aerospace Systems Mar. 1973 20 p

A revolutionary cockpit concept for a 1975-85 one-man, multi-mission fighter aircraft completed an initial simulation phase recently. The design goal of this concept is to achieve a one-man workload level by presenting the pilot only the information necessary for the particular mission segment he is performing, and yet provide maximum flexibility in terms of pilot options. Key elements of the cockpit design are: Multiple, time-shared electronic displays; keyboard and voice command computer input devices; wrap-around cockpit arrangement for ease of access to the control-display devices; an integrated total energy command; and a system of dependent automation that permits reduced pilot workload during anomalies. The simulator provides a one-of-a-kind capability for examination of the flight deck design issues involved in tailoring the power and flexibility of the computer to the capabilities and limitations of the human pilot in the performance of his mission. Author

N73-23971* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LIPID ABSORBING POLYMERS
H. E. Marsh, Jr. and C. J. Wallace *In its* Quart. Tech. Rev., Vol. 2, No. 4 Jan. 1973 p 1-6 refs

New polymers have been made that have the unusual property of being capable of absorbing both water and oils. As a result of this property, they are able to absorb lipids from micellar solutions. Lipid absorptions from model bile solution as high as 10% (based on dry polymer weight) in 5 min and 59% at equilibrium were measured. The presence of significant amounts of cholesterol, as well as of bile acid, in the absorbed lipids was confirmed by thin layer chromatography. Author

N73-23972* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
UNIFIED APPROACH TO THE BIOMECHANICS OF DENTAL IMPLANTOLOGY
D. E. Grenoble (Univ. of Southern Calif.) and A. C. Knoell *In its* Quart. Tech. Rev., Vol. 2, No. 4 Jan. 1973 p 7-17 refs

A unified approach is proposed, using multidisciplinary systems technology, for the study of the biomechanical interactions between dental implants and host tissues. The approach progresses from biomechanical modeling and analysis, supported by experimental investigations, through implant design development, clinical verification, and education of the dental practitioner. Author

N73-23980* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE MESA ARIZONA PUPIL TRACKING SYSTEM
D. L. Wright *In its* Quart. Tech. Rev., Vol. 2, No. 4 Jan. 1973 p 87-92
CSCL 05E

A computer-based pupil tracking teacher monitoring system was designed for Mesa Public Schools, Mesa, Arizona. The established objectives of the system were to: (1) facilitate the economical collection and storage of student performance data necessary to objectively evaluate the relative effectiveness of teachers, instructional methods, materials, and applied concepts; and (2) identify, on a daily basis, those students requiring special attention in specific subject areas. The system encompasses computer hardware/software and integrated curricula progression/administration devices. It provides daily evaluation and monitoring of performance as students progress at class or individualized rates. In the process, it notifies the student and collects information necessary to validate or invalidate subject presentation devices, methods, materials, and measurement devices in terms of direct benefit to the students. The system utilizes a small-scale computer (e.g., IBM 1130) to assure low-cost replicability, and may be used for many subjects of instruction. Author

N73-23986 Texas Technological Univ., Lubbock.
WORK-REST SCHEDULES UNDER PROLONGED VIBRATION WITH IMPLICATIONS TO MILITARY OPERATIONS
R. A. Dudek, M. M. Ayoub, M. A. El-Nawawi, and T. M. Khalil *In* Human Eng. Labs. Mil. Requirements for Res. on Continuous Operations Apr. 1972 p 51-69 refs
R. A. Dudek, M. M. Ayoub, M. A. El-Nawawi, and T M Khalil *In* Human Eng. Labs. Mil. Requirements for Res. on Continuous Operations Apr. 1972 p 51-69 refs

(Contract DAAD05-69-C-0102)

Research of work schedules for single and multistation crews subjected to vibrational environments is discussed. Beneficial work schedules and work-rest ratios are provided. Author

N73-23987 Texas Technological Univ., Lubbock.
SELF DETERMINED WORK-REST CYCLES IN THE HEAT
J. D. Ramsey, C. G. Halcomb, and A. K. Mortagy *In* Human Eng. Labs. Mil. Requirements for Res. on Continuous Operations Apr. 1972 p 70-88 refs

(Contract DAAD05-69-C-0102)

The selection of a rest schedule to optimize performance for monitoring type tasks is discussed along with the influence of working in a hot environment on performance and on selection of a work-rest schedule. Self-determined work-rest schedules were investigated for optimizing the subject's performance. It is concluded that using a self-determined work-rest procedure is useful to establish a desirable schedule for performing a task. However, after this is established, a specific schedule should be utilized to avoid those operators who would choose inappropriate schedules. F.O.S.

N73-23988 Louisville Univ., Ky. Performance Research Lab.
APPLICABILITY OF RESEARCH ON SUSTAINED PERFORMANCE, ENDURANCE, AND WORK-REST SCHEDULING TO THE DEVELOPMENT OF CONCEPTS AND DOCTRINE OF CONTINUOUS OPERATIONS
Ben B. Morgan, Jr. and Earl A. Alluisi *In* Human Eng. Labs. Mil. Requirements for Res. on Continuous Operations, Apr. 1972 p 89-115 refs

The effects of work-rest schedules, circadian rhythms, continuous work, and sleep loss on work behavior or sustained performance were studied. A description of this research, including a discussion of the synthetic-work methodology and the multiple-task performance battery that is the foundation of that methodology, is presented. Some of the more important findings of this research are also presented, and the applicability of these findings to the requirements for continuous operations is discussed. Author

N73-23989 Human Factors Research, Inc., Los Angeles, Calif.
SOME OBSERVATIONS FROM A LITERATURE REVIEW TO ANTICIPATE BIOLOGICAL PROBLEMS THAT MIGHT ARISE IN SUSTAINED AND CONTINUOUS OPERATIONS
James F. OHanlon *In* Human Eng. Labs. Mil. Requirements for Res. on Continuous Operations Apr. 1972 p 116-132 refs

(Contract DAHC04-71-C-0015)

The biological effects of sleep deprivation, and the effects of prolonged physical work with respect to present concepts of sustained and continuous operations are discussed. It is concluded that under realistic field conditions, it is expected that the degradation in performance and physiological status will occur rapidly and recovery will be slow as a consequence of the combination and interaction of the effects of numerous stressors. F.O.S.

N73-23990 Texas Technological Univ., Lubbock.
PHYSIOLOGICAL RESPONSE TO PROLONGED MUSCULAR ACTIVITY
M. M. Ayoub, Ed Burkhardt, Gene Coleman, and Nancy Bethea *In* Human Eng. Labs. Mil. Requirements for Res. on Continuous Operations Apr. 1972 p 133-187 refs

(Contract DAAD05-69-C-0102)

The ability of man to work for an extended period of time without fatigue, and the recovery patterns with alternating levels of load were studied to assess the oxygen consumption build-up as the activity progressed. Experiments conducted include: alternating physical loads, eight and sixteen hour experimentation twenty four hour experimentation, and physiological rhythms. Results of the measurements are discussed. F.O.S.

Subject Index

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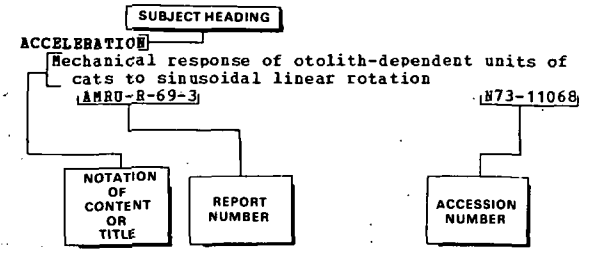

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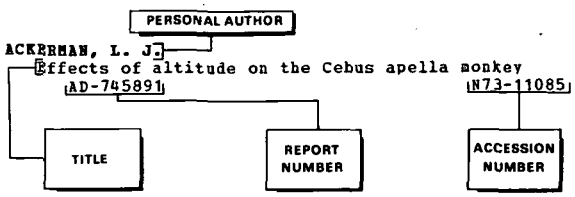

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