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Rossanigo, F. & G. Meineri 1961 [BEHAVIOR OF SOME RESPIRATORY MEASUREMENTS IN PERSONS SUBJECTED TO ACCELERATION ALONG DIFFERENT BODY AXES.] Rev. Med. Aero (Paris) 2:34-39, Dec. 1961 (Fr)

4,300

Rossanigo, F., & G. Meineri 1961 COMPORTAMENTO DI ALCUNE GRANDEZZE RESPIRATORIE IN SOGGETTI SOTTOPOSTI AD ACCELERAZIONI SECONDO DIVERSI ASSI CORPOREI (BEHAVIOR OF SOME RESPIRATORY VALUES IN SUBJECTS EXPOSED TO ACCELERATIONS ALONG DIFFERENT BODY AXES). Rivista di medicina aeronautica e spaziale (Roma) 24(4):485-500, Oct.-Dec. 1961

ABSTRACT: Eight normal men, averaging 28 years of age, were exposed to head-foot and chest-back accelerations on the human centrifuge. The time for each test was approximately 60 seconds, the desired level of acceleration being reached in 4 seconds. Deceleration time was prolonged proportionally to the multiples of g chosen for each given test in order to avoid labyrinthine disturbances. There was observed an increase in pulmonary ventilation proportional to acceleration values and corresponding variations of alveolar gas tension. Slight concurrent variations of vital capacity and inspiratory and expiratory reserve volumes were found, presumably of mechanical origin. More evident and significant phenomena were induced by positive acceleration.

4,301

Rossanigo, F., & G. Meineri 1961 COMPORTAMENTO DI ALCUNE GRANDEZZE RESPIRATORIE IN SOGGETTI SOTTOPOSTI AD ACCELERAZIONI SECONDO DIVERSI ASSI CORPOREI (BEHAVIOR OF SOME RESPIRATORY VALUES IN SUBJECTS EXPOSED TO ACCELERATIONS ALONG DIFFERENT BODY AXES.) Rivista di medicina aeronautica e spaziale (Roma) 24(4):485-500, Oct.-Dec. 1961

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Rossbach, L.J. 1959 DEVELOPMENT OF A PHYSIOLOGICAL PRESSURE TRANSDUCER SYSTEM FOR RECORDING UNDER SEVERE ACCELERATIVE OR DECELERATIVE FORCES. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: This is a report of the design and fabrication of a physiologic pressure transducer system for recording under severe accelerative or decelerative forces. The present system specifications include recording the equivalent of zero to 50 cm. Hg. with less than ± 3 per cent error full-scale, with a response time of 0.001 sec., under accelerations or decelerations of up to 200 G. The transducer itself is a small, blunt nosed, closed cylinder capable of being introduced into the heart of a small dog through the carotid artery. Its design combines evaporation deposition techniques with strain gage principles to reduce to a negligible value the effects of environmental acceleration inputs. The transducer output is amplified and reproduced on a recording oscillograph. Thus, the intralumen transducer system has a very high natural frequency is capable of operation under severe environmental acceleration inputs. The transducer output is amplified and reproduced on a recording oscillograph. Thus, the intralumen transducer system has a very high natural frequency, is capable of operation under severe environmental conditions, and is free of motion artefacts generally produced by pressure generated within the catheter due to accelerations of the contained column of fluid in standard manometer-catheter systems. (J. Aviation Med. 30(3):200, March 1959)

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Rossen, R., H. Kabat, & J. P. Anderson 1943 ACUTE ARREST OF CEREBRAL CIRCULATION IN MAN. Arch. Neurol. & Psychiat. 50:510-528

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Rossle, R. 1950 PATHOLOGY OF BLAST EFFECTS. In German Aviation Medicine, World War II, (Washington, D.C.: Government Printing Office, 1950) pp. 1260-1273

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Roth, E.M. 1955 MEDICAL ASPECTS OF TRAVEL IN OUTER SPACE
Harvard Med. Alumni Bull. 20(4): 10-13, July 1955

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Roth, H. P. 1949 ACCELERATION - TIME - VELOCITY DISTANCE CHART (University of California, Los Angeles) 18 Aug. 1949

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Roth, H. P. 1952 PHYSICAL FACTORS INVOLVED IN HEAD-ON COLLISIONS OF AUTOMOBILES (Institute of Transportation & Traffic Engineering, Los Angeles, Calif.) ITTE Reprint No. 18, pp. 349-356

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Roth, H.P. 1953 IMPACT AND DYNAMIC RESPONSE OF THE BODY. In H. Haber ed., Symposium on Frontiers of Man-Controlled Flight (Los Angeles: The Instit. of Trans. and Traffic Engineering, Univ. of Calif.)

ABSTRACT: The general effects on the body of impacts of varying degrees of seve are fairly well known. Impacts of low order produce effects generally limited to discomfort; if somewhat more severe: pain. If they are still more severe, actual damage to body structure and interference with function may occur. Damage may range from that which is slight and repairable, to complete disintegration. However, interference with function may cause death with little discoverable evidence of its mechanism of operation.

4,309

Roth, H., C.F. Lombard, A.G.Gross & A.Z. Klain 1948 STUDIES OF NEW MATERIALS FOR CONTROLLED IMPACT ENERGY ABSORPTION. (Paper, nineteenth annual meeting of the Aero-Medical Association, Toronto, Canada, June 1948) Department of Aviation Medicine, University of Southern California Contract N6ori77, Task 1, 31 March 1951.

ABSTRACT: Utilizing newly developed impact-test apparatus enabling greatly improved resolution of force-time relations during impacts, preliminary studies were made of various materials which might find application in the protection of the human body (especially the head) against impact forces. Both theoretical analysis and experimental results demonstrated that low-density materials exhibiting largely non-resilient behavior under impact forces have definite value in design of protective equipment.

4,310

Roegner, H. F. 1960 CRASH INJURY EVALUATION: SUMMARY EVALUATION OF U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 15-PR-126, TREC Tech. Rept. No. 60-73, December 30, 1960

ABSTRACT: This report reviews and discusses findings, conclusions, and recommendations forthcoming from the three evaluations and the five accident investigations. The purpose of the evaluations and investigations is to: (1) Evaluate the over-all crashworthiness of the basic aircraft structure; (2) Draw attention to all features which could either lead to or prevent unnecessary exposure of crew members and passengers to serious or fatal injury in accidents where crash forces are within survivable limits; (3) Make recommendations for remedial action in areas where deficiencies exist or are believed to exist in order to improve the crash safety aspects of the aircraft; and (4) Note the existence of effective crash safety features.

4,311

Roegner, H. F. & J. Carroll 1960 CRASH INJURY INVESTIGATION: U. S. ARMY HU-1A BELL IROQUOIS HELICOPTER ACCIDENT, FORT CARSON, COLORADO, 9 JUNE 1960. (Aviation Crash Injury Research, Phoenix, Arizona) AvCIR 12-PR-122, TREC Tech. Rept. 60-72, December 1960.

SUMMARY: This investigation revealed that the injuries experienced by the occupants resulted from vertical deceleration, failure of the troop seat, and failure of the transmission support, permitting displacement of the transmission into the cabin of the aircraft through the rear bulkhead. The side and the rear roof support members failed in this accident in a manner almost identical to failures of these parts experienced in other HU-1A helicopter accidents. The accident also revealed the excellent energy absorption characteristics of the skid landing gear and the crew seat cushion.

4,312

Roth, H. P., C. F. Lombard, A. G. Gross and A. Z. Klain 1951 STUDIES OF NEW MATERIALS FOR CONTROLLED IMPACT ENERGY ABSORPTION
(Office of Naval Research, Washington, D. C.)
March 1951 Contract N6ori77

SUMMARY: Utilizing newly developed impact-test apparatus enabling greatly improved resolution of force-time relations during impacts, preliminary studies were made of various materials which might find application in the protection of the human body (especially the head) against impact forces. Both theoretical analysis and experimental results demonstrated that low-density materials exhibiting largely non-resilient behavior under impact forces have definite value in design of protective equipment.

4,313

Roth, H. P., C. F. Lombard, A. G. Gross, A. Z. Klain & S. W. Ames 1949 IMPACT ACCELERATION OF THE HUMAN HEAD USING PROTECTIVE HEADGEAR. (Dept. of Aviation Med., University of S. Calif., School of Medicine, Los Angeles, Calif.) Contract Noori77, Project NR161-014; March 18, 1949. ASTIA ATI 209 401

ABSTRACT: The immediate purpose of this preliminary series of tests was to determine the physical characteristics of tolerable impacts below the concussion level and to find out what correlation there might be between instrumental measurements obtained during impact blows and the subjective sensations of persons wearing various protective headgear.

The following conclusions have been reached as a result of this preliminary test program:

1. When wearing a suitable protective headgear, the human head can tolerate, without concussive symptoms, impacts with a delivered kinetic energy of 8.7 foot-pounds, at a velocity of 6.5 feet per second.

2. G-tolerance of the human head appears to vary with the site of impact, and probably lies within the range of approximately 15 to 40 "G".

3. Physical measurement of energy factors in impact situations correlates well with the subjective sensations of test subjects wearing protective headgear.

4. Although acceleration of the head itself may be inferred from study of the data from the present instrumental setup, even more significant data should result from use within helmets of a simulated head, equipped with its own accelerometer and with pressure pickups distributed over the area on which a helmet might bear.

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Roth, J. G., S. I. Cohen, A. J. Silverman, G. E. Johnson, et al. 1958 BIOELECTRIC MEASURES DURING FLIGHT. A PRELIMINARY REPORT. J. Avia. Med. 29(2):139-144, Feb. 1958

ABSTRACT: Preliminary experiments were conducted to determine the feasibility of in-flight bioelectric measurements. A JC-131B (Convair) aircraft was modified to permit the installation of a Galvanic Skin Response apparatus, an Electroencephelograph, and a pen and ink oscillograph. Although the components were too large for operational bombers and fighters, it was hoped that the design of smaller components would be aided by the results of this experiment. It is believed that bioelectric measures will provide greater insight into the stresses and requirements for successful operation of high performance aircraft.

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Rothert, G. D., Jr., B. Y. Creer, & J. G. Douvillier, Jr. 1959 USE OF FLIGHT SIMULATORS FOR PILOT-CONTROL PROBLEMS. (National Aeronautics & Space Administration, Washington, D. C.) NASA Memo 3-6-59A

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Rothman, M. I. 1954 TECHNICAL NOTES ON SLERAN (Holloman Air Development Ctr., Holloman AFB, N. Mex.) HADC TN 54-2, Feb. 1954

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Rothman, Max I. 1958 RESULTS OF ACCELEROMETER SHAKER TESTS (Air Force Missile Development Ctr., Holloman AFB, N. Mex.) Rept. AFMDC TN-58-13; ASTIA AD-154 102; Aug. 1958

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Rowe, D.E., J. L. Day, and L.H. Witbeck 1959 THE NOLC ROCKET SLED AS A SUPERSONIC ENVIRONMENT SIMULATOR (Naval Ordnance Lab., Corona, Calif.) NOLC rept. no. 468; NAVORD rept. no. 5967; 27 August 1959, ASTIA AD-229 429

ABSTRACT: The NOLC Rocket Sled was designed and built by the Naval Ordnance Laboratory Corona as a research test vehicle for use on the Supersonic Naval Ordnance Research Track (SNORT) at the Naval Ordnance Test Station, China Lake, Calif. It provides NOLC with a reliable means for the supersonic environment testing of guided missile components and ordnance items during their development and evaluation stages. It is believed that the design ideas incorporated in the sled can be adapted to the needs of other activities interested in building test vehicles for similar purposes. (Author)

4,319

Rowen, B. 1959 AEROMEDICAL SUPPORT OF THE X-15 PROGRAM. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: For approximately ten years aeronautical engineers have been recording in-flight data from instrumented aircraft on ground read-out indicators through telemetry. During the flight phase of a research aircraft such as the X-2, the pilot's physiologic status was not recorded during flight. During the flight phase of the X-15 aircraft, physiologic data will be telemetered so that a flight surgeon observing the ground read-out can tell when the pilot is approaching the limit of his physiological tolerance. This will quantitatively identify the most stressful portion of a particular mission profile. Items usch as (1) cockpit and suit pressure differential (2) helmet

and suit pressure differential. (3) pilot's body surface temperatures, monitored during flight by a flight surgeon at the ground receiving station. The over-all objective is to obtain in-flight quantitative physiologic data, and to provide information of the man's ability to perform while under stress. Such data will provide future design criteria for the machine which will include the man as a useful component in the system. (J. Aviation Med. 30(3):200, March 1959)

4,320

Rowen, B. 1959 HUMAN FACTORS SUPPORT OF THE X-15 PROGRAM. (presented April 27, 1959, at the 30th annual meeting of the Aero Med. Assoc., Los Angeles, Calif.) Aerospace Medicine, 30(11):816-820, November 1959

Abstract: The X-15 research program is being conducted as a national effort by the National Aeronautics and Space Administration (NASA), the United States Air Force, and United States Navy. Primary research interest is to obtain (1) knowledge of actual flight conditions beyond the earth's atmosphere; (2) determination of aerodynamic heating, heat transfer rates, and their effects on aircraft structure, and (3) quantitative physiological data during actual flight; additional research objectives include (4) knowledge of missions involving exit from and re-entry into the earth's atmosphere, and (5) man's reaction to space flight.

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Rowen, B. 1961 DYNA-SOAR PILOT TRAINING. Lectures in Aerospace Medicine 16-20 January 1961. (Conducted at the School of Aviation Medicine, Brooks AFB, Texas)

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Royal Aircraft Establishment 1953 PARACHUTE TESTS IN AFRICA (Autumn, 1952) (Royal Aircraft Establishment, Farnborough) Interim Rept., M. E. Dept. Test Note.

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Royal Australian Air Force 1944 MINUTES OF THE FIRST MEETING OF THE ACCELERATION SECTION OF NO. 2 FLYING PERSONNEL RESEARCH UNIT HELD AT THE OLD MEDICAL SCHOOL, SYDNEY UNIVERSITY, ON 29TH MARCH 1944 AT 2 P.M. (Royal Australian Air Force, Flying Personnel Research Committee) F.R. 78; 29 March 1944; ATI-156 761

4,324

Royal Canadian Air Force 1956 AEROMEDICAL HANDBOOK FOR AIRCREW. (Royal Canadian Air Force) Rept. No. AFA 69

ABSTRACT: This is a handbook designed to provide the aircrew with a better understanding of the human factors concerned in present-day flying. Included are chapters titled (1) physiology; (2) flying fitness; (3) physics of the atmosphere; (4) anoxia; (5) hyperventilation; (6) methods of increasing oxygen supply to the body; (7) oxygen equipment and its use; (8) standard diluter-demand system; (9) oxygen pressure-demand system and mask; (10) removal of oxygen mask at altitude; (11) decompression sickness; (12) effects of flight on the ears and sinuses; (13) expansion of gas in the abdomen; (14) effects of heat, cold, and noise; (15) explosive decompression; (16) vision; (17) care of personal equipment; (18) acceleration or g; (19) orientation and (20) physiological aspects of escape from aircraft.

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Rozenblyum, D. Ye 1939 THE EFFECT OF ACCELERATION ON THE ORGANISM. Military Sanitation Voyenno-Sanitarnoye delo, 1:4-11

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Rozenblyum, D. 1959 PERED POLETOM CHELOVEKA V KOSMOS (Prior to the Flight of Man into Outer Space)
Meditsinskii Rabotnik (Moskva), 38 (1786): 2, May 12, 1959
See also: "Prior to Sending a Man In Outer Space Ships" Central Intelligence Agency Scient. Inform. Rep., Sept. 18, 1959, pp. 46-50. (PB 131891T30)

ABSTRACT: In any manned flight into space in a hermetically sealed cabin an artifically maintained microclimate is required. The selection of a system of air regeneration will present relatively few difficulties, since as early as the late 1930's four Soviet scientists successfully endured a period of 100 hours in a sealed cabin with a simulated environment. The inadequacy and unreliability of the sensory organs due to high speed, radial acceleration,

and weightlessness will require automatic devices for navigation and piloting. Prolonged transverse accelerations are well tolerated. The observation of animals in rocket flights and of Laika in Sputnik shows that respiration and circulation are not substantially distrubed by the weightless state. It is supposed that the initial symptoms of vertigo, disruption of fine motor coordination, and illusions disappear as the organism becomes adjusted to weightlessness. Meteors and short-wave untraviolet radiation are not regarded as serious threats. Information on the intensity of cosmic radiation obtained from the Sputniks and the Soviet space rockets will indicate means of protection for the astronauts from the effects of cosmic rays.

4,327

Rubin, A., J. Winston, H. Metz-Rubin, & L. Berwick 1951 THE VESTIBULAR RESPONSES TO TURNING, WITH NOMOGRAMS FOR THE DETECTION OF STREPTOMYCIN AND OTHER DRUG TOXICITIES AND FOR THE PREDICTION OF THE NORMAL VARIATIONS OF NYSTAGMUS AND VERTIGO. Ann. Otol. Rhinol. Laryngol. 60:108-116

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Rubin, H. J. 1942 AIRSICKNESS IN A PRIMARY AIR FORCE TRAINING DETACHMENT J. Aviation Med. 13:2772-76, 1942.

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Rudeseal, P.R. 1954 HUMAN SUBJECT DOWNWARD EJECTION TESTS FROM B-47 AIRCRAFT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) TN 54-100, Nov. 1954. ASTIA AD 88 324

ABSTRACT: A series of downward seat ejection tests were conducted from the navigator-bombardier position with human subjects on a B-47 aircraft to demonstrate that this was a safe method of escape. Prior to conducting the tests with human subjects, a series of tests were performed with instrumented anthropometric dummies to measure the force on the hands tending to break the handgrip during ejection. After the forces were determined, a shock absorbing device was installed in the handgrip system which enabled human subjects to be ejected at 425 knots IAS from 10,000 feet without injury. This proved that downward seat ejection was a feasible means of escape up to 425 knots IAS from the B-47 aircraft. (DFAWT summary)

4,330

Rudolph, J. 1952 STATIC TEST -PROTOTYPE 32G EJECTION SEAT AND RAILS- MODEL F-94C. (Lockheed Aircraft Corp., Burbank, Calif.) Report No. 8667, July 3,1952. ASTIA ATI 162 996

ABSTRACT: At the request of the F-94C Project Structures Engineer, static tests were conducted on the 32 G ejection seat rails. The seat was in the fully extended position during the tests. Inertia, catapult, and air loads at both low and high airplane speeds were simulated. Attention was given to the effect produced by the offset catapult.

4,331

Rudolph, L. A., J. A. Schaefer, R. E. Dutton, & R. H. Lyons 1957 SERUM GLUTAMIC OXALACETIC TRANSAMINASE IN EXPERIMENTAL TISSUE INJURY. J. Lab. & Clin. Med. 49:31.

Cited Cope, F. W. Nov. 1957.

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Ruff, S. 1935 DIE BEGRENZUNG DER FLIEGERISCHEN LEISTUNG DURCH DEN MENSCHLICHEN ORGANISMUS (The Limitation of the Flying Performance Because of the Human Organism) Luftwehr. (Berlin) 2:297-300. ASTIA ATI 68 443.

ABSTRACT: A crew, trained for the endurance of excessive accelerations, can stand a maximum of 4- 5 g for 30- 40 sec, or 6-7 for 2- 3 sec. Beyond that point, visual disturbances and impairment of consciousness occur. At 10.5 g, concussion of the brain resulted. Ruptures of inner organs are to be expected at 6-7 g, and beyond this point, in addition to these lesions, concussions of the brain occur.

4,333

Ruff, S. 1936 TYPICAL FRACTURES OF FIBULA IN OBSERVATION PLANE PILOTS DUE TO ACCELERATION WHEN FLYING IN SHARP CURVES. (Wahrend des Fluges aufgetretene Fibulafrakturen, eine durch Fliehkräfte bedingte typische Verletzung von Beobachtern) Luftfahrtmed., 1:50-52

ABSTRACT: A series of fractures of the lower third of the fibula was investigated. In each case, the victim was a military observer and the fracture occurred when the plane described a curve while he was in a standing position. Although banking would give the plane a downward acceleration of 4.5 -5 g,

and increase the apparent weight of the body from 80 kg. to 300-400 kg, this weight should be safely supported even by one leg. However, further questioning disclosed the fact that of gravity of the observer out of the base of support of the body formed by his feet. The weight of the body was placed on one leg at such an angle as to cause the fracture.

4,334

Ruff, S. 1937 UNFALLERFAHRUNGEN (Protection Against Possible Injuries Caused by Airplane Crashes) Part V of 10 parts.
March 1937. ASTIA ATI 60742

ABSTRACT: Protective measures against possible injuries to flying personnel by airplane crashes were investigated. Statistics show an overwhelming number of head injuries in airplane crashes. The causes of the injuries were investigated, and suggestions for the protection of personnel are presented. It is suggested that in addition to the crash-helmet, the pilot should be fastened to the seat by several belts (one belt around the abdomen being insufficient) The back strap should be tight enough and fastened in such a manner as to prevent a forward surge of the body. Suggestions for cockpit-seat improvements are made.

4,335

Ruff, S. 1937 HEAD INJURIES IN AIRCRAFT ACCIDENTS: THEIR ORIGIN AND THE POSSIBILITY OF THEIR PREVENTION. (Kopfverletzungen bei Flugunfallen, ihre Entstehung und Möglichkeiten zu ihre Minderung)
Luftfahrtmed., 1:355-360

ABSTRACT: In 1936 more than 50% of all injuries and almost 80 percent of the fatal injuries to fliers involved the head. Faulty seats or safety straps or the complete lack of the latter were responsible in most cases. Numerous instances of the failure of seats were discovered. To be effective, a safety strap must be attached near the top of the chair back as well as at the seat, to keep the head and shoulders from being thrown forward when the plane stops suddenly.

4,336

Ruff, S. 1937 DIE LUFTKRANKHEIT (Airsickness)
Luftfahrtmedizinische Abhandlungen (Leipzig) 1: 277-285

4,337

Ruff, S. 1939 UEBER DEN EINFLUSS HOHER FLIEHKRÄFTE AUF DEN MENSCHLICHEN ORGANISMUS (Concerning the Influence of High Centrifugal Forces Upon the Human Organism)
Wiener klinische Wochenschrift (Vienna) 52:861-864.

ABSTRACT: A review of the effects of high centrifugal forces on man, such as appear in experimental flying with fast machines and while pulling out of a dive. The influence of weight, reaction, time and the direction of the aircraft is considered. In the normal sitting position the focus of the disturbances found in high flying occurs in the collection of considerable quantities of blood in the legs through the hydrostatic pressure differences exerted parallel to the great vessels. The circulation remains, on the other hand undisturbed, if one places the pilot in the aircraft so that momentum is exerted perpendicular to the great vessels, which means that the pilot is in a prone position.

4,338

Ruff, S. 1940 BIOLOGICAL PROBLEMS OF HIGH SPEED FLYING.
(Biologische Probleme des Hochgeschwindigkeits fluges) ASTIA ATI-60571

ABSTRACT: A general discussion of the different biological problems which arise in high-speed flying is presented. The influence of centrifugal forces on body functions is explained with the aid of diagrams, graphs, and photographs. It was found that a person in a prone position is able to withstand centrifugal forces of much greater magnitude than a person sitting Experiments showed that accelerations of 14 to 16 g could be withstood if the crew of an airplane were in a prone position.

4,339

Ruff, S. 1938 ÜBER BLUTDRUCK UND PULSFREQUENZ MESSUNGEN BEI ZENTRIFUGAL-BESCHLEUNIGUNGEN IM FLUGZEUG (Concerning Blood Pressure and Pulse Frequency Measurements During Centrifugal Accelerations in the Airplane)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 116-120.

4,340

Ruff, S. 1938 THE EFFECT OF CENTRIFUGAL FORCES ON THE HUMAN ORGANISM. (Ueber Beschleunigungsuntersuchungen am Menschen) ASTIA ATI-106 822, 12 January 1938

4,341

Ruff, Siegfried 1940 HIGH ALTITUDE ACCIDENTS DURING THE WAR - PART 1 of 3 PARTS (HOEHENFLUGUNFAELLE WAEHREND DES KRIEGES) ASTIA ATI 53562.

ABSTRACT: Statistics are given for the causes of accidents occurring during high altitude flight. The smallest number, 10 percent, are caused by the failure of instruments. Illness and consitutional disorders account for 14.5%. The greatest cause of accidents, 75.5%, proved to be lack of familiarity with the instruments and ensuing service failure. A lack of knowledge of the effect of high altitude upon the human organism also contributed to the accident rate.

4,342

Ruff, S. 1942 HUMAN RESISTANCE TO CERTAIN TYPES OF UNEVEN ACCELERATION. (Ueber die Beschleunigungsfestigkeit des Menschen...Beschleunigungen) ASTIA ATI-47632,

ABSTRACT: Studies were made by the German Aeronautical Research Institute on human resistance to certain types of shock accelerations. Results of experiments are discussed pertaining to the distribution of forces acting upon certain parts of the human body in airplane crash landings, parachute shocks and in the ejection of catapult type seats in modern aircraft. It was concluded that in airplane crash landings the body can tolerate force up to 26 g, with the necessary precautions, without injury. Experiments have proven that a 2000 kg shock can be absorbed without injury in parachute opening and 20 g can be endured with the ejection catapult seat.

4,343

Ruff, S. & H. Strughold 1942 EFFECTS OF ACCELERATION (RAF, Institute of Aviation Medicine, Farnborough) F. P. R. C. Report No. 422, February 1942.

Translation of a section from their Compendium of Aviation Medicine.

4,344

Ruff, S. 1938 UBER DAS VERHALTEN VON BLUTDRUCK UND PULSFREQUENZ UNTER DEM EINFLUSS VON FLIEHKRAFTEN UND UBER VERSUCHE ZUR STEIGERUNG DER BESCHLEUNIGUNGSERTRAGLICHKEIT. (Behavior of blood pressure and pulse frequency under the influence of centrifugal forces and research for the increase of acceleration tolerance.) Luftfahrtmedizin 2:259-280.

ABSTRACT: The author describes a method by which systolic and diastolic blood pressure may be registered about every 15 seconds, even under the influence of high acceleration.

With this method experiments were performed on man, using the centrifuge in connection with which the blood pressure and pulse were registered. These experiments showed that accelerations up to 3 g., even for considerable periods of time, were tolerated without disturbances and with no essential changes in blood pressure. The pulse, however, rose rapidly from the beginning in this as well as in all other experiments. In the presence of accelerations over 3 g. disturbances to vision and consciousness occurred, accompanied by considerable change in blood pressure. The changes adjustment of the circulation.

In experiments with accelerations up to 5 g. for brief periods, there were only slight changes in pulse rate. Reduction of systolic blood pressure and of blood pressure amplitude occurred only after 4 g. had been reached. There were no subjective disturbances in this group of tests. Further experiments had to do with determining the effectiveness of a number of measures for increasing the acceleration tolerance. It was found that during digestion the tolerance was greatly increased and that addition of CO_2 to the atmosphere (within the plane) was also helpful.

The use of abdominal girdles was not quite so effective. Another measure which increases tolerance to acceleration is lying down. In this position high speed does not affect the organism so much as in the sitting position.

4,345

Ruff, S., & H. Strughold 1942 COMPENDIUM OF AVIATION MEDICINE (GRUNDRISS DER LUFTFAHRTMEDIZIN.) (Leipzig: Johann Ambrosius Barth, 1939) Trans. Nat'l. Research Council, Washington, D. C. 1942.

ABSTRACT: German Aviation Medicine has valiantly kept pace with the astonishing rise of German aviation. Untiring in its research it has provided advice and help for the service and in return has derived its stimulus from the demands of the air corps. Not content with practical research alone, German Aviation Medicine, in the few years of its activity, has bodly attacked the scientific fundamentals of the problems of aviation;

4,344

Ruff, S. 1938 UBER DAS VERHALTEN VON BLUTDRUCK UND PULSFREQUENZ UNTER DEM EINFLUSS VON FLIEHKRAFTEN UND UBER VERSUCHE ZUR STEIGERUNG DER BESCHLEUNIGUNGSERTRAGLICHKEIT. (Behavior of blood pressure and pulse frequency under the influence of centrifugal forces and research for the increase of acceleration tolerance.) Luftfahrtmedizin 2:259-280.

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Ruff, S., & H. Strughold 1942 COMPENDIUM OF AVIATION MEDICINE (GRUNDRISS DER LUFTFAHRTMEDIZIN.) (Leipzig: Johann Ambrosius Barth, 1939) Trans. Nat'l. Research Council, Washington, D. C. 1942.

ABSTRACT: German Aviation Medicine has valiantly kept pace with the astonishing rise of German aviation. Untiring in its research it has provided advice and help for the service and in return has derived its stimulus from the demands of the air corps. Not content with practical research alone, German Aviation Medicine, in the few years of its activity, has bodly attacked the scientific fundamentals of the problems of aviation;

the result is a new medical discipline. The medical profession at large is entitled to information regarding the results of these investigations for in their implications they touch upon nearly every field of medicine. It is therefore pertinent that the authors present a cross section of the status of Aviation Medicine today and make it accessible to the public. They are primarily addressing medical students and those physicians who are connected with aviation, to whom knowledge of aviation medicine is particularly desirable. The present compendium serves the purpose of explaining to those not specially trained in the main problems of Aviation Medicine.

4,346

Ruff, S. 1942 INFLUENCE OF GREAT TANGENTIAL FORCES ON THE HUMAN ORGANISM War Med.,(Chicago) 2(3):534-536. May 1942.

4,347

Ruff, S., tr., & J.B. Bateman 1945 MEDICAL PROBLEMS CONCERNING PARACHUTE JUMPS FROM HIGH ALTITUDES AND AT HIGH VELOCITIES.
(Paper, Lilienthal Association in Braunschweig, Salzburg and Thorn, winter 1941-1942)
Translated as Appendix 5 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft
ASTIA ATI 7245

ABSTRACT: With the steadily increasing performance of our aircraft a series of medical problems has arisen which are related to existing rescue devices and to others still to be developed. This report discusses briefly that phase of aviation medical knowledge and investigation which deals with the above questions- that is to say, with parachute jumps from present-day and future aircraft. The medical problems which arise in bailing out from modern aircraft are to be attributed to flight at increasing altitudes and at ever increasing velocities. (Author)

4,348

Ruff, S. 1946 HUMAN TOLERANCE OF ACCELERATION AND MEASURES IN AIRCRAFT CONSTRUCTION TO INCREASE IT. (Transl., U.S. Air Force Aero M. Cent., Heidelb.) Transl. from: Zschr. Ver. Deut. Ingen., 84:817

4,349

Ruff, S. 1950 BRIEF ACCELERATION: Less Than One Second. In Dept. of the Air Force, German Aviation Medicine, World War II. (Wash., D. C.: U. S. Govt. Printing Office, 1950). I, 584-597.

4,350

Ruff, S. & R. Schroedter 1957 EINE SCHLEUDER FÜR BESCHLEUNIGUNGSUNTERSUCHUNGEN (A Catapult for Acceleration Tests) Luftfahrttechnik. Pp. 38-39

4,351

Ruff, S. 1960 [AVIATION ACCIDENTS CAUSED BY HUMAN FAILURES] Hefte Unfallheilk 62:53-62

4,352

Ruff, S. 1961 THE HUMAN CENTRIFUGE AND ITS APPLICATION TO PILOT SELECTION. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration (New York: Pergamon Press, 1961) AGARDograph No. 48, pp. 1-13

ABSTRACT: The human centrifuge constructed for the Institute Fur Flugmedizin der Deutschen Versuchsanstalt Für Luftfahrt had to fulfill various technical demands: (1) A maximum acceleration of 40 g; (2) A wide range of acceleration rate, from 0.01 g/sec to about 20 g/sec, adjustable by hand as well as automatically; (3) A diameter not longer than 16 m; (4) Different arms should be provided for different purposes; (5) A sufficient quantity of collector rings should be provided for transmission. A short survey is given of the special technical devices chosen in order to satisfy these demands.
The second part of the paper deals with the centrifuge as a selection instrument: a choice reaction time test with visual and auditory stimuli was used to study efficiency impairment under acceleration. The rate of acceleration was 0.01 g/sec, later 0.1 g/sec. The run at 4 or 4.5 g lasted for a maximum of 5 minutes. (AUTHOR)

4,353

Rulon, P. J., P. B. Sampson, and B.Schohan 1951 THE EFFECTS OF "G" FORCES ON THE PERFORMANCE OF TELETYPE OPERATORS (Educational Research Corp., Cambridge, Mass.) WADC AF Techn. rept. no. 6568 Oct. 1951 ASTIA AD 1164

ABSTRACT: Twelve AF teletypists (hunt-and-peck and touch operators) were performance-tested under stright and level and g-force flight conditions in 3 different positions: facing forward, sideways, and rearward in the aircraft. The forces imposed ranged from 0 to 2 g, with intervals of straight and level flight interspersed with periods of turbulence and acceleration. The recorded data were collated in terms of events transpiring on the teleprinter simultaneously with a given g force. Speed and accuracy indexes were also calculated. Hunt-and-peck typist speed scores were greater, but accuracy scores were smaller under g force conditions than under optimum flight conditions. Speed and accuracy decreased for touch teletypist under g-force conditions. Under all flight conditions, maximum typing speed was achieved when the subjects faced rearward in the aircraft. No consistent evidence was obtained to justify the superiority of one position over the others with respect to typing accuracy. Speed and accuracy of typing improved consistently with practice. Consistent patterns were obtained for finger displacement errors about the intended teleprinter key with a radical decrease in frequency toward the peripheral keys. Displacements occurred more frequently in a lateral direction than vertically or diagonally.

4,354

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES: I. INTRODUCTION; METHODS; CHANGES IN POSITION OF THE DIAPHRAGM, IN HEART SIZE, AND IN INTRA-ABDOMINAL PRESSURE DURING INCREASED INTRAPULMONIC PRESSURE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160, Rept. No. 1; ASTIA AD-132 984; 10 Nov.1943

ABSTRACT: Similarities between the circulatory changes resulting from increased intrathoracic pressure and from positive radial acceleration indicate that compensation to these stresses depends upon closely related mechanisms. Initial observations have been made on certain effects of several modifications of the Valsalva maneuver. When intrapulmonic pressure is elevated to 40 mm Hg just after a full inspiration the diaphragm may move upward or downward, the cardiac silhouette on X ray gets smaller and the intragastric pressure usually approximates intrathoracic pressure. When intrapulmonic pressure is elevated to 40 mm Hg after a forced expiration the diaphragm invariably moves upward, the size of the cardiac silhouette is reduced usually to a lesser extent, and the intragastric pressure exceeds intrathoracic pressure by 5 mm to 23 mm Hg. When intrapulmonic pressure is maintained at 40 mm Hg while leakage of air occurs through a valve in the manometer system the gradient in pressure between thorax and abdomen is greatest of all, being as much as 35 mm to 50 mm Hg. (AUTHOR)

4,355

Rushmer, R. F. 1943 CIRCULATORY COLLAPSE PRODUCED BY STIMULATION OF AN ARTERIAL WALL. (USAAF School of Aviation Medicine, Randolph Field, Texas) Research Proj. No. 166, Report No. 1, 10 September 1943.

4,356

Rushmer, R. F. 1943 OVERVENTILATION IN SUBJECTS DURING THE SWING TEST (USAAF School of Aviation Medicine, Randolph Field, Texas) Rept. No. 133-1, May 1943.

4,357

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES. CAM No. 234; 10 Nov. 1943

ABSTRACT: Similarities of circulatory changes resulting from increased intrathoracic pressure (cf. Valsalva maneuver) and from positive radial acceleration indicate that compensation to these stresses is based on similar mechanisms. (a) When intrapulmonic pressure is elevated to 40 mm Hg after forced inspiration (Vl maneuver), intragastric pressure is equal to intrapulmonic pressure. (b) When intrapulmonic pressure is elevated to 40 mm Hg after forced expiration (Ve maneuver) intragastric pressure is higher than intrapulmonic by 8 to 23 mm Hg. (c) When intrapulmonic pressure is maintained at 40 mm Hg while a leakage of air occurs through a manometric valve, (Ml maneuver) intragastric pressure is 35 to 50 mm Hg higher than intrapulmonic. Repeated performance of the Ml maneuver during centrifugation will raise blackout threshold 3 "g".

4,358

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES: II. ARTERIAL PRESSURE, VENOUS PRESSURE, AND FINGER VOLUME DURING INCREASED INTRAPULMONIC PRESSURE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160; Rept. No. 2; ASTIA AD-132 985; 1 Dec. 1943

ABSTRACT: Study was made of the effects of increased intrathoracic and intra-abdominal pressure on arterial pressure in the arm, on venous pressures in the arm and in the leg, and on volume of the finger. Venous flow from the arm to the thorax failed to occur in 75% of normal subjects during the Vi maneuver, in 100% during the Ve maneuver, and in 22% during the Ml maneuver. Venous return

failed to occur from the lower extremities to the abdomen in all subjects during all the maneuvers. A rapid increase in venous pressure was usually accompanied by a rapid increase in the volume of the finger and a poor compensation of the arterial blood pressure during the Vi maneuver. Individuals displaying a rapid increase in venous pressure during the Vi maneuver do so on subsequent trials and on subsequent days. The abdomino-thoracic gradient in pressure produced during the Ve and Ml maneuvers apparently facilitates the maintenance of arterial blood pressure. (AUTHOR)

4,359

Rushmer, R. F. 1943 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES; ARTERIAL PRESSURE, VENOUS PRESSURE, AND FINGER VOLUME DURING INCREASED INTRAPULMONIC PRESSURE. CAM No. 233; 1 Dec. 1943

ABSTRACT:
(a) In normal subjects venous return from arm to thorax fails in 75% of men performing Vl breathing maneuver, in 100% performing Ve maneuver and in 22% performing Ml maneuver. Venous return from legs fails to occur in all subjects performing all three types of breathing maneuvers.
(b) Rapid increase in venous pressure is usually accompanied by a rapid increase in finger volume. Poor compensation of arterial blood pressure occurs during Vl maneuver.
(c) Individuals displaying a rapid increase in venous pressure during Vl maneuver do so on subsequent days.
(d) Abdomino-thoracic gradient in pressure produced during Ve and Ml maneuvers apparently facilitates maintenance of arterial blood pressure.

4,360

Rushmer, R. F. 1944 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECTS OF CENTRIFUGAL FORCES. (3) TWO CASES OF CIRCULATORY FAILURE DURING INCREASED INTRAPULMONIC PRESSURE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160; Rept. No. 3; ASTIA AD-144 994; 10 Jan.1944

ABSTRACT: Two subjects performing modifications of the Valsalva maneuver while suffering, from primary neurogenic shock developed visual and cerebral disturbances and poor circulatory compensation to the maneuvers. A third subject, having poor tolerance to rapid changes in posture and to centrifugal force, demonstrated a subjective and circulatory response to increased intrathoracic pressure similar to the subjects mentioned above. Improvement in tolerance to increased intrathoracic pressure on repeated trials by Subject 3 was associated with a reduction in the rate of increase in venous pressure, especially during the VI maneuver. Correlation of the circulatory response to increased intrathoracic pressure with tolerance to G on the human centrifuge may lead to the development of a simple test for detection of poor tolerance to centrifugal forces. (AUTHOR)

4,361

Rushmer, R. F. 1944 PHYSIOLOGY OF INCREASED INTRATHORACIC PRESSURE IN RELATION TO THE EFFECT OF CENTRIFUGAL FORCES: IV. COMPARISON OF PHYSIOLOGICAL RESPONSES TO INCREASED INTRAPULMONIC PRESSURE AND TO APPLIED CENTRIFUGAL FORCES. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 160, Rept. No. 4, ASTIA AD-132 986, 1 Aug. 1944

ABSTRACT: A summarization was made of the factors in the circulatory compensation to increased intrapulmonic pressure which aid in the understanding of tolerance to radial acceleration. During neurogenic peripheral circulatory failure in a limited number of human subjects, dimming of vision occurred at a systolic pressure of 65 mm Hg; blackout at 40 mm Hg; and unconsciousness when the blood pressure was not measurable. On the basis of these observations, it is predicted that the average individual who has a blackout threshold of 5g, develops a systolic blood pressure of 140 mm Hg at the level of the heart during the application of the force. Deductions from the results with the Valsalva maneuver and from the protective value of certain anti-g devices suggest that venous pooling in the extremities is not the most important variable concerned with the individual's tolerance to positive acceleration, provided the duration of the applied force is brief. Theoretical considerations and a few service observations make the crouching position seem just as effective in improving g-tolerance as any of the mechanical devices available but practical difficulties interfere with its full use in existing aircraft. It is recommended that further attempts be made to overcome the difficulties of using the crouching position in the human centrifuge, and to make precise measurements on the relation of position of the body to blackout threshold. (AUTHOR)

4,362

Rushmer, R. F. 1944 COMPARISON OF EXPERIMENTAL INJURIES RESULTING FROM DECELERATIVE FORCES APPLIED TO THE VENTRAL AND DORSAL ASPECTS OF RABBITS DURING SIMULATED AIRCRAFT ACCIDENTS
(School of Aviation Medicine, Randolph Air Force Base, Tex.)
Proj. no. 301 Rept. no. 1 8 Oct. 1944 ASTIA AD 135 555

ABSTRACT: Rabbits subjected to moderate amounts of decelerative force received somewhat less internal damage when the decelerative force was applied to the back by a flat surface than occurred in animals facing the force and supported by a web harness similar to a Sutton harness. When rabbits were subjected to decelerative forces or a magnitude of 300 g's to 400 g's with the force acting on areas of comparable size on the dorsal and ventral surfaces there was no apparent difference in the degree of internal injury sustained. The location of internal injury bore little relation to the site of application of a large force. This suggests that most of the trauma under these circumstances is the result of a combination of two factors: (1) high pressure waves, transmitted through the solid viscrea and fluid elements of the body, and (2) tearing of tissues such as liver, mesentery, intestinal tract, and large blood vessels, from sudden distortion of displacement. The most severe injuries resulted when the animals were loosely attached and allowed to continue to travel forward and decelerate against a flat surface which had completely decelerated at the time of impact by the animal. (Author)

4,363

Rushmer, R. F. 1944 A STUDY OF THE ROLE OF INTRA-ABDOMINAL PRESSURE IN TOLERANCE TO CENTRIFUGAL FORCE. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No.316; Rept. No. 1; ASTIA AD-135 558; 9 Sept. 1944

OBJECT: To determine the importance of hydrostatic pressure provided by the mass of movable abdominal contents in supporting venous return from the splanchnic area. CONCLUSIONS AND RECOMMENDATIONS: (a) The intra-abdominal pressure of both dogs and man is sufficient to support, on the average, a column of blood from any level in the abdomen to a level a few centimeters below the dome of the diaphragm. (b) The combined effect of the intra-abdominal pressure and the intra-thoracic pressure is adequate to elevate blood above the level of the dome of the diaphragm in dogs. (c) The increase in intra-rectal (and intra-abdominal) pressure during positive radial acceleration is related to the magnitude of the centrifugal force. (d) The increase in intra-rectal pressure on the centrifuge during positive radial acceleration fails to reach levels predicted on the basis of a column of fluid of constant height. This is believed to be the result of protrusion of the anterior abdominal wall and compression of intestinal gas producing descent of the diaphragm. (e) The use of pneumatic anti-g devices which apply pressure (1 lb/sq. in./g) to the anterior abdominal wall increases the pressure within the abdomen to a level consistent with an elevation of the diaphragm to about its normal level. (f) A hypothesis is presented to explain the effectiveness of anti-g devices in terms of their ability to maintain the heart and diaphragm at or near their normal positions. (AUTHOR)

4,364

Rushmer, R. F. 1944 INTERNAL INJURY PRODUCED BY ABRUPT DECELERATION OF SMALL ANIMALS. (School of Aviation Medicine, Randolph AFB, Texas) Project No. 241, Rept. No. 1, 2 Sept. 1944

ABSTRACT:
(a) This article is mainly a description of an apparatus to produce abrupt deceleration in mice. The same type of internal injuries occur as those found in humans in aircraft accidents.
(b) The lungs, liver, spleen, and mesentery are most frequently affected by large forces applied transversely through the body and in that order.
(c) Decelerative forces developed at the upper end of the carriage of the apparatus are undoubtedly greater than those developed in the pilot compartment of aircraft. The forces calculated at the abdominal surface of mice ranged from 153-227 "g". It is entirely possible that forces of this magnitude may occur in airplane crashes.
(d) In spite of the fact that data obtained this way cannot be directly applied to the problem of aircraft accidents, fundamental investigation as to the mechanism of action of these forces, the effect of position on internal injury, and the incidence of injury to various tissues can be carried out.

4,365

Rushmer, R.F. 1945 THE CHANGES IN PRESSURE IN THE PERITONEAL CAVITY PRODUCED BY SUDDEN DECELERATION OF EXPERIMENTAL ANIMALS. (AAF School of Aviation Medicine, Randolph Field, Texas) Report No. 472-1

4,366

Rushmer, R.F. 1945 DECELERATION (Paper presented at conference on "Recent Developments in Aviation Medicine," AAF School of Aviation Medicine, Randolph Field, Texas, June 4 and 5, 1945)

4,367

Rushmer, R. F., E. L. Beckman and D. Lee 1946 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION.
(Office of Naval Research, Washington, D. C.)
December 1946 CONTRACT N6ori77
Also see Am. J. Physiol., 151 (2):355-365, December 1947.

SUMMARY: The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varied simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration.

Both C. S. F. and venous pressures remained relatively enchanged at or near heart level during exposure to either positive or negative G.

Under the conditions obtaining in these experiments, the cerebrospinal fluid pressure appears to be primarily a reflection of the venous pressure existing at any level within the cerebrospinal cavity. The results of these studies indicate that the veins, and probably minute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

In a majority of cases, the arterial blood pressure at neck level increased by larger incroments than the venous pressure at same time during the exposure to negative G. Since the artorial walls are called upon to support only the differential between intra-arterial and cerebrospinal fluid pressure, the cerebral arteries are afforded considerable but incomplete protection under these conditions.

4,368

Rushmer, R. F and G. M. Hass 1946 A COMPARISON OF CRASH INJURIES IN MAN AND IN LABORATORY ANIMALS
(School of Aviation Medicine, Randolph Air Force Base, Texas.)
Proj. no. 471 Rept. no. 1 25 March 1946 ASTIA AD 135 542

See also Am. J. Surg. 76(1):44-50, 1948.

ABSTRACT: A comparison is made of the internal injuries encountered during post-mortem examination of flying personnel killed in aircraft accidents with the pathologic lesions produced by abrupt deceleration of three species of laboratory animals: cats, rabbits, and mice. In spite of many differences in the conditions obtaining during the deceleration, the lungs revealed gross pathologic changes in more than 75% of both humans and experimental animals. In general, the types of lesions in the lungs, liver, spleen, diaphragm, kidneys gastrointestinal tract, and pancreas were similar in man and laboratory animals. The incidence and severity of the lesions were considerably greater in the human cases who died instantly. Extensive trauma to the brain, heart, and great vessels were not observed in the experimental animal. These findings indicate that direct experimentation on laboratory animals can be a valuable adjuct in the study of the mechanisms of production of internal injuries and possibly in designing methods of protection against large decelerative forces. (Author)

4,369

Rushmer, R. F., E. L. Beckman, and D. Lee 1947 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION. Amer. J. Physiol. 151(2):355-365. Dec. 1947.

ABSTRACT: The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varied simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration. Both C.S.F. and venous pressures remained relatively unchanged at or near heart level during exposure to either positive or negative G. Under the conditions obtaining in these experiments, the cerebrospinal fluid pressure appears to be primarily a reflection of the venous pressure existing at any level within the cerebrospinal cavity. The results of these studies indicate that the veins, and probably minute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

4,370

Rushmer, R. F., E. L. Green, & H. D. Kingsley 1946 INTERNAL INJURIES PRODUCED BY ABRUPT DECELERATION OF EXPERIMENTAL ANIMALS. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 401, Rept. No. 1, ASTIA AD-135 531; 15 Jan. 1946
See also J. Avia. Med. 17:511-525, Dec. 1946

ABSTRACT: Statistical appraisal of the results obtained using a strain gauge accelerometer to record decelerative forces in forty experiments revealed that this apparatus provides a reliable measure of the forces produced under the conditions obtained in this series of experiments. Forty cats under nembutal anesthesia were exposed in a random order to four different patterns of decelerative force. The animals were embedded in plaster of Paris in the supine position on a cart which was allowed to drop 19.25 feet. Using four different sets of paraffin blocks the cart was exposed to decelerative forces having peak forces averaging 1'0.9 g. 267.5 g. 626.1 g. and 10'.5.2 g. The internal injuries resulting from the application of such forces resemble grossly many of the traumatic lesions observed in man at post-mortem after air-craft accidents. Large decelerative forces acting for a brief period appear to produce injuries of greater severity than smaller forces acting over a longer period, if the velocity at impact is constant. The lunge, liver, and spleen were the most common sites of pathologic lesions in this series of experiments. The lesions in the lungs were characterized by hemorrhages and emphysematous areas within the parenchyma of the lungs. The most common lesions in the liver and spleen consisted of lacerations through the capsule and into the parenchyma in areas not likely to be exposed directly to externally applied force. Hemorrhages into the lung are not always revealed by roentgenograms of the chest. (AUTHOR)

4,371

Rushmer, R. F. 1947 A ROENTGENOGRAPHIC SUTDY OF THE EFFECT OF A PNEUMATIC ANTI-BLACKOUT SUIT ON THE HYDROSTATIC COLUMNS IN MAN EXPOSED TO POSITIVE RADIAL ACCELERATION.
(Office of Naval Research, Washington, D. C.)
December 1947 Contract N6ori77
Also see Am. J. Physiol., 151(2), December 1947.

SUMMARY: Roentgenograms were obtained of the head and trunk of subjects exposed to positive radial acceleration with and without pressurization of pneumatic anti-blackout suits. In this way measurements of the changes in the height of the hydrostatic column of abdominal organs, in the intrarectal pressure and in the distance from heart to brain have been obtained.

The diaphragm is depressed during exposure to radial acceleration and elevated above its normal level by pressurization on the abdominal bladder with a pressure of 1.2 pounds per g.

In addition to the changes in position of the diaphragm, pressurization of the anti-blackout suit increased the overall intrarectal pressure by an amount sufficient to support a column of blood from any point in the abdomen to a level above the diaphragm without a contribution by the vascular walls.

The overall increase in intrarectal pressure appeared to be produced by increased tension or stretching of the diaphragm.

The distance from the base of the heart to the base of the skull was reduced by an amount sufficient to provide a protection of about 0.5 g during exposure to 5 g.

In addition to this mechanism for protection there is probably an increase in blood pressure at heart level to account for the remainder of the protection produced by the anti-blackout equipment.

4,372

Rushmer, R. F., E. L. Green, & H. D. Kingsley 1946 INTERNAL INJURIES PRODUCED BY ABRUPT DECELERATION OF EXPERIMENTAL ANIMALS. J. Avia. Med. 17:511-525, Dec. 1946
See also (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 401, Rept. No. 1, ASTIA AD-135 531, 15 Jan. 1946

ABSTRACT: Statistical appraisal of the results obtained using a strain gauge accelerometer to record decelerative forces in forty experiments revealed that this apparatus provides a reliable measure of the forces produced under the conditions obtained in this series of experiments. Forty cats under nembutal anesthesia were exposed in a random order to four different patterns of decelerative force. The animals were embedded in plaster of Paris in the supine position on a cart which was allowed to drop 19.25 feet. Using four different sets of paraffin blocks the cart was exposed to decelerative forces having peak forces averaging 1'0.9 g. 267.5 g. 626.1 g. and 10'.5.2 g. The internal injuries resulting from the application of such forces resemble grossly many of the traumatic lesions observed in man at post-mortem after aircraft accidents. Large decelerative forces acting for a brief period appear to produce injuries of greater severity than smaller forces acting over a longer period, if the velocity at impact is constant. The lunge, liver, and spleen were the most common sites of pathologic lesions in this series of experiments. The lesions in the lungs were characterized by hemorrhages and emphysematous areas within the parenchyma of the lungs. The most common lesions in the liver and spleen consisted of lacerations through the capsule and into the parenchyma in areas not likely to be exposed directly to externally applied force. Hemorrhages into the lung are not always revealed by roentgenograms of the chest. (AUTHOR)

4,373

Rushmer, R. F. 1946 THE CHANGES IN PRESSURE IN THE PERITONEAL CAVITY PRODUCED BY SUDDEN DECELERATION OF EXPERIMENTAL ANIMALS. (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 472; Rept. No. 1; ASTIA AD-135 543; 19 April 1946.

See also J. Aviation Med. 18(2):199-206.

ABSTRACT: Using a strain gauge pressure recorder, measurements have been obtained of the changes in pressure occurring within the peritoneal cavity of anesthetized cats during exposure to about 270 g. The magnitude of the maximum positive pressure ranged from 803 to 2607 mm Hg, averaging 1657 mm Hg (15.6 to 50.5 p. s. i., a v. 31.9 psi) Since it is possible that the natural frequency of the recording system was low with respect to the duration of peak pressures, these figures may be low and the wave form may have been somewhat distorted. Demonstration of waves of pressure within the peritoneal cavity does not constitute evidence that these pressure changes are responsible for injury. However, this finding indicates the necessity for further investigation of the role of pressure changes during abrupt deceleration to the production of pathologic lesions. (AUTHOR)

4,374

MOTION PICTURE

Rushmer, R. F. 1946 CRASH INJURIES IN EXPERIMENTAL ANIMALS (AAF School of Aviation Medicine, Randolph Field, Texas)

ABSTRACT: This motion picture was designed to illustrate the effects of abrupt deceleration on experimental animals. Anesthetized cats were restrained in various ways in carts constructed so that obstructions could be installed which were similar to those found in aircraft cockpits. High speed motion pictures (3600 frames per second) were taken to observe the points of contact and distortion of animals at impact. The pathological lesions produced by the action of decelerative forces are shown in color.

Injuries of the lungs, liver, spleen, mesentery, spine and renal vessels were found which were similar to those encountered at post-mortem on humans following aircraft accidents. Injuries sustained by the lungs were characterized by diffuse hemorrhages into the parenchyma which were most commonly found in the middle and lower lobes. The location of these hemorrhages did not appear to be related to the direction of action of the decelerative force. Areas of emphysema along the lung margins were encountered in a few cases. The lesions found in the liver and spleen usually consisted of linear lacerations of the capsule on the diaphragmatic aspect, extending into the parenchyma and often associated with profuse hemorrhage. Pressure waves could be seen traversing the anterior abdominal walls of animals in the supine position. There was a great deal of variability in the severity of the injuries sustained by animals exposed to decelerative force under apparently similar conditions. (Federal Proceedings 5(1):90, 1946)

4,375

Rushmer, R. F. 1947 CIRCULATORY EFFECTS OF THREE MODIFICATIONS OF THE VALSALVA EXPERIMENT. AN EXPERIMENTAL STUDY. Amer. Heart J. 34:399-418.

4,376

Rushmer, R. F. 1947 THE CHANGES IN PRESSURE IN THE PERITONEAL CAVITY PRODUCED BY SUDDEN DECELERATION OF EXPERIMENTAL ANIMALS. J. Aviat. Med. 18(2):199-206.

SUMMARY & CONCLUSIONS: 1. Using a strain-gauge pressure recorder, measurements have been obtained of the changes in pressure occurring within the peritoneal cavity of anesthetized cats during exposure to about 270 G.

2. The magnitude of the maximum positive pressure ranged from 803 to 2,607 Hg. averaging 1,657 mm Hg (15.6 to 50.5 p.s.i. av. 37.9 p. s. i.) Since it is possible that the natural frequency of the recording system was low with respect to the duration of peak pressures, these figures may be low and the wave form may have been somewhat distorted.

3. Demonstration of waves of pressure within the peritoneal cavity does not consitute evidence that these pressure changes are responsible for injury. However, this finding indicates the necessity for further investigation of the role of pressure changes during abrupt deceleration to the production of pathologic lesions.

4,377

Rushmer, R. F. 1947 THE EFFECT OF POSITIVE RADIAL ACCELERATION ON THE INTRARECTAL PRESSURE. J. Aviation Med. 18(1):96-1016, 104.

CONCLUSIONS: 1. Intrarectal pressures were recorded on subjects during exposure to varied amounts of positive radial acceleration. The intrarectal pressure was found to be directly proportional to the magnitude of the acceleration expressed in g's. This is evidence for the theory that the intra-abdominal pressure is primarily a hydrostatic type of pressure.

2. The intrarectal pressure increased by approximately 60 per cent of the control pressure at 1 G for each unit increase in the magnitude of the radial acceleration. It is believed that this represents progressive reduction in the height of the hydrostatic column of abdominal contents due to descent of the diaphragm.

3. Application of pressure (52 mm. Hg per G) to the anterior abdominal wall by means of a pneumatic anti-G suit produced an increase in intrarectal pressure equivalent to the hydrostatic effect of elevating the diaphragm less than 3 inches.

4. These findings suggest that the effectiveness of the anti-G suit in preventing blackout is related to the function of maintaining the heart and diaphragm at approximately their normal position during radial acceleration.

4,378

Rushmer, R. F., E. L. Beckman & D. Lee 1947 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION.
Amer. J. Physiol. 151(2):355-365, Dec. 1947.

ABSTRACT: 1. The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varied simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration.

2. Both C.S.F. and venous pressures remained relatively unchanged at or near heart level during exposure to either positive or negative g.

3. Under the conditions obtaining in these experiments, the cerebrospinal fluid pressure appears to be primarily a reflection of the venous pressure existing at any level within the cerebrospinal cavity.

4. The results of these studies indicate that the veins, and probably minute vessels, are almost perfectly protected against sudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

5. In a majority of cases, the arterial blood pressure at neck level increased by larger increments than the venous pressure at some time during the exposure to negative g. Since the arterial walls are called upon to support only the differential between intra-arterial and cerebrospinal fluid pressure, the cerebral arteries are afforded considerable but incomplete protection under these conditions.

4,379

Rushmer, R.F. 1947 A ROENTGENOGRAPHIC STUDY OF THE EFFECT OF A PNEUMATIC ANTI-BLACKOUT SUIT ON THE HYDROSTATIC COLUMNS IN MAN EXPOSED TO POSITIVE RADIAL ACCELERATION. Amer. J. Physiol. 151(2):459-468, Dec. 1947.

ABSTRACT: Roentgenograms were obtained of the head and trunk of subjects exposed to positive radial acceleration with and without pressurization of pneumatic anti-blackout suits. In this way measurements of the changes in the height of the hydrostatic column of abdominal organs, in the intrarectal pressure and in the distance from heart to brain have been obtained.

The diaphragm is depressed during exposure to radial acceleration and elevated above its normal level by pressurization of the abdominal bladder with a pressure of 1.2 pounds per g.

In addition to the changes in position of the diaphragm, pressurization of anti-blackout suit increased the overall intrarectal pressure by an amount sufficient to support a column of blood from any point in the abdomen to a level above the diaphragm without a contribution by the vascular walls.

The overall increase in intrarectal pressure appeared to be produced by increased tension or stretching of the diaphragm. The distance from the base of the heart to the base of the skull was reduced by an amount sufficient to provide a protection of about 0.5 g during exposure to 5 g.

In addition to this mechanism for protection there is probably an increase in blood pressure at heart level to account for the remainder of the protection produced by the anti-blackout equipment.

4,380

Rushmer, R. F. and G. M. Hass 1948 COMPARISON OF CRASH INJURIES IN MAN AND IN LABORATORY ANIMALS. Amer. J. of Surg., 76(1):44-50. See also (School of Aviation Medicine, Randolph AFB, Texas) Proj. No. 471, Rept. No. 1, ASTIA AD-135 542, 25 March 1946.

ABSTRACT: A comparison is made of the internal injuries encountered during post-mortem examinations of flying personnel killed in aircraft accidents with the pathologic lesions produced by abrupt deceleration of three species of laboratory animals: cats, rabbits, and mice. In spite of many differences in the conditions obtaining during the deceleration, the lungs revealed gross pathologic changes in more than 75% of both humans and experimental animals. In general, the types of lesions in the lungs, liver, spleen, diaphragm, kidneys gastrointestinal tract, and pancreas were similar in man and laboratory animal. The incidence and severity of the lesions were considerably greater in the human cases who died instantly. Extensive trauma to the brain, heart, and great vessels were not observed in the experimental animal. These findings indicate that direct experimentation on laboratory animals can be a valuable adjunct in the study of the mechanisms of production of internal injuries and possibly in designing methods of protection against large decelerative forces. (AUTHOR)

4,381

Rushmer, R.F., Beckman, E.L., and D.Lee 1951 PROTECTION OF THE CEREBRAL CIRCULATION BY THE CEREBROSPINAL FLUID UNDER THE INFLUENCE OF RADIAL ACCELERATION. (University of Southern Calif., School of Medicine, Los Angeles) Contract N60ri77, Task 1, 31 March 1951

ABSTRACT: The cerebrospinal fluid and venous pressures measured at head and neck levels in anesthetized cats varried simultaneously and by approximately the same amounts during wide variations in these pressures produced by positive and negative radial acceleration.

The results of these studies indicate that the veins, and probably min ute vessels, are almost perfectly protected against dudden changes in intravascular pressure by simultaneous changes of the same magnitude in cerebrospinal fluid pressure.

In a majority of cases, the arterial blood pressure at neck level increased by larger increments than the venous pressure at some time during the exposure to negative G. Since the arterial walls are called upon to support only the differential between intra-arterial and cerebrospinal fluid pressure the cerebral arteries are afforded considerable but incomplete protection under these conditions.

4,382

Russian Handbook 1941 HIGH SPEED FLYING. BLIND FLYING. HIGH ALTITUDE FLYING. (RAF, Institute of Aviation Medicine, Farnborough), F. P. R. C. Report No. 392d.

4,383

Russian Handbook 1941 PARATROOPS. (RAF, Institute of Aviation Medicine, FARNBOROUGH) F. P. R. C. Report No. 392f.

4,384

Russel, W. E., J. R. Erwin, & H. R. DeHaven 1943 MEDICAL RESEARCH IN SOME ASPECTS OF AIRCRAFT DESIGN. J. Aeron. Sci. 10:227-231.

4,385

Rusk, H. A. 1952 NEW PLANES POINT UP NEED TO STUDY 'HUMAN ELEMENT' N. Y. Times, I, 49:1-3, May 25, 1952.

4,386

Rute, L. 1962 A STUDY OF AERODYNAMIC EFFECTS OF ISOTHERMAL AND TEMPERATURE GRADIENT ATMOSPHERES ON RE-ENTRY TRAJECTORIES (Polytechnic Inst. of Brooklyn, N. Y.) Contract AF 49(638)445, Proj. 9781, AFOSR-2411, ASTIA AD-281 765.

ABSTRACT: The behavior of skip and impact trajectories of space vehicles entering and atmosphere in which temperature varies with altitude is studied. The atmosphere is divided into layers, each of which is characterized by an

appropriate temperature gradient. Numerical results for heat transfer rates, relative decelerations and altitude as functions of flight time, and an altitude-range history for STD Day (ARDC Model Atmosphere, 1959) Hot and Cold Day, are presented for selected re-entry conditions. These results are compared with those obtained in an isothermal (exponential) atmosphere for the same re-entry conditions. The difference in peak heat transfer rates and maximum relative decelerations in the two atmospheric models is not significant for properly selected scale heights. However, the effect of temperature variation upon minimum elevation for the skip trajectory and upon range to point of impact for impact trajectories is noticeable. (Author)

4,387

Ryan, C. ed. 1952 ACROSS THE SPACE FRONTIER (New York: Viking, 1952)

ABSTRACT: An expansion of a scientific symposium first published in Collier's Authors of individual chapters, in addition to Ryan, are J. Kaplan, W. von Braun, H. Haber, W. Ley, O. Schachter, and F.L. Whipple.

4,388

Ryan, E. A., W. K. Kerr, and W. R. Franks 1950 SOME PHYSIOLOGICAL FINDINGS ON NORMAL MEN SUBJECTED TO NEGATIVE G. J. Aviation Med. 21(3): 173-194.

SUMMARY: 1. A feeling of pressure in the head region, sometimes of a throbbing nature, is the outstanding symptom on exposure to negative g (up to -3g).

2. Visual symptoms under negative g, especially of the higher magnitudes studied, are common and consist of blurring, greying or reddening of vision.

3. Negative g either on the tilt table (-1 g for one minute) or in the accelerator (up to 3 g negative for five seconds under the conditions of this study) produces slowing of the pulse rate in proportion to the magnitude of the negative acceleration, (i. e., the greater amount of negative g the more marked bradycardia).

4. While the greater part (93 per cent) of the pulse rate slowing on a negative tilt occurs within the first three seconds the maximum slowing is not attained until ten to fifteen seconds after the tilt. There is then a significant partial recovery in pulse rate above the lowest level until an equilibrium pulse rate is reached within the 25 to 45 seconds after the tilt. These changes may be mediated through the carotid sinus reflex.

5. The pulse rate quickly returns to its normal value or a little above it when the negative g passes off.

6. There is a more marked slowing of the pulse rate when exposed to 1 g negative on the tilt table on the last as compared with the first of a series of 1 g negative exposures occurring either on one or successive days. This change in pulse rate response is correlated with an acquired subjective increase in the negative g tolerance. There is a similar acquired tolerance on repeated exposures to the higher negative g values studied (-1 g to -3 g).

7. Electrocardiograms taken under negative g show many changes which become more marked as the amount of negative g increases. The most striking alteration is prolonged periods of cardiac asystole (in one -3 g test the asystole lasted for nine seconds). Despite these variations there were no subjective cardiac symptoms. The electrocardiographic changes are strikingly similar to those resulting from pressure on a sensitive carotid sinus.

8. Healthy young men can, under the experimental conditions outlined, safely withstand 3 g negative for 5 seconds.

4,389

Ryan, J. J., & J. P. Stapp 1959 HUMAN EXPERIMENTS ON AIR TRANSPORT CRASH PROTECTION. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959).

ABSTRACT: Modulated Deceleration. It has been found in experimental tests with human subjects on the principle of the hydraulic cylinder and piston for controlled attenuation that: (1) Hydraulic shock absorbers afford maximum protection to human occupants upon crash; (2) inherent design makes possible protection for different loads, speeds and displacements; and (3) maximum energy absorption is provided with minimum weight, complexity and modification. Applicability on Air Transports. Although the human tests were made with the automobile as the research vehicle, including restraints accompanied by quick retraction of dangerous projections, the hydraulic energy absorber may be applied in air transport crash protection as follows: (1) attachment to seat tracks in a jet airliner; (2) distribution of absorber forces in aircraft structure; and (3) individual absorbers on seat supports. This paper includes calculations, designs and conclusions for maximum human protection in aircraft utilizing hydraulic shock absorbers.
J. Aviation Med. 30(3):201, March 1959)

4,390

Ryan, J. J. 1960 CRASH-DECELERATION TESTS WITH HUMAN SUBJECTS. (Presented before the Fourth Annual Meeting of the Human Factors Society, Boston, Mass., 14 Sept. 1960). In Human Factors in Technology (New York: McGraw-Hill Book Co., 1962), Chapt. 15.

4,391

Ryan, J.J. 1961 HUMAN CRASH DECELERATION TESTS ON SEAT-BELTS. (Paper, Annual Meeting of the Aerospace Med. Assoc., Chicago Ill., 26 April 1961)

ABSTRACT: Tests have shown that seat-belt forces applied to the human subject in deceleration are sinusoidal in character, are determined by the natural frequency of the spring-mass system and by damping, and are dependent upon the ti e history of the forces applied at the belt connections. The development of favorable seat-belt characteristics is described. The limiting forces are dependent upon the ability of the pelvic bone system to transmit the sinusoidal rearward and downward forces exerted by the belt on the body. A secondary problem is the rotation of the upper torso about the seat-belt after impact. The results of these force applications from tests are noted. Criteria of aircraft design are suggested to allow maximum impacts without immobilizing injury, permitting immediate evacuation.

4,392

Ryan, J.J. 1962 AUTOMOTIVE HUMAN CRASH STUDIES In Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, Pp 345-354.

ABSTRACT: The development of safety devices for vehicles has required research into the application of engineering principles for the mechanical reduction of impact forces. It has been shown that the forces exerted on a human supported by a seat-belt may be reduced four times through proper engineering design of the vehicle and the belt. Further studies with human beings in the seat-belt environment using the apparatus available require an extension of the engineering with bio-physics and applied medicine.

4,393

Ryan, J.J. 1962 HUMAN CRASH DECELERATION TESTS ON SEAT-BELTS.
(1961 Annual Meeting of the Aero Medical Association, Chicago, Ill., 26 April)
Aerospace Med. 33(2):167-174, Feb. 1962.

ABSTRACT: Tests have shown that seat-belt forces applied to the human subject in deceleration are sinusoidal in character, are determined by the natural frequency of the spring-mass system and by damping, and are dependent upon the time history of the forces applied at the belt connections. The development of favorable seat-belt characteristics is described. The limiting forces are dependent upon the ability of the pelvic bone system to transmit the sinusoidal rearward and downward forces exerted by the belt on the body. A secondary problem is the rotation of the upper torso about the seat-belt after impact. The results of these force applications from tests are noted. Criteria of air-craft design are suggested to allow maximum impacts without immoblizing injury, permitting immediate evacuation.

4,394

Ryan, J.J. 1962 MECHANICAL REDUCTION OF IMPACT FORCES BY AUTOMOTIVE DESIGN. (Presented before the Annual Meeting of the American Med. Assoc., New York, 27 June 1961) Published in Research Review 6(2):1-37 by the National Safety Council, Chicago, June 1962.

4,395

Ryan, J.J. 1962 REDUCTION IN CRASH FORCES.
In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961, Pp. 48-89

4,396

Ryker, N. J. and S. h. Bartholomew 1951 DETERMINATION OF ACCELERATION BY USE OF ACCELEROMETERS
(Prosthetic Devices Res. Proj., Inst. of Engr. Res., Univ. of Calif., Berkeley, Calif.)
Series 11, Issue 17, Sept. 1951.

4,397

Ryker, N.J. 1962 MANNED SPACE FLIGHT
(North American Aviation, Inc., Space and Information Systems Division, Downey, Calif.) July 17-19, 1962.

ABSTRACT: Herein is described the major difference between several manned space flight missions and their effect upon the hardware design of spacecraft sub-systems.

4,398

Ryabchikov, E. 1962 IN THE CITY OF "THE CELESTIAL BROTHERS".
Trans. from Pravda (Moscow) (USSR) Aug. 7, 1962, p. 4.
(Office of Technical Services, Washington, D.C)
Nov. 9, 1962 63-13886

ACCELERATION

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4,399

Sabbagh, E.N. 1956 PERFORMANCE CHARACTERISTICS OF CUSHIONING MATERIALS IMPACTED UNDER A HEAVY WEIGHT HIGH IMPACT SHOCK MACHINE. (Lowell Technological Institute Research Foundation, Mass.) Rept. for Dec. 1954-June 1955, Contract No. AF18(600)-127, Rept. No. TR-55-229, Feb. 1956. ASTIA AD 90 856

ABSTRACT: The energy absorption characteristics of cushioning materials impacted under a heavy-weight high-impact shock machine (AD 90 917) are reported as analyzed by an analog computer system. Test specimens were fabricated in the shape of circular cylinders; the diameter of the circular bases was 24 in. and the thickness of the specimen was either 2, 4, or 6 inches. Specimens for tests at standard conditions were stored for 5 days on racks in an air-conditioned testing room at 70 degrees F and 56% RH. Cushioning materials tested at -67 degrees F and 160 degrees F were conditioned in a temperature chamber for 3 to 4 hours prior to testing. The impacting hammer had a static weight of 1.28 psi over the area of the sample throughout the tests. The velocity of the hammer at the time of initial contact varied from 20 to 50 fps in increments of 5 fps. Graphs of energy are presented for 36 materials. Test results are also given in tabular form for certain values of thickness and velocity in order to present strain data, values of resilience, and other information. Results for 15 additional materials, for which insufficient quantities were available for complete tests, are also presented in tabular form. The tests show that the expanded polystyrenes are the best energy absorbers. Wood fiberboard, high-density wool pads, and cane fiberboard, respectively, follow the expanded polystyrenes in energy absorbing capacity.

4,400

Sabetay, I. 1960 PREPARATIONS FOR LAUNCHING A MANNED SATELLITE INTO SPACE Stiinta si Tehnica 1960(10):14-15, 17

ABSTRACT: Based on the successful recovery of two dogs in a Soviet biosatellite on August 19, 1960, the article deals with various preparations for launching a manned satellite into space. The USSR started examinations on the vital activity of animals in hermetically closed cabins launched by a rocket to an altitude of 100 km already in 1949. One of the dogs was jettisoned at an altitude of 90 km with the parachute opening after 3 sec. of free fall. Thus, the dog had to sustain an acceleration force 7 times greater than the terrestrial gravity force.

The behaviour and the physiological functions of the animals launched and recovered by the USSR in August 1960 was watched by TV during the whole flight. At present, the biologists are studying the effects of the flight on the organisms of two dogs, mice, flies, plants, and microbes which were in the space ship. All these experiments are only preparations for the launching of the first man into space. (CARI)

4,401

Sabrie, R. 1951 LA MALADIE DES TRANSPORTS MARITIMES, TERRESTRES, AÉRIENS. SON IMPORTANCE AUX ARMÉES, SA THÉRAPEUTIQUE. (The Sea, Ground and Motion Sickness; Its Military Importance and Its Therapy) Journal des Praticiens, Paris, 65:359-361, July 1951.

4,402

Sabrie R. 1958 ANTI-EMETIC DRUGS IN MOTION SICKNESS Prod Pharm 13:541-54, Nov. 1958

4,403

Sachs, L.D. & G.E. Hirt 1951 STATUS REPORT CATAPULT DEVELOPMENT PROGRAM (Pitman-Dunn Laboratory, Frankford Arsenal, Philadelphia) May 1951. ASTIA ATI 115678

ABSTRACT: This is a report of development, performance tests, and vibration tests of various catapults and cartridges.

4,404

Sachs, L.D. 1952 HISTORICAL SKETCHES OF THE CATAPULT DEVELOPMENT PROGRAM. ASTIA AD 14 357

ABSTRACT: Motion sickness results from inadequate adaptation of medular, cerebral, and spinal centers to continuous nonphysiological stimuli. Not motion as such, but the rhythmical repetition of exterior stimuli disturbs the adaptive mechanism. Vestibular, proprioceptive and visual senses take part in the development of the symptoms. The receptors of the inner ear constitute a major etiological factor. A well-functioning layrinth has been called a prerequisite to motion sickness. The vagus is the effective nerve,

and vagotonics are particularly prone to motion sickness. Circulatory disturbance, cerebral anemia, optokinetic nystagmus, shifting tensions and stresses in the abdomen, and neurosis are additional etiological factors. The effectiveness of the German drug "Vomex A" (beta-dimethylaminoethyl bezhydryl ether-1,3-dimethyl-8-chloro-xanthine) is discussed and statistically documented.

4,405

Sadoff, M., N.M. McFadden, & D.R. Heinle 1961 A STUDY OF LONGITUDINAL CONTROL PROBLEMS AT LOW AND NEGATIVE DAMPING AND STABILITY WITH EMPHASIS ON EFFECTS OF MOTION CUES (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-348, Jan. 1961. NASA N62-70922.

ABSTRACT: An investigation was conducted in several types of simulators, including the Johnsville centrifuge, and in-flight to assess the effects of incomplete or spurious motion cues on pilot opinion and task performance over a wide range of longitudinal short-period dynamics. Most of the tests were conducted with a conventional center stick; however, a brief evaluation in the centrifuge of a pencil type side-arm controller was also made.

4,406

Saenger, E. 1949 THE LAWS OF MOTION IN SPACE TRAVEL. Interavia 4:416

4,407

Sais, V. 1959 RADIOLOGICAL STUDY OF THE CERVICAL VERTEBRAE IN FLIGHT PILOTS A.M.A. Proceedings, April, 1959

Abstract: It was the purpose of this study to determine the extent to which high accelerations cause deformities of the spinal column in jet pilots, particularly with relation to the cervical region. X-rays of 228 fighter pilots revealed the following abnormalities: twelve subjects showed slightly flattened lordotic curvatures, in fifty-nine subjects the cervical region showed a stretched, straight-line profile, and in seventeen cases there was evidence of inverted lordosis. The results are correlated to conditions prevailing in high-speed flight.

4,408

Saito, I., Y. Ueno, M. Iwane, M. Ishizaki et al. 1962 THE INFLUENCE OF ACCELERATION ON THE CARDIAC FUNCTION. PART I. HEART SIZE AND ELECTRO-CARDIOGRAPHIC FINDINGS UNDER G AND THEIR RELATION TO THE FATALITY.
In The Reports of the Aero-Medical Laboratory, Japanese Air Self Defense Forces, Tachikawa, Japan. 2(2):1-11, March 1962.

ABSTRACT:

1. The alteration of ECG findings and the heart size were studied in fifteen dogs under the positive G. The heart size was examined through X-ray movie picture.
2. The pulse rate increased in accord to higher G.
3. The alteration of ECG under G has taken place as following: sinus non-respiratory arrhythmia → supra-ventricular premature beat → nodal rhythm → paroxysmal ventricular tachycardia → ventricular fibrillation → death
   → cardiac arrest → death

When the nodal rhythm has lasted more than two to three minutes, these changes were irreversible and dogs usually expired.

4. Both the size of the heart shadow and the difference of the area of systolic and diastolic phase have increased suggesting the augmentation of the cardiac output, Above 5 to 6 G, these have decreased, and on 10 G, there recognized only minimal heart contraction. (Author)

4,409

Saito, I., and M. Ishizaki 1962 THE INFLUENCE OF TRANSVERSE G ON THE PULMONARY FUNCTION.
In The Reports of the Aero-Medical Laboratory, Japanese Air Self Defense Forces, Tachikawa, Japan. 2(2):12-17, March 1962.

ABSTRACT:

1. The pulmonary function was studied under six transverse G while breathing room air or 100% oxygen.
2. The vital capacity, inspiratory capacity and tidal capacity have increased significantly when the subjects breathed 100% oxygen instead of the room air.
3. As subjective findings, there appeared the dry cough, inspiratory difficulty of breathing and also the prominent second pulmonary sound were noticed.
4. The possible cause for these findings was discussed. (Author)

4,410

Saito, I., M. Iwane, M. Ishizaki et al. 1962 THE FLICKER FUSION FREQUENCY AND POSITIVE G.
In The Reports of The Aero-Medical Laboratory, Japanese Air Self Defense Forces, Tachikawa, Japan, 2(1):23-29, March 1962.

ABSTRACT: The flicker fusion frequency threshold for both eyes was determined

on human subjects exposed to positive acceleration. A series of 73 runs were made at acceleration ranging one to five G at Human Centrifuge, Tachikawa.

The flicker fusion frequency threshold decreased moderately 6%, 9%, 11.6% and 19.6% respectively at 2,3,4, and 5 G compared to the value of 1.4G on which levels of G it is suspected there is no remarkable hemodynamic changes.

In order to clarify the cause of the decrease of the flicker fusion frequency threshold under higher G, the investigation was made while the subjects were breathing low oxygen enough to produce low arterial saturation up to 60%, revealing there are no changes in the threshold.

The real cause of the decrease in the flicker fusion frequency threshold under G is still obscure. (Author)

4,411

Saito, I., Y. Ueno, & M. Ishizaki 1962 G-LOAD DURING SPECIAL FLIGHT IN THE T-33. Boei Eisei (National Defense Medical Journal) (Tokyo) 9(3):99-100, March 1962

ABSTRACT: Four test pilots were used to determine the g-loads during various airplane maneuvers. For each maneuver the maximum g-load and the increase in the rate of g are given. The maneuvers tested were the vertical turn, loop, dive recovery, the Immerman turn, and the clover leaf. No adverse effects on visibility were found, and no differences in sensations from those of centrifugal-gravity simulators were noted. (Aerospace Medicine 33(11):1397, Nov. 1962)

4,412

Saito, I., Y. Ueno, M. Ishizaki, & H. Fujihara 1962 EFFECTS OF ACCELERATION LOAD ON CIRCULATORY FUNCTION. Boei Eisei (National Defense Medical Journal) (Tokyo) 9(3):26, March 1962

ABSTRACT: Both men and dogs were exposed to forces of 5-10 g in a centrifugal-force apparatus. In dogs cardiac output decreased abruptly at 7-8 g and nearly ceased at 10 g. It appeared that the safe limit for life is at the point where nodal rhythm has been operating for no longer than 1 or 2 minutes. In the majority of dogs there was no evidence to show a lack of blood in the brain. Organs below the level of the heart were hyperemic as expected. In humans black-out occurred within a minute at 5-6 g. (Aerospace Medicine 33(11):1397, Nov. 1962)

4,413

Sala, O. and G. Pivotti 1952 RECHERCHE SUI RAPPORTI TRA STIMOLI ACCELERATORI DI ALTO VALORE FISICO E RISPOSTA VESTIBOLARE (INVESTIGATIONS ON THE RELATIONS BETWEEN ACCELERATION STIMULI OF HIGH INTENSITY AND VESTIBULAR RESPONSE) Bollettino della Societa italiana di biologia sperimentale (Napoli), 28(11):1750-1753

ABSTRACT: The correlation of the amount and duration of angular acceleration with postrotatory nystagmus was established experimentally on 15 rabbits at angular accelerations higher than 666 degrees/sec^2. In that range, increases of angular deceleration were not followed by a proportional increase in the duration of nystagmus and in the number of eye movements (as was the case at lower accelerations).

4,414

Sala, O., and G. Pivotti 1953 SUI CARATTERI DEL NISTAGMO VESTIBOLARE EVOCATO DA STIMOLI ACCELERATORI DI MOLTO ALTO VALORE FISICO (ON THE CHARACTERISTICS OF VESTIBULAR NYSTAGMUS EVOKED BY ACCELERATORY STIMULI OF VERY HIGH PHYSICAL VALUE)
Bolletino della Societa italiana di biologia sperimentale, (Napoli) 29 (1): 104-106. Jan. 1953. In Italian.

ABSTRACT: High accelerations (3500°/sec. for 120/1000 of a second) did not induce a nystagmic response in guinea pigs. This response is usually produced by changes in the vestibular centers. However, a vestibular nystagmic response was obtained by successive moderate accelerations.

4,415

Salathé, A. 1877 PHYSIOLOGIE EXPERIMENTALE. Traveux du Laboratoire de M. Marey III. 251-272, (In French)

ABSTRACT: Salathé, in his classical studies on the effects of gravitation, first used clearly formulated questions to attack the problem on centrifugal effects (1877). For his animal experiments he used a horizontal centrifuge 1.50 m. (4.92 ft) in diameter. A simple arrangement permitted the recording or respiration while the centrifuge was running.

4,416

Salathe, A. 1877 DE L'ANEMIE ET DE LA CONGESTION CEREBRALE PROVOQUEE MECANIQUEMENT CHEZ LES ANIMAUX PAR L'ATTITUDE VERTICALE OU PAR UN MOUVEMENT GIRATOIRE (Concerning Anemia and the Cerebral Congestion Mechanically Caused in Animals by Vertical Position or by a Gyratory Motion)
Physiol. Exper. 3: 251-272

4,417

Salaznev, V.P. 1958 ISKUSSTVENNYY SPUTNIK ZEMLI (ARTIFICIAL EARTH SATELLITE) (Moscow: Oborongis, 1958)

ABSTRACT: On the basis of domestic and foreign, chiefly American sources, the author discusses the theoretical problems involved in the construction and launching of Soviet artificial satellites, specifically Sputnik I, the world's first. He indicates the path to be followed by scientists in solving the problem of conquering space, mentioning past and future difficulties, and pointing out the main problems the artificial satellites will solve. He reviews the successive stage in the conquest of space, beginning with the launching of the unmanned earth satellite and ending with the establishment of interplanetary space stations and the use of space ships. Several models of the earth satellite, celestial rockets, and space stations are described. The principles of control and celestial orientation of the artificial satellite during its orbital flight are reviewed, and a description is given of the most important instruments installed in the satellite. (CARI)

4,418

Salis, G. Oct. 1958 SOME TESTS ON BEFAB 'SAFELAND' SAFETY BARRIERS (Advisory Group for Aeronautical Research and Development) Rept # 228, ASTIA AD 227 469.

SUMMARY: This Report describes results obtained during tests carried out at the Italian Air Force Test Centre on a device known as the Befab 'Safeland' Barrier, the object of which is to arrest jet aircraft in short distances. Tests were carried out with two types of barrier, the 4-3F and the 6-3F, using DH. 100, Fiat G. 80, F86E and F.84F aircraft. The results show that it is possible to arrest jet aircraft in landing or takeoff, in relatively short distances and with an almost constant longitudinal deceleration of about 1 g. Braking action is smooth enough not to affect the pilot and damage to the aircraft is easily repairable at the squadron second line maintenance service. During the tests it was found that some precautions were necessary in setting up the arresting net in order to guarantee good operation of the barriers. Setting up of the unit is simple and quick, and does not require any preliminary ground preparation. Maintenance is simple and straightforward.

4,419

Salonna, F., & L. Carbonara 1956 AZIONE DI ALCUNI FARMACI SEDATIVI SULLA REFLETTIVITA VESTIBOLARE (EFFECT OF SOME SEDATIVES ON VESTIBULAR REFLEXES). Archivio italiano di otologia rinologia e laringologia (Milano) 64(4):507-513 July-Aug. 1956

ABSTRACT: The administration of a barbiturate, Luminal (phenylethylmalonyl uric acid), and a paraaminobenzoic acid derivative, Nevanide (diethylammonium paraaminobenzoate) to guinea pigs prior to rotatory stimulation induced a decrease in post-rotatory nystagmus. Vestibular reflexes were more pronounced and of shorter duration for Luminal, and moderate and of longer duration for Nevanide. The dosage required to obtain a decrease in vestibular reflexes was higher for Luminal than for Nevanide.

4,420

Salpeter, M.M. and C. Walcott 1960 AN ELECTRON MICROSCOPICAL STUDY OF A VIBRATION RECEPTOR IN THE SPIDER. Exp Neurol. 2:232-50, June 1960

4,421

Salzman, E. W., & S. D. Leverett 1956 STUDIES IN ORTHOSTATIC VENOCONSTRICTION. I. PERIPHERAL VENOCONSTRUCTION DURING ACCELERATION. II. ROLE OF THE CAROTID SINUS MECHANISM. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 56-483; ASTIA AD-97 298; Sept. 1956

ABSTRACT: A technique for demonstrating active venous constriction has been developed, using miniature intravascular balloons. Validation of the technique was performed in vitro and by drug studies and direct stimulation of the sympathetic chain in vivo. Active venous constriction was demonstrated in dogs during acceleration on the centrifuge. The magnitude of the venous response was strongly correlated with the animals' ability to maintain arterial pressure. The importance of the venous system in supporting the circulation under a hydrostatic load is discussed. The demonstration of peripheral venoconstriction during common carotid artery occlusion implicated the carotid sinus mechanism in the control of peripheral venous tone. Deafferentation of the aortic arch by cervical vagotomy enhanced the venous response to carotid occlusion. Venoconstriction was correlated with arteriolar constriction of peripheral venomotion and arteriolar reactivity is suggested. (AUTHOR)

4,422

Salzman, E.W. and S.D. Leverett 1956 PERIPHERAL VENOCONSTRICTION DURING ACCELERATION AND ORTHOSTASIS. Circulation Res. 4(5):540-545. Sept. 1956.

ABSTRACT: Using a miniature balloon technique, peripheral vaso-constriction was measured in dogs given two types of centrifuge runs; one in which a peak of 3 g was reached in 3 to 4 seconds and held for a 15 second plateau, and the other in which the acceleration was gradually increased at the rate of 1 g per 10 seconds. By eliminating the constriction with Dibenzyline, an adrenergic blocking agent, the semiquantitative interpretation of results was made possible. Active peripheral venoconstriction was observed in dogs exposed to centrifugal acceleration. The magnitude of the venoconstrictor response was strongly correlated with the animal's ability to maintain arterial pressure, suggesting the importance of contraction of the venous reservoir in the support of cardiac output under a hydrostatic load.

4,423

Salzman, E. W. 1957 REFLEX PERIPHERAL VENOCONSTRICTION INDUCED BY CAROTID OCCLUSION. Circulation Res. 5:149-152.

4,424

Sampson, Philip B., Edwin H. Elkin, James Heriet & Robert Nelsen 1960 HEAD AND EYE TRACKING IN RESPONSE TO VELOCITY AND ACCELERATION INPUTS (Institute for Applied Experimental Psychology, Tufts University, Medford, Massachusetts) Office of Naval Research Contract No. Nonr 494(16) Project No. N.R. 144-122, April 1960. ASTIA AD 237445

ABSTRACT: This study was conducted to find out how well visual tracking could take place when both the head and eyes were free to follow moving targets and to discuss the relevance of the findings to the notion of using the eye as a control mechanism. The target used in this experiment swung horizontally about the subject at three different velocities (30, 60, and 90°/ sec.) and three accelerations (5, 20, and 45°/ sec.^{2}). The tracking error record obtained indicated that the eye was able to track the targets within the same tolerances reported for eye tracking when the head was fixed. In addition there was the suggestion that by permitting both head and eye movements, higher velocities could be tracked than by the eyes alone.

A reasonable constant head lead angle was found for the constant velocity inputs which varied with the magnitude of the input. Various implications of this finding were discussed.

An electric circuit analog was developed for part of the data and used to predict head and eye output in response to acceleration inputs, using constants derived from the velocity input data. The agreement between the obtained and the predicted function appeared promising.

4,425

Sand, A. 1940 THE MECHANISM OF THE ACUSTOLATERAL SENSE ORGANS IN FISHES WITH SPECIAL REFERENCE TO PROBLEMS IN THE PHYSIOLOGY OF THE SEMI-CIRCULAR CANALS Proc. Royal Soc. Med. 33:741-750

4,426

Sander, E.G. 1960 STRESS EFFECTS ON GASTRO-INTESTINAL PHYSIOLOGY (Aerospace Medical Division, Wright Air Development Division, Dayton, Ohio) Project 7163(805), Internal

ABSTRACT: The objective of this research is to determine the effects of vibrational stress upon the function and physiology of the gastro-intestinal tract. The functions to be studied are digestion, nutrient absorption, rate of food passage, and nutrient requirements. Digestion studies will include estimates of calcium, phosphorus, and nitrogen retention. The absorption rates of glucose, one fatty acid, one amino acid, one vitamin, calcium, and phosphorus, shall be determined using radioisotopes. The above factors will be studied in rats under different frequencies of vibration as well as different durations of exposure.

4,427

Santi, G.P. 1955 ACCELERATION PROBLEMS IN EJECTION-SEAT DESIGN.
In U.S. Assistant Secretary of Defense (Research and Development) Washington D.C., Shock and Vibration Bulletin No. 22. Supplement.
ASTIA AD-94 697

4,428

Santos, F.R. dos 1952 SALTO PARAQUEDAS, DECISAO E PROBLEMAS.
(PARACHUTE JUMPING: DECISION AND PROBLEMS.)
Imprensa medica (Rio de Janeiro), 28 (459) : 51-67

ABSTRACT: The decision to bail out from an airplane is influenced by factors related to the aircraft (type, condition, position in the air, velocity, and degree of maneuverability), by factors related to the altitude (degree of anoxia temperature, and distance from anti-aircraft fire in combat), by terrain features, and by atmospheric conditions. Factors determining the degree of safety during the jump are as follows: acceleration during free fall, deceleration during opening of the parachute, and impact on hitting the ground.

An analysis of 50 fatal instances (17.5%) out of 400 emergency bailouts revealed the following causes: (1) bailout elevation was too low, 48%; (2) the parachute got caught in the plane, 10%; (3) the subject was hit by the plane during fall, 20%; and (4) other causes (parachute was improperly adjusted prior to jump, parachute caught fire from burning plane, drowning of airman), 22%. Bone fractures on hitting the ground occurred three times less in experienced parachute jumpers than in those who had never jumped. In conclusion, the most important reasons for the unsuccessful outcome of emergency bailouts are summarized.

4,429

Sapirstein, L. A. & E. Ogden 1961 THE CORONARY HEMODYNAMIC RESPONSE TO ENVIRONMENT.
(USAF Aero Syst. Div., Wright-Patterson, AFB, Ohio) ASD TR 61-161, Nov. 1961

4,430

Sarnoff, C. A. and J. C. Mebane 1958 EPISODIC PSYCHOGENIC G FORCE INTOLERANCE. A STUDY OF THREE CASES.
J. of Aviation Medicine 29(4):287-290, April 1958.

ABSTRACT: Intolerance to G forces was exhibited by three military aviation students, referred for study by the flight surgeons of their training organizations, which had become noticeable during acrobatic flying. None had unusual physical or neurologic findings but all possessed disturbed personality patterns and developed incapacitating anxiety under stress.

4,431

Saruta, N. & K. Shimizu 1959 A STUDY ON THE EFFECT OF A CENTRIFUGAL FORCE ON LIVING BEINGS.
Kyushu J. Med. Sci. 10:251.

ABSTRACT: Insects (a vivaparous fly, the Sarcophaga peregrina) and plants (Phaseolus aureus) were subjected to multiples of G for the entire duration of their growth in order to study the effect of centrifugal force on the various stages of their biological cycle.

Of 40 larvae subjected to 20 G, eight died during the first week and the others did not go through the metamorphosis until the stage of the perfect insect. Of an equal number of larvae subjected to 9 G, four died during the first week and only eight developed into a perfect insect.

Of the larvae subjected to 4 G none died and 25 reached the insect stage. Obviously, all of the 40 control larvae lived and went through the entire process of evolution.

4,432

Sasaki, Frank T., Norman F. Eslinger & Glen L. Neidhardt 1959 MODEL TESTS AND STUDIES OF THE PROBLEMS OF DYNAMIC TENSIONS IN AIRCRAFT-ARRESTING GEAR CABLES
(American Machine & Foundry Company, Mechanics Research Division) Contract No. AF 33(616)-5282 ,WADC TR 59-495 Project No. 1351-60716 Oct. 1959 ASTIA AD 237 294

ABSTRACT: The results of tests performed on a one-tenth scale model aircraft arresting gear are reported. The model incorporated a means of cable tension alleviation and was designed to have dynamic similitude to a full-scale arresting gear. The purpose of the test program was to obtain experimental verification of an analytical method, developed under this same contract, for determining cable tensions in an arresting gear with the inclusion of tension alleviation.

Comparisons between actual and calculated cable tension curves are presented and show close agreement. It is, therefore, concluded that the analytical method can be used in order to determine cable behavior in an arresting gear with sufficient accuracy. Moreover, the method is a practical one.

4,433

Sauers, W. F. April 1943 TEST FLIGHT OF PRONE POSITION FLIGHT CONTROLS INSTALLED IN CG-4A GLIDER. (Inter-Office Memo, Glider Branch to Design Branch, Aircraft Lab.) 2 April, 1943.

4,434

Savely, H.E. 1945 EFFECTS OF ACCELERATION ON MAN. (War Depart., Air Forces) TSELA-3-697-11, Feb. 28, 1945. Appendix 1

4,435

Savely, H.E., W.H. Ames, & H.M. Sweeney 1946 LABORATORY TESTS OF CATAPULT EJECTION SEAT USING HUMAN SUBJECTS. (AMC, Wright Field, Dayton, Ohio) Memo Rept. TSEAA 695-66C Oct. 1946. ASTIA ATI 119947

ABSTRACT: The purpose of this report is to present the results of ejection seat experiments on the 30-foot test tower using the T2 catapult. Successful utulization of the present type catapult ejection seat requires a solution to the following problems: (a) Reduction of the added acceleration imposed on the occupant because of the effects of cushioning, compression of the body, and slipping forward in the seat. (b) Provision of safeguards against extreme flexion or extension of the neck during the ejection stroke. Before human subjects are used with the next higher fractional charge of cartridges of Type IOW 6030-S, namely the 67-7-gram charge, either in aircraft or in experimental tests, a larger number of subjects should be used with the lower fractional charges in order to find a solution to the problems detailed in this report. An indoctrination program involving ejection on a test tower should be required of all personnel flying airplanes equipped with ejection seats. The two 100-foot test towers now under construction will provide experimental conditions more nearly simulating those in aircraft.

4,436

Savely, H. E. 1952 HUMAN PROBLEMS IN ESCAPE FROM HIGH-SPEED AIRCRAFT. Air Univ. Quart. Rev., 5 (2): 65-67.

ABSTRACT: (1) The use of high-pressure masks, breathing helmets, and elastic vests has proven disadvantageous (painful distension of unprotected facial areas, pooling of blood in the limbs, leakages through the masks). - (2) Determinations of human acceleration tolerance by means of catapult devices revealed that an average of 20 g's for 1/10 second, or 25 g's for .01 second is withstood without injury. The rate of application of the ejecting force has an influence on the interaction between man and seat; slower application of force will make higher ejection velocities tolerable. - (3) Measurements carried out on the linear decelerator (deceleration cart) have shown that man can tolerate up to 45 g's wearing a simple crash harness. The rate of application of the decelerating force determines again the effect on the human organizm (shock signs were observed at deceleration rates of 1360 g/sec., while a rate of 493 g/sec. caused no ill effects at decelerations up to 40 g). Experimental investigations of decelerations of longer duration with the body rotating in one or more planes are still outstanding. (4) Wind-blast effects were measured under simulated conditions in wind-tunnel tests on unprotected humans at wind speeds up to 425 m.p.h. (normal

bailouts) and up to 470 m.p.h. (test seat ejections). Blasts at sonic speeds were directed at dummies wearing an A-13A oxygen mask and U.S. Air Force F-3 helmets. Tissues of the body protected from the direct force showed no ill effects. Medium-weight winter flying clothing affords ample protection against high-altitude temperatures (up to 80,000 ft.)

4,437

Savely, H.E. 1955 THE PHYSIOLOGY OF ESCAPE
(Paper, Symposium on Escape from High Performance Aircraft, Oct. 1955)

4,438

Savely, H.E., & J.P. Henry 1957 A NEW LOOK AT AVIATION PHYSIOLOGY
J. Aviation Med. 28(6):531-534

4,439

Savoini, C. S., G. A. Reed, & H. W. Burnette 1962 AUTOMATIC COMPUTER PROCESSING OF CHIMPANZEE PHYSIOLOGICAL AND PSYCHOMOTOR DATA. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: The Computation Division at Holloman AFB was able to process automatically chimpanzee physiological and psychomotor data from centrifuge tests conducted at the University of Southern California by the Aeromedical Field Laboratory. The magnetic tape playback speed-up technique, the analog computer technique of handling physiological data, and the digital computer processing of physiological and psychomotor data are described. The psychomotor data was processed thru a unique method that allowed the computer to recognize the psychomotor behavior as well as reaction time. (Aerospace Medicine 33(3):350-351, March 1962)

4,440

Sawyer, E.V. 1951 LANDING OF SPACECRAFT
Brit. Interplan. Soc. J. 10:300-301, Nov. 1951

ABSTRACT: The most efficient braking device is the parachute drag brake (also known as "drogue chute" or "parabrake"). It is controlled by a drag cord passing through rings on the skirt of the canopy so that the drag force can be varied

4,441

Scano, A. and G. Meineri 1961 THE ACTION OF SOME SYMPATHICOMIMETIC SUBSTANCES ON RESISTANCE TO POSITIVE ACCELERATION.
In Riv. Med. Aero. 24:335-342, July-Sept. 1961 (Italy).

4,442

Scano, A. 1961 RESEARCH ON ACCELERATIONS IN ITALY
(Paper, Panel on Acceleration Stress of the Armed Forces-NRC Committee on Bio-Astronautics, 6-11 March 1961, NASA Ames Research Ctr., Moffett Field, Calif.)

4,443

Scano, A. 1962 LA CENTRIFUGA UMANA: STRUMENTO DI INDAGINE E DI ADDESTRAMENTO (THE HUMAN CENTRIFUGE: INSTRUMENT OF RESEARCH AND TRAINING) Rivista di medicina aeronautica e spaziale (Roma) 25(1):121-130, Jan.-Mar. 1962

ABSTRACT: The human centrifuge was developed to simulate accelerations of various speeds, directions, and durations analogous to those of aircraft in order to study the physiological reactions of humans exposed to them. The first centrifuge of note, however, was used to treat mental disorders. It was built in 1818 in a Berlin psychiatric clinic, rotated at 40-50 turns per minute, and managed to attain 5 g at the outer arm level. In 1877, Salathe used a small centrifuge of 1.5 meters in diameter for acceleration studies in small animals, and in 1898, Wenusch constructed a centrifuge with a maximum velocity of rotation to about 8 g, also for treating mental disorders. It was not until 30 years later in Germany and in the United States that the first human centrifuge for research purposes was developed. In 1938, the Center of Studies and Research in Aviation Medicine, Torino, constructed the first Italian centrifuge which attained 20 g. The latter apparatus is described and illustrated, and its modifications (eventually between 1 and 33 g was attained) and research possibilities are explored. (J. Aerospace Medicine 33(10):1280, Oct. 1962)

4,444

Schafer, E. 1938-39 THE INFLUENCE OF BODY POSITION UPON ALTITUDE TOLERANCE. (Uber den Einfluss der Korperhaltung auf die Hohenfestigkeit) Luftfahrtmed., 3:257-266

ABSTRACT: The effects of postion on the heart, circulation and general condition were studied using 8 male aviators as subjects, during ascent, descent and level flight in a low pressure chamber at 6500 m. In the recumbent position, the diastolic blood pressure dropped but the increase in pressure amplitude was the highest in this position. The pulse rate attained the same frequency in all positions at a level of 6500 m.

Danger of collapse in the standing position is produced by orthostatic factors as well as by oxygen deficiency. (J. Aviation Med., 11(1):51-52)

4,445

Schaefer, Hans 1947 WORK ON PHYSIOLOGY OF THE CIRCULATORY SYSTEM AND ON ELECTROPHYSIOLOGY (BEITRAEGE ZUER KRISLAUFPHYSIOLOGIE UND ELEKTROPHYSIOLOGIE) ASTIA ATI 12793

ABSTRACT: The author reviews the research work and accomplishments of the division of experimental pathology and therapy of the W.G. Kerkhoff institute of Bad Nauheim. A four-stage amplifying apparatus was constructed for the recording of the potentials of the heart, the heart nerves, and muscles. Among the subjects studied are listed electrophysiology of the circulatory system, cardiac reflexes, sensitivity as a disease factor, anoxemia, tetanus, choline esterase, and coronary circulation.

4,446

Schaefer, J., & S. Kubicki 1956 ZUR ABLEITUNG VON EEG (EKG UND AUGENNYSTAGMUS) BEI DREHBEWEGUNGEN (RECORDING OF EEG (ECG AND EYE NYSTAGMUS) IN ROTATORY MOVEMENTS) Zeitschrift für die gesamte experimentelle Medizin (Berlin) 128(1):50-54, Nov. 1956

ABSTRACT: An apparatus is described which permits the simultaneous registration of the vestibular optic nystagmus induced by rotation together with the effect of centrifugal forces on the electroencephalogram and electrocardiogram. A small laboratory animal may be rotated and nystamgus, EEG and ECG recorded electrically during rotation.

4,447

Schaefer, K.E., ed. 1962 ENVIRONMENTAL EFFECTS ON CONSCIOUSNESS. (New York: The MacMillan Co., 1962)

ABSTRACT: Proceedings of the First International Symposium on Submarine and Space Medicine, U.S. Submarine Base, New London, Conn., Sept. 8-12, 1958. Contents include:

Noell, W.K., Effects of High and Low Oxygen Tension on the Visual System;
Wing, K.G., Effects of Certain Environmental Changes Upon the Cochlear Response of the Cat;
Therman, P.O., Neurophysiological Effects of Carbon Dioxide;
Stein, S.N., The Neurophysiological Effects of Oxygen Under High Pressure;
Taylor, H.J., Neurophysiological Effects of Nitrogen;
Davis, H., The Problem of Consciousness;
Graybiel, A., Orientation in Space, with Particular Reference to Vestibular Functions;
Gerathewohl, S.J., Effect of Gravity-Free State;

4,448

Schaefer, V.H. and R.G. Ulmer 1959 A REPRESENTATIVE BIBLIOGRAPHY OF RESEARCH IN LOW-FREQUENCY MECHANICAL VIBRATION. U.S. Army Med. Res. Lab. Rep. 405:1-27, 12 November 1959

4,449

Schafer, G. E. and R. T. Gallagher 1952 ILLUSIONS Flying Safety 8:18-22, July 1952

4,450

Schalkowsky, S., & H. F. Blazek 1961 ROTATING PENDULUM ACCELEROMETER American Rocket Society J. 31(4):469-473, Apr. 1961

ABSTRACT: The basic features of precision accelerometers particularly adapted to the measurement of slowly varying low level accelerations and their specific applications to space vehicles are considered. The contrast between the rotating pendulum and conventional approaches to accelerometer instrumentation is discussed. (JPL)

4,451

W. Schaub 1952 GEDANKEN EINES ASTRONOMEN ZUR WELTRAUMFAHRT (THOUGHTS OF AN ASTRONOMER ON ASTRONAUTICS) Weltraumfahrt 3:34-38, April 1952

4,452

Schechter, H. B. 1960 SOME WEIGHT CONSIDERATIONS FOR MANNED LUNAR MISSIONS American Rocket Society J. 30(2):195-197, Feb. 1960

ABSTRACT: The total weight requirements for three possible types of manned, round-trip, soft-landing lunar missions are investigated, all starting out from a space station circling the earth at an altitude of about 350 miles. The first and second missions follow direct hit flight trajectories and employ chemical and nuclear power plants, respectively. Thrust magnitudes needed are determined by imposing an initial landing deceleration load factor of 3 earth g. The third mission makes use of a nuclear power plant as a sort of "ferry boat" to reach a circular orbit around the moon, whereas for the landing and ascent portions at the moon, the final payload is propelled by chemical rockets. After rendezvous with and attachment to the orbiting ferry boat, the payload is returned to the earth space station.

4,453

Scheele, Leonard A. 1957 SUMMARY OF MEDICAL ASPECTS OF AUTOMOBILE CRASH INJURIES AND DEATHS
The Journal of the American Medical Association, Vol. 163, No. 4, Jan. 26, 1957

ABSTRACT: Motor-vehicle accidents represent a health problem of tremendous significance. They demand attention as insistently as any epidemic disease. They represent the interaction of the driver, the vehicle, and the road as host, agent, and environment respectively. The driver requires study just as do the other two elements, and the licensing of drivers calls for a more extensive medical evaluation than is now provided. A cooperative effort is necessary in which manufacturers, traffic engineers, law-enforcing agencies, and the medical profession will concentrate on the solution of this urgent problem.

4,454

Scheetz, H.A. and G.J. Hasslacher, III 1959 DESIGN AND EVALUATION OF THE DROP TOWER FACILITY FOR SHOCK TESTING. (Pennsylvania State U., University Park) Technical rept. no. 17, ASTIA AD-235 360, 15 Sept. 1959

ABSTRACT: A drop tower shock testing facility for testing small end items such as panel type milliammeters was constructed. A combination pneumatic-hydraulic decelerator utilizin g a standard automobile tire was developed. The shock pulse produced was free of high frequency ringing and secondary impacts. The differential equations of motion for the deceleration cycle were derived and used to analyze the impactor displacement, velocity and acceleration. The effects of damping on the shock pulse were studied. Curves showing typical shock pulses for heights up to 60 feet are presented. (Author)

4,455

Schelhorn, A. E. 1959 A STUDY OF THE DYNAMIC RESPONSE CHARACTERISTICS OF FLIGHT SIMULATORS (Wright Air Development Center, Wright-Patterson, AFB, Ohio) WADC Technical Report 59-98, April 1959, ASTIA AD-210 566.

4,456

Schellong, F. & M. Heinemeir 1933 ÜBER DIE KREISLAUFREGULATION IN AUFRECHTER KÖRPERSTELLUNG UND IHRE STÖRUNGEN (Concerning the Circulatory Regulations in Perpendicular Body Position and Their Disturbances)
Zeitschrift für die gesamte experimentelle Medizin (Berlin) 89: 49-60

4,457

Scher, S. H. 1948 PILOT ESCAPE FROM SPINNING AIRPLANES AS DETERMINED FROM FREE-SPINNING-TUNNEL TESTS (National Advisory Committee for Aeronautics, Washington, D. C.) Research Memo. No. L8D28. Sept. 9, 1948.

4,458

Scher, S. H. 1951 PILOT ESCAPE FROM SPINNING AIRPLANES AS DETERMINED FROM FREE-SPINNING-TUNNEL TESTS. (National Advisory Committee for Aeronautics, Washington, D. C.) Oct. 1951.

ABSTRACT: Procedure for pilot escape from spinning airplanes has been determined by means of tests in which pilot escape was simulated from 21 airplane models spinning in the Langley 20-foot free-spinning tunnel. The results in general indicated that the pilot should bail-out of the outboard side. Calculated centripetal accelerations acting on the pilot during a spin are presented.

4,459

Scherberg, M.G., & H. Ferguson 1952 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52 278, Oct. 1952. ASTIA AD-5010

ABSTRACT: Accelerations having short durations (less than 5 sec) and orders of magnitude above 2 g were represented by the equation of motion, $X = K \times 2$, where $\dot{x}$ and $\ddot{x}$ are the velocity and acceleration, respectively, and K is a positive constant. Calculations of the maximum acceleration expected at a given time (t) after the initiation of escape were made to obtain upper bounds for escape acceleration histories depending only on the initial velocity of escape. Graphs of these upper bounds are given for t = 0.5 to 4.0 sec and for initial speeds at 200-mph intervals, from 400 to 1800 mph. For upper bounds from t - 0.0 to 0.5, the method was not applicable; an alternate method is given for these values. Graphs which show the rate of onset of acceleration (defined as a jolt and represented by the third derivative $\dddot{x}$) as a function of the initial acceleration are included for initial speeds from 400 to 1800 mph in 200-mph intervals. Contrary to the upper-bound results, the jolt results appeared to be valied at transonic and supersonic as well as at heoretically, around the calves than around the thighs. This differential is not provided by leggings.
(e) It is suggested that the tilt table is a valuable testing instrument for anti- "g" devices.

4,460

Scheubel, F. N. 1950 PARACHUTE OPENING SHOCK
In German Aviation Medicine, World War II
(Government Printing Office, Washington, D. C.) Vol. I, pp. 599-611

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Scheuler, O. 1959 SPACE FLIGHT SIMULATORS.
In Alperin, M. and H.F. Gregory, Eds., Vistas in Astronautics
(New York: Pergamon Press, Ltd.) Vol. II

4,462

Schiele, J. S., & H. B. W. Sheasby 1961 RUNWAY DECELERATION TESTS WITH WESTINGHOUSE DECELOSTAT CONTROLLER EQUIPMENT. (Central Experimental & Proving Establishment, Canada) Addendum No. 1 to CEPE Rept. No. 1536; ASTIA AD-261 243; May 1961

SUMMARY: The Cosmopolitan anti-skid brake tests proved the Westinghouse Decelostat System to be reliable and effective in stopping the aircraft without tire damage. Although the operation of the system was not as smooth as that of comparable equipment now in service, it was considered satisfactory for installation on all Cosmopolitan Aircraft. (AUTHOR)

4,463

Schinkl, K. 1957 THE EFFECT OF AIRCRAFT SPINS ON THE HUMAN BODY.
(Einwirkung des Trudelvorganges auf den menschlichen Korper)
Zeitschrift fur Flugwissenschaften (Braunschweig), 5(8): 221-227

ABSTRACT: The effects of the radial and angular accelerations generated in a spin of an aeroplane on the human body are discussed. The danger from radial and angular accelerations is threefold: (1) the impairment of free movements of body and limbs, the weight of which is increased many times as the result of acceleration, (2) the impairment of vision and consciousness due to impeded cerebral circulation at certain positions of the body during the spin, and (3) the impairment of the sense of direction because of incompatible information from the visual senses and the vestibular system. The receptors in these organs are greatly overstimulated by the angular accelerations of the spin. Certain prophylactic measures are reviewed.

4,464

Schlang, H.A., A.L. Hasleys & R.J. Pearson, Jr. 1957 COARCTATION OF THE AORTA WITH RESISTANCE TO BLACKOUT FROM ACCELERATION FORCES.
U.S. Armed Forces Med. J. (Wash) 8(5):725-729. May 1957.

4,465

Schlomka, G. 1938 EFFECT OF FLYING ON THE CIRCULATION. Med. Klin., 1: 421-423

ABSTRACT: Flying makes two special claims on the circulation. One arises from the accelerations occurring in precipitate flying when the plane curves or is intercepted; these accelerations affect the circulation directly; the other claim comes from the indirect effect of the heart on the deficient O_2 saturation of the blood. The blood displacement appearing from the effect of centrifugal accelerations- there takes place, according to the opinions of many workers, a "coagulaton" of the blood in the vessels of the lower part of the body at the expense of the cranial vascular regions - seems to constitute the true circulatory dynamic factor at such accelerations. This blood displacement means, hemodynamically, for the circulation the same thing as a sudden vasomotor failure, although the clinical phenomena do not exactly resemble the latter. At attempts to restrain failure of circulation in high accelerations, the author warns of the use of abdominal muscular pressure, as there is the fear that it is done more or less in the shape of the Valsalva pressure which leads, because of the lessening blood influx into the right ventricle, to an undesired premature failure of the circulation. Raising of the acceleration endurance by crouched posture and consequent confinement of respiration and the squeezing out of the blood reservoir of the abdominal viscera appears possible if this measure can be carried out the flying practice. For very considerable accelerations the possibilities of the swinging seat are pointed out.

THE INFLUENCE OF SPEED IS OF GREAT IMPORTANCE TO THE CIRCULATION. THE MAIN role is played here by the centrifugal acceleration. The latter effects a disproportionate distribution of the blood in the body and a reduction in the circulatory amount of blood. The sound circulation is capable of setting against it a great number of compensatory forces, but the faulty circulation is seriously endangered thereby. The amounts of blood engorged in individual portions of the body by the centrifugal acceleration may cause blood vessels to burst, especially so if they are changed by arteriosclerosis. Further-more atmosphereic illness which is identical with sea-sickness, has a bad effect upon the injured circulation. The author concludes that flying entails a considerable burden on the circulation and that, therefore, persons with faulty circulation should abstain from flying.

4,466

Schmaltz, G. 1932 THE PHYSICAL PHENOMENA OCCURRING IN THE SEMICIRCULAR CANALS DURING ROTATORY AND THERIME STIMULATION. Proc. Roy. Soc. Med. 25:359-381

4,467

Schmidt, C.F. 1943 SOME PHYSIOLOGICAL PROBLEMS OF AVIATION. Tr. Stud. Coll. Physicians, (Philadelphia) 11:57-64

ABSTRACT: Lately engineers have provided us with airplanes capable of greater

speed, maneuverability, altitude and range, than human beings could tolerate without dangerous or fatal consequences. The success of aviation, therefore, depends on intimate and effective association between medical research groups, engineers and training groups

Regarding high altitudes, up to 8,000 feet, usually no effects are discernible, except slight acceleration of the pulse, but above, safe zone symptoms of anoxia begin. Above 35,000 feet anoxemia develops; 50,000 feet being the absolute ceiling for flight with ordinary oxygen equipment.

In problems related to motion (effect of centrifugal force) the loss of vision or consciousness is due to acute anemia of the retina and of the brain, because of decreased cardiac output.

In dive bombing, it is customary to open flaps in the wings to slow the dive, so that the pilot may pull out without "blacking out", but this makes the plane an easier target.
When the plane is turned with the pilot's head outward (negative acceleration), the phenomena are those of acute cerebral congestion, leading to mental confusion or red vision ("red-out".)

4,468

Schmidt, I. 1938 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. (Bibliography of Aviation Medicine)
(Berlin: J. Springer, 1938)

ABSTRACT: The first volume of an important bibliography, covering the literature in aviation medicine and high-altitude research up to the end of the year 1936. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

4,469

Schmidt, I. 1943 BIBLIOGRAPHIE DER LUFTFAHRTMEDIZIN. ZWEITE FOLGE. EINE ZUSAMMENSTELLUNG VON ARBEITEN UBER LUFTFAHRTMEDIZIN UND GRENZGEBIETE, 1937 BIS ENDE 1940. (Bibliography of Aviation Medicine, Part Two). Luftfahrtmedizin Vol. 8, No. 1, March 1943.

ABSTRACT: The second volume of an important bibliography, covering the literature in aviation medicine and high-altitude research through the years 1937 to the end of 1940. Constitutes a survey of world literature on the subjects of psychophysiology of the flier, altitude research, acceleration research (including centrifugal forces, parachute jumping, and air sickness), accidents, effects of sound, fatigue, flying sickness, flying fitness and aviation hygiene.

4,470

Schmidt, I. 1948 BIBLIOGRAPHY OF AVIATION MEDICINE, VOLUME III. (Incomplete) (School of Aviation Medicine, Randolph Air Force Base, Texas)

ABSTRACT: A compilation of reports pertaining to Aviation Medicine and its borderline fields, covering the years 1941 through 1945, and including supplementary references for the year 1940.

After the present material had been supplemented above all by Anglo-American literature, it was supposed to be published as the third volume of the "Bibliographie der Luftfahrtmedizin". But the war prevented its completion. As we believe that these references will be of interest to many an aeromedical scientist, they will be disseminated for public use. The references concern first of all German publications, but include also those foreign papers which have been accessible. Anglo-American references have been omitted, since they are all listed in the "Bibliography of Aviation Medicine" by E. C. Hoff and J. F. Fulton.

4,471

Schmidt, L. 1952 VERSUCHE ZUR LIEGENDEN UNTERBRINGUNG DES FLUGZEUGFUEHRERS (Investigations on the Prone Position for Pilots) (Royal Aircraft Establishment, Gt. Britain) Library Trans. No. 396 Jan. 1952.

ABSTRACT: The "B.9" is a twin engine, cantilever, lowwing monoplane of composite construction, stressed for an ultimate factor of 22 g. The pilot is placed in the fuselage nose. The bed on which the pilot lies is provided with for and aft adjustment and an adjustable chin rest. There are arm rests, and the legs are slightly bent. A back parachute replaces the conventional chest-type parachute. Modified stick controls (in preference to wheel controls) are used. Brakes and rudder are controlled by the feet in the conventional manner. All secondary controls and switches are situated on the port side of the fuselage. The prone position was considered comfortable by the pilots. Fatigue was experienced by some in the nape of the neck and in the shoulders. The chin rest was considered disturbing in horizontal flight. The relative position of the field of view, as compared to the seated position, shifted into a position with the main line of vision declined 30 degrees below the horizon. Flight handling was not encountered difficult. The feeling os "suspension" was absent in the vertical dive. Maximum accelerations of 8.5 g pullouts and 6 g in steep spirals were tolerated over several seconds.

4,472

Schmitt, T.J. 1954 WIND-TUNNEL INVESTIGATION OF AIR LOADS ON HUMAN BEINGS. (Navy Department, The David W. Taylor Model Basin Aerodynamics Lab., Washington, D.C.) Report 892 Aero 858, Jan. 1954.

ABSTRACT: An investigation was conducted in the Taylor Model Basin 8- by 10-foot subsonic, atmospheric Wind Tunnel 2 to determine the drag coefficient

of man. Tests were made at several yaw angles with subjects of various sizes in five body positions: standing, sitting, supine, and two squat positions. Data were obtained for the subjects in both the clothed and nude conditions.

A parameter was formulated from the available physical characteristics of the subjects tested and all coefficients were based on this. Drag coefficients were obtained which should be reliable in predicting drag forces on men of average stature under a variety of conditions. Lift, side force, and moments were also obtained which indicate relative trends of motion for each position.

4,473

Schnee, L. 1961 CENTRIFUGE AND SIMULATED HIGH ACCELERATION TEST ANALYSIS AND RESULTS OF THE 16 PIGA. (Instrumentation Lab., Mass. Inst. of Tech., Cambridge) Report no. E-1079, ASTIA AD-335 392, Nov 1961

4,474

Schneider, B. A. 1945 THE INJURY RECORD FOR PLANES INVOLVED IN ACCIDENTS, U. S. ARMY AIR FORCES, CONTINENTAL U.S. FOR JAN. 1944 - JUNE 1945 (Office of Air Surgeon, Washington, D. C.)

4,475

Schneider, J. 1938 SEGELFLUG UND UNFALL. (Sailplane and Accidents) Luftfahrtmed., 2:303-313

ABSTRACT: This is a general review article in which the author discusses the typical injuries arising from glider crashes. He advocates a flat pedal rather than the rod type of rudder control, to minimize fractures of the talus, seats that permit forward motion of the body instead of the "anatomical" design in use, and adequate shoulder harnesses and crash helmets.

4,476

Schneider, J. 1938 MEDICAL PEHNOMENA OBSERVED DURING A GLIDER FLIGHT IN A THUNDERSTORM - PART 5 OF 10 PARTS

ASTIA ATI 60991

ABSTRACT: Phenomena observed on an aviator injured in a glider flight in a thunderstorm are analyzed. Photographs of the lacerated face and swollen hands show the seriousness of the case. Embolism occurred in the third week after flight. For a long time the heart condition remained labile. The discussion of the case described includes several suggestions, such as, after reaching a certain altitude, covering the face and ears of the flier with a heavy cream layer. It is stressed that electrostatic dangers in high-altitude gliding are negligible in comparison with dangers produced by cold.

4,477

Schneider, J. 1950 DER MENSCH IM SCHWERFELD. (Man in a Gravitational Field). Weltraumfahrt. 1. 82-85.

4,478

Schneider, Justus 1950 PROTECTION MEASURES FOR PREVENTION OF INJURIES-ESPECIALLY SPINAL FRACTURES IN AIRCRAFT ON SKIDS. German Aviation Medicine-World War II, pp 612-616.

4,479

Schneider, R. C., E. Reifel, H. O. Crisler, & B. G. Oosterbaan 1961 SERIOUS AND FATAL FOOTBALL INJURIES INVOLVING THE HEAD AND SPINAL CORD. J. American Medical Association 177(6):362-367, August 12, 1961

ABSTRACT: A neurosurgical review was made of the direct football fatalities in the 1959 season, with a study of the postmortem findings and types of injury. Three case reports have been presented in detail to show the types of injury. One of these mechanisms of cervical injury was due to vascular insufficiency of the vertebral arteries following severe cervical hyperextension, resulting in the syndrome of acute central cervical spinal cord injury. A patient with such an injury made a complete recovery. In the second case report the player had severe hyperextension of the cervical spine with fracture-dislocation, tetraplegia, and death. The third case, discussed in detail, showed an atlanto-axial dislocation with probable vertebral artery compression, cord injury, and death within one and a half hours. Three other patients listed in the summary of 1959 case fatalities exhibited a serious injury due to hyperextension of the cervical spine.
The possibility of carotid artery injury with severe torsion due to wrenching of the face guard was described.
On the basis of these studies suggestions were made concerning revision of the helmets with special attention to alteration and type of materials of which they are constructed, the removal or changes in the plastic face guard, and improvement in the chin strap.
The remarkable thing about such an investigation is that considering the vast number of participants in football there are only an infinitisimal number of fatal injuries. (AUTHORS)

4,480

Schneider, W. G., E. B. Wilson, P. E. Cross, et al., ed. M. P. White 1946 EFFECTS OF IMPACT AND EXPLOSION. (Office of Scientific Research and Development, and National Defense Research Committee, Division 2, Washington, D.C.) Vol. I; ASTIA ATI-37 735

ABSTRACT: A summary technical report by NDRC covers the study of the effects of impact and explosion research as carried out was divided into five categories,

namely: explosions in air, water and underground with the inclusion of muzzle blast control; the terminal ballistics of steel armor, concrete, plastic protection, and earth, and the development of a frangible bullet for training aerial gunners. Other investigations covers the properties of matter concerning the propagation plasticity in solids, the behavior of steels under very large pressures, and the design of a separate wind tunnel; studies of protective measures; of the application of information on weapon and effectiveness to the problems of selective weapons for specific targets, and with estimated resulting damage.
CONTENTS INCLUDES:

Schneider, W. G., et al., Underwater Explosives and Explosions;
Kennedy, W. D., Explosions and Explosives in Air;
Lampson, C. W., Explosions in Earth;
Slade, J. J., Jr., Muzzle Blast, Its Characteristics, Effects & Control;
Beth, R. A., Fundamentals of Terminal Ballistics;
Curtis, C. W., Terminal Ballistics of Armor;
Beth, R. A., Terminal Ballistics of Concrete;
Stipe, J. G., Jr., Terminal Ballistics of Plastic Protection;
Stipe, J. G., Jr., Terminal Ballistics of Soil;
Cross, P. E., et al., The Frangible Bullet for Use in Aerial Gunnery Training;
Puckett, A. E., Design of Model Supersonic Wind Tunnel
White, M. P., Behavior of Materials under Dynamic Loads;
Bridgman, P. W., et al, Deformation of Steel under High Pressure;
Pugh, E. M., Defense against Shaped Charges;
White, M. P., Structural Protection;
Stipe, J. G., Jr., Target Analysis and Weapon Selection;
Slutz, R. J., The Division 2 Technical Library;
Stipe, J. G., Jr., Training of Operation Analysts;
Stipe, J. G., Jr., Weapon Data Sheets;

(CARI)

4,481

Schock, G. J. D. 1960 AIRBORNE GSR STUDIES A PRELIMINARY REPORT
Aerospace Medicine 31(7):543-546 July 1960

ABSTRACT: Evidence gained from subjects exposed to pre-weightlessness accelerations and weightlessness suggest changes in GSR and heart rate to be due to emotional factors rather than to weightless or positive G. Instrumentation techniques for high performance aircraft are presented for measuring GSR and heart rate of human subjects.

4,482

Schock, G.J.D. 1960 PERCEPTION OF THE HORIZONTAL AND VERTICAL IN SIMULATED SUBGRAVITY CONDITIONS.
U. S. Armed Forces Med. J. 11:786

ABSTRACT: This investigation was conducted with the aim of ascertaining the role played by the labyrinth in the perception of the body position in subgravity

conditions. The subject was seated in a special rotating chair and had to orient a fluorescent rod in a dark room without any reference marks, according to his own evaluation of the true horizontal and vertical. The error relative to the real coordinates was measured with a special device.

The tests were carried out under the following conditions: 1) head inclined to the lefy at 45° (upheld by a special support); 2) body inclined to the left at 42°; 3) body inclined to the left at 28°; 4) seated, with head and rtunk erect. The tests were executed on the ground and in the water. In the latter case the subject was wearing a breathing set. Each of the five subjects gave eight evaluations, four for the horizontal and four for the vertical, alternating the rotation of the rod from clockwise to anticlockwise.

On the whole, the tests have shown that absolute orientation deteriorates when the subject lacks any visual reference point under subgravity conditions, and that body position has an important bearing upon this function.

4,483

Schocken, K., & S.J. Gerathewohl 1960 A QUANTITATIVE EVALUATION OF THE ELECTROCARDIOGRAMS OF TWO SQUIRREL MONKEYS UNDER CHANGING CONDITIONS. (Army Ballistic Missile Agency, Redstone Arsenal, Alabama) Rept. No. DV-TN-12-60

ABSTRACT: The following cardiodynamic effects of changes of the gravitational force have been previously observed: 91) a marked increase in cardiac rate occurs in almost all subjects during acceleration and deceleration periods, (2) the electrocardiogram is generally normal in the zero-G state, (3) the heart rate is increased and unstable during post-acceleration weightlessness, (4) transient changes may occur in the electrocardiogram if the state of the gravitational field changes, (5) the steady cardiodynamic state seems to be the same for zero G as for the one G condition, (6) increased G loads lead to the condition of physiological stress, (7) the absence of G-forces is a mechanically stressless condition, (8) the stresses imposed by acceleration and the condition of weightlessness encountered in aircraft and missile flights are within the range of tolerance of the human and animal organism. These cardiodynamic effects are confirmed by the electrocardiographic findings of the 2 bioflights of monkeys. A rigorous statistical evaluation of the limits of normality, in a similar manner as was carried out previously in humans, is possible and can be performed as soon as sufficient statistical material is available.

4,484

Schoeck, P., & F. Halberg 1962 EFFECTS OF DECELERATION IN MAN ON PLASMA 17-HYDROXYCORTICOSTEROIDS. Minnesota Med. 45(6):625-631, June 1962

ABSTRACT: A 34-year-old male volunteer was subjected to rapid acceleration

followed by prompt deceleration. Plasma hormone determinations were made 15, 30, and 105 minutes following a crash against a wall at 25 m. p. h. These 17-hydroxy-corticosteroids values seem significantly elevated, compared with the mean values expected at corresponding times when a two-fold standard of comparison is used. A 24-hour profile on the same subject on an uneventful day is made available for comparison. (AUTHOR)

4,485

Schoenherr, K.E. and W.F. Brownell 1963 THE HIGH-SPEED BASIN AND INSTRUMENTATION AT THE DAVID TAYLOR MODEL BASIN. (David Taylor Model Basin, Washington, D.C.) Report no. 1660, ASTIA AD-297 122, January 1963

ABSTRACT: The 2968-ft high-speed model basin and several instrumentation systems used for testing a wide variety of models such as full-scale, torpedoes towed and self-propelled, hydrofoils, planing boats, pumpjets, propellers, and other high-speed vehicles are described. Information concerning the basin; towing carriages; and propulsion, force, and speed measuring instrumentation is presented. Typical test procedures and usage of the carriages are discussed. New instrumentation nearing completion, which will greatly extend the high-speed basin testing capabilities, is described. (Author)

4,486

Scholander, P.F. 1943 FINAL REPORT ON TEST OF ANTI "G" DEVICES FOR PILOTS (ANTI-BLACKOUT DEVICE) (Eglin Field, Proof Dept., AAF Proving Ground Command) Serial No. 7-43-9., 4 Nov. 1943

ABSTRACT: (a) The Berger Bros. gradient pressure suit and the Clark Wood arterial occulusion suit were compared by 24 experienced pilots. Both suits were effective in preventing blackout up to 8 to 9.5 "g" in planes. Both effectively prevent "g" fatigue.
(b) When 2 to 3 "g" are held continuously for two to ten minutes, the AOS produces severe pain or distracting discomfort in the limbs. No discomfort is produced by the GPS when 2 to 3 "g" are held continuously for 20 minutes. Hence the GPS is preferred by most pilots. Both suits are comfortable when worn outside aircraft and offer good flotation.
(c) The GPS pressure equipement operates satisfactorily from the standard instrument vacuum pump with special oil filter in tests up to 33,000 feet. The few failures encountered in the tests could be easily prevented in the future. The AOS requires an electric motor, pump, and switch to power it. Serious failures in the powering devices occurred. Out of 4 pumps tested, one was completely broken in the process and 2 partially broken.

4,487

Scholtz, G. 1935 AKTUELLE FRAGEN DER PHYSIOLOGIE DES FLIEGENS (Actual Questions About the Physiology of Flying)
Deutsche Medizinische Wochenschrift (Stuttgart) 61: 780

4,488

School of Aviation Medicine 1959 REPORTS ON SPACE MEDICINE - 1958
(School of Aviation Medicine, Randolph AFB, Texas)

ABSTRACT: A series of articles and reports by research scientists at the School of Aviation Medicine, USAF, including:

1. Human Performance in the Space Travel Environment, George T. Hauty
2. Supersonic and Hypersonic Human Flight, Julian E. Ward, Siegfried J. Gerathewohl and George R. Steinkamp
3. Human Engineering of the Sealed Space Cabin, Julian E. Ward and George R. Steinkamp
4. Fatigue, Confinement, and Proficiency Decrement, George T. Hauty and R.B. Payne
5. The Feasibility of Recycling Human Urine For Utilization in a Closed Ecological System, Willard R. Harkins
6. Space Cabin Requirements as Seen by Subjects in the Space Cabin Simulator, Willard R. Hawkins and George T. Hauty
7. Weightlessness: The Problem and the Air Force Research Program, Siegfried J. Gerathewohl

4,489

Schreiber, B., T. Gualtierotti, D. Mainardi and D. Passerini 1957 EFFECTS OF ACCELERATIONS ON CEREBELLAR POTENTIALS IN BIRDS AND ITS RELATION TO THE SENSE OF DIRECTIONS. (Italy, University of Milan)
Technical note AFOSR TN-57-519, ASTIA AD 136 601, Jun 56-May 57
Also; Am. J. Physiol., 197(2):469-474, Aug 1959

ABSTRACT: Rotatory and post-rotatory cerebellar responses of homing and domestic pigeons and of migratory and sedentary doves have been studied by means of a centrifuge, the speed and plane of rotation of which could be changed at will. No appreciable differences have been found in the rotatory cerebellar responses in any of the animals tested.

4,490

Schreiber, H. 1952 THE MAZE OF ACCIDENT STATISTICS
Interavia, Geneva, 7:196 April 1952

4,491

Schrenk, O., R. Irrgang 1941 UNTERSUCHUNGEN ZUM SITZKATAPULT (Studies for the Design of Ejection Seats) ASTIA ATI 71651

4,492

Schrenk, O., & R. Irrgarg, tr. J. B. Bateman 1945 STUDIES ON THE CATAPULT SEAT. (Zentrale Fur Wissenschaftliches berichtswesen der Luftfahrtforschung Des Generalluftzeugmeisters) Technische Berichte 8:24-30, 1941.
Translated as Appendix 3 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft.

ABSTRACT: The accelerations which can be tolerated by human beings depend very greatly upon direction and are also significantly greater when the time of action is short than they are when it is long. These physiological conditions must be taken into account in the design of a catapult seat. During the process of ejection of a pilot successive accelerations acting in different directions come into effect. It is shown by experiments with models and by calculations at the Ernst Heinkel aircraft factory that the accelerations which occur are physiologically tolerable although they sometimes approach the limit of tolerance. The vertical accelerations required in the actual ejection are especially favorable when designed for the clearance of a double tail (7 g, compared with 18 g in the case of a central vertical stabilizer) The backward acceleration caused by air movement is about 24 g in the most unfavorable case considered here (v = 900 km./hr.; see Figure 16). This acceleration can just be tolerated in the vertical position; it diminishes very rapidly. Steps must be taken to insure that after the ejection the pilot is not turned head over heels and thus brought into the physiologically dangerous horizontal position in which the acceleration will act in the direction of the feet. It is best to arrange for a gentle backwards rotation under all conditions. The results of the investigation are established by means of various model experiments and calculations. (Author)

4,493

Schroeder, F.J., R.H. Putz et al. 1956 FEASIBILITY STUDY OF A HIGH G CENTRIFUGE (Aircraft Armaments, Inc., Cockeysville, Md.) Rept. no. ER-953, Contract DA 36-039-sc-72311, 1 Jüne-31 Aug 56. Oct 1956, ASTIA AD-111 965.

ABSTRACT: "This report contains a summary of the design work done to date on the high G centrifuge. The procedure, assumptions, and equations used in the design of the centrifuge containers, arm, and shaft are discussed in detail, covering such facotrs as strength, aerodynamic drag, flutter and vibration, and choice of material and working stresses. In addition, consideration is given to the selection of suitable shaft bearings, power plant, and vacuum pumps. The preliminary design of the evacuated test chamber is qualitatively presented. A number of drawings predicated on the above design considerations are included at the end of the report. It is felt that no problem has presented itself to date whose seriousness is sufficient to jeopardize the feasibility of the design (Contractor's abstract)

4,494

Schroeder, F. J. 1956 FEASIBILITY STUDY OF A HIGH G CENTRIFUGE, SECOND QUARTERLY REPORT FOR THE PERIOD 1 SEPTEMBER 1956 TO 30 NOVEMBER 1956. (Aircraft Armaments, Inc., Cockeysville, Md.) ASTIA AD-121 744.

4,495

Schroeder, H. A., & O. Horwitz 1943 ANALYSIS OF CRASHES FROM THE VIEWPOINT OF CERTAIN PHYSIOLOGICAL DISTURBANCES. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-115., 22 Feb. 1943.

ABSTRACT: Of 30 crashes occurring in the past 6 months at Pensacola in two-seated trainers, 19 were due to obvious causes (fatalities - 4). The remaining 11 (8 fatalities) were due to a combination of vertigo and acceleration.

4,496

Schroeder, H. A. 1945 HIGH ACCELERATIONS IN INTERMEDIATE TRAINING: INCIDENCE OF SYMPTOMS AND AN ESTIMATE OF TOLERANCE TO "G". (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-71; 12/29/45

ABSTRACT: Questionnaire submitted to students and instructors showed that one-half had either grayed or blacked out, one-eighth did so frequently. The "g" involved was never over 6 and was usually less than 5 "g" applied for less than 4 seconds. Pilots were very ignorant as to the cause of blackout. In 165 cases, Immelman turns, split S's, sharp pull outs and pull ups were the most frequent causes of blackout.

4,497

Schroeder, H.A. 1951 PREVENTION OF INJURIES DUE TO CRASH. J. Aviation Med. 22:306-311

4,498

Schroeder, H. A. 1953 PERTINENT STUDIES OF HUMAN TOLERANCE TO ACCELERATION Shock and Vibration Bulletin No. 19.

4,499

Schroers, R. 1951 SOME DEVELOPMENTS FOR GREATER CRASH SAFETY IN AIRCRAFT (Civil Aeronautics Administration) Oct. 1951

4,500

Schubert, G. 1931 ÜBER DIE PHYSIOLOGISCHEN AUSWIRKUNGEN DER CORIOLISKRÄFTE BEI TRUDENBEWEGUNG DES FLUGZEUGES, VORLÄUFIGE MITTEILUNG (Concerning the Physiological Effects of the Coriolis Forces During Rolling Movement of the Airplane, Temporary Announcement)
Acta oto-laryngologica (Stockholm) 16: 39

ABSTRACT: Coriolis forces are forces due to a coriolis acceleration. Accelerations perpendicular to the track of the relative movement occur in all relative movements in which the system rotates. There are no prescribed movements for the pilot because, depending on the movements of the plane, a certain movement of the head may hinder or help, for it may produce delusory perceptions which would prompt the pilot to steer the plane the wrong way. It is desirable to keep still and to try to keep looking at the horizon or the earth's surface.

4,501

Schubert, G. 1932 DIE PHYSIOLOGISCHEN AUSWIRKUNGEN DER CORIOLIS-BESCHLEUNIGUNGEN BEI FLUGZEUGSTEIGERUNG (The Physiological Effects of the Coriolis Accelerations During Aircraft Ascent)
Zeitschrift für Hals-, Nasen- und Ohrenheilkunde (Berlin) 30: 595-604.

4,502

Schubert, G. 1933 LES EFFETS PHYSIOLOGIQUES DES ACCELERATIONS DE CORIOLOS (The Physiological Effects of Coriolis Accelerations)
Congr. int. Sécurité aérien. (Paris) 4(9): 151-155

4,503

Schubert, G. 1934 AKTUELLE MEDIZINISCHE FRAGE IN DER AVIATIK. (Actual Medical Problems in Aviation.) Med. Klin., 30: 1321-1326, October. 5, 1934

ABSTRACT: In considering the disturbances caused by aviation it is necessary to take into account the effects of various types of flight, i.e., oblique, level and centrifugal.

In oblique flight hyperirritability of the labyrinth is likely to occur with abnormal Purkinje turning sensations, falling reactions and nausea. The simultaneous depressor vascular reflex may lead to transitory deficiency of the cebral circulation.

In level flight one has to consider the air-pockets. Here proper strapping of the pilot is of paramount importance to prevent air sickness from irritation of the otolith apparatus.

In centrifugal flight the circulatory effect is due to increased bydrostatic pressure. The vascular region below the heart is dilated, filling the venous reservoirs and diminishing the circulating blood, the end phase consisting in empty pulsation of the heart.

4,504

Schubert, G. 1935 PHYSIOLOGIE DES MENSCHEN IN FLUGZEUG. (Physiology of human subjects in flight) (Berlin: Springer, 1935)

ABSTRACT: This book is published as vol. 34 of the monograph. A.d. Gesgeb. d. Physiol. der Pflanzen u. Tiere. The book is written largely from the standpoint of the neurologist but contains chapters on respiration, circulation, metabolism and altitude flying. Each chapter has a bibliography and there is a good index. The effects of flying on the different senses and on the central nervous system are discussed. One reviewer emphasizes that one great merit of the book is that it shows how very much in its infancy the study of physiology of aviation still remains, and the wide field that still remains to be explored. ABSTRACT: Journal of Aviation Medicine , 8 (1): 60, March 1937

4,505

Schubert, G. 1936 PHYSIOLOGIE DES FLIEGERS (Physiology of the Flyer) Münchener medizinische Wochenschrift (Munich) 83: 374

4,506

Schubert, G. 1954 CORIOLIS-NYSTAGMUS. J. Aviation Med. 25(3):257-259.

SUMMARY: Coriolis-accelerations elicit typical vestibular nystagmus in human subjects as revealed by the electro-nystagmogram. In the experiments the Coriolis accelerations were produced by bending or raising the head during a rotation with constant angular velocity (turning chair). By this, with respect to man, an objective evidence is furnished for the supposition that the Coriolis-acceleration produces an additional endolymph flow in the semi-circular canals. Consequently it becomes obvious that the sensations of tilting as well as the symptoms of nausea are caused by excitation of the semicircular canal system.

4,507

Schubert, G. 1959 VESTIBULAR FUNCTION AND GRAVITY
(2nd World and 4th European Congress on Aviation & Space Medicine, Rome, Italy, 27-31 October 1959)

4,508

Schubert, G., & H. Kolder 1962 FACTOR ANALYSIS OF SPACE ORIENTATION. Rivista di medicina aeronautica e spaziale (Roma) 25(1):64-86, Jan.-Mar.1962

ABSTRACT: Information from the visual system sufficed to set the apparent vertical according to visual clues in four persons exposed to radial accelerations on

a centrifuge of 2.5 g. At 3 g, space orientation according to visual clues was more difficult. Without visual clues, information originating in the otolithic organs improved perception of resultant acceleration proportionally to the degree of tilting of the longitudinal axis of the head toward the direction of resultant acceleration. Information from somesthetic receptors did not interact with perception of the direction of resultant acceleration mediated by labyrinthine receptors, as long as the direction of acceleration acting on them was oblique. The change in perception of the apparent vertical with head tilting was different when the direction of the longitudinal axis of the body coincided with the direction of the resultant acceleration without visual clues. Information from somesthetic receptors, acted upon in the "normal" direction, suppressed to a certain degree additional information from the otoliths. There was no further improvement of the setting of the apparent vertical unless the longitudinal axis of the head was placed about 10 degrees toward the direction of the resultant acceleration. (Aerospace Medicine 33(10):1269, Oct. 1962)

4,509

Schuetze, U. 1940 EFFECT OF HIGH WIND VELOCITIES ON THE HEAD (UNTERSUCHUNGEN UEBER DEN EINFLUSS HOHER WINDGESCHWINDIGKEITEN AUF DEN KOPF)
ASTIA ATI 25690

ABSTRACT: Wind-tunnel tests on models, and flight tests on human subjects were made in an effort to determine the maximum accelerations the human head can withstand without danger. Results have shown that a dynamic pressure up to 1130 kg/m^2 could be safely withstood without a head-rest, breathing was still possible, and the eyes withstood the pressure well. At pressures over 2000 kg/m^2 goggles become a danger to the eye. With a head-rest 2 or 3 times the width of the head, flutter of the cheeks decreases, breathing is made easier, and periodic opening of eyes is possible.

4,510

Schütze, U. 1941 STUDIES CONCERNING THE EFFECT OF HIGH WIND VELOCITIES ON THE HEAD. Luftfahrtmedizin 5(4):322-336

ABSTRACT:

Experiments in the wind tunnel and in aircraft are reported. These experiments show the tolerance of the human head to those high wind blast pressures which occur at the velocity of flight of modern aircraft. Follosing the description of the experimental setup, the results are set forth and illustrated by means of curves and diagrams. When the human head was unsupported it was found that wind blast pressures up to 1130 kg/m^2 (1.6 p.s.i) (corresponding to wind velocities of 500 km/h (311 m.p.h) near ground level) can be well tolerated on the whole. It was still possible to breathe under these conditions. The eyes also withstood the pressure well. In one

experiment an accident occurred; this is discussed in detail. Various types of breathing mask and mouthpiece were investigated from the point of view of their appropriateness for use in bailing out from high speed aircraft. It was found that even with wind blast pressures of 30 to 450 kg/m2 (0.5 to 0.6 p.s.i.) these devices were blown away, especially when the head was turned slightly away from the wind.

4,511

Schütze, U., tr.,-J. B. Bateman 1945 STUDIES CONCERNING THE EFFECTS OF HIGH WIND VELOCITIES ON THE HEAD. Luftfahrtmedizin 5(4):322-336, 1941
Translated as Appendix 15a to Lovelace, W. R., E. J. Baldes, & V. J. Wulff, The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

SUMMARY: Experiments in the wind tunnel and in aircraft are reported. These experiments show the tolerance of the human head to those high wind blast pressures which occur at the velocity of flight of modern aircraft. Following the description of the experimental setup, the results are set forth and illustrated by means of curves and diagrams. When the human head was unsupported it was found that wind blast pressures up to 1130 kg/m^2 (1.6 p.s.i.) (corresponding to wind velocities of 500 km/h (311 m.p.h.) near ground level) can be well tolerated on the whole. It was still possible to breathe under these conditions. The eyes also withstood the pressure very well. In one experiment an accident occurred; this is discussed in detail. Various types of breathing mask and mouthpiece were investigated from the point of view of their appropriateness for use in bailing out from high speed aircraft. In was found that even with wind blast pressures of 350 to 450 kg/m^2 (0.5 to 0.6 p.s.i.) these devices were blown away, especially when the head was turned slightly away from the wind blast.
Studies of goggles showed that when wind blast pressures of more than 2000 kg/m^2 (2.8 p.s.i.) (corresponding to velocities of more than 600 km/h (540 m.p.h.) near ground level) were incident normally upon the face, there was danger to the eyes from breakage of the goggles. When the wind is obliquely incident, the ordinary rubber strap gives way even with a wind blast pressure of 300 kg/m^2 (0.4 p.s.i.) (250 km/h (155 m.p.h.)) and goggles are lifted away from the face. In experiments with boards of different widths placed behind the head, it was shown that the subjectively unpleasant effects of wind blast (such as flapping of the cheeks and impairment of breathing) could be considerably ameliorated by a head board two to three times the width of the head. It was also found that with a broad head rest it was easily possible to keep the eyes open, as long as the air is free from dust. (AUTHOR)

4,512

Schurr, G.G. 1962 STUDY OF SOFT RECOVERY FROM TWO-STAGE VEHICLES.
(Space Recovery Systems, Inc., El Segundo, Calif.)
ASTIA AD-272 857, January 1962

ABSTRACT: Possible recovery methods for vertically re-entering payloads released from two-stage boosters are investigated and discussed. Reentry

trajectories including deceleration and heating rates were calculated for a series of reentry velocities and ballistic parameters. The influence of drag variation during reentry on peak deceleration and heating rates is investigated. A recovery method using a variable area drag brake (flexibrake), a parachute system and aerial snatch by helicopter was selected as the most suitable system for recovery of a payload released from a booster consisting of an XM-33 rocket as first stage and an ABLX 244 rocket as second stage. The flexibrake will limit the maximum deceleration to 15 G and the maximum deceleration onset rates to 300 G/sec. Altitude stabilization of the payload during the entire flight is maintained by a hydrogen peroxide attitude control system. Preliminary weights and volumes for the payload and recovery vehicle were estimated. (Author)

4,513

Schwab, R.S. 1947 SYNDROME OF CEREBRAL CONCUSSION FROM AIR BLAST Arch. Neurol. Psychiat. 58:97-103

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Schwarz, E.R., & W.J. Hamburger 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Div., Massachussets Institute of Technology, Div. of Industrial Cooperation Contract #2-6343; Fabric Research Laboratories, Inc., Contract #C45589; U.S. Army Air Corps, Materiel Div., Wright Field, Dayton, Ohio, Order #N33-038 AC-12462) June 30, 1946, ASTIA ATI No. 87219

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Schwarz, E.R., et al. 1946 IMPACT INVESTIGATION ON TEXTILE MATERIALS. (Textile Div., Mass Inst. of Technology, Div. of Indl. Cooperation) Progress Rept. No. 11, 10 Sept. 1946

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Schweer, H.W. and G.J. Walhout 1962 S-2B SNOW AERIAL APPLICATOR AIRCRAFT ACCIDENT, PHOENIX, ARIZONA, 18 OCTOBER 1961.
(Aviation Crash Injury Research, Phoenix, Arizona) Rept. No. AvCIR 62-4, DA 44-177-tc-802, TCREC TR 62-43, May 1962. ASTIA AD 277 267L.

ABSTRACT: A snow aerial applicator, Model S-2B, crashed near Phoenix, Arizona, on 18 October 1961. At the time, the aircraft was engaged in applying insecticide to a cotton field. Severe impact conditions accompanied in the crash, resulting in major damage to the forward fuselage section. Crash protection features incorporated into the aircraft were instrumental in crash force attenuation to the cockpit section and damage reduction to the cockpit environment Moderate injuries sustained by the pilot are directly related to the improper use of the shoulder harness. The investigation further revealed that the location of the shoulder harness anchorage is of special significance relative to occupant retention. (Author)

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Schwichtenberg, A. H. 1960 SPACE MEDICINE AND ASTRONAUT SELECTION
Minnesota Med. 43(12):797-812, Dec. 1960.

ABSTRACT: The interdependence of the fields of medicine, design engineering, and human engineering in the support of manned space flight is demonstrated in a discussion of the external stresses and hazards of space flight, including acceleration, heat, vibration, meteorites, hypoxia, decompression, radiation, weightlessness, noise, glare, and problems of the cabin environment and atmosphere. The various physical tests developed on the basis of the knowledge and experience gained from aviation medicine for the selection of astronauts are described. It is suggested that the research techniques employed in the space program, such as the data-processing technique for the handling of information on applicants for the astronaut program, may be usefully applied to general medical practice.

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Schwichtenberg, A. H. 1961 MEDICAL ASPECTS OF SPACE FLIGHT
Ann. Rev. Med. 12:299-322, 1961.

ABSTRACT: A brief outline is given of space exploration information made possible by great advances in the physical sciences, mathematics, engineering, technology, and the life sciences. Lack of communication among highly specialized physical scientist, engineers, and physicians is largely responsible for the unusually slow adaptation of many of these advances to medical research, instrumentation, and practice. Aerospace medicine requires a board, multidisciplinary approach to the study of external stresses (both within the atmospheric envelope of the earth and in the environmental space beyond) that are

imposed upon the human organism by circumstances of flight. Attention is given to the following stresses involved in space flight and their medical implications: acceleration, heat, vibration, radiation, decompression, hypoxia, weightlessness, noise and illumination, as well as those concerned more directly with the operation of the space craft itself, such as the cabin environment and atmospheres. The selection of astronauts, function of man in space, and man-machine relationships are also discussed.

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Schwimmer, S. and R.A. Wolf 1962 PRELIMINARY RANKING OF INJURY CAUSES IN AUTOMOBILE ACCIDENTS. (In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 6-19

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Schwinge, H.T. 1962 EFFECTIVENESS AND LIMITATIONS OF MOVING POLYNOMIAL ARC SMOOTHING OF POSITION-TIME DATA FROM THE HOLLOMAN TRACK. (Air Force Missile Development Center, Air Force Systems Command, Holloman AFB, New Mexico)

ABSTRACT: Various specifications concerning the testing and calibration of inertial guidance systems on the Holloman Track limit the tms error of the vehicle velocity to 1 part in 20,000. This report investigates the data accuracy obtained by applying moving polynomial arc smoothing to the measured displacement time data. A number of possible modifications concerning data acquisition and handling and the elimination of the major error sources are recommended.

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Arch. Neurol. & Psychol. 43:270-283

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ABSTRACT: The work of collecting acceleration data for racing airplanes during races, started in January 1934, has been continued by obtaining similar data in the airplanes winning first and second places in the 1935 Thompson Trophy Race. Records were taken in the Howard Racer "Mr. Mulligan" and in the Wittman D-12 Racer. The maximum positive accelerations were generally smaller than those recorded in other airplanes during earlier races; the maximum in the Howard Racer was 2.8 g, and one value of 4.25 g was obtained in the Wittman Racer. Minimum values were as low as -0.55 g in the Howard Racer and 0.3 g in the Wittman Racer.

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Searle, G. F. C. and F. A. Lindeman 1917 PRELIMINARY REPORT ON THE MEASUREMENT OF ACCELERATIONS OF AEROPLANES IN FLIGHT. (British Advisory Comm. for Aeronautics) Reports and Memoranda, No. 376, Sept. 1917.

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Searle, G. F. C., & W. Cullimore 1918 REPORT ON MEASUREMENT OF ACCELERATIONS ON AEROPLANES IN FLIGHT. (British Advisory Committee for Aeronautics) Reports and Memoranda No. 469, June 1918

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Seat, R.L. 1961 ENVIRONMENTAL TESTING OF THE PROJECT MERCURY. (Institute of Environmental Sciences, Mt Prospect, Ill.) Reprint 61-21

ABSTRACT: Project Mercury is a national effort of the United States, conceived and organized to send man on his first step into space. Basic responsibility for this effort has been placed with the National Aeronautics and Space Administration. This paper discusses the major systems of the Mercury Spacecraft; electrical, communication, instrumentation, environmental control, sequential control, rockets and pyrotechnics, altitude control, and landing.

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Seckel, E., I.A. Hall, D.T. McRuer, and D.H. Weir 1958 HUMAN PILOT DYNAMIC RESPONSE IN FLIGHT AND SIMULATOR (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical Report 57-520, August 1958, AD 130 988

ABSTRACT: This report presents the results of an effort to determine the difference in pilot tracking behavior resulting from differences between flight and ground simulator control environments. The investigation has been centered on an experiment designed to estimate the quasi-linear describing functions and linear correlations of several pilots when engaged in lateral and longitudinal tracking tasks with random appearing forcing functions. A Navion aircraft functioned as the controlled element in the flight environment and the same airplane, with aircraft dynamics generated with analog computer techniques, provided the ground simulator controlled element. Statistical analyses of describing function and linear correlation data revealed that: (1) Individual run phase angle (in degrees) amplitude ratio (in db), and linear correlation data are approximately normally distributed about their mean values for all runs. (2) The mean values of pilot's describing functions in longitudinal flight and simulator control exhibit significant differences in both amplitude ratio and phase angle. (3) The mean values of pilot's describing functions in lateral flight and simulator control exhibit significant differences in phase angle and no significant differences in amplitude ratio. (4) Significant differences between flight and simulator linear correlations were present for both lateral and longitudinal control. (5) The flight and simulator variances for lateral amplitude ratio and lateral and longitudinal phase were significantly different. No significant differences appeared between flight and simulator variances for longitudinal amplitude ratio and lateral and longitudinal linear correlation.

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Sells, S.B. & C.A. Berry, eds. 1961 HUMAN FACTORS IN JET AND SPACE TRAVEL: A MEDICAL-PSYCHOLOGICAL ANALYSIS (New York: Ronald Press, 1961)

ABSTRACT: Contents include: "Medical Aspects of Jet and Space Travel" by A. Graybiel; "Natural Environment and the Environment of Flight" by H.B. Hale; "Radiobiology and the Environment of Flight" by G.L. Hekhuis; "Basic Aspects of Skilled Performance" by W.A. Wilbanks; "Human Operator Performance Under Non-normal Environmental Operating Conditions" by W.G. Matheny; "Group Behavior Problems in Flight" by S.B. Sells; "Human Qualifications for and Reactions to Jet Flight" by C.A. Berry; "Human Requirements for Space Travel" by S.B. Sells and C.A. Berry; "Protective Medicine in Jet and Space Flight" by J.A. Norton; "Air Craft Accidents and Flight Safety" by H.G. Moseley; "Human Factors Related to Jet Aircraft" by T.G. Hanks; "The Engineered Environment of the Space Vehicle" by H.G. Clamann; "Operational Aspects of Space Flight" by A.M. Mayo; "Speculations on Space and Human Destiny" by H.B. Webb.

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Sells, S.B. 1961 MILITARY SMALL GROUP PERFORMANCE UNDER ISOLATION AND STRESS. AN ANNOTATED BIBLIOGRAPHY. III. ENVIRONMENTAL STRESS AND BEHAVIOR ECOLOGY. (Arctic Aeromedical Lab., Fort Wainwright, Alaska) Rept. No. AAL TR 61-21, Project 8243-11, Oct. 1961. ASTIA AD-276 829.

ABSTRACT: Abstracts of studies on measurable dimensions of group structure and their relations to group behavior are presented. It is organized in 10 sections: (1) General Studies and Reviews, (2) Autonomy, (3) Clarity of Goals and of Roles, (4) Cohesiveness, (5) Control of Behavior of Group Members, (6) Homogeneity of Memberships, (7) Participation in Group Activities, (8) Potency of Group to Its Members, (9) Size of Group, and (10) Status Hierarchy and Stratification. (Author)

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Sem-Jacobsen, C. W., O Nilseng, C. Patten and O. Eriksen 1958 AIRBORNE EEG RECORDING IN HIGH-PERFORMANCE AIRCRAFT. (Air Force Office of Scientific Research, Washington, D. C.) AFOSR-TR 59-35, Sept. 1958. ASTIA AD 213 038.

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Sem-Jacobsen, C.W., O. Nilseng, C. Patten and O. Eriksen 1958 AIRBORNE EEG RECORDING IN HIGH PERFORMANCE AIRCRAFT. (Presented at Third World Congress of Aviation Medicine, Brussels, 1958).
See also (Air Force Office of Scientific Research, Washington, D.C.) AFOSR TR 59-35, Sept. 1958. ASTIA AD 213 038.

ABSTRACT: Under this contract it was attempted to try (a) to solve technical problems related to airborne EEG, (b) to evaluate the data obtained by this technique. Ten commonly flown maneuvers were selected as a standard test. During the ten maneuvers, changes were seen in the EEG recording in response to the most stressful maneuvers. The pilots were divided into three groups on the basis of the EEG records. Group A showed only minimal changes in response to the test flight. Group B showed marked high voltage changes of short duration in response to same maneuvers. In the EEG's of the pilots belonging to group C gross changes of probably more pathological nature were seen. The EEG recording appears to give promising data about the pilot's actual physiological capability under the physical and mental stress caused by the maneuvers.

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Sem-Jacobsen, C.W., O. Nilseng, C. Patten, and O. Eriksen 1959 ELECTRO-ENCEPHALOGRAPHIC RECORDING IN SIMULATED COMBAT FLIGHT IN A JET FIGHTER PLANE: THE PILOT'S LEVEL OF CONSCIOUSNESS. J. EEG & Clin. Neurophysiol. 11:154-155.

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Sem-Jacobsen, C.W. 1959 ELECTROENCEPHALOGRAPHIC STUDY OF PILOT STRESSES IN FLIGHT. J. Aviation Med. 30(11):797-801

SUMMARY: With 8-channel airborne EEG equipment, tracings were made of a group of jet pilots, as well as personnel with no previous flight experience, during simulated combat flight. A uniform standardized flight schedule was utilized. On the basis of the EEG tracings, thirty jet pilots were divided into three groups according to the changes seen in the records. A minimal, B marked, and C gross. The same pilots were graded by the Air Force according to their flight performances. The results obtained strongly support a close correlation between the changes in the brain as measured by EEG during flight stress and the pilot's ability to perform under these conditions. Airborne EEG recording is demonstrated as a new method for studying the stress to which the jet fighter pilot is subjected.

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Sem-Jacobsen, C.W. 1961 "BLACK-OUT" AND UNCONSCIOUSNESS REVEALED BY AIRBORNE TESTING OF FIGHTER PILOTS.
Aerospace Med. 32(3):247, March 1961.

ABSTRACT: To verify and substantiate earlier work, fifty pilots were, during the months of August and September, 1960, tested with airborne EEG recording. The tests were carried out at Wright-Patterson Air Force Base in a F-100 under the supervision of the Aerospace Medical Laboratory. Most of the pilots were selected from different commands and bases. The EEG tracings were supplemented with recordings of the EKG, the respiration, and the flight pattern. Movies were also taken intermittently during simulated combat flight. The results demonstrate that a number of active fighter pilots had brief periods of unconsciousness during manoeuvres frequently flown by T.A.C. fighters. Several had convulsive jerks. It should be noted that some of them, however, on the centrifuge did not black out or lose consciousness when subjected to the same or even heavier G-loads. These observations were made in a number of pilots of whom several had committed 'pilot error." No indication of "black-out" or unconsciousness was found in a group of instructors or test pilots subjected to the same examination. The study reveals a reason "pilot error" and may explain a number of aircraft accidents. Taken into use the test may increase flight safety and decrease the number of unfortunate fatalities.

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Sem-Jacobsen, C. W. 1961 BLACK-OUT AND UNCONSCIOUSNESS REVEALED BY AIRBORNE TESTING OF FIGHTER PILOTS. (Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Illinois, April 24-27, 1961)

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Cekoslov. Psychiat. (Prague), 57(1):61-69, Jan. 1961 (in Czechoslovakian with English summary).

ABSTRACT: Attention is called to the most important somatogenic as well as psychogen noxious factors in the microclimate of space ships, and to the influence of these factors on the higher nervous activity. Among the most outstanding specific one, influencing mental functions, are weightlessness, forces of gravity and subgravity, noise, ultransound and infrasound, vibrations, isolation complicated by sensory and motor deprivation, etc. Some mental disorders endangering the crew while on space mission are analyzed in some detail. Psychogenic approaches to the selection of spacemen or members of space crews are specified and advocated. Possibilities and means of preservation and development of mental health, and prevention of its distrubances in spacemen and among space crews form part of the complex task of mental hygiene. Research trends in psychogenic problems of space flight are outlined.

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See also In Bergeret, ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 107-118

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Senelar, R., R. Loubiere, F. Violette 1961 EFFECTS OF REPEATED POSITIVE ACCELERATIONS OF SMALL INTENSITY AND LONG DURATION: ANATOMICAL RESEARCH ON DOG KIDNEY. (EFFETS DES ACCELERATIONS POSITIVES REPETEES DE FAIBLE INTENSITE ET LONGUE DUREE. ETUDE ANATOMIQUE SUR LE RIEN DE CHIEN) In Bergeret, ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 107-118
See also Medecine Aeronaut. (Paris) 14(4):339-352, 1959

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Severy, D.M., J.H. Mathewson and A.W. Siegel n.d. AUTOMOBILE SIDE-IMPACT COLLISIONS. (Society of Automotive Engineers, Inc., New York) SP 174

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Severy, D. M., et al. n.d. TECHNICAL FINDINGS FROM AUTOMOBILE IMPACT STUDIES (Institute of Transportation & Traffic Engineering, University of California, Los Angeles, Calif.) Rept. #41

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(Calif. State Governor's Safety Conference, Engr. Div.) Oct. 1954

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Severy, D.M. and J.H. Mathewson 1958 AUTOMOBILE BARRIER AND REAR-END COLLISION PERFORMANCE. (Paper, Society of Automotive Engineers Summer Meeting, Atlantic City, N.J. 8-14 June 1958) SAE Preprint 62C.

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See also: Transactions, SAE 67:238-262, 1959.

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Severy, Derwyn M. 1960 AUTOMOBILE COLLISIONS ON PURPOSE (UCLA, Institute of Transportation and Traffic Engineering, Los Angeles, Calif.) ITTE Preprint 89, Nov. 1960, See Also J. Human Factors Society 2(4):186-202.

ABSTRACT: This paper presents a brief discussion of some of the findings from 48 full-scale automobile collision experiments conducted at UCLA during the past ten years. These experiments have provided critically needed data on physical factors relating to vehicular collision dynamics and attending motorist injuries. Use of both human subjects and anthropometric dummies facilitate procurement of critically needed data on the relation of design to injury causation.

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Severy, D. M. 1960 AUTOMOBILE COLLISIONS ON PURPOSE
Hum. Factors 2(4):186-202, Nov., 1960.

ABSTRACT: A brief discussion was presented of some of the findings from 48 full-scale automobile collision experiments. The experiments have provided data on physical factors relating to vehicular dynamics and attending motorist injuries. Both human Ss and anthropometric dummies have been used to secure specific data on 1) deceleration patterns for different locations on the driver and car structure, 2) the relation of impact speed to deformation and repair costs, 3) the performance of motorist restraining devices, and 4) the interaction of the dirver with the car's interior and external environment during collisions. Public acceptance of safety devices and design changes known to reduce injury was discussed.

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Severy, D. M., et al. 1960 AUTOMOBILE SIDE-IMPACT COLLISIONS, SERIES II (Society of Automotive Engineers, Inc., New York) SP 232, Jan. 1960

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In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961. Pp. 33-47

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Sewall, H. 1946 THE CLINICAL RELATIONS OF GRAVITY AND CIRCULATION
Amer. J. Med. Science 151:491

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Shablin, V.A. 1961 THE INFLUENCE OF ANGULAR DISPLACEMENT OF A JOLTING NATURE ON THE HUMAN BODY. (O Viliyanii Na Organizm Cheloveka uglovykh Peremeschenii Tolchkoobraznogo Khuraktera) Gigena i Sanitariya (USSR) 26:46-51 Trans.: (Office of Tech. Serv., Washington, D.C.) 61-28268.

ABSTRACT: Some observations on 10 healthy persons 20 to 22 years indicated that the nature of functional changes in the body depends on the frequency of angular displacements, the number and magnitude of the jolts. Angular displacements with a frequency of 23 minute (0.38 cps) and an amplitude of 6° where the jolts were 13 per minute and an acceleration of 1.5 g acting on the human body for 2 hours originally changes the functional condition of the vestibular apparatus and its excitability. Bradycardia is noted in the cardio-vascular system after the effect of these vibrations. With the increase in the rate of angular displacement from 23 to 48 minute (0.8 cps) keeping other physical factors constant there is an increase in volume of pulmonary ventilation (to 174%) oxygen consumption (162% energy expenditure of the body (177%). Under these conditions which are otherwise the same the increase in the number of jolts per minute with simultaneous although slight increase in their magnitude from 1.0 to 2.0 g. Along with the changes mentioned leads to distinct phenomena of cardio-vascular and nervous system excitation.

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Shadee, J. 1936 LES MODIFICATIONS DE L'ACUITE VISUELLE CHEZ LES PILOTES APRES LES VOLS DE CHASSE. (Effects of Speed on Visual Acuity in Air Pilots) Rev. Pol. de la med. aeronautique.) 1, 1936

ABSTRACT: The author divides his material into two age groups. In the older group (29-36) after prolonged flights of 45 minutes to 1½ hours there occurred a diminution of visual acuity persisting for one to two hours. No such diminution was noted after short flights. In the younger group visual acuity was on the contrary, increased following flight, regardless of duration. The changes in visual acuity were insignificant, averaging only about 0.05. The author believes them due to changes in the circulation of the blood occuring in rapid flight at high altitude owing to accelerated changes in direction of flight. These changes are better compensated and disappear sooner in the younger pilots.
ABSTRACT: Journal of Aviation Medicine 7(4) : 217-218, December 1936

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Shalay, K. N., A. S. Gumenyuk, & N. N. Spektor 1956 ZAMECHANIYA K STAT'YE PROFESSORA D. YE. ROZENBLYUM "OB OSNOVNYKH VOPROSAKH V OBLASTI FIZIOLOGII USKORENIY. (NOTES TO PROFESSOR D. YE. ROZENBLYUM'S PAPER: "FUNDAMENTAL PROBLEMS IN PHYSIOLOGY OF ACCELERATION"). Voyenno-meditsinskiy Zhurnal (Military Medical Journal). 5:91, 1956. (Translation in USAF Air Intelligence Information Report "Physiology of Acceleration: A Controversy between D. Ye. Rozenblyum and G. L. Komendantov." IR-1407-57. 21 May 1957.)

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Shamburek, R. H. 1963 G FORCES AND YOU.
U.S. Army Aviation Digest 9(11):43-47. Nov. 1963.

ABSTRACT: Accelerative forces during dive bombing runs in the Army JOV-1C aircraft are discussed with particular emphasis on the physiological mechanics and symptoms which the pilot should be familar with. Protective measures against excessive G forces, such as physical fitness, eating a full meal prior to flights, body position muscle tensing, Ml manuaver, and anti-G suits are discussed. OV-1 instructors should particularly emphasis to students that (1) visual symptoms (grayout or blackout) are unreliable and dangerous as measures of acceleration because they are so close to unconsciousness. Except for an accelerometer, better judgements can be made by pressure sensing at seat, load on the arms, and face sagging, and (2) students who blackout at low levels should be checked by a flight surgeon. (CARI).

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Shapland, D. J. 1961 THE DYNAMIC MODEL - AN ENGINEERING APPROACH TO THE PROBLEM OF TOLERANCE TO ABRUPT ACCELERATIONS.
(Paper, Nat'l. Academy of Sciences Symposium on "Impact Acceleration Stress." 27-29 Nov. 1961, Brooks AFB, San Antonio, Texas)

ABSTRACT: The tolerance of the human body to short duration accelerations can be analyzed with the aid of analogous dynamic models, consisting of springmass systems. The basic principles of this technique are discussed in an attempt to clarify this method of investigating the problem. The basic models used are explained, and the methods of application described.

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Shapland, D.J. 1961 THE DYNAMIC MODEL - AN ENGINEERING APPROACH TO THE PROBLEM OF TOLERANCE TO ABRUPT ACCELERATIONS.
(Stanley Aviation Corp., Denver, Colo.) Nov. 1961.

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Shapland, D. J. 1961 QUARTERLY STATUS REPORT #2 ON HUMAN BODY DYNAMICS STUDY
(Stanley Aviation Corp., Denver, Colo.) Rept. No. 787, 6 Oct. 1961

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Shapland, D.J. 1961 THE USE OF MATHEMATICAL MODELS TO INVESTIGATE THE EFFECTS OF PROTECTIVE SUPPORTS ON THE HUMAN BODY DURING ABRUPT ACCELERATIONS. (Stanley Aviation Corp., Denver, Colo.) Rept. No. 781, Sept. 1961.

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Shapland, D. J. 1962 DYNAMIC MODELS FOR DETERMINING HUMAN TOLERANCE TO ABRUPT ACCELERATIONS. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Spring-mass systems analogous to the human body subjected to short duration accelerations are proposed and criteria suggested that can be applied to the response of these systems to indicate degrees of tolerance of the human body. The basic mathematics governing the motion of linear and non-linear, damped single-degree-of-freedom models is described and the equations of two- and three-degree-of-freedom models developed. Comparison of the solutions with available experimental data enables the dynamic characteristics of the models to be established for the spinal and transverse directions. Analytical solutions are possible for simple acceleration time inputs and complex inputs can be studied using digital computer techniques. A special purpose electronic analog computer that has been developed for rapid evaluation of complex inputs is also described. The dynamic models can be used to predict human tolerance to arbitrary inputs and also to ascertain the influences of seat cushions and restraint system effects Examples of the use of the models are given and their advantages and limitation discussed. (Aerospace Medicine 33(3):368-369, Mar. 1962)

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Shapland, D. J. 1962 A STUDY OF THE DYNAMIC MODEL TECHNIQUE IN THE ANALYSIS OF HUMAN TOLERANCE TO ACCELERATION. (Stanley Aviation Corp, Denver, Colo.) Doc. No. 793, 21 Feb. 1962

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Shaw, C.C. 1954 ON A COMMON DYNAMIC FACTOR IN MOTION SICKNESS
Military Surgeon 114:347-350 Jan.-June 1954

ABSTRACT: Of the six motions of a ship, yaw, sway and surge possess negligible accelerations and contribute to seasickness only when they become sunchronized with roll and heave and pitch, either singly or in unison. Linear accelerations of pitch and roll and heave, alone or in combination, may produce motion sickness. Their nauseating and veriginous effects are compounded by surge, sway and yaw. The total sum of the linear accelerations of pitch, roll and heave resulting from the forces of wind and waves appears to be the basic dynamic cause of motion sickness. In a seaway, heave is the worst malefactor.

Thus, the mechanical or dynamic cause of motion sickness is identical on land, at sea and in the air. It can be simply stated as the sum of linear accelerations and decelerations along and around the longitudinal, lateral and vertical axes. Each of the six degrees of freedom of motion may thereby contribute to motion sickness. However, the linear accelerations of surge, sway and yaw are almost negligible. From the practical viewpoint, motion sickness, when it occurs, is induced by the sum of the linear accelerations of pitch, roll and heave. And the greatest of these in a seaway is heave.

4,577

Shaw, C. C. 1954 ON THE DYNAMICS OF MOTION SICKNESS IN A SEAWAY. Scientific Monthly 78:110-116.

4,578

Shaw, R.F. and N.B. Marple 1961 METHODS FOR DETERMINING BLOOD FLOW THROUGH INTACT VESSELS OF EXPERIMENTAL ANIMALS UNDER CONDITIONS OF GRAVITATIONAL STRESS AND IN EXTRA TERRESTIAL SPACE CAPSULES. (Columbia Univ., College of Physicians and Surgeons; Electronics Research Labs., New York) Status rept. no. P-1/168, Rept. no. CU-1-61-NASA-112-PS/ERL, 1 May 1961

ABSTRACT: The following work is described: (1) technical development of blood flowmeter instrumentation; (2) surgical considerations related to special problems of chronic implantation of flowmeter probes; (3) study of the relationship between levels of blood flow and organ activity.

4,579

Shaw, R.S. & H.E. Savely 1947 ACCELERATION -TIME DIAGRAM FOR CATAPULT EJECTION SEATS. (Aeromedical Lab., Wright-Patterson AFB, Ohio) Memo Rept. TSEAA 695-66D, 11 Feb. 1947.

4,580

Shaw, R.S. 1947 HUMAN TOLERANCE TO ACCELERATION IN DOWNWARD SEAT EJECTION. (AMC, Wright-Patterson AFB, Ohio) Memo Rept. TSEAA 695-74C 12 Dec. 1947.

CONCLUSIONS: In downward seat ejection, velocities of 28.5 feet per second can be safely accomplished using a 24-inch stroke.

The standard safety belt and shoulder harness with the addition of toe straps provide adequate fixation of subjects in this ejection. (DACO)

4,581

Shaw, Lt. R.S. 1947 HUMAN TOLERANCE TO NEGATIVE G OF SHORT DURATION. A.M.C. Memorandum Rept. No. TSEAA-695-74.

4,582

Shaw, R. S. 1948 HUMAN TOLERANCE TO NEGATIVE ACCELERATION OF SHORT DURATION. J. Aviation Med. 19 (1):39-44.

SUMMARY: Experiments have been conducted to determine the tolerance of humans to forces like those which would be experienced in escape from aircraft by downward seat ejection. It has been found that seated human subjects can tolerate considerably more than 3 negative g for periods of time under 0.3 seconds.

4,583

Shaw, R. S. 1948 NEGATIVE ACCELERATION Military Surgeon 102 (6): 483-487.

4,584

Shaw, R.S., J.L. Gamble, P.J. Maher, J.P Henry & O. Gauer 1948 ON THE USE OF VENOUS PRESSURE IN THE HEAD AS A TOLERANCE INDEX OF NEGATIVE G IN HUMANS. Fed. Proceedings, 7:113

ABSTRACT: Injury to animals from negative acceleration of over three seconds'duration first appears as rupture of small vessels about the head; consequently, it was thought that venous pressure in the head might be used as an index of tolerance in humans exposed to negative acceleration on the centrifuge. Four subjects were secured in a seat with an adjustable back mounted on the centrifuge, and venous pressures during negative acceleration were measured with a variable inductance manometer. Venous pressure in the frontal vein of human subjects exposed to negative acceleration was found to vary linearly with the magnitude of the acceleration as though from a simple hydrostatic column based at the heart; they ranged from 80 to 110 mm. Hg. No appreciable movement of the heart was noted in X-rays of the chest taken under negative accelerations of 3 g.; "Red-out" was not observed in this series. Pressures were recorded with subjects in 45-degree and 60-degree backward tilted seats, and compared with those obtained in the standard 10-degree seat tilt. No significant protection against negative acceleration as indicated by venous pressures in the frontal vein resulted from this tilting. Breath holding and straining maneuvers, which increase venous pressure in the resting subject, enhanced the disagreeable subjective sensations, while closing the glottis and attempting inspiration (Müller Maneuver), which decreases venous pressure, resulted in considerable alleviation of symptoms under negative accelerations up to 3 g.

4,585

Shaw, R.S. & J.P Henry 1948 THE PRESSURIZED HELMET AS A NEGATIVE G PROTECTIVE DEVICE. Aero Medical Laboratory Serial No. MCREXD4-74-E, Air Material Command Memo. Rept. TSEAA-695-74E

ABSTRACT: In MR. No. TSEAA-660-100 entitled "Emergency Pressure Suit", dated May 5, 1946, a pressurized helmet is described, and its use as a negative g protective device is suggested. Inasmuch as most of the injury from negative acceleration of several seconds duration is related to over-distension of the blood vessels of the head, it is reasonable that such a helmet applying counter pressure to these vessels would provide some degree of protection. This work was undertaken to determine the amount of protection such a device would afford. This report describes preliminary experiments to evaluate the pressurized helmet as a protective device against negative acceleration. The preliminary experiments suggest that: (a) Pressure breathing with a pressurized helmet does not significantly raise negative g tolerance. (b) The use of the pressurized helmet with the glottis closed raises negative g tolerance by an amount similar to the positive g tolerance increase obtained from the anti-g suit.

4,586

Shaw, R.S. 1948 RUPTURED INTERVERTEBRAL DISC FROM POSITIVE ACCELERATION. J. Aviation Med. 19(4):276-278. Aug. 1948.

SUMMARY:

1. Back injury from positive acceleration is reviewed.
2. A case of proven and a case of probable herinated nucleus pulposus resulting from a dive "pull-out" are reported.
3. A flexed back predisposes an individual to this injury during positive acceleration and should be avoided.

4,587

Shaw, R. S., & J. P. Henry 1948 THE SIGNIFICANCE OF THE VOLUME OF BLOOD CONTAINED IN THE LEGS IN NEGATIVE ACCELERATION. (Engineering Div., Air Materiel Command, Wright-Patterson AFB, Ohio) Memo Rept. No. MCREXD-695-74J. ASTIA AD-55922; 11 May 1948

ABSTRACT: Venous pressure in the forehead was measured in 3 humans exposed to negative acceleration of 2 g. When the circulation in the legs was isolated by means of pneumatic cuffs, the venous pressure in the forehead was about 15 mm. of Hg less than when the blood was allowed to drain from the legs into the trunk. A similar reduction in pressure could be obtained by preventing drainage of blood from the legs by altering their position until they were at right angles to the direction of the centrifugal force. (ASTIA)

4,588

Shaw, R. S., J. P. Henry, J. L. Gamble and O. Gauer 1948 VARIATIONS IN VENOUS PRESSURE UNDER NEGATIVE ACCELERATION. J. Appl. Physiol. 1:441-447.

4,589

Shaw, R. S., J. L. Gamble,J. P. Henry, and O. H. Gauer Jan. 1948 VENOUS PRESSURE IN THE HEAD UNDER NEGATIVE ACCELERATION. Memo Rept. TSEAA-695-74D, 15 Jan. 1948.

4,590

Shaw, R. S., J. L. Gamble, J. P. Henry, & O. Gauer 1948 VENOUS PRESSURE IN THE HEAD UNDER NEGATIVE ACCELERATION. (Aero Medical Lab., Dayton, Ohio) Memo Rept. No. MCREXD4-695-74D, 15 Jan. 1948

ABSTRACT: This report describes venous pressure changes in the heads of human subjects exposed to negative acceleration, and their use in determining negative acceleration tolerance. The report also describes the protection against negative acceleration afforded human subjects by the partial supine position as gauged by venous pressure changes. Through various tests it was concluded that under negative acceleration, venous pressure in the head of the human varies as though from a hydrastatic olumn based in the region of the heart. No significant protection against negative acceleration is obtained from the 45° and 60° backward titled sent.

4,591

Shea, F. 1953 CIR CALLS FOR STRONGER CABINS. Aviation Week, 59(16):98-99. 19 Oct. 1953.

ABSTRACT: In the controversy over forward-facing versus aft-facing seats in transport planes, it is felt that there has not been enough evidence collected by investigators of air crashes to justify one in preference to the other. The crash of a DC-6 at Elizabeth, N.J., on Feb. 11, 1952, is described, and it is stated that the investigators of this accident reported that the casualty rate would have been just as high with aft-facing seats as with the forward-facing seats, which were standard on this plane. However, it is definitely recommended that seats in transports be reinforced for lateral g forces. Present seats are designed to bear only 1 and 1/2 g laterally, and it is recommended that they be strengthened to stand loads as high as 35 g laterally.

4,592

Sheffield, F. C. 1942 "G" MEN OF THE AIR. ON PILOTS FLATTENING OUT: AVOIDING THE PHYSIOLOGICAL ILL EFFECTS OF VIOLENT ACCELERATION Flight 41:134-135, 1942.

4,593

Sheftel, G.A., A. Smirnov, F.I. Shumetev and N.T. Gorchakov 1936 EFFECTS OF PARACHUTE JUMPING ON HUMAN ORGANISM. Sovetskii vrachebny zurnal, (Leningrad) p. 1166-72 Aug 15, 1936

4,594

Shelley, T. 1941 GERMAN-NAVY REPORT ON THE PHYSIOLOGICAL EFFECT OF NIGHT FLYING ON THE EYES. (USN., Office of Chief of Naval Opns., Intelligence Div.) Intelligence Report Serial X2905-S-45, 31 July 1945.

ABSTRACT: Report on the Effect of Vibrations on the Vegetative Nervous System and the Sinew Reflexes. Experiments are carried out to establish the connection between the effect of shock and reflex action. The effect of vertical vibrations on the sinus is noted. Explanatory diagrams are included in this section.

4,595

Shepard, A. B., Jr. 1961 PILOT'S FLIGHT REPORT, INCLUDING IN-FLIGHT FILMS. (Paper, Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961, NASA, Washington, D.C.). Pp. 109-116

4,596

Shepelin, O. P. 1961 EFFECT OF PULSATING AND STEADY NOISES ON THE ORGANISM UNDER EXPERIMENTAL CONDITIONS
(Trans. of Gigiena i Sanitariya (USSR) 26(3):25-31, 1961)
(Office of Technical Services, Washington, D. C.) 61-28031

4,597

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1954 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR4, Dec. 29, 1954

ABSTRACT: This is the first progress report on aircraft catapult and arresting and details preliminary considerations concerning linear accelerators and specific requirements of the Navy in relation to existing facilities.

4,598

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR5, Jan. 31, 1955

ABSTRACT: This is the second progress report on aircraft catapult and arresting and reviews the capabilities of the human centrifuge at AMAL and the HG-1 catapult facility at the U.S. Naval Base, Philadelphia for simulating catapult launchings and carrier landings.

4,599

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR8 Feb. 28, 1955

ABSTRACT: This the third progress report on aircraft and catapult arresting. On the 24th and 25th of January, 1955, conferences were held at AMAL with Lt. Col. J.P. Stapp of the Holloman Air Force Base concerning the capabilities of the deceleration track at Holloman. Further detailed information on the HG-1 catapult with the Aero Medical Equipment Laboratory is presented to supplement the general information of the second progress report.

4,600

Shepler, H.G., J.D. Hardy, C.F. Gell & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR9 March 30, 1955

ABSTRACT: This ite fourth progress report on catapult and arresting. A visit was made to the Holloman deceleration track to determine its capabilities for use in simulating catapult and arresting. It was decided that probably only the decelerations simulating arrested landings could be carried out on the Holloman

track. The Naval Ordnance Test Station was visited to determine the capabilities of its track facilities. It was concluded that the Naval Ordnance Research Track is capable of providing necessary facilities for any contemplated test performance during acceleration and deceleration that had been proposed at conferences by Bureau of Aeronautics representatives.

4,601

Shepler, H.G., J.D. Hardy, C.F. Gell, & E. Hendler 1955 AIRCRAFT CATAPULT AND ARRESTING; HUMAN LIMITATIONS IN.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR10 May 24, 1955

ABSTRACT: This is the fifth and final progress report on aircraft catapult and arresting. Recommendations based upon the study of available linear accelerating devices are made as follows: (1) that initial studies be carried out at the Naval Ordnance Test Station, China Lake, California, (2) that studies be carried out in collaboration with the Aeromedical Field Laboratory, Holloman Air Force Base, New Mexico, and (3) that should tests in aircraft be indicated from the initial study, such tests should be scheduled at the Naval Air Test Center, Patuxent River, Maryland or the Naval Air Test Station, Lakehurst, New Jersey with the assistance of AMAL personnel as desired. A brief outline of the problems relating to performance testing under acceleration is also included in this report.

4,602

Shepler, H. G., C. F. Gell, E. Hendler, J. D. Hardy 1955 HUMAN LIMITATIONS IN AIRCRAFT CATAPULT AND ARRESTING. PHASE I. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 318; TED ADC AE-6304; TED ADC AE-1407; 31 Dec. 1955

ABSTRACT: Analysis of the problem was first made in terms of the required activity of the pilot during take-off and landing procedures. The question was then put as to whether the pilot could maintain control of the aircraft during acceleration at 10 G during a 250-300 foot stroke. If not, how long after the end of acceleration would it be before the pilot could take control? The following laboratories and tracks were visited to study the capabilities and availability for tests of performance degradation due to acceleration: (1) Human Centrifuge - AMAL; (2) HG 1 Catapult - AMEL; (3) Ejection Seat Tower - AMEL; (4) XC-7 Steam Catapult - Patuxent, Md.; (5) High Speed Research Track - Holloman AFB, N. Mex.; (6) High Speed Research Track - Naval Ordnance Test Station, China Lake, Calif. It was concluded that the facilities at Holloman AFB and Naval Ordnance Test Station were suitable for initial studies but the cost of operation of these tracks is very high. At present there exists no facility for a thorough study of the linear acceleration and deceleration problems in the range of acceleration patterns encountered in catapult launchings and arrested landings. However, thorough studies might be made at the Ships Installations Facility at Lakehurst, providing facilities for human experimentation were available.

4,603

Shevi, I. and N.G. Kuz'mina. 1956 IZMENENIIA V KLETKAKH NEKOTORYHH ORGANOV KHOLODNOKROVNYKH ZHIVOTNYHH POD DEISTVIEM VIBRATSII. (Changes in the cells of some organs of cold-blooded animals under the effect of vibration) Gig. san. 21:37-40

4,604

Shipler, H. G. 1958 PILOT PERFORMANCE AND TOLERANCE STUDIES OF ORBITAL RE-ENTRY ACCELERATION. (U. S. Naval Air Development Center, Johns ville, Pa.) TED ADC AE1412, MA-8. 19 Sept. 1958.

4,605

Shirley, R. E. 1957 STANDARDS FOR ACCELERATION.
In: Symposium: Physical Standards and Selection, Randolph Air Force Base, Texas Pp. 135-139, ASTIA AD-144 144.

ABSTRACT: The effects of application of g-force are briefly discussed. The method of determination of g tolerance using a centrifuge is described. At the present time it is noted that few Air Force personnel are g intolerant or susceptible. It is also noted that the mood of the patient or experimental subject is important in production and maintenance of g tolerance. It is strongly suggested that this, or some similar test be included in the examination of pilot trainees so that subjects who do not possess a physiological adaptation to increased intrathoracic pressure may be tested on the centrifuge for g tolerance before a large amount of training time and money have been invested in these personnel.

4,606

Shirley, T. 1960 MEN OF SPACE.
(Philadelphia; Chilton Co., Book Division, 1960)

4,607

Shternfel'd, A. 1959 OT ISKUSSTRENNYKH SPUTNIKOV K MEKHPLANETNYM POLETAM (FROM MAN-MADE SATELLITES TO INTERPLANETARY FLIGHTS) Gosudarstvennoye Izdatel'stvo Fiziko-Matematicheskoy Literatury (Moscow), 1959 (Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio) Trans. No. MCL-1301, 18 Sept. 1961. ASTIA AD 264 626

ABSTRACT: The launching of an automatically controlled rocket to Venus will enable scientists to obtain valuable scientific data. But much more data will be supplied by flights around Venus, especially the flight of a manned rocket.

At a definite trajectory the cosmic rocket after flying around the celestial body will automatically return to the point of take-off, traveling on inertia without any fuel consumption. That is why flights of people around Venus will be easier and sooner than the flight with landing on the surface of Venus with return to Earth. But the flight around Venus is a considerably more difficult problem than the flight around the Moon. In the latter case, the rocket is preferably in the terrestrial field of gravitation. Having overtaken the Moon, it will come back to Earth. But when a cosmic rocket will fly in the direction of Venus then at a relatively short distance from the Earth it will fall into the field of gravitation of the Sun thus fully subjecting the movement of the rocket to gravitation.

4,608

Shternfeld, Ari. 1959 MAN IN COSMIC SPACE
Soviet Space Science (New York: Basic Books, 1959) Pp. 163-189

ABSTRACT: Presents an excellent, simplified discussion of work and life under conditions of weightlessness. Defines G-force for the layman.

4,609

Shternfel'd, Ari 1959 SOVIET SPACE SCIENCE.
Trans. of mono. Iskusstvennyye Sputniki, 2nd ed., Moscow, Nov. 1957
(New York: Basic Books, Inc.) Pp. 163-189

4,610

Shternfel'd, A. 1961 TWENTY-FOUR HOURS IN SPACE OPENS THE WAY TO THE PLANETS
Tekhnika molodezhi 1961(11):14-15

ABSTRACT: The author discusses space flights which could be completed in 25 hrs., 18 mins., the duration of German Titov's space flight. The author states the launching and descent time and speed. Although Titov suffered no ill effects of weightlessness, artificial gravity could be produced for future cosmonauts. The author states that it would be possible to fly to the moon in 25 hrs. The author compares a 25 hr. and 5-day flight to the moon. (CARI)

4,611

Shuvatvo, L. P. 1961 MICROAPPARATUS FOR THE REGISTRATION OF CERTAIN PHYSIOLOGICAL FUNCTIONS BY RADIO
(Trans. of mono Mikroapparatura dlya Tegistratsii po Radio Nekotorykh Fiziologicheskikh Funktsii, Moscow, 1959.)
(Office of Technical Services, Washington, D.C.) 61-27396

4,612

Siegel, M. 1951 ANALYTICAL AND TEST INVESTIGATION OF TYPE HG MARK I CATAPULT PERFORMANCE CHARACTERISTICS (Naval Aircraft Factory, Philadelphia, Pa.) 19 April 1951, Rept. no. M-5038, ASTIA AD-102 385

ABSTRACT: The purposes of this test and analytical investigation are as follows (1) Experimentally determine the performance characteristics and optimum conditions of operation of the HG-1 Catapult. (2) To investigate both experimentally and analytically the processes involved in the launching cycle so as to evaluate the practicability of conforming with the original catapult design specifications Predict the extent of improvement which may be obtained through further catapult modifications. In the HG-1 system control of acceleration by means of regulating oil back pressure has been shown to be very sensitive to the regulating valve poppet opening velocity. It was found that for full stroke operation at any launching condition there is one acceleration build up rate which will give relatively smooth acceleration characteristics. Flexibility of ram and launching car structure was found to superimpose a high frequency vibratory acceleration about the average values. The probable effect of these vibratory accelerations on test specimens, and suggestions for mitigating the superimposed vibratory accelerations in future catapult designs are described in the conclusion section of this report.

4,613

Sieger, W. J., & E. H. Copeland 1961 UNIFORMITY IN SHOCK TESTING
In 1961 Proceedings of the Institute of Environmental Sciences National Meeting, April 5, 6, 7, 1961, Washington, D. C. (Mt. Prospect, Ill.: Institute of Environmental Sciences, P. O. Box 191) pp. 291-298

4,614

Siegfried, M. 1957 BIBLIOGRAPHY OF RESEARCH REPORTS ISSUED BY THE BIOPHYSICS BRANCH (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio) Jan. 1957
ASTIA AD 126 361

ABSTRACT: This bibliography has been compiled to tabulate those publications including technical reports, technical notes, memorandum reports, and papaers which are considered to be of lasting interest in the fields of research being

conducted in the Biophysics Branch of the Aero Medical Laboratory, Directorate of Research, Wright Air Development Center.

This material, divided by Section according to the type of work conducted and covering the areas of acceleration, anthropology, bioelectronics, escape, and stress and fatigue, lists only those articles now published. Because the Stress and Fatigue Section is just newly formed, only papers in this area are listed in the present edition.

4,615

Sieker, H.O. 1952 DEVICES FOR PROTECTION AGAINST NEGATIVE ACCELERATION. PART I. ACCELERATION STUDIES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 52-87, ASTIA AD 142 259.

ABSTRACT: Previous experimental work has shown that negative acceleration is tolerable within certain physiological limits. This report summarizes studies in which human subjects were exposed to negative acceleration with and without protection. The tolerance limits for negative acceleration in unprotected subjects in the upright seated position was found to be 2.5 g. The acceleration was limited to this level by the subjects' discomfort and the bradycardia noted in theelectrocardiogram. At 3 g in addition to marked discomfort, conjunctival hemorrhage and cardiac asystoles were noted. When the subject in the upright position was protected by means of counter-pressure about the head and neck, the tolerance to negative acceleration was increased to 5 g. The tolerance limit for negative acceleration was found to be 4 g in the negative g aspect of the USAF prone position bed. (Author)

4,616

Sieker, H. O. 1961 EFFECT OF ACCELERATION ON THE HEART. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine). (Boston: Little, Brown, and Co., 1961). Pp. 52-60

4,617

Siffre, M. 1951 TRAUMATISMES ET PARACHUTAGES (TRAUMATISM AND PARACHUTE JUMPING)
Revue du Corps de Sante Militaire, Paris 7:121-130, 1951

4,618

Sifuentes, S. S. 1958 SEAT BACK-PASSENGER-IMPACT ABSORPTION CHARACTERISTICS DEVELOPMENTAL TEST MODEL 22. (Convair, San Diego, Calif.) Rept. #SL58-177, 16 June 1958

4,619

Sillevaerts, C. 1935 NOTES SUR LA PATHOLOGIE SPECIALE DE L'AVIATEUR (Notes on Diseases Peculiar to the Aviator)
Mém. Acad. Méd. Belg. (Brussels) 25(4): 1-95

4,620

Silliphant, W. M. & V. A. Stembridge 1958 AVIATION PATHOLOGY: THE ROLE OF THE PATHOLOGIST IN AIRCRAFT ACCIDENT FATALITIES. U.S. Armed Forces Med. J. 9:207-233, February 1958.

4,621

Silverman, A.J., et al. PSYCHOPHYSIOLOGIC CORRELATES OF VASCULAR RESPONSES. I. AFFECT, RESPONSE TO THE HUMAN CENTRIFUGE AND CATECHOL AMINE LEVELS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio)

SUMMARY: Inter and intra-individual variations in G-tolerance have long been an enigma. Since black-out represents the point of cardiovascular decompensation where there is insufficient blood pressure to perfuse the retina, the human centrifuge is an excellent way to study response variations to massive hypotensive stresses. From anecdotal evidence, and previous work suggesting relationship of blood pressure responses, and differential catechol amine release in association with specific affects (anger and anxiety), it was postulated that the same relationships might account for differences in G-tolerance. Black-out levels on six subjects were thus obtained and urinary bioassays done for adrenaline and noradrenaline; while a focused psychiatric interview determined the presence and intensity of anxiety and agression. Results indicated that during the control period, adrenaline was highest in the low G group, and noradrenaline highest in the high G group. Both catechol amines increased during the stress period, as expected, but the above relationships held. Noradrenaline increased progressively in higher G subjects. Low G subjects revealed prominent anxiety. Middle G subjects showed moderate anxiety and agression. In further experiments when there was a shift in affect, G-tolerance also changed in the predicted direction. (DACO)

4,622

Silverman, A. J., S. I. Cohen, G. D. Zuidema, and C. S. Lazar 1957 PREDICTION OF PHYSIOLOGIC STRESS TOLERANCE BY PROJECTIVE TESTS. THE FOCUSED THEMATIC TEST. J. Project. Techn. 21:189-193.

4,623

Silverman, A. J., S. I. Cohen, & G. D. Zuidema 1957 PSYCHOPHYSIOLOGIC INVESTIGATIONS IN CARDIOVASCULAR STRESS. Amer. J. Psychiatry 113(8):691-693

SUMMARY: Anecdetal material led us to the observation that subject's variation in blackout level seemed correlated with their affect state, and that psychological differences appeared to exist between low "g" and high "g" tolerance subjects. It seemed most likely that these variations were ultimately due to different degrees of efficiency of the compensatory blood pressure response to the cardiovascular stress. - - - The decision was made to study aggression and its handling rather than the entire personality. It soon became apparent that high "g" subject seemed more outgoing and aggressive than low "g" subjects.

In preliminary testing 13 protocols were prepared, consisting of 6 low "g" and 7 high "g" subjects previously tested on the centrifuge. These protocols were presented independently to 2 clinical psychologists who - - - properly placed 12/13 of the subjects. In addition, 33 further subjects were tested. The authors attempted to place these subjects in their appropriate "g" tolerance categories on the basis of the projective test. Using the criteria on a 6 point scale, a numerical score was obtained. Figure I illustrates that the subjects were placed in their appropriate categories with a high degree of success.
In most instances the test was not administered on the same day as the centrifuge ride. Thus, what was being assessed by the projective test was the usual way the subject handled or expressed aggression. When the test is given close to the time of the actual centrifuge stress, it is assessing the subject's affective state, at the appropriate time, and its accuracy in predicting "black-out" levels increases.

Double-blind cross validation studies now under way are taking this into account and suggest that the 92% accuracy of prediction will be maintained. (DACO)

4,624

Silverman, A. J., S. I. Cohen, & G. D. Zuidema 1957 PSYCHOSOMATIC FACTORS IN "BLACKOUT" (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR
See also J. Nervous & Mental Disease 125(1):64-68 (F)
NOTE: Reel 7, Flash 7, Item 54

SUMMARY: 1) On the basis of observation of behavior and interviews, a psychosomatic factor appeared to be identified in tolerance to G-forces. 2) Aggressive feelings appeared related to increased tolerance, while anxiety was associated with lower black-out levels. 3) The possible relationship of these affects to adrenaline noradrenaline levels and hence to G-tolerance is discussed. (AUTHOR)

4,625

Silverman, A. J., S. I. Cohen, & G. D. Zuidema 1957 PSYCHOSOMATIC FACTORS IN "BLACKOUT" J. Nervous & Mental Disease 125(1):64-68
NOTE: Reel 7, Flash 7, Item 54
See also (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR

SUMMARY: 1) On the basis of observation of behavior and interviews, a psychosomatic factor appeared to be identified in tolerance to G-forces. 2) Aggressive feelings appeared related to increased tolerance, while anxiety was associated with lower black-out levels. 3) The possible relationship of these affects to adrenaline noradrenaline levels and hence to G-tolerance is discussed. (AUTHOR)

4,626

Silverman, A.J., S.I. Cohen, G.D. Zuidema & L.L. Vickery 1958 PSYCHOLOGIC BIOLECTRIC ASSESSMENT OF G-SUIT PROTECTION. (USAF, Wright Air Dev. Div., Wright-Patterson AFB, Ohio) WADC TN 56-400, ASTIA AD 97278.
NOTE: CARI P&S 2.15

ABSTRACT: Performance of a psychomotor task and arousal as measured by GSR were assessed on six subjects who were centrifuged at 3 g for ten rides, while protected and again while unprotected by an anti-g suit. Results suggested less arousal and better sustained performance when protected by the suit.

4,627

Silverman, A.J., S.I. Cohen, and B. Shmavonian 1959 SELECTION TECHNIQUES FOR SPACE CREWS (Duke U. School of Medicine, Durham, N.C.) Contract AF 49(638) 354); AFOSR TN 59-145, 29 Mar 1961, ASTIA AD-253 128

ABSTRACT: Accurate selection techniques depend in part upon accurate identification of the presumptive stresses. The impact upon each individual of these various forces varies considerable depending upon the meaning these stresses have for him, due to personality differences and variations in the psychophysiological state of the moment. Thus, crew selection will involve such problems as: (a) Determination of the personality types most suited to the mission in general, as well as the specific jobs they would be expected to carry out. (b) The motivations and other psychological characteristics such as judgement, which might be expected to lead to the highest performance capability of the individuals. (c) The conscious and unconscious attitudes which might be detrimental to individual and group functioning and methods to avoid these attitudes from occurring or interfering with the person's functional capacity. (d) A delineation of the specific psychophysiological responsitivity to various aspects of the mission, determined in part by (a), (b), and (c). Psychological test techniques have been able to discriminate high and low resistance to g forces, as well as high and low cardiac output subjects, and discrimination of ulcer and non-ulcer patients.

4,628

Silverman, A.J., S.I. Cohen & B. Shmavonian 1959 SELECTION TECHNIQUES FOR SPACE CREWS. (Paper, Regional Research Meeting of the American Psychiatric Association December 1-3, 1958, Miami, Fla.) ASTIA AD-253 128

4,629

Silvette, H. & S.W. Britton 1948 ACCELERATORY EFFECTS ON RENAL FUNCTION Am. J. Physiol, 155:195-202 , Nov. 1948.

4,630

Silvette, H. & S.W. Britton 1948 SLIDE RULE FOR DETERMINATION OF "G" J. Aviation Med. 19:297, Aug. 1948.

4,631

Simmonds, W. J. 1943 PROBLEMS OF ACCELERATION Med. J. Aust. 2:127-129, 1943.

4,632

Simmons, C.F. 1950 WINDBLAST PROTECTIVE VISOR ASSEMBLIES FOR USE WITH HELMETS AND OXYGEN MASKS. USAF Technical Report 6037, Sept. 1950. ASTIA ATI 87407

ABSTRACT: Problems incident to the development of wind blast head-protection equipment for use by aircrew men during seat ejection were studied. The equipment was tested by using both live subjects and dummies ejected from airplanes flying at speeds up to 485 mph. Tests were also made with wooden model heads using an altitude chamber to produce air blast in excess of 500 mph. It was determined that a modified P-1 helmet and a modified A-13A oxygen mask plus a visor mechanism will remain on the wearer at 485 mph.

4,633

Simon, A.W. 1959 THE CALCULATION OF THE VELOCITY AND THE ACCELERATION OF THE ROCKET SLED FROM THE TIME-SPACE DATA BY THE METHOD OF LEAST-SQUARES POLYNOMINALS. (Air Force Missile Development Center,Holloman AFB, New Mex.) Rept. No. AFMDC TN-59-5, April 1959. ASTIA 211 524.

ABSTRACT: A method of calculating the velocity and acceleration of the center of gravity of the rocket sled from measured time vs distance travelled on the Holloman track is presented. The least-squares method is used to reduce the residual errors in measurement and to provide a most probable solution. (Author)

4,634

Simon, A.W. 1962 A THEORETICAL STUDY OF THE EFFECT OF ACCELERATION AND DECELERATION ON THE HUMAN BODY.
(Air Force Office of Scientific Research, Holloman AFB, New Mex.)
Working Paper DRA-62-4, July 1962.

4,635

Simon, G. B. 1959 MEASURING INTELLECTUAL ABILITY IN MAN UNDER HIGH ACCELERATION. In Proceedings of the Pilot Clinic on the Instrumentation Requirements for Human Comfort and Survival in Space Flight, 26-27 Oct. 1959, Fier, New York Pp. 106-116

4,636

Simon, G. B. 1961 THE SIMULATOR AS A HUMAN FACTORS RESEARCH TOOL FOR MANNED SPACE FLIGHT.
(Institute of the Aerospace Sciences, New York, N. Y.)
Paper 61 196 1890, June 1961

ABSTRACT: This paper discusses the simulator as a human factors research tool for manned space flight. Some of the research that needs to be done with man in a simulation facility is indicated and the need for such research is clarified. Some of the characteristics of the simulation facility are described with a discussion of state-of-the- art limitations.

4,637

Simons, A.K. 1951 TRACTOR RIDE RESEARCH
Paper: Society of Auto. Engineers National Tractor Meeting, 10-13 Sept. 1951
S.A.E. Preprint 653
See also: Society of Automobile Engineers Transactions, April 1952, Pp. 357-364

ABSTRACT: It cannot be over emphasized that the job the tractor must do, the position of the seat on the tractor, and the posture of the body in the seat will all affect tractor seat suspension design. One scientific approach to the problem is to (1) record the absolute tractor motion in all 3 directions simultaneously while the field operation is in progress, (2) subsequently analyze those records in the light of human tolerances and (3) design the seat suspension to isolate against the objectionable part of this motion. The use of such electronic equipment opens up new fields of investigation to the suspension engineer and the medical profession to determine physical and human responses to all conditions of motion. The challenge is to the seating engineer to try to devise a seat suspension that will do as good a job in isolating vibration and supporting his body as do his own legs without that unfortunate adjunct of becoming fatigued.

4,638

Simons, A.K. 1952 TRACTOR RIDE RESEARCH.
SAE Transactions, 6:357-364

ABSTRACT: The results of these studies revealed: a) the test course ride typified plowing and discing operations, b) the predominance of all motion was near the natural frequency of the tractor in the vertical and transverse directions, c) the accelerations were consistantly beyond Jacklin's disturbing comfort level in the vertical and transverse directions and occasionally in the longitudinal direction, d) the need for reducing transverse and vertical vibrations appeared to be mutually desirable.

4,639

Simons, A.K., A.O. Radke & W.C. Oswald 1956 A STUDY OF "TRUCK RIDE" CHARACTERISTICS OF STANDARD CUSHION VS. SUSPENSION TYPE SEATS IN MILITARY VEHICLES
(Detroit Arsenal and Aberdeen Proving Ground) Contract No. DA-11-022-ORD-1999; ORD Project TT1-696; DA Project 5T7201001; Sub-Directive 60405330-11-80802. Rept. No. 118, 16 March 1956.

ABSTRACT: The purpose of this study was to electronically record and compare the "truck ride" (1-8 cps) felt by the truck driver in a standard seat cushion assembly and suspension seats installed in a rubber-tired military truck and driven over permanent test courses at the Aberdeen Proving Ground.

Truck acceleration levels in the vertical, transverse and longitudinal directions were found to exceed the "intolerable" and "uncomfortable" limits suggested by vibration table studies in Europe and the U.S.A. The standard driver's cushion seat amplified vertical basic truck motions (1½-6 cps), transmitting an average of 124% of the vehicle vibration intensity to the driver's belt on the Belgian block and staggered bump courses. The assistant driver's seat averaged 139% transmission. The suspension seats attenuated the basic truck motions (1½-6 cps) to the extent of transmitting an average of 80% of the truck vibration intensity to the driver's belt for suspension A (69% for suspension B), over the same test courses. These field test results correlate with performances determined in laboratory vibration table studies of man on the standard and suspension type seats. This correlation is important because laboratory vibration table studies are easier to make and are subject to greater experimental controls.

Laboratory vibration studies on man in a rigid seat were made (0-6 cps) which show the different responses of man's head, neck and belt and the gross effects of variation in muscle tension.

Some theories are presented on man's expenditure of energy in holding onto steering wheel and pushing into back cushion to reduce the amplifying effect of conventional cushions. The serious lack of data throughout the world on man's short and long term reaction to vibrations in the 1-8 cps range is emphasized.

4,640

Simons, D.G. 1949 USE OF V-2 ROCKET TO CONVEY PRIMATE TO UPPER ATMOSPHERE. (Air Material Command, Wright-Patterson AFB, Ohio) Rept. No. TR-5821. May 1949.

ABSTRACT: The report describes the techniques and devices developed to protect a monkey during flight in the nose-section of a V-2 rocket. Results obtained from 2 separate flights are discussed. Each time the properly supported animal (rhesus monkey) was enclosed in a pressurized capsule containing a 24-hr oxygen supply and apparatus for carbon dioxide and water vapor absorption. Also, provisions for recording respiration and the electrocardiogram on a Cook recorder during the flight were included. The experiments are referred to as Project Albert I- included in Blossom III fired on June 11, 1948, and Project Albert II- included in Blossom IVB, fired on 6/14/49. After installation of Albert I, 9 lbs anaesthetized, indication of neither heart action nor respiration could be obtained, due either to death of the monkey or to failure of the electrocardiographic apparatus. The rocket attained 37 miles altitude, and separation of the nose occurred as scheduled, but the parachute system failed, causing destruction upon impact. Albert II, 6½ lbs., also anaesthetized, reached 85 miles altitude, but again parachute failure killed the animal upon impact. However, the animal was still alive and apparently well throughout the 340 secs. flight. Barring parachute failure, animal recovery was considered likely. During 10 to 15 secs f peak acceleration at 5.5 G, the per-minute decreases in heart rate and respiration were 190 to 110 and 90 to 60, respectively. The free-fall condition, lasting several minutes, was characterized by gradual decrease in pulse rate from 190 to 180 and respiratory rate from 65 to 60, suggesting a calming effect of a gravity-free environment rather than cardio-acceleration, as anticipated.

4,641

Simons, D. G. & J. P. Henry May 1950 ELECTROENCEPHALOGRAPHIC CHANGES OCCURRING DURING NEGATIVE ACCELERATION. HEADWARD CENTRIFUGAL FORCE.
(AMC, Wright-Patterson AFB, Ohio) AF-TR-5966, May.1950 ASTIA AD-76873

ABSTRACT: Three rabbits were subjected to negative acceleration in experiments similar to those conducted in this laboratory by Gamble, et al., J. Appl. Physiol. 2:133, 1949. It was proved that the abnormal brain waves reported by those authors were not respiratory artefacts. They only developed after accelerations sufficiently severe to cause ischemic cerebral hypoxia secondary to disturbance of the cardio-vascular system. The experiments thus confirmed the theory that cerebral dysfunction occurring during negative acceleration may be due to disturbance of the cardiovascular system.

4,642

Simons, D. G. 1958 AREAS OF CURRENT SPACE MEDICAL RESEARCH
In Alperin, M., M. Stern, & H. Wooster, eds. Vistas in Astronautics: Proceedings of the First Annual AFOSR Astronautics Symposium (New York: Pergamon Press, 1958) pp. 299-303, Part 6, Human Factors

ABSTRACT: Effects of heavy-ray particles, the design of sealed cabins, the effects of weightlessness, and the problems of reentry into the atmosphere are briefly discussed.

4,643

Simons, D.G. 1958 SPACE MEDICINE - THE HUMAN BODY IN SPACE.
In Ten Steps Into Space, The Franklin Institute, Philadelphia, Pa., Monograph No. 6, pp. 161-178, Dec. 1958.

4,644

Simons, J.C. & M.S. Gardner 1963 WEIGHTLESS MAN: A SURVEY OF SENSATIONS AND PERFORMANCE WHILE FREE-FLOATING.
(6570th Aerospace Medical Research Labs., Aerospace Medical Division, AFSC, Wright-Patterson AFB, Ohio) Report No. AMRL-TDR-62-114, March 1963.
ASTIA DDC 410767.

ABSTRACT: The effect of surface-free behavior on work performance in space has been investigated to determine what techniques should be developed to aid the orbital workers. While they performed gross motor activities under weightless conditions, subjects reported their sensory and performance experiences during Keplerian parabalas in a C-131 B aircraft in both lighted and dark cabin conditions. Their experiences were categorized into sensation influences upon orientation and body motion influences upon body attitude and position control. Unique

examples of short-term weightless behaviors were found and their causes are briefly discussed. Potential applications of these weightless responses to hardware development and to crew training and selection are discussed, and significant areas for future research are proposed.

4,645

Simpson, J. D. 1941 MEDICINE OF FLYING J. Roy. Nav. Med. Serv. 27: 249-258.

4,646

Singer, E. and G.J. Peters 1961 SYSTEMS ANALYSIS OF A LAUNCH PHASE PRECISION TRACKING SYSTEM
(ITT Federal Laboratories, Air Force Missile Test Center (ARDC0, Patrick Air Force Base, Florida) (LAPTAR) Contract No. AF 08(606)-4008 ASTIA AD 254103

ABSTRACT: The preliminary design of a multistatic radar system called LAPTAR which will perform high accuracy measurements of missile position, velocity, and acceleration from launch to 20,000 ft. is presented. Factors leading to the proposed design, a description of the system, and an analysis of system performance are included.

Consideration of possible geometries and radar site locations led to the selection of an ellipsoidal or range-sum measurement system with three fixed receiver stations situated near the boundaries of Cape Canaveral, and a mobile transmitter-receiver near the launch pad. Accuracy requirements called for use of phase coherent techniques and a cooperative missile-borne beacon. The beacon transponds an X-band carrier with three modulation frequencies to provide unambiguous velocity and range measurements. Phase coherence is maintained with a closed loop time multiplexing subsystem.

The error analysis shows that LAPTAR is the most accurate radar system yet devised within the present state-of-the-art. Indications are that the system will provide real-time and post analysis information under all environmental circumstances, independent of any outside system, and that under most conditions the key accuracy specification will be met.

4,647

Singer, S. F. 1960 SYMPOSIUM ON SPACE MEDICINE. USAF School of Aviation Medicine, (Brooks AF Base, Texas) Jan. 1960.

4,648

Sinnamon, E.G. & W.S. Wray 1962 BIBLIOGRAPHY OF AVIATION MEDICAL ACCELERATION LABORATORY PUBLICATIONS, 1950-1960 (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-6211 Sept. 27, 1962

ABSTRACT: A bibliography with abstracts and indices is presented which covers all of the published work of the Aviation Medical Acceleration Laboratory during its first decade, 1950-1960. The primary facility at this laboratory is the 50-foot radius human centrifuge with its gimbal-mounted gondola. This device is capable of producing acceleration levels up to 40G and with computer control can realistically simulate flight profiles of air and space vehicles. The subject matter covered by the publications includes aviation and space medicine, the effects of acceleration on the animal and human organism, human performance under acceleration stress, dynamic stimulation of aircraft and space vehicles, biochemistry, physiology, psychology, and engineering. Included are formal reports, progress reports and articles which appeared in the open literature. The material is coded and grouped under subject headings and indexed by author, title and report number or journal citation. ASTIA numbers are given for all reports available under that system.

4,649

Sipple, W.C., C.H. Fugitt, W.B. Wentz & C.F. Gell 1954 DEVELOPMENT OF SCINTILLATION COUNTING TECHNIQUES FOR USE IN ACCELERATION STRESS STUDIES. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5411 30 July 1954. ASTIA AD 39 396

ABSTRACT: A description is made of the special laboratory facilities and instrumentation programs which were evolved for the satisfactory utilization of radioisotopes in connection with studies peculiar to acceleration physiology. A special instrumentation program has been completed whereby scintillation counting of weak gamma emitters in situ is now possible on subjects during their exposure to acceleration stress on the human centrifuge.

4,650

Sipple, W. C., & B. D. Polis 1959 A PHYSIOLOGICAL END POINT FOR THE STUDY OF THE TOLERANCE OF SMALL MAMMALS TO HIGH ACCELERATION STRESS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5906; ASTIA AD-226 560; 17 June 1959

ABSTRACT: By means of a transistor amplifier mounted before the slip rings of an animal centrifuge it was possible to obtain recordings of the EKG of rats under acceleration stress. With this information a physiological end point for the tolerance of the rat to 20G (positive acceleration) was defined as the time to reduce the heart rate of the animal from an initial state ranging from seven to nine beats per second to a final moribund state of 2 beats per second. The instrumentation and techniques employed permit the option of recovering the animal alive after approaching the limit of tolerance to acceleration. (AUTHOR)

4,651

Sipple, W. C., & B. D. Polis 1961 THE ELECTROCARDIOGRAM AS AN INDICATOR OF ACCELERATION STRESS. IRE Trans. on Bio-Medical Electronics, BME-8(3):189-191, July 1961

ABSTRACT: By means of a transistor amplifier mounted before the slip rings of an animal centrifuge it was possible to obtain recordings of the electrocardiogram of rats under acceleration stress. With this information, a physiological end point for the tolerance of the rat to 20 g (positive acceleration) was defined as the time to reduce the heart rate of the animal from an initial state ranging from seven to nine beats per second to a final moribund state of 2 beats per second. The instrumentation and techniques employed permit the option of recovering the animal alive after approaching the limit of tolerance to acceleration. (AUTHORS)

4,652

Sipple, W. C. et al 1961 MINIATURIZED PHYSIOLOGICAL TELEMETRY SYSTEMS Aerospace Medicine 32(3):247, March 1961.

ABSTRACT: Two types of miniaturized systems for telemetry of physiological signals have been developed, permitting acquisition of data from subjects unencumbered by wiring to recording equipment. In both systems the transmitters are worn by the subject in a helmet or pocket package, with the receivers and recording equipment being located remotely. The first system is for short range applications, with advantages of small size and weight. In the second system the desired signals are converted to frequency modulated subcarriers, multiplexed and fed to a long range F.M. transmitter, requiring discrimination at the recording station. Each of the two systems has its particular advantages determined by the conditions of use and number of channels of information required.

4,653

Sipple, W.C., & B.D. Polis 1961 A PHYSIOLOGICAL END POINT FOR THE STUDY OF THE TOLERANCE OF SMALL MAMMALS TO HIGH ACCELERATION STRESS, USING A TRANSISTORIZED AMPLIFIER FOR THE MEASUREMENT OF THE ELECTROCARDIOGRAM. I.R.E. Trans. Med. Elect., BME-8, No. 8: 189-191, July 1961.

ABSTRACT: By means of a transistor amplifier mounted before the slip rings of an animal centrifuge, it was possible to obtain recordings of the "EKG" of rats under acceleration stress. With this information, a physiological end point for the tolerance of the rat to 20 G (positive acceleration) was defined as the time to reduce the heart rate of the animal from an initial state ranging from seven to nine beats per second to a final moribund state of 2 beats per second. The instrumentation and techniques employed permit the option of recovering the animal alive after approaching the limit of tolerance to acceleration.

4,654

Sirotinin, N. N. 1961 EFFECT OF GRAVITATIONAL FORCES ON THE ORGANISM AT EARLY STAGES OF ONTOGENESIS. Patologicheskaya Fiziologiya i Eksperimental'naya Terapiya (Moscow) 5(5):13-15, Sept/Oct. 1961

ABSTRACT: The author describes experiments conducted on newborn and adult mice, rats, rabbits, cats, dogs, and guinea pigs to determine their tolerance to radial acceleration. Results of these experiments showed that immature mice, rats, rabbits, kittens, and puppies possess considerably greater resistance to radial acceleration than adult animals. Guinea pigs are more developed at birth than other animals and, therefore manifest almost the same resistance to radial acceleration as adult guinea pigs.
It appears that the increased resistance of newborn animals to radial acceleration is linked with decreased reactivity of their organisms. The mechanisms associated with decreased reactivity require further study. (CARI)

4,655

Sisakyan, N. M. 1960 BIOLOGICAL OBSERVATIONS OF ANIMALS CARRIED BY ROCKETS. Academy of Sciences of the USSR 30(11):15-24

ABSTRACT: A paper presented by N. M. Sisakyan at a conference of the USSR Academy of Sciences, which reports the experimental results of biological observations of animals during vertical rocket flights to altitudes of up to 450 km and during their safe return to earth.

4,656

Sisakyan, N.M. 1961 BIOLOGY AND COSMIC FLIGHTS
Dept. of Commerce, Washington, D.C. JPRS Trans. No. 9469, June 19, 1961
Original Source: Priroda (Nature) (Moscow) (1): 7-16, Jan. 1961

ABSTRACT: Soviet accomplishments in space biology in terms of space flights to date are summarized, and the problems to be resolved for successful manned cosmic flights are discussed. Vertical rocket flights carrying animals to 450 km altitude solved certain problems of assuring safety and special recovery under special flight conditions. The effects of acceleration and deceleration were manifested in the elevation of blood pressure, an increase in pulse frequency and certain changes in the electrocardiogram; during weightlessness these changes gradually decreased and approached the original level. After 5 to 6 minutes or at the end of the weightless period, the indices of the main physiological functions returned to the original level. The physiological information obtained by telemetry is still not completely processed; preliminary data testifies that changes in the physiological indices did not exceed changes observed during training.

4,657

Sisakyan, N.M. 1961 BIOLOGIIA I KOSMICHESKIE POLETY (BIOLOGY AND SPACE FLIGHT) Priroda (1): 7-16, 1961
See also: "Soviet Literature on Life Support Systems", Air Information Division, Wright-Patterson AFB, Ohio. AID Report 61-59 April 28, 1961 ASTIA AD 256 235

ABSTRACT: Soviet experiments with animal-bearing rockets show that at heights of 78-85 km and speeds of 2,000 km/hr or at 39-46 and 4,100 km/hr catapulting is the reliable emergency escape method and causes no great functional disturbances in the animal. It has also been found that 3-10 minutes of weightlessness causes no great functional lesions to the animals cardiovascular or respiratory system. Experiments indicate that the body can more easily withstand the transition from acceleration to weightlessness than the reverse. No changes, genetic or otherwise, have so far been noted in the bacteria and phages contained in the second Soviet space ship. (CARI)

4,658

Sisakyan, N. M. 1961 BIOLOGICAL PROBLEMS OF SPACE FLIGHTS. GENERAL MEETING OF THE ACADEMY OF SCIENCES USSR.
(Abstract trans. of Akademiya Nauk SSSR, Vestnik, 31(6):31-40, 1961)
(Office of Technical Services, Washington, D.C.) 61-28484

4,659

Sisakyan, N. M. 1961 BIOLOGICHESKIE PROBLEMY KOSMICHESKIKH POLETOV (BIOLOGICAL PROBLEMS OF SPACE FLIGHTS) Vestnik Akademii nauk SSSR (Moska) 31(6): 31-40, June 1961
German Translation: Sowjetwissenschaft, Naturwissenschaftliche Beitrage (Berlin) 1961(12):1243-1253, Dec. 1961

ABSTRACT: The development of space biology may be divided into five stages: (1) basic work preparatory to biological experiments with high-altitude rockets, (2) animal experiments with high-altitude rockets, (3) animal experiments on artificial satellites with the vital data sent by way of radiotelemetry, (4) biological experiments in space ships with re-entry and landing, and (5) flight of man in space. On the basis of the experimental conclusions it was safe to assume that short space flights below the radiation belt under conditions similar to Sputniks II, III, IV, and V are not dangerous to man with regard to cosmic radiation. Selection of Soviet cosmonauts was done from volunteers. The training included the study of principles of rocket flight, space ship construction, special problems of astronomy, geophysics, space biology and medicine, flight training, reading of maps of the landing area, and instruction on aircraft and radio controls. Other topics mentioned are the flight of Vostok, problem areas of space flight, environmental extremes in space, and biological bases for safety of space flight. (J. Aerospace Medicine 33(8):1029, Aug. 1962)

4,660

Sisakyan, N. M. et al 1961 CERTAIN PROBLEMS OF SPACE BIOLOGY
Trans. of Zhurnal Obshchei Biologii (USSR) 22(5):325-332, 1961.
(Joint Publications Research Services, New York, N. Y.)
Jan. 23, 1961 JPRS: 12097

ABSTRACT: Three basic problems are discussed: (1) the effect of extremal factors of cosmic space upon living earth organisms; (2) the biological bases for safeguarding space flights and life on the planets; and the forms and conditions of extra-terrestrial life.

4,661

Sisakyan, N.M. 1961 MAN AND SPACE
Pravda, 27 Mar. 1961. P. 4, Cols. 1-3.

ABSTRACT: On the average the dogs in flight required one and one-half hours to recover from stresses experienced during launching, after which time their pulse rate, breathing, and blood returned to nearly pre-flight levels.

4,662

Sisakyan, N. 1961 MAN AND SPACE.
Pravda 85(15575):6, 26 March 1961
(Aerospace Technical Intelligence Ctr., Wright-Patterson AFB, Ohio,
Trans. No. MCL-1149, 27 July 1961) ASTIA AD-261 823

ABSTRACT: Soviet science and technology never ceases to amaze mankind with its ever increasing achievements in the study of space. On March 25 the fifth sputnik weighing an impressive 4695 kilograms and carrying a four-legged cosmonaut -- the dog Zvezdochka -- and other biological specimens, was launched from the Soviet Union and returned again, on the same day, to a pre-selected landing site, by a command from the ground.

The attention of the entire world is attracted to the flights of Soviet space ships, the outstanding results of our scientists when investigating outer space. This Soviet and world interest is due mainly to the fact that each such flight enriches science with new important facts on the rules that govern the influence of space conditions on living organisms, gives valuable information on the operation of the multitude of complex research instruments, automatic devices and the equipment of the spaceship. We are acquiring ever newer information on the unknown depths of space. Finally, we are getting a clear concept of the increasing power of our rocket systems, capable of sending increasingly heavier ships into space with unfailing accuracy.

The recent successes in sending and recovering living organisms has yet another important fundamental significance. With each flight the moment approaches when man will be a passenger on the spaceship. This will be a new historic landmark in the development of science.

4,663

Sisakyan, N. 1961 MANNED SPACE FLIGHT PROBLEMS DESCRIBED
FBIS, USSR & East Europe, Nr. 145, July 28, 1961

ABSTRACT: Successful completion of a series of experiments with satellite ships made it possible to start preparing for man's flight into space. Results of research have shown that the limits of endurance could be considerably expanded, provided one makes intelligent use of the organism itself, and even more so of the proper technical means. The state of weightlessness is considered one of the characteristic factors of space flight. Experiments carried out on animals which were returned to earth proved that their 24-hour period in a state of weightlessness had no negative effect on their main functions. When a very careful analysis was carried out, some slight changes in the activity of the blood circulation apparatus had been discovered. (CARI)

4,664

Sisakian, N. M., O. G. Gazenko, & A. M. Genin 1961 NEKOTORYE PROBLEMY KOSMICHESKOI BIOLOGII (SOME PROBLEMS OF SPACE BIOLOGY) Zhurnal obshchei biologii (Moskva) 22(5):325-332, Sept.-Oct. 1961
English Translation: (Office of Technical Services, U. S. Dept. Commerce) U. S. Joint Pub. Research Serv., Washington, No. 12097 (CSO:6503-N) Jan. 23, 1962

ABSTRACT: The field of space biology is reviewed in regard to three basic problems: (1) the effects of extreme conditions of space on terrestrial organisms, (2) the biological bases for support of space flights and life on other planets, and (3) extraterrestrial forms and conditions of life. Suggestions for partial or complete regenerative cycles in space ships include: regenerative cycle of water by physical or physico-chemical methods, oxygen regeneration by electrolysis of water or biochemical conversions by means of anaerobic bacteria, and food regeneration by chemical synthesis of basic biochemicals with subsequent biosynthesis. The more feasible method seems to be utilization of photosynthetic processes of unicellular algal suspensions. Speculations on exobiology discuss hypotheses of the ecosphere of the sun, and interstellar migration of microorganisms in light of some suggestive findings concerning the composition of meteorites. (Aerospace Medicine 33(8):1029-1030, Aug. 1962)

4,665

Sisakyan, N. 1961 THE ROAD TO THE STARS
USSR, June 1961, p. 10

ABSTRACT: A good deal is known today about the hazards in space against which an astronaut must be safe-guarded. Cosmic radiation is the most threatening. A second group of hazards that needed study included noise, vibration, initial acceleration at blast-off, and weightlessness in orbital flight. Noise and vibration are only present during blast-off. It has been established that acceleration

is best endured when the forces act in the direction: chest-back, or back-chest, and also from left to right and from right to left. It follows that an astronaut should be in a reclining position when a ship goes into orbit and on re-entry into the denser layers of the atmosphere. During the state of weightlessness, the astronaut finds himself undergoing certain physiological changes. Most investigators maintain that the human body can adapt itself to weightlessness. An essential role is played by visual analysis which makes the needed corrections in behavior and movements. (CARI)

4,666

Sisakyan, N., V. Parin, V. Chernigovskiy & V. Yazdovskiy 1961 SPACE BIOLOGY MEETING
FBIS USSR & East Europe, Nr. 192, Oct 4, 1961

ABSTRACT: This is a report on the general meeting of the biology department of the U.S.S.R. Academy of Sciences and of the papers presented at that meeting. The authors stress the fact that all the studies of outer space conducted by Soviet scientists have been for peaceful purposes exclusively. They also state that the young science of space biology gives rise to its own specific methods of research, differing basically from conventional ones. These are methods of biological radiotelemetry and new techniques of experimentation, automatically affected by special instruments according to a predetermined program. The report furnished certain data obtained by Soviet scientists and lists some of the problems to be solved by space biology such as weightlessness and radiation effects. A new science, exobiology, examines the pecularities of extraterrestrial forms of life on the planets of the solar system. The author of another paper found that the physiological, biochemical, morphological, and immunological changes registered in experimental objects after space flights, proved to be of reversible nature. They did not show specific effects of cosmic radiation, weightlessness, and g-forces. The best explanation is that these changes were the organisms' generalized reaction to a complex irritant. (CARI)

4,667

Sisakyan, N. 1962 BIOLOGY AND THE CONQUEST OF SPACE
Trans. of Aviatsiya i Kosmonavtika (USSR) 44(2):24-30, 1962.
(Joint Publications Research Service, New York, N. Y.)
May 10, 1962 JPRS: 13708

4,668

Sisakyan, N. M. and V. I. Yazdovskii eds. 1962 METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT.
Abstract trans. of mono. Pervye Kosmicheskie Polety Cheloveka (First Space Flights of Man) Moscow, 1962, p. 167-174.
(Office of Technical Services, Washington, D. C.)
Dec. 19, 1962 63-15322

4,669

Sisakyan, N.M. & V.I. Yazdovskiy 1962 METHODS AND TECHNIQUES OF BIOMEDICAL CONTROL IN SPACE FLIGHT
(Aerospace Information Division, Washington, D.C.) AID Report No. 62-201, Dec. 19, 1962. ASTIA AD 294 573
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, pp. 167-174

ABSTRACT: Physiological measurements performed on Vostoks I and II included electrocardiography (with two sets of leads), pneomography, and registration of pulse rate. In addition, kinetocardiography was performed on Vostok II. The pulse rate was monitored continuously by means of a cardiophone which transformed the R peaks of electrocardiographs into rectilinear pulses of 0.1 to 0.2 sec duration. These were modulated by an auditory frequency of 3 kc and were transmitted continuously by a signal transmitter on a frequency of 19.95 mc. Other measurements were transmitted periodically. During reentry all physiological parameters were registered by means of a self-contained onboard system. After ejection of the cosmonaut, registration was carried on by means of a self-contained device located on his person. Transmitted data on pulse frequency was recorded on undulating and on magnetic tapes. (Author)

4,670

Sisakyan, N. M. and V. I. Yazdovskii, eds. 1962 PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT.
Abstract trans. of mono. Pervye Kosmicheskie Polety Cheloveka (First Space Flights of Man) Moscow, 1962, p. 176-198.
(Office of Technical Services, Washington, D.C.)
Dec. 19, 1962 63-15321

4,671

Sisakyan, N.M. & V.I. Yazdovskiy, eds. 1962 PHYSIOLOGICAL RESPONSES OF COSMONAUTS DURING SPACE FLIGHT
Aerospace Information Division, Library of Congress AID Report 62-202, December 19, 1962 ASTIA AD 294 572
Original Source: Pervyye kosmicheskiye polety cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR, 1962, 176-198

ABSTRACT: This publication presents a detailed report of the physiological responses of Yu. A. Gagarin and G.S. Titov to space flight. The record of changes in pulse rate and respiration rate during acceleration and weightlessness are presented.

4,672

Sisakyan, N.M., V.V. Parin et al. 1962 PROBLEMS OF SPACE BIOLOGY AND PHYSIOLOGY (U.S. Department of Commerce, Office of Technical Services, Joint Publications Research Service) JPRS: 16, 083 7 Nov. 1962 ASTIA AD 299 909
Original Source: Izvestiya Akademii Nauk SSSR. Seriya Biologicheskaya (Moscow) No. 2: 153-162. 1962.

ABSTRACT: The achievements of modern science and engineering, particularly the outstanding progress of astronautics, have given birth to a new branch of knowledge, space biology. The first characteristics of space biology, which distinguishes it appreciably from the biological disciplines created long ago, is the interpenetration and inherent connection with other fields of nautral and technical sciences. The second characteristics of space biology is its youth in connection with which the list of its tasks, the program of future research, is considerably more extensive than what has been attained. Despite its youth, space biology has created and is continuing to create specific methods of investigation, which are fundamentally different from ordinary laboratory or field biology methods.

At the present time, it would be difficult to present the scientific problems constituting the content of space biolgoy with adequate completeness; however, three main problems appear to us sufficiently well defined: 1. study of the effect of extreme space factors on living organisms of the earth. 2. study and development of the biologycal basis of provision for space flights and for life on planets. 3. study of the forms and conditions of life outside the earth.

4,673

Sisakyan, N.M. & V.I. Yazdovskiy 1962 RESULTS OF POSTFLIGHT MEDICAL EXAMINATIONS OF G.S. TITOV
Aerospace Information Division, Washington, D.C. AID Report No. 62-204 Dec. 19, 1962 ASTIA AD 294 571
Original Source: Pervyye Kosmicheskiye Polety Cheloveka (First Space Flights of Man) Moskva, Izd-vo AN SSSR pp. 125-153

4,674

Sitchov, A. & J. Ivanov 1938 THE EFFECT OF ACCELERATIONS ON THE ORGANISM OF ANIMALS AND HUMAN BEINGS Vo. Sanit. Dyelo 2:79.

4,675

Sjoberg, A.A. 1931 EXPERIMENTELLE STUDIEN UBER DEN AUSLÖSUNGMECHANISMUS DER SEEKRANKHEIT (Experimental Studies Concerning the Release Mechanism of Seasickness)
Acta Oto-Laryngologica (Stockholm) Supp. 14: 1

4,676

Slager, U.T. 1962 SPACE MEDICINE
(Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1962)
Library of Congress Catalog Card No. 62-12491

ABSTRACT: Contents include papers on the following subjects: "The Concept of Space Flight"; "Development of the Space Vehicle"; "The Concept of Space Medicine" "Pressure and Oxygen in the Upper Atmosphere and Space"; "Meteoritic Material in the Upper Atmosphere and Space"; "Experimental Space Simulation"; "The Biological Effects of Low Pressure"; "The Temperature During Flight in the Atmosphere"; "The Temperature During Orbital Flight"; "Experimental Space Simulation"; "The Biological Effects of Temperature Variations"; "Radiation in Space"; "Experimental Space Simulation"; "Interaction of Electromagnetic Radiations With Matter"; "The Biological Effects of Non-Ionizing Radiation"; "Ionizing Radiations in Space"; "Experimental Space Simulation"; "Mode of Action of Ionizing Radiations"; "The Biological Effects of Ionizing Radiation"; "Dynamics of Space Flight"; "Experimental Simulation of Space Flight Accelerations"; The Biological Effects of Acceleration"; "The Dynamics of Weightlessness"; "The Experimental Simulation of Weightlessness"; "The Biological Effects of Weightlessness"; "Noise and Vibration in Space Flight"; "Experimental Space Simulation"; "The Biological Effects of Sound and Vibration"; "Metabolic Requirements in Space"; "Experimental Space Simulation"; "The Biological Effects of Life Support Systems Imbalance"; "Life-Support Systems"; "Ionizing Radiation"; "Particulate Matter"; "Toxic Chemical Compounds"; "Psychological Stress in Space"; "Experimental Space Simulation"; "Psychological Effects of Space Flight"; "The Space Environment"; and "Biology of Far Space".

4,677

Slater, A. E. 1957 MEDICAL AND BIOLOGICAL PROBLEMS
In Bates, D. R., ed., Space Research and Exploration
(London: Eyre, 1957) pp. 165-181

4,678

Slater, E.T.O., A.E. Slater & H.E. Ross 1950 SYMPOSIUM OF MEDICAL PROBLEMS ASSOCIATED WITH SPACE FLIGHT
Brit. Interplanetary Soc. J. 9(1): 14-37. Jan. 1950

ABSTRACT: Three papers are presented: "Psychological Problems of Space-Flight" by E.T.O. Slater; "Balancing Mechanisms of Inner Ear" by A.E. Slater; and "Lunar Spacesuit" by H.E. Ross.

4,679

Slayton, D.K. & A.B. Shepard 1961 ASTRONAUTS DISCUSS MERCURY TRAINING
Aviation Week & Space Technol., 74(25):67, 71, 73-75, 77, 79

ABSTRACT: This article written by two astronauts describes the training program for Project Mercury. Various methods were used to simulate flight stresses. A weightless state was produced for 15-30 seconds in the interior of an aircraft. A human centrifuge was used to produce high acceleration and high altitude. A special chamber producing temperatures of 250° was used in training for working under heat loads. Survival training on water included exercises in distilling water and learning methods of sun protection. The overall psychological effect of the training period was to instill confidence in the astronauts.

4,680

Slayton, D. K. 1961 PILOT TRAINING AND PREFLIGHT PREPARATION.
(Paper, Conference on Results of the First U.S. Manned Suborbital Space Flight, June 6, 1961, NASA, Washington, D.C.)

4,681

Sloane, M. 1963 TEST SETUP AND PROCEDURE TO DETERMINE THE EFFECT OF SEQUENTIAL EXPOSURE TO ACCELERATION AND THE GASEOUS ENVIRONMENT OF THE SPACE CAPSULE UPON THE PHYSIOLOGIC ADAPTATION OF MAN.
(U. S. Naval Air Material Center, Philadelphia, Pa.) NAEC-ACEL-504 18 June 1963. DDC AD 409 463.

ABSTRACT: Procedures and engineering support are discussed for conducting a human study on the physiological effects of 100% oxygen and 5 psia when imposed under conditions of acceleration combined with steady state confinement. Special measures were necessary to insure continuity of environment since the acceleration and confinement capabilities were located at two different Naval activities.

4,682

Slonim, A. R. MEASUREMENT OF BIOCHEMICAL CHANGES IN BODY FLUIDS (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) Proj. 7220, RPO - 805

ABSTRACT: This task covers the search for a biochemical assay method to be applied to subjects exposed to various acceleration patterns. The work entails a study of the level of the sympathomimetic hormones (epinephrine/norepinephrine) in the plasma rather than the urine of a centrifuge subject. Such catechol amines are believed to be the responsive agents in an individual's tolerance to acceleration.

4,683

Slonim, A. R. 1960 EFFECT OF ACCELERATION ON BLOOD CREATINE, CREATININE AND INORGANIC PHOSPHOROUS IN MAN. J. Appl. Physiol. 15(2):271-274, March 1960

ABSTRACT: Ten healthy male subjects were centrifuged front to back at 6 G for 3 minutes, with head and trunk inclined 25 degrees forward in the direction of acceleration. Average control values of blood creatine, creatinine, and inorganic phosphorus were almost identical to those found immediately after exposure to the acceleration. Relatively large differences (test minus control) in some individuals were not significant. Acceleration of the magnitude and/or duration used in this study does not appear to be comparable to the effects of vigorous exercise on the phosphocreatine system of man. (AUTHOR)

4,684

Slonim, A. R. 1961 EFFECTS OF RELATIVELY HIGH ACCELERATIONS ON SOME BIOLOGICAL SYSTEMS. J. Appl. Physiol. 16(2):221-225, March 1961

ABSTRACT: Fasting male subjects were exposed to forward accelerations (12-degree back angle) at fatiguing levels varying both in amplitude and duration, nonfatiguing levels and mock runs, and to treadmill exercise. The following analyses were made: plasma bicarbonate, blood glucose, phosphorous and creatinine, urine creatinine, urine volume, urinalysis, and an estimate of creatinine clearance. The only consistent change noted after fatiguing accelerations was a small rise in blood creatinine ($P < 0.05$). Exercise, however, resulted in a marked ($P < 0.01$) decrease in bicarbonate, rise in blood creatinine, and drop in clearance. Accelerations in comparison to exercise showed little effect on either muscular or renal activity. No correlation was found between any of the biochemical measurements and acceleration intensity nor were there any differences noted between real and mock accelerations, indicating that none of these tests could index the severity of accelerative stress. The fatigue associated with high accelerations is not easily explainable in terms of increased muscular activity. (AUTHOR)

4,685

Slowik, J. and W. Weir 1963 INVESTIGATION OF CREW ESCAPE SYSTEM SURFACE IMPACT TECHNIQUES FOR ADVANCED AEROSPACE VEHICLES (Flight Dynamics Laboratory, Aeronautical Systems Division, Air Force Systems Command, Wright-Patterson AFB, Ohio) Proj. No. 1362, May 15, 1963 ASD-TDR-63-173.

ABSTRACT: This report describes the results of a four-part study related to the parachute landing impacts of a manned capsule. A survey of literature with the objective of establishing human tolerance to rapidly applied acceleration, revealed a substantial discrepancy among the data published by investigators in this area. The tolerance limits published in HIAD were accepted as the parametric limits for the present study, pending the completion of advanced studies in this area. Analyses of typical parachute landings revealed that horizontal velocities of up to 56 fps and vertical velocities of up to 33 fps are possible. Secondary impacts resulting from toppling are likely. Active and passive attenuation methods were quantitatively evaluated in an effort to determine an optimum attenuator. From the results of this evaluation, it was recommended that an active type system be developed to negate the horizontal velocity and that a conventional passive type system be employed to alleviate the vertical impact. A study of experimental techniques indicated that part-scale model testing is feasible and advantageous for a program in which prototype attenuators are validated. Methodologies were derived for dynamic scaling of the results obtained from small model experiments to permit prediction of full-size model performance.

4,686

Slye, R. E. 1961 VELOCITY REQUIREMENTS FOR ABORT FROM THE BOOST TRAJECTORY OF A MANNED LUNAR MISSION. (National Aeronautics and Space Administration, Washington, D. C.) Technical Note D-1038; ASTIA AD-260 178; July 1961

ABSTRACT: An investigation is made of the abort velocity requirements associated with failure of a propulsion system for a manned lunar mission. Two cases are considered: abort at less than satellite speed, which results in maximum decelerations in the following entry, and abort at greater than satellite speed with immediate return to earth. The velocity requirements associated with the latter problem are found to be substantial (several thousand feet per second) and are found to be even more severe if boost trajectories which lead to burnout at high altitudes or large flight-path angles are used. The velocity requirements associated with abort at less than satellite speed are found to be less severe than those for abort at greater than satellite speed except for non-lifting vehicles. It is found that abort rockets sufficient for abort at greater than satellite speed can be used to reduce maximum decelerations in entries following an abort at lower speeds. This reduction is accomplished by use of the abort rockets to decrease entry angle immediately prior to entry into the atmosphere. (AUTHOR)

4,687

Smedal, H.A., & A.P. Webster 1949 SAFE PARACHUTE DESCENT - AN UNSOLVED PROBLEM. J. Aviation Med. 20(6):443-447

4,688

Smedal, H. A., B. Y. Creer, & R. C. Wingrove 1960 THE ABILITY OF PILOTS TO PERFORM A CONTROL TASK IN VARIOUS SUSTAINED ACCELERATION FIELDS. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960) Aerospace Med. 31(11):901-906

ABSTRACT: An investigation has been made attempting to establish the ability of pilots to perform a control task in various sustained acceleration fields typical of those which might be encountered by a forward facing pilot flying an entry vehicle. For this program a special restraint system was developed in an attempt to maximize the accelerations in which the pilot could operate. The experiment was accomplished utilizing a flight simulator setup involving a centrifuge. A detailed description of the restraint system will be presented as it relates to protection against the various acceleration vectors. The effects caused by acceleration on the circulatory, respiratory and visual systems will be discussed in relation to the pilot's tracking ability. It is believed that the information which has been obtained will be of considerable value in the design of atmosphere entry vehicles.

4,689

Smedal, H.A. G.R. Holden, and J.R. Smith, Jr. 1960 A FLIGHT EVALUATION OF AN AIRBORNE PHYSIOLOGICAL INSTRUMENTATION SYSTEM, INCLUDING PRELIMINARY RESULTS UNDER CONDITIONS OF VARYING ACCELERATIONS. (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-351, Dec. 1960. NASA N62-70925 ASTIA AD 247 141

ABSTRACT: An instrumentation system has been designed at the Ames Research Center to measure the pilot's electrocardiogram, pulse rate, respiration rate, and blood pressure during control studies in flight and in motion simulators. Preliminary evaluation of this system in a T-33 aircraft demonstrated its reliability. Interesting preliminary observations were made as to the effect of subgravity conditions on pulse rate and blood pressures.

4,690

Smedal, H.A., B.Y. Creer, & R.C. Wingrove 1960 PHYSIOLOGICAL EFFECTS OF ACCELERATION OBSERVED DURING A CENTRIFUGE STUDY OF PILOT PERFORMANCE (Ames Research Center, Moffett Field, Calif.) NASA Technical Note D-345, Dec. 1960, NASA N62-70919

ABSTRACT: An investigation has been made in an attempt to establish meaningful human tolerance to acceleration boundaries typical of those which might be encountered by a forward facing pilot flying an atmosphere entry vehicle. The experiment was accomplished utilizing the Johnsville Centrifuge as a flight simulator and operated as a closed loop system, with a representative control problem. The physiological effects of these accelerations on the circulatory, respiratory, and visual systems are discussed.

4,691

Smedal, H. A., G. W. Stinnett, & R. C. Innis 1960 A RESTRAINT SYSTEM ENABLING PILOT CONTROL UNDER MODERATELY HIGH ACCELERATION IN A VARIED ACCELERATION FIELD. (National Aeronautics and Space Administration, Washington, D. C.) NASA Technical Note D-91; ASTIA AD-236 603; May 1960

ABSTRACT: A restraint system is described which was used in a joint centrifuge program by the Ames Research Center of the National Aeronautics and Space Administration and the Aviation Medical Acceleration Laboratory of the Naval Air Development Center. The program was designed to study the ability of a pilot in a forward-facing position to control an entry vehicle which employed lift. The pilot was required to carry out a relatively complex tracking problem on a flight simulator which involved the centrifuge operated as a closed loop system. Dynamics typical of an entry vehicle were used and the pilot was subjected to varied acceleration-time profiles with relatively high accelerations, up to 7g, from various directions for approximately 2 to 5 minutes duration. In order to conduct these tests, it was necessary to design a special restraint system. This system combined the use of a modified NASA posterior mold or couch with an anterior restraint made from nylon straps and nylon netting. A special support for the head and face was also incorporated in the restraint system. The use of this restraint system permitted a thorough study of some of the control problems of entry vehicles. (AUTHOR)

4,692

Smedal, H.A., H.C. Vykukal, R.P. Gallant, & G.W. Stinnett 1961 CREW PHYSICAL SUPPORT AND RESTRAINT IN ADVANCED MANNED FLIGHT SYSTEMS. American Rocket Society J. 31(11):1544-1548, Nov. 1961.

ABSTRACT: A new concept in physical support and restraint for pilot and crews of motion flight simulators or advanced manned flight vehicles has been described. The principle of a wear-in restraint which is easily secured to or released from the support structure, which is part of the vehicle, is the basic concept in this support and restraint system. Its capability as a functional support

and restraint for vehicle control studies during sustained accelerations has been established by its use in 3 human centrifuge programs. Its capability for tolerance to impact accelerations is unproven. Further improvements and testing is required in order to qualify it as an omnidirectional support and restraint system adequate for sustained and impact accelerations of high magnitude. (Authors)

4,693

Smedal, Harald A. and C. Dewey Havill 1962 DEVELOPMENT AND USE OF MARK SENSE RECORD CARDS FOR RECORDING MEDICAL DATA ON PILOTS SUBJECTED TO ACCELERATION STRESS. Aerospace Medicine 33(10):1187-1192 Oct. 1962.

ABSTRACT: This report presents the design format of two machine record cards of the mark sense card type which have been developed for use in connection with recording medical data on test pilots who are subjected to various acceleration stresses. One is a series card used to record subjective data from pilots after a single or a series of runs on a motion simulator during which acceleration stress is encountered. The other is a history card intended for use once a year at the time of the pilot's annual physical examination. The history card is intended to provide information regarding accumulative effects of repeated acceleration stress on the pilot. The series card has been used during one centrifuge program conducted by the NASA, Ames Research Center at the Naval Air Development Johnsville, Penn., during March, April, and May of 1961 and has proved very successful. Although the population group was small and so not ideally suited for mark sense card data acquisition some valuable accurate subjective information was obtained, particularly in regard to vision. This information would not have been obtained by simply keeping a log.

4,694

Smedal, H. A., T. A. Rogers, & T. D. Duane 1962 SOME EFFECTS OF ACCELERATION ON CERTAIN PHYSIOLOGIC FUNCTIONS OBSERVED DURING A CENTRIFUGE STUDY OF PILOT PERFORMANCE. (Paper, 33rd Annual Meeting, Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: As a part of a continuing study into the effects of acceleration on pilot performance, this report will present additional physiological data concerning the effects of acceleration on man. 22 test pilots were subjected to sustained acceleration as high as 14 g EBI, 10 g EBO and 9 g EBD. Some observations as to meaningful tolerance levels to acceleration as well as the effect such acceleration have on the visual, cardiovascular and respiratory systems will be reported. These observations will include a statistical evaluation of the subjective symptoms reported by the pilots during and after the centrifuge runs. The

objective finding concerning the function of the respiratory system such as tidal and minute volumes, vital capacities, and other pulmonary function indices will be described. Pulse rate change and variations in blood pressure during acceleration will also be reported. Some problems that arise in the visual system will be brought out. (Aerospace Medicine 33(3):351-352, Mar. 1962)

4,695

Smedal, Harald A., Terence A. Rogers, Thomas D. Duane, George R. Holden & Joseph R. Smith 1963 THE PHYSIOLOGICAL LIMITATIONS OF PERFORMANCE DURING ACCELERATION
Aerospace Medicine 34(1): 48-55, Jan. 1963

ABSTRACT: The present report is concerned with the principal findings with respect to visual and cardiovascular dunctions, and some extensions of our previously reported respiratory data.

Experienced test pilots have performed sophisticated tracking tasks under acceleration and their performances were evaluated. Concurrent physiological experiments have been conducted in an effort to correlate psychomotor performance with changes in physiological functions. The experiments have been chiefly concerned with three organ systems most acutely affected by acceleration stress, namely visual, circulatory, and respiratory.

A particularly important aspect of this program is that the development of a suitable restraint system has permitted the study of pilots under acceleration in the EBO vector as well as in the EBI vector, the latter having been used for almost all previous experiments in the field. From the very beginning, it was clear there are interesting differences between the effects of EBI and EBO acceleration, and much of the subsequent work comprises a systematic comparison of the changes in various functions during acceleration in these two vectors.

4,696

Smirnov, N. I. and V.L. Ruban 1949 DEPENDENCE OF THE VELOCITY OF DROPS ON THE VELOCITY OF THE MEDIUM
Zhurnal Prikladnoi Khimii, USSR, Vol. 22, 1949, No. 11, pp. 1211-1213
R.A.E. Translation No. 371.

4,697

Smith, A. C. 1952 AUTOMOBILE CRASH SAFETY RESEARCH.
(Cornell Aeronautical Laboratory, Inc. Buffalo, N. Y.)
Report No. YB-846-D-1, 21 October 1952

Abstract: This report contains results of a 3 phase research program in crash safety. The time-motion characteristics of the occupants of an automobile during crash decelerations were experimentally obtained to establish the probable hit zones, velocity of impact and the attitude and angle of the body at the instant of impact. A study of methods of reducing the damage incurred by an automobile in a crsh showed "Royalite" a synththetic plastic, impact resist. material. Passenger protection discussed, padding characteristics, chest protection device for steering wheel.

4,698

Smith, A.H., C.M. Winget and C.F. Kelly 1959 PHYSIOLOGICAL EFFECTS OF ARTIFICIAL ALTERATIONS IN WEIGHT. Naval Research Reviews 16-24, April 1959

4,699

Smith, A. M. O. and C. F. Lombard 1951 THE EFFECT OF ELASTICITY UPON THE PRESSURES WITHIN A LIQUID FILLED TUBE WHEN SUBJECTED TO FLUCTUATING FORCES.
(Office of Naval Research, Washington, D. C.)
January 1951 Contract N6ori77

SUMMARY: In order to better understand the recorded blood pressures of animals exposed to the fluctuating accelerations of the Epicyclic centrifuge, a theoretical analysis is presented so that the nature of the dynamic responses can be envisioned.

No summary is possible since this is a highly mathematical and theoretical treatise.

4,700

Smith, B. J., ed. 1958 HUMAN CONTROL DYNAMICS IN AIR AND SPACE CRAFT.
(Proceedings of 2nd Annual Human Factors Discussion Group, 11th Annual International Air Safety Seminar, Nov.1958)

4,701

Smith, C. P., Jr. 1952 THE PHYSICAL RECOVERY OF INSTRUMENTS AND DATA FROM A ROCKET FLIGHT. In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 441-446

4,702

Smith, E.W. 1959 DEVELOPMENT OF ZERO ALTITUDE ESCAPE SYSTEM FOR SUPERSONIC AIRPLANES. (North American Aviation, Columbus, Ohio), Report no. 59H-215 (Paper, Aero Medical Assoc., 30th Annual Meeting, April 27-29, 1959)

ABSTRACT: In recent years considerable attention has been focused on supersonic flight regimes and the need for escape systems capable of meeting the maximum speeds which these airplanes fly. It is somewhat surprising to know that in current century series aircraft the egress emergencies are still predominantly in the medium to low subsonic speed ranges at low altitudes with a very small percentage of the emergency escapes being required in the high performance areas. On the basis of probability alone the need for a supersonic ejection system has not been demonstrated by the current operational statistics. Without belaboring the point the current state-of-the-art knowledge makes possible the proper coverage of supersonic escape regimes without undue compromise to the most necessary low altitude low speed regime. The North American Aviation Company is satisfied that a supersonic ejection seat system is not only feasible but is now in an advanced state of development and is expected to be completely qualified, for the A3J-1, Navy attack airplane by the end of the year, 1959.

4,703

Smith, E.W. 1959 THE DEVELOPMENT OF A ZERO ALTITUDE ESCAPE SYSTEM FOR SUPERSONIC AIRPLANES. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959.)

ABSTRACT: A zero level-supersonic escape system presents formidable problems not encountered in the subsonic system. These are: (1) heavier structure capable of withstanding 2,500 psf impact pressure, (2) control of drag-weight ratio at high speeds, (3) automatic retention and release of arms, legs, and torso, (4) control of seat-man attitude during high speed ejection to insure transverse G loading, (5) variable parachute opening time delay system acting as a function of dynamic pressure and altitude to activate short time delays at low speed-low-level and longer time delays at high speed. Physiologic design allowable used were: 35 G transverse 20 G positive and 10 G negative. Due to the constraints of space and weight, a simplified "box kite" collapsible fin system was utilized together with a drogue parachute. A lift plate on the seat bottom acts to cancel negative lift forces at the 17° ejection angle to gain altitude at higher speeds. Stability in pitch and yaw at high speeds

controlled by dynamically balancing the reaction of the fins, lift plate, head plate area, and rocket thrust. Positive (rearward) pitching is achieved at high speed in this manner and, at low speeds by rocket thrust moments. Fast drogue deployment is utilized to "catch" positive pitching overshoots at low speeds where significant aerodynamic forces are not present. System was developed for the Navy A3J Vigilante attack aircraft. (J. Aviation Med. 30(3):204, March 1959)

4,704

Smith, F.K. n.d. CENTRIFUGE METHODS AND TECHNIQUES IN THE U.S. NAVY. (U.S. Naval Air Development Ctr., Aviation Medical Acceleration Lab., Johnsville, Pa.)

ABSTRACT: The human centrifuge at the Naval Air Development Center, Johnsville, Pa. has a welded steel arm, 50 ft in length, which rotates in a horizontal plane. At the end of the arm an oblate spheroid aluminum gondola, 10 ft in diam by 70 inches in width, is mounted in a double gimbal system. The arm can accelerate to 173 miles per hr at the gondola center, producing a radial acceleration of 40 G in 7 sec. The double gimbal system can continuously position the subject with respect to the direction of the resultant acceleration vector. The outer (roll) gimbal is limited to 90° of travel. The inner (pitch) gimbal can make complete rotations. Angular accelerations can reach 10 rad/sec^2 and angular velocities can reach 2.8 rad/sec. With this power capability and with proper control the 3 linear acceleration components of flight can generally be simulated continuously. The angular accelerations of the centrifuge with only three degrees of freedom of control in general cannot match those of flight.

4,705

Smith, G.B., Jr., and L.E. Lamb 1959 VECTORCARDIOGRAPHY IN AEROSPACE FLIGHT-APPLICATIONS AND RATIONALE. In: L.E. Lamb, Ed., The First International Symposium on Cardiology in Aviation. (School of Aviation Medicine, Brooks AFB, Texas, 12-13 November 1959) ASTIA AD-244389, pp. 37-48.

ABSTRACT: The vectorcardiogram offers three distinct advantages over the conventional electrocardiogram:

1. It enables relatively undistorted representation of the electrical forces of the heart. (The validity of this statement depends on the reference system used.) Thus, the true magnitude and direction of the spatial vectors are available.
2. The loop or spatial pathway described by the vectorcardiogram provides a measurement that is not available in the routine electrocardiogram. This may be plotted along a time base as in the linear vectorcardiogram.
3. The use of a cathode ray oscilloscope rather than a direct writing instrument allows greater accuracy in presentation of rapid or minute changes in electrical forces.

The applications of vectorcardiography in assessing the pilots cardiovascular system and in monitoring cardiovascular function during flight have

been discussed. For fundamental reasons outlined in the report this technique promises to have even wider applications to aviation cardiology in the future.

4,706

Smith, G.B., Jr., S.J. Gerathewohl et al. 1962 BIOASTRONAUTICS (National Aeronautics and Space Administration, Washington, D.C.) NASA-SP-18, NASA N63-11508

ABSTRACT: This publication contains papers presented at Session L of the NASA-University Conference on the Science and Technology of Space Exploration, at Chicago, Illinois on November 1-3, 1962. The following papers are presented: "Environmental Biology" by G.B. Smith, Jr. (NASA. Manned Spacecraft Center); "Physiological and Behavioral Sciences" by S.J Gerathewohl and B.E. Gernandt (NASA. Ames Research Center); "Bioengineering" by Richard S. Johnston (NASA. Manned Spacecraft Center); "Exobiology" by R.S. Young (NASA. Ames Research Center).

4,707

Smith, G.B. 1962 ENVIRONMENTAL BIOLOGY
In: Proceedings of the NASA-University Conference on the Sciences and Technology of Space Exploration, 1: 395-398. (Washington, D.C.: National Aeronautics and Space Administration, December 1962) NASA SP-18

ABSTRACT: Environmental factors in space flight and their effects on man are discussed as they relate to promoting and maintaining are included: (1) biodynamics, involving noise and vibrations, sustained accelerations and impacts, and the effects of weightlessness; (2) radiations from the sun, the stars, the Van Allen belt, and nuclear-reactor propulsion or power systems; (3) life support, consisting of providing food, water, oxygen, etc.; and (4) medical selection and maintenance. The National Aeronautics and Space Administration has used the skills of various federal agencies, the academic world, and industry, as well as its own centers in these endeavors.

4,708

Smith, H. P. R. et.al. DISCUSSION ON THE ROLE OF NERVOUS SYSTEM IN ADAPTATION TO HIGH PERFORMANCE FLYING
Proc. Roy. Soc. Med. 48:868-877, Nov. 1955

ABSTRACT: Disorientation under instrument flight conditions is probably the most common cause of fatal accidents not due primarily to mechanical failure. Flight experience indicates a division into two methods of

causation. The first is due to either inadequate or misleading data making computation difficult, or indeed impossible. The solution of this is probably possible with the application of existing knowledge and techniques in the design of indicators and certain sounds. The second method of causation is due to environmental factors, the most upsetting being vibrations of very low frequency and large amplitude such as occur in the application of alternating positive and negative g to the man either through aircraft control effects or such as occur in high-speed flight in turbulent air. It is possible for an unacclimatized man to be disorientated with after effects lasting for twenty-four hours by a flight of only thirty minutes under these conditions. (J. of Aviation Medicine 29(9):689, Sept. 1958)

4,709

Smith, H. 1951 CRASHWORTHINESS
The Tech. Instructor 6:3-6, June 1951

4,710

Smith, P. 1942-43 PARADOCTORS
Med. Economics 20(12):37-43. 1942-43

4,711

Smith, P.K. 1943 EFFECT OF BENZEDRINE ON SWING SICKNESS (School of Aviation Medicine, USAF, Randolph AFB, Texas) Rept. No. 113-1, August 1943

4,712

Smith, P.K. 1943 EFFECT OF HYOSCINE (SCAPOLAMINE) ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 111-2, April 1943.

4,713

Smith, P.K. 1943 EFFECT OF THIAMINE CHLORIDE ON SWING SICKNESS (School of Aviation Medicine, Randolph AFB, Texas) Report 142-1, Aug. 1943.

4,714

Smith, P.K. 1943 EFFECT OF V-5 ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 132-1, April 1943

4,715

Smith, P.K. 1944 THE EFFECTIVENESS OF SOME MOTION SICKNESS REMEDIES IN PREVENTING AIRSICKNESS IN NAVIGATION STUDENTS. (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 261-1, June 1944.

4,716

Smith, P.K. 1945 ATTEMPTS TO FIND A REMEDY SUPERIOR TO HYOSCINE FOR MOTION SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 333-1, August 1945

4,717

Smith, P.K. 1945 EFFECT OF PYRIDOXINE HYDROCHLORIDE ON SWING SICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 333-2, August 1945

ABSTRACT: Pyridoxine hydrochloride given either in doses of 100 mgm. or 200 mgm. given on the average of approximately 1 hour before swinging produced no appreciable decrease in the incidence of swing sickness.

4,718

Smith, P.K. 1945 EFFECTS OF SWING SICKNESS AND SIDE EFFECTS OF SOME ATROPINE-LIKE DRUGS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 297-1, January 1945

4,719

Smith, P.K. 1945 USE OF HYOSCINE HYDROBROMIDE FOR THE PREVENTION OF AIRSICKNESS IN FLEXIBLE GUNNERY STUDENTS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 261-3, December 1945

4,720

Smith, P.K. 1946 PRESENT STATUS OF DRUGS FOR USE IN MOTION SICKNESS WITH PARTICULAR REFERENCE TO AIRSICKNESS (School of Aviation Medicine, USAF Randolph AFB, Texas) Rept. No. 468-1, June 1946

4,721

Smith, P.K. 1948 TREATMENT OF AIRSICKNESS WITH DRUGS. Am. J. Med., 4:649

4,722

Smith, R.W., & J.W. Altman 1961 SPACE PSYCHOLOGY: SOME CONSIDERATION IN THE STUDY OF ASTRONAUTS' BEHAVIOR. (American Institute for Research, Pittsburg, Pa.) April 1961.

ABSTRACT: The following environmental factors and their potential implications for human behavior are discussed: altered atmospheric characteristics, high gravitational loads, weightlessness, temperature, radiation, noise and vibration, isolation and confinement, sexual deprivation, time, and encounters with alien factors.

4,723

Smith, W. G. 1958 TESTING TOMORROW'S SPACE PIONEERS. Science Digest 43(3):10-16, March 1958

ABSTRACT: A popularized account of the numerous and often grueling tests men now are undergoing in order to prepare for human flight into space: research in space medicine, increasingly long periods of time spent in simulated space flight conditions, studies in the effect of weightlessness on the human body, and so forth, is presented here. Partially solved and as yet unsolved problems are discussed.

4,724

Snell Memorial Foundation 1957 COMPARATIVE IMPACT PERFORMANCE TESTS, SPORTS TYPE PROTECTIVE HEADGEAR. (Snell Memorial Foundation, a trusteeship of the San Francisco Region, Sports Car Club of America) 18 May 1957

4,725

Snively, G.G. & C.O. Chichester 1959 STUDIES IN HEAD PROTECTION
Sports Car 16:37. Dec. 1959.

4,726

Snively, G. G. 1961 IMPACT ATTENUATION IN PROTECTION AGAINST CONCUSSION. (Snell Memorial Foundation, Inc., San Francisco, Calif.) Sept. 1961

4,727

Snively, G. G. and C. O. Chichester 1961 IMPACT SURVIVAL LEVELS OF HEAD ACCELERATION IN MAN
Aerospace Medicine 32(4):316-320, April, 1961.

SUMMARY: Studies based upon actual field data suggest that in the design of protective headgear unique emphasis must be placed upon the effects of sharply localized force loading.

Analysis of accident data in the light of experimentally derived force-deflection curves of helmet liners has been used to obtain the G loading of the human head.

Survival limits of localized head acceleration of brief duration in man have been shown to exceed 450 G.

Preliminary observations on experimental and prototype helmets suggest that protection against impact energy levels far higher than currently considered in helmet design can quite feasibly be attained.

4,728

Snively, G.G. & C.O. Chichester 1962 EVALUATION AND DESIGN CRITERIA OF PROTECTIVE HEADGEAR. In M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961
Pp. 182-190

4,729

Snively, G. G. and C. O. Chichester 1962 SAFETY IN RACING, PART II (Personnel Restraining Systems in Automotive Safety, work supported in part by Research Grant no. AC-51 of the U. S. Public Health Service. May 1962)

4,730

Snyder, F.W. 1962 EFFECTS OF LOW FREQUENCY VERTICAL VIBRATION ON HUMAN PERFORMANCE. (Paper, Meeting of Aero Medical Association, Atlantic City, April 9-12, 1962)

ABSTRACT: This program was initiated in 1959 under contract with office of Naval Research. A laboratory facility designed for human experimentation is used. Seventeen subjects participated in the first experiment establishing judged vibration severity levels identified as definitely perceptive, mildly annoying, extremely annoying, and alarming. Sinusoidal vibration frequencies ranged from 1-27 cps. Acceleration ranged from 0.01 g at 1 cps to 1.5 g at 20 cps. Performance of six to nine subjects was measured for continuous tracking and discrete tasks during vibration. Highlight results are; performance is degraded on some tasks but not on others; subjects are not always aware of performance degradation; some correlation exists between affected body region and vibration frequency; distraction irritation in nose region occurs above 12-14 cps; visual degradation is greatest in the range 12-23 cps.

4,731

Snyder, R.G. 1959 BRACING MAN FOR SPACE FLIGHT.
(Paper, American Anthropological Assoc. and Sociedad Mexicana de Antropologia, Mexico City, Dec. 1959)

ABSTRACT: The author of this paper discusses a frequently encountered aspect of abrupt deceleration which occurs in the field of aviation--that of the vertebral injury. Vertebral fractures are of particular concern due to the increasing incidence of this type of injury resulting from high impact situations. A major explanation for the increasing incidence of vertebral injuries appears to be due to the increase in the vertical component of deceleration force diagrams. Present restraint systems do not give adequate support because they are basically designed for lineal deceleration protection only. Recognition of this point is observed in the recent modification of the shoulder harness inertial reel locking device in fighter type aircraft. The proposed bracing restraint is designed to keep the back in optimal position for high deceleration loads. Use of a bracing restraint would tend to keep the back in optimal position for such loads. In regard to comfort it is believed that if this support were properly fitted and snugged, it would provide the pilot with support which he does not have at present. The most important consideration in such a system is the degree of additional protection which could be obtained. In instances of abrupt deceleration while wearing such a device, the force normally borne by the lumbar area of the vertebral column would be partially absorbed by the bracing system.

4,732

Snyder, R.G. 1959 A NEW APPROACH TO THE PROBLEM OF INCREASING HUMAN TOLERANCE TO HIGH DECELERATION FORCES.
Journal of the Arizona Academy of Science 1(2):68-71

SUMMARY: Preliminary design and theory of a full back brace restraint system intended for wear under flight clothing by pilots of high performance aircraft is briefly described. It is hypothesized that such a protective device might not only decrease physical fatigue on long flights, but due to its individual support characteristics might offer a method of substantially increasing human tolerance to abrupt multi-directional deceleration forces. Such a system might have an immediate usefulness in reduction of the present high incidence of vertebral fractures incurred by pilots of high performance aircraft, and might be utilized by personnel of space vehicles. (Author)

4,733

Snyder, R. G. 1961 MANNED SPACE FLIGHT VEHICLES AND THE PHYSICAL ANTHROPOLOGIST
Am. J. Phys. Anthropol. 19(2):185-193, June 1961.

ABSTRACT: Anthropometrics and biomechanics have already helped to elucidate problems in aeronautical science. Future problems of interest include hypersonic escape, space capsule environments, seating and restraint, weightlessness, human tolerance to various physical forces, criteria of physique, recycling of wastes in nutrients, radiation effects and a vast array of other biological and cultured relationships. The author briefly outlines the role of physical anthropology in some of these areas. Regarding the problem of restraint, a complete outline of requirements for a minimum restraint system is given. Feeding, walking, and medical problems are discussed in conjunction with the weightless condition. In conclusion it appears that physical anthropology, having the most comprehensive range of knowledge of man, will contribute much to future research in aerospace medicine.

4,734

Snyder, R. G. 1962 A CASE OF SURVIVAL OF EXTREME VERTICAL IMPACT IN SEATED POSITION. (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) CARI Rept. 62-19, Oct. 1962

ABSTRACT: Physical, biophysical, and medical data are presented concerning the case of a 20-year-old male of excellent physical condition who jumped from the Golden Gate Bridge in San Francisco, surviving for ten days a free-fall deceleration in the seated position (buttocks to head) of a calculated 4128 g for .0023 secs. Specific trauma resulting from this impact indicates that this may closely approach the extreme human survival tolerance(s) to impact in this position, and that while distribution of forces through support of the upper torso may greatly minimize injury to the skeletal system, protection of internal organs will present a much more difficult problem. (AUTHOR)

4,735

Snyder, R. G. 1962 HUMAN SURVIVAL OF EXTREME VERTICAL DECELERATION IN FREE-FALL. (Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City, N. J.)

ABSTRACT: Most studies concerned with human tolerance to abrupt impact forces have of necessity been confined to aspects of the body's lower limits, with an end-point often being that of subjective pain or below that level at which non-reversible trauma may occur. As a result little is known about the higher ranges of human impact survivability or variability. In this investigation information concerning vertical impacts received in accidental, suicidal, or homicidal free-falls was obtained during the past year on 2000 individuals who survived falls greater than ten feet. These included both sexes and ranged from infancy to 91 years in age. In addition, data have been obtained on fatal falls for the same period. Of the survivable falls, 100 cases were selected for intensive study in which most variable were known or could be determined accurately. In each case the exact distance of the fall, body position upon impact, material impacted, and resulting deformation were known, allowing bio-physical calculations of velocity and impact forces to be made. Complete medical histories and roentgenograms were obtained on each subject and the injuries correlated with the directions, magnitude, and distribution of force at impact. These data indicate that under certain conditions the human body can survive considerably higher impact forces than previously reported. Although impact tolerance variability was evident, some factors were found which appear to increase the human impact survival limit.
(Aerospace Medicine 33(3):369-370, Mar. 1962)

4,736

Snyder, R. G. 1963 HUMAN SURVABILITY OF EXTREME IMPACTS IN FREE-FALL (Civil Aeromedical Research Institute, Federal Aviation Agency, Oklahoma City, Oklahoma) CARI Report 63-15.

ABSTRACT: Human deceleration tolerances beyond the limits imposed by voluntary experimental methods were studied by means of intensive case histories of 137 individuals who have survived extremely abrupt impacts in accidental, suicidal, and homicidal free-falls. Fall distances ranged up to 275' and calculated velocities up to 116 ft/sec(79 mph). Physical and biological data are presented on both sexes with an age range of 1½ to 91 years, and with impacts occurring in all body axis orientations. A detailed analysis of factors found to affect survivability in free-falls collected in the past two years, demonstrate that humans have survived impact forces considerably greater than those previously believed tolerable. (CARI)

4,737

Snyder, R. G. 1963 HUMAN TOLERANCES TO EXTREME IMPACTS IN FREE-FALL (Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., May 2, 1963)

SUMMARY: Physical and biological data have been presented on 137 of 168 cases of individuals who have survived extremely abrupt impacts in free-falls. Fall distances ranged up to 275' and calculated velocities up to 116 ft/sec (79 mph). This population included both sexes with an age range of 1½ to 91 years. A detailed analysis of factors found to affect survivability in free-fall impacts was presented.
It has been shown that humans have survived impact forces considerably greater than those previously believed tolerable. It is suggested that muscular relaxation (as in intoxication or paranoid schizophrenia) may play an important role in reducing trauma in some cases. These data also indicate that, as the duration of impact is decreased below .0006 seconds and zero time is approached body tissues may not respond as expected and survival of impact forces of normally fatal magnitude may be increased. (AUTHOR)

4,738

Snyder, R. G. 1963 HUMAN TOLERANCES TO EXTREME IMPACTS IN FREE-FALL Aerospace Medicine 34(8)695-709.

SUMMARY: Physical and biological data have been presented on 137 of 168 cases of individuals who have survived extremely abrupt impacts in free-falls. Fall distances ranged up to 275' and calculated velocities up to 116 ft./sec. (79 mph). This pupulation included both sexes with an age range of 1½ to 91 years. A detailed analysis of factors found to affect survivability in free-fall impacts were presented.

It has been shown that humans have survived impact forces considerably greater than those previously believed tolerable. It is suggested that muscular relaxation (as in intoxication or paranoid schizophrenia) may play an important role in reducing trauma in some cases. These data also indicate that, as the duration of impact is decreased below .0006 seconds and zero time is approached, body tissues may not respond as expected and survival of impact forces of normally fatal magnitude may be increased.

4,739

Snyder, R.G. 1963 INFANTICIDE AND AURORA 7: AEROMEDICAL ANTHROPOLOGICAL RESEARCH IN EXTREME HUMAN DECELERATION. (Paper, presented at annual meeting, American Association of Physical Anthropologists, University of Colorado, Boulder, Colo., 4 May 1963)

ABSTRACT: Current scientific knowledge of human physical, physiological, and psychological responses to extreme impact forces is primarily restricted to non-reversible injury thresholds experimentally induced with voluntary

subjects. A new approach, based upon two-year's nation-wide investigation of selected cases of survived accidental, suicidal, and homicidal free-falls, has provided considerable information concerning human tolerances to high impact forces up to terminal velocity. These data indicate that under certain conditions, man may survive deceleration forces many times higher than previously considered possible. Implications for manned space flight are considered. (Author)

4,740

Snyder, R.Z. 1961 A3J-1 SPIN SIMULATION PROGRAM ON THE NAVY HUMAN CENTRIFUGE. (Aviation Medical Acceleration Lab., Johnsville, Pa.) NADC-MA 6104, 17 March 1961. ASTIA AD 256 260.

ABSTRACT: The Navy acceptance tests for the A3J-1 include a spin test of five turns before starting recovery. Pilot ability to recover the aircraft while subjected to spin type acceleration loads was evaluated through the operation of the human centrifuge, so as to simulate an A3J-1 spin of eleven turns, with either steady or osciliatory loading during either normal or inverted spins. It was found that the pilots were capable of performing the required recovery procedures while exposed to the various predicted loads.

4,741

Snyder, R.Z. 1960 NONDESTRUCTIVE TESTING OF THE AVIATION MEDICAL ACCELERATION LABORATORY HUMAN CENTRIFUGE
(U.S. Naval Air Development Center, Johnsville, Pa.) (Minutes of 11th Annual Conference on Nondestructive Testing, Sept. 13-15, 1960)

ABSTRACT: The purpose of this paper is to present information pertinent to stress monitoring problems connected with nondestructive testing of the 50-ft. human centrifuge. A description of the centrifuge and its equipment is given along with detailed specifications concerning structure and performance. The present system of stress testing is examined and the centrifuge modification program is discussed in relation to future stress testing requirements. Recommendations are solicited on the problem of developing an adequate method to stress monitor centrifuge programs on the present centrifuge and on the development of a stress analysis program that can be incorporated into plans and design of the new centrifuge.

4,742

Sochring, K 1945 LIST OF PUBLICATIONS AVAILABLE AT THE LIBRARY OF THE GERMAN AEROMEDICAL RESEARCH INSTITUTE. (Buecherei des Luftfahrtmedizinischen Forschungsinstitut des Reichsluftfahrtministeriums)
ASTIA ATI-59256, June 1945

ABSTRACT: A list of publications available at the Library of the German Aeromedical Research Institute is presented. The list includes periodicals dealing with general medical, physiological, aero-medical, and other scientific topics; also textbooks and treatises on physics, chemistry, physiology, physiological chemistry, hygiene, internal medicine, and aeromedicine, on the physiology of high altitudes, as well as books on miscellaneous subjects. A number of books listed are the property of the members of the Research Institute.

4,743

Sohn, R. L. 1960 VEHICLE DESIGN FOR LUNAR LANDING
(Space Technology Labs., Inc., Los Angeles, Calif.)
Rept. No. STL/TR-60-0000-09169; 20 May 1960

ABSTRACT: Impact conditions to be encountered during a landing on the surface of the moon will be determined by uncertainties in launch and midcourse trajectory guidance accuracies, retro-rocket performance, terminal guidance, and retro-rocket orientation. For semi-soft landings, in which no attempt is made to remove residual velocities and altitudes after retro-firing, impact velocities can reach several hundred ft/sec. Further, the direction of impact will not be known, so that an omni-directional impact structure is required. For full soft landings, velocities can be reduced to less than 50 ft/sec.

4,744

Sokolov, V.A. 1961 STAGES ON A GREAT ROAD
(Air Information Division, Wright-Patterson AFB, Ohio) AID Rept. No. 61-156
ASTIA AD 269 794
Original Source: Nauka i zizhn' April 1961. Pp. 5, 8ff.

4,745

Solley, C. M. 1960 INFLUENCE OF HEAD TILT, BODY TILT, AND PRACTICE ON REDUCTION OF ERROR IN PERCEPTION OF THE POSTURAL VERTICAL.
J. gen. Psychol. 62(First Half):69-74, Jan. 1960.

ABSTRACT: The effects of head tilt, body tilt, and practice, and the interactions of these variables on the decrease in error in perception of the postural body-vertical were investigated. Twenty-four male students participated; six were assigned to each of four experimental conditons: two body

tilt (30 degrees right or 30 degrees left) and two head tilt (30 degrees right or 30 degrees left). A given S was always tilted in one direction with one direction of head tilt; his task was to return himself to true vertical on each of 30 trials. Average error for blocks of five trials was computed per S; these data were examined by an analysis of variance. The results were discussed in light of other findings in the area. (Tufts)

4,746

Solliday, R. E. 1961 EVALUATION OF PROJECT MERCURY SIMULATOR. (Naval Air Test Center, Patuxent River, Md.) Proj. TED PTR RAAD-3058, FT 2123-68, Rept. No. 1, 21 Feb. 1961

4,747

Sommer, A. V. 1952 THE PILOT IS THE LIMIT. Aero Digest 65:17-25. Dec. 1952.

4,748

Sommer, J. 1939 ZUR FRAGE DER EINWIRKUNG VON MECHANISCHEN SCHWINGUNGEN AUF DEN EIGENREFLEXAPPARAT DES MENSCHEN (On the Question of the Effect of Mechanical Vibrations Upon the Individual Reflex Apparatus of Man) Luftfahrtmedizin 4: 292.

4,749

Sorin, A.B. 1957 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF THE MIL-S-7877 PASSENGER SEATS IN FORWARD AND AFT FACING POSITIONS (Paper, American Medical Association Convention, May 7, 1957)

4,750

Sorin, B. A. 1955 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF MIL-S-7877 PASSENGER SEATS IN FORWARD AND AFT FACING POSITIONS. (BuAer, Flight Safety Foundation, Inc.)

4,751

Sosnow, M. & E. Ross 1961 ELECTRODES FOR RECORDING PRIMARY BIOELECTRICAL SIGNALS
(USAF Biomedical Lab., Wright-Patterson AFB, Ohio)
Contract AF 33(616) 7304, Proj. 7222, Task 71751, ASD TR 61 437, Sept. 1961.

ABSTRACT: This report summarizes electroding practices in the biological sciences. The literature concerning major problems associated with physiological electroding techniques in common use is reviewed. Primary areas of interest and discussion are 1) general electrode problems; 2) methods of minimizing these problems; and 3) specific applications to bioelectric measurements such as electroencephalography, electrocardiography, GSR, electromyography, and electrical optokinetics. (Tufts)

4,752

Soule, H. A. and O. Seidman 1942 INFLUENCE OF LOADING CONDITION ON PILOTING TECHNIQUE FOR SPIN RECOVERY FOR PURSUIT AIRPLANES. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA RB, June 1942..

4,753

Space Technology Labs. 1962 PERVYI V MIRE GRUPPOVOI POLET V KOSMICHESKOE PROSTRANSTVO (OSNOVNYE ITOGI) (The World's First Tandem Flight in Space (Basic Results)
(Space Technology Labs., Inc., Redondo Beach, Calif.)
Transl. from Pravda (Moscow) P. 1-3, Oct. 22, 1962.
Rept. 9990-6333-KU-000 STL-TRANS-70 N63-18841

ABSTRACT: The objectives, spacecraft design, guidance and measurement systems, radio and T.V. communications systems, biomedical studies, and the parameters for the accomplishment of the first Soviet tandem flight in space--Vostok 3 and Vostok 4--are given. The technological and organization problems confronted and solved in preparation for such a flight are discussed, including: (a) devising a complex of ground support, data processing, and recovery systems; (b) organization and operation of simultaneous flight command, guidance, and ground control systems; and (c) organization of radiation and medical control systems to check on the astronauts' conditions. The astronauts' duties during flight were: (1) to communicate with ground stations and the other satellite via radio; (2) to conduct regular psychological, physiological, and vestibular tests, besides the normal medical tests; (3) to conduct observations of the other ship, the earth , clestial bodies, and other phenomena, and to evaluate the manual controls; (4) to make motion pictures inside the capsule and through portholes; (5) to evaluate the experiences related to the state of "free-floating", and (6) to conduct biological experiments, such as regulating atmospheric conditions in the capsule and performing normal body functions. (N63-18841)

4,754

Spatz, H. 1950 BRAIN INJURIES IN AVIATION.
German Aviation Medicine, World War II (Dept. Air Force, 1950) I, 616-640.

4,755

Specht, H. 1952 TOXICOLOGY OF TRAVEL IN THE AEROPAUSE
In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere, A Study of the Aeropause (Albuquerque, N. Mex.: Univ. of New Mexico Press, 1952) pp. 171-181

4,756

Spector, M. 1959 DIZZINESS IN RELATION TO ORGAN SYSTEM.
Eye Ear Nose Monthly 38:1030-5, December 1959

4,757

Spector, M. 1961 POSITIONAL NYSTAGMUS AND VERTIGO.
In. J. Int. Coll. Surg. 36:359-363, Sept. 1961.

4,758

Spector, W. S., Ed. 1956 HANDBOOK OF BIOLOGICAL DATA.
WADC Tech. Rept. 56-273, October 1956. ASTIA AD 110 501

ABSTRACT: This report presents tabular data and certain graphs, charts and diagrams in the broad areas of plant, animal, and pre-clinical medical sciences. The principal factors in selecting table subjects and data were their basic importance or wide general interest, and adaptability to tabular presentation. The report, as presented, represents a condensation and abridgment of some 20,000 pages.

The tables are arranged under the following categories: (I) Biochemical and Biophysical Characteristics; (II) Genetics, Cytogenetics, and Reproduction; (III) Development and Morphology; (IV) Nutrition, Digestion, and Metabolism; (V) Respiration and Circulation; (VI) Other Physiological Activities and Performances; (VII) Biologically Active Compounds; (VIII) Environment and Survival; (IX) Symbiosis and Parasitism; and (X) Ecology and Biogeography. In every category some tables will be of interest to all biologists generally, and some tables will be of interest to those in major branches of biology.

Material in this Handbook, like that in the previous reports are unique in the high degree of authoritativeness sought for the data. These tables, like those in the previous reports, are also unusual in their treatment of the well-known phenomenon of biological variability. Quantitative data are supplemented with such essential information as units, methods, and conditions of measurement, conversion factors, glossaries, and taxonomy lists. An Appendix and an unusually complete Index are included.

4,759

Spells, K.E. 1959 A DISCUSSION OF SOME ASPECTS ON THE THEORY OF THE SEMICIRCULAR CANAL (Flying Personnel Research Committee (Gt. Brit.) Rept. No. FPRC 1095; Aug. 1959, ASTIA AD-237 775

ABSTRACT: An attempt is made to derive equations for the motion of the cupula from first principles, and to indicate the nature of the assumption required to reduce these equations ot the equation given by van Egmond et al (J. Physiol. 110: 1, 1949). Also an attempt has been made to allow for the effect of leakage of endolymph between the cupula and the walls of the ampulla. (Author)

4,760

Spells, K.E. 1961 CALCULATIONS FOR THE DESIGN OF LARGE SCALE WORKING MODELS OF THE SEMI-CIRCULAR CANAL
(R.A.F. Institute of Aviation Medicine, Farnborough, Hants.) I.A.M. Scientific Memorandum No. 34, February, 1961

ABSTRACT: Equations representing general relationships to be satisfied between linear dimensions and other parameters are given for the construction of models dynamically similar to the semi-circular canal as contemplated in the theory of Steinhausen and others. The equations are transformed for the case when a piston in a cylinder replaces the cupula-ampulla, and numerical calculations are provided for a 16" model.

4,761

Sperry, E.G., H.P. Nielsen, I.M. Barash 1955 DOWNWARD EJECTIONS AT HIGH SPEEDS AND HIGH ALTITUDES. J. Aviation Med. 26(5):356-372

SUMMARY AND CONCLUSION: The instances of delayed separation from the seat in which the subject was thrown from the seat by the recovery parachute warrant discussion. In each case the subjects were in the seat for approximately ten seconds following ejection. They were experienced parachutists and had each made at least one previous ejection test. They were instructed shortly before take off to open manually the lap belt at the first opportunity, it being assumed that they could never beat the automatic function of the belt release. In each case, interrogation disclosed that they had maintained an alert and observing mind. This was proved by checking their description of events against the photographic results. However, there was apparently no sense of time, in that each man had no idea that ten seconds had elapsed. When thrown from the seat, they were just beginning to take corrective action. This may explain reports of fatal emergency ejections in which apparently successful ejections have been completed at moderate altitudes, but with no subsequent attempt to clear the seat or pull the rip cord.

4,762

Spezia, Emil 1962 ROLE OF PILOT FACTORS IN ARMY FIXED WING ACCIDNETS (Army Board for Aviation Accident Research, Fort Rucker, Ala.) Rept. No. HF 1-62, ASTIA AD-293 805,

4,763

Spiegel, E.A. & T.D. Demetriades 1922 BEITRAGE ZUM STUDIUM VEGETATIVEN NERVENSYSTEMS. III. MITTEILUNG. DER EINFLUSS DES VESTIBULARAPPARATES AUF DAS GEFASZSYSTEM (Contribution to the Study of the Vegetative Nervous System. III. Report. The Influence of the Vestibular Apparatus Upon the Vessel System)
Archiv für die Gesamte Psychologie (Leipzig) 196: 185-199

4,764

Spiegel, E. A., M. J. Oppenheimer, G. C. Henry, & H. T. Wycis 1944 EXPERIMENTAL PRODUCTION OF MOTION SICKNESS. War Med. 6:283-290

4,765

Spiegel, E. A., M. Spiegel-Adolph, H. T. Wycis and M. Marks 1947 CEREBRAL CONCUSSION AND CONVULSIVE REACTIVITY. A. Res. Nerv. & Ment. Dis. Proc., 26:84.

4,766

Spiegel, E. A., M. Spiegel-Adolph, H. T. Wycis, M. Marks and A. J. Lee. 1947 SUBCORTICAL CHANGES IN CEREBRAL CONCUSSION. J. Nerv. & Ment. Dis. 106:359.

4,767

Spindler, T.F. & R.W. Hohl 1953 G x TIME FLIGHT PATTERNS IN THE NAVAL AIR TRAINING COMMAND. PHASE I: ACROBATIC AND GUNNERY MANEUVERS IN BASIC TRAINING AS FLOWN IN INSTRUCTORS BASIC TRAINING UNIT. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 059.27.01, 7 Aug. 1953. ASTIA AD 21051

ABSTRACT: The acceleration patterns in Acrobatic and Gunnery flights at the Instructors Basic Training Unit, NAS, Pensacola, Florida, have been determined using Hathaway Recording Linear Accelerometers.

The magnitude and duration of the G forces in these Acrobatic and Gunnery maneuvers (as flown in the Instructors Basic Training Unit) frequently exceeded the blackout threshold values as determined on the human centrifuge.

This is a reasonable explanation for the high incidence of G symptoms in certain phases of Basic Flight Training. These factors and their significance in Naval Air Training have been discussed.

4,768

Spindler, T.F. 1953 G x TIME FLIGHT PATTERNS IN THE NAVAL AIR TRAINING COMMAND PHASE II AND III: ACROBATIC AND GUNNERY MANEUVERS IN BASIC TRAINING AS FLOWN BY FLIGHT STUDENTS. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 059.27.02, 28 Aug. 1953. ASTIA AD 21030

ABSTRACT: The acceleration patterns in acrobatics and gunnery flights by students in the Naval Air Basic Training Command have been determined using recording accelerometers.

These student G x time patterns were higher in acrobatics than the instructors patterns, (previously determined in a similar study), and, also, had much more variation particularly between the average and the high G recorded in each maneuvers.

The use of recording linear accelerometers in training aircraft would bring instances of excessive G to the instructors attention immediately and would also provide graphic acceleration patterns, for each maneuver, for use in post flight discussions.
The use of recording linear accelerometers in training aircraft would bring instances of excessive G to the instructors attention immediately and would also provide graphic acceleration patterns, for each maneuver, for use in post flight discussions.

The sue of anti-G suits would raise the tolerance of practically all flight personnel sufficiently to eliminate blackout and consciousness in the Basic Training Command. This protection would increase pilot efficiency and would also contribute materially to flight safety.

Due to the high level of positive accelerative forces, now known to be present in acrobatic and gunnery flights in the Basic Training Command, it is suggested that reconsideration be given the possibility of utilizing the standard Navy anti-blackout suit in the Basic Training Command.

4,769

Spratt, H.G.M. 1957 TRANSDUCER CHARACTERISTICS: MEASUREMENT OF DISPLACEMENT, VELOCITY, ACCELERATION. Elect. and Radio Eng. 34:2-8, Jan. 1957

4,770

Squires, R.D. & E. Hendler 1959 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC. 1958
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR81, April 6, 1959

ABSTRACT: This report presents the results of a symposium held at AMAL to ascertain the existing capability for estimating any change in measurable physiological variables occurring in pilots while flying air or space craft. The minutes of the meeting are included as an enclosure. Some of the physiological measurements that might be made are respiration, blood pressure, ECG, EEG, and some of the environmental measurements are pilot body temperature, inside pressure suit temperatures, cabin temperature and pressure, and radiation exposure. The final size and weight of the entire instrument package, including power supply and tape recorder and excluding telemetering equipment, must be kept at an absolute minimum, e.g., to be able to fit into a Martin Baker ejection seat.

4,771

**Squires, R.D. 1959 NADC BIOLOGICAL INSTRUMENTATION SYMPOSIUM OF 10 DEC 1958
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR89 June 8, 1959**

ABSTRACT: This is the second report concerning bioinstrumentation and gives details of immediate and long term aims of the project. An airborne instrument package is being designed which will include the following: physiological parameters (EKG, systolic blood pressure, blood oxygen saturation, respiratory rate and minute volume, galvanic skin resistance) and environmental parameters (oxygen supply pressure, oxygen flow rate, suit pressure and temperature, cabin pressure and temperature, relative humidity, pressure suit and cabin and TV monitoring of pilot and instrument panel). In addition, a ground control and data processing installation will be designed and constructed.

4,772

Squires, R. D. et al 1961 THE REMOTE MONITORING OF PHYSIOLOGICAL DATA FROM PERSONNEL IN FLIGHT.
Aerospace Medicine 32(3):248, March 1961.

ABSTRACT: The text of the presentation will be based on the technical and physiological data obtained from studies done at the Aviation Medical Acceleration Laboratory during the past two years. The discussion will attempt to describe a workable total system concept for remote monitoring of physiological data compatible with our experience and the present state of the art. Included will be a discussion of the various physiological transducers tried at the Aviation Medical Acceleration Laboratory.

4,773

Stacy, R. W., D. T. Williams, R. E. Worden, & R. O. McMorris 1955 ESSENTIALS OF BIOLOGICAL AND MEDICAL PHYSICS. (New York: McGraw-Hill Book Co., Inc., 1955)

4,774

Stahle, J. 1958 ELECTRONYSTAGMOGRAPHY IN THE CALORIC AND ROTARY TESTS A CLINICAL STUDY. Acta Oto-laryngol. suppl. 137

4,775

Stanbridge, R.H. 1934 AIR SICKNESS. Air Travel, (Lond.), 1:21-27

4,776

Stanley Aviation Corporation 1960 FOOTBALL, HUMAN FACTORS, AND THE B-58 (Machine Design, News Report-July 7, 1960)

ABSTRACT: After being awarded an Air Force contract to build escape capsules for Convair's three-man B-58 Hustler, Stanley Aviation Corporation conducted several acceleration tests using football players from Colorado University. Accelerometers mounted on their shoulder pads recorded the startling information that they had absorbed from three to five times as much shock as the Air Force believed feasible.

Because of these tests, crew members of combat aircraft will again enjoy the freedom of "shirtsleeve" flight. The escape capsule for the B-58 not only eliminates the need for clumsy pressure suits but promises crewmen infinitely safer separation from a stricken aircraft at any speed and altitude.

An assortment of gas-initiated devices controls the ejection sequence. Leg and torso positioning, door closure, pressurization, and rocket powered departure from the aircraft occur in a matter of a few seconds (the capsule's three doors rotate closed within 1 second).

If the pilot chooses, he can fly the aircraft after encapsulation--the control stick is inside the capsule and essential flight instruments are visible through a window.

If the capsule should land in water, an immersion valve releases pressurized air to inflate flotation balloons attached to the ends of four outrigger booms. The crew member can safely stay afloat in Beaufort Scale 5 seas (19-24 mph) for at least 72 hours.

The capsule, by specification, will have an over-all reliability of at least 97 percent at an 80 percent confidence level.)

4,777

Stanley Aviation Corp. 1960 REVISED GROUND LANDING SYSTEM FOR THE PROJECT MERCURY CAPSULE (Proposal, Stanley Aviation Corporation, Denver, Colo.) No. 756, Sept. 1960.

4,778

Stanley Aviation Corp. 1962 A STUDY OF THE DYNAMIC MODEL TECHNIQUE IN THE ANALYSIS OF HUMAN TOLERANCE TO ACCELERATION. (Stanley Aviation Corporation, Denver, Colo.) No. 793, Feb. 21, 1962.

4,779

Stapp, J.P. 1948 ANALYSIS OF INJURIES SUSTAINED AND EVALUATION OF PROTECTIVE EQUIPMENT USED BY PILOT IN TF 80-C, no. 48-358 MAJOR ACCIDENT OF 8 SEPTEMBER 1948. (Engr. Div., USAF Air Materiel Command, Muroc AFB, Calif.) Memo. Report MBEC-1303, 22 Nov. 1948.

4,780

Stapp, J.P. 1948 PROBLEMS OF HUMAN ENGINEERING IN REGARD TO SUDDEN DECELERATIVE FORCES ON MAN. Mil. Surgeon 103(2):99-102, Aug. 1948.

ABSTRACT: The article points out some of the problems, methods, and viewpoints of human engineering applied to the field of linear decelerative forces of rapid onset, brief duration, and high magnitude and their effect on the living human body.

4,781

Stapp, J.P. 1949 HUMAN EXPOSURES TO LINEAR DECELERATION. PART I. PRELIMINARY SURVEY OF AFT-FACING SEATED POSITION (Wright Air Development Center, Wright-Patterson AFB, Ohio) AF Technical Report 5915, June 1949. ASTIA ATI 71065

ABSTRACT: A linear decelerator was used to expose three young healthy males to decelerations from back to chest in the seated position. Two series of decelerations at approximately 5 g increments up to 30 g's were carried out with initial rates of change of deceleration at 500 and 1000 g's per second. Total duration of exposures ranged from .15 to .42 seconds. Subjective accounts of the experiences of each individual are given and oscillographic records of the decelerations on the chest, on the helmet, and on the seat discussed. No more than mild discomfort or injury was experienced. Ultimate decelerations voluntarily tolerable to the subjects used was not reached, since the tests

were halted to improve the mechanical reliability of the decelerator.

4,782

Stapp, J. P. 1951 HUMAN EXPOSURE TO LINEAR DECELERATIVE FORCES IN THE BACKWARD FACING SEATED POSITIONS
Mil. Surgeon 109: 106-108, Aug. 1951

4,783

Stapp, J.P. 1951 HUMAN EXPOSURES TO LINEAR DECELERATION PART II. THE FORWARD-FACING POSITION AND THE DEVELOPMENT OF A CRASH HARNESS (Wright Air Development Center, Aero Medical Lab., Wright-Patterson AFB, Ohio) AF TR No. 5915, Part 2, Dec. 1951. ASTIA ATI 136452

ABSTRACT: Fifty-three experiments are reported in which twelve healthy male human volunteers were exposed to linear decelerations at right angles to the long axis of the body. In fifty-one experiments the subject sat facing forward on the decelerator. For comparison the subject was seated facing backward in two cases. The range of deceleration from 10 g at 575 g per second rate of change of deceleration to 38.6 g at 1370 g per second was explored by a series of six deceleration configurations increasing by about 5 g increments. A second group of six runs provided a range of deceleration of 14.0 g at 281 g per second to 45.4 g at 493 g per second. Duration of deceleration ranged from .15 to .35 seconds for all experiments. Measurement of harness loading during deceleration by means of bonded strain gauge tensiometers attached to a symmetrical half of the harness allowed comparison of loadings for three harness configurations, and served as a check on accelerometer data in twenty-two experiments. The weight of the subject multiplied by the deceleration at the chest was compared with the total loading of the harness measured simultaneously by the tensiometers, with good agreement. The limited number of channels confined measurements during a run to physical factors, so that physiological and clinical data consisted of such measurements before and after runs as electrocardiogram, x-rays when indicated, ophthalmoscopic examination, testing of reflexes, urinalysis and dye excretion tests, pulse respiration, temperature and blood pressure, and detailed interrogation for subjective data. In all cases where subjects were adequately restrained, findings were essentially negative below the level of 30 g, with due allowance for mild abrasions, contusions, and transient effects due to excitement and exertion. At 30 to 35 g plateau, slight signs of shock such as palor, sweating, falling blood pressure and rising pulse were occasionally present with rate of change of deceleration above 1000 g per second. In two runs above 38 g at more than 1300 g per second rate of change of deceleration, definite shock levels of blood pressure, pulse, and respiration occurred, with near syncope in one case and with two brief episodes of syncope in the other. At the same 38 g level but with rate of change of 330 g per second, and at 45.4 g at 493 g per second, blood pressures were elevated and pulse and

respiration increased to exertion levels but there was no sign of shock. Venous pressure in the veinules of the eyes evidently exceeded 80 mm. Hg. in this last run since mild retinal hemorrhage and bulbar conjunctival petechiae were produced.
Subjectively, limits of voluntary tolerance were approached at 17.0 g at 1000 g per second rate of onset with the standard Air Force harness configuration, at 38.0 g at 1350 g per second with the inverted V leg strap added to the shoulder straps and lap belt assembly, and at about 46.0 g with rate of change of deceleration of about 500 g per second, using the latter configuration. Much higher levels can be survived. although reversible injurious effects may intervene. Of eight harness configurations tested, including the standard AF design, the minimum modification to provide adequate restraint up to the maximum exposure to deceleration in this series of experiments is the addition of the inverted V leg strap. The principles of crash harness design and requirements for adequate protection are discussed.

4,784

Stapp, J. P. 1951 HUMAN TOLERANCE TO DECELERATION---SUMMARY OF 166 RUNS. J. Aviation Med. 22(1):42-45; 85. Feb., 1951.

ABSTRACT: Backward facing seat tests were conducted on five young males in 19 tests, covering the range of 10 to 35 average applied g deceleration by 5 g increments, with durations between 0.42 and 0.11 seconds, in two series of rate of changes of deceleration slopes, one of 500 g per second, the other at 1,000-1.200 gps. The maximum was 35.4 g average applied deceleration applied for 0.16 secs, at a rate of change of 1,200 g per second. Measured on the chest accelerometer, peaks of 57 g for 0.02 secs duration occurred, with forces exceeding 8,800 lbs. or 34.5 psi on the impinging back area. In none of these experiments have there been other thln mild degrees of injury. It is concluded that an airline passenger could sustain up to 35 g in the rear-ward facing position.

A series of 36 experiments were run with the subject in the forward facing position. Runs started at 10 g average applied acceleration for .36 seconds to 40 g for .12 secs, in 5 g increments, at 1,200 g per sec. Except for two minor injuries no irreversible physiological changes were noted. Tests were made with various harness configurations. The main findings were: (1) that 40 g at 1200 gps for .12 seconds can be endured with adequate restraint; (2) the present USAF harness cannot be endured above 17 g; (3) addition of a V-leg strap to the present harness extends its range to 25-30 g.; (4) if the straps from the waist down are tighter than the shoulder straps it is subjectively less irritating; (5) that strengthening of aircraft seats and enclosures of cockpits is justified and overdue in view of the strength and g tolerance of the body. (CARI)

4,785

Stapp, J. P. 1952 HUMAN AND CHIMPANZEE TOLERANCE TO LINEAR DECELERATIVE FORCE. (Paper presented at Conference on "Problems of Emergency Escape in High-Speed Flight", 29-30 Sept. 1952, at Wright Air Development Ctr., Wright-Patterson AFB, Ohio) ASTIA AD-14 351

CONCLUSIONS:

1. Chimpanzee subjects have sustained exposure to linear decelerations of 65.5 g at 1400 g per second rate of onset, with peak values exceeding 100.0 g's during abrupt stops, with the subjects seated facing forward, seated facing backward, lying on one side transversely facing the rear, and supine head first, and have incurred no irreversible injuries.
2. Chimpanzee subjects have sustained without injury exposure to linear decelerations of 51.0 g at 900 g per second rate of onset in the supine feet first position, corresponding to parachute opening shock, and to 47.0 g at 1170 g per second rate of onset in the sidewise seated position.
3. Human volunteer subjects have sustained exposure to 45.4 g at 493 g per second rate of onset of deceleration, and up to 38.6 g at 1370 g per second rate of onset of deceleration in the forward facing seated position, and up to 35.0 g at 1150 g per second rate of onset in the backward facing seated position without exceeding the limits of voluntary tolerance.
4. Tolerance to decelerative force is higher when the force is applied to solid structures such as the pelvic and pectoral girdles. Signs of cardiovascular shock are manifested at 28 g and 1060 g per second rate of onset when large decelerative forces are localized on the abdomen by a lap belt.
5. The combined effect of deceleration plateau and rate of onset of deceleration results in manifestations of shock at lower plateau values as the rate of onset increases, f or values above 35.0 g and 1100 g per second rate of onset.
6. The minimum modification of the existing USAF standard lap belt and shoulder harness for adequate protection up to 45.0 g and 36 psi consists in adding the inverted -V leg strap and using No. 13 nylon in place of No. 8 nylon in the shoulder straps.
7. No evidence of cumulative effects due to repeated exposures to decelerative forces has been found in any of the twelve subjects, one of whom sustained 26 exposures in a period of 50 months.

4,786

Stapp, J. P. 1953 TOLERANCE TO ABRUPT DECELERATION (AGARD Medical Panel, London, September, 1953)

4,787

Stapp, J. P. 1953 TOLERANCE TO ABRUPT DECELERATION (Research and Development Board, Dept. of Defense, Washington, D. C. Shock and Vibration Bulletin No. 19, Feb. 1953.

4,788

Stapp, J.P. 1953 CRASH PROTECTION IN AIR TRANSPORTS. Aeronaut. Eng. Rev., 12(4):71-78.

ABSTRACT: In 1947, tubular steel sled slipper with one to four solid fuel rockets for propulsion was mounted on a standard gage track. Peak decelerations exceeding 100 g would thus be reproduced. Parachute dummies, chimpanzees, and human subjects were used in these experiments. Later a standard ejection seat catapult was developed which was suspended from a monorail. The carriage was decelerated by impinging against a lead cone at the end of the rail. With anesthetized pigs as subjects, motion pictures, instrument readings, and autopsy data provided the bases for analysis. Time-displacement data for human subjects are given in the paper. It was found that humans show the most severe transient physiological effects when subjected to a rate of change of deceleration of 1,370 g per sec. and a peak acceleration of 38.6 g. Protection of human occupants is limited by such factors as dynamic stress limitations of the aircraft, relative positions of seats, specifications of life belts, and sex and age factors.

4,789

Stapp, J.P., & H P. Nielsen 1953 PROPOSED TESTS FOR ESCAPE FROM VERY HIGH VELOCITY AIRCRAFT. (Holloman Air Development Center, Holloman AFB, New Mex.) ASTIA AD 26 626

SUMMARY: The hazards faced by crew members when they escape from high-speed aircraft at high altitudes are described. At 15,000 ft. problems arise from the low temperature, low atmospheric pressure, tumbling and spinning, wind blast, and deceleration. The literature concerning the effect of such factors on human physiology is reviewed. In the study of the effects of deceleration on the human body, a highspeed sled,track, and water braking system are considered.

4,790

Stapp, J. P. & W. C. Blount 1953 HOLLOMAN AFB SHORT TRACK FACILITY. (Aero. Medical Field Laboratory, Holloman Air Development Center, New Mexico)

ABSTRACT: The Short Track Facility has proven to be a versatile testing device which can be operated and maintained at a modest cost. The water brake with its adjustable orifices permits establishing the desired deceleration pattern with accuracy to within plus or minus 5%. Thus far, established parameters of 90 g at 12,000 g per second and 5 g at 100 g per second have been attained. Future testing with the air gun is expected to enable the maximum values to be increased.

This preliminary study has four objectives: To determine the feasibility of employing lead cones as a braking device, to test the water inertia braking system and establish repeatability curves for that system, to determine the effect of impact forces upon the spinal column in the intact subject for various directions of orientation, to determine any adverse physiological or psychological effects that may be incurred by human subjects during low impact deceleration runs.
It should be noted that no effort has been made to arrive at any technical conclusions as too few tests were conducted to offer statistical evidence.

Continued research in decelerations above 100 g will be accomplished for all directions of subject orientation. (Authors)

4,791

Stapp, J. P. 1954 ROCKET SLEDS AS BIOLOGICAL TEST VEHICLES. (Paper presented before the American Rocket Society, El Paso, Tex., Sept. 1954).

4,792

Stapp, J. P. 1954 WHOOOOOOOOSH, - ARTICLE ON TOLERANCES TO DECELERATION, WINDBLAST AND TUMBLING, Flying Safety J., June 1954 10(6):2-7.

ABSTRACT: The author recalls his experiences as a subject in a rocket sled experiment on maximum tolerance of transversal acceleration at Holloman Aero Medical Field Laboratory. A short biography of the author is included.

4,793

Stapp, J. P. 1954 TRACK-TESTING THE BRAIN OF THE WEAPONS SYSTEMS. (Paper, a ditto copy) (Aero Medical Field Laboratory, Holloman Air Development Center, New Mexico).

ABSTRACT: The author briefly summarizes the deceleration tests run at Edwards AFB and Holloman AFB to determine human tolerance to crash type decelerations. Supplemental charts summarize the number of animal, dummy and human tests run on each of 4 tracks, and show human tolerance limit indicated by these tests. (CARI)

4,794

Stapp, J. P. 1955 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. I. ABRUPT DECELERATION AND WINDBLAST.
J. Aviation Med. 26(4):268-287.

SUMMARY: Human experiments on a rocket propelled linear decelerator sled capable of higher than 25 g decelerations for longer than one second durations have determined parameters for limits of reversible incapacitation of volunteer human subjects. These limits of human tolerance relate to decelerations experienced during escape from high performance aircraft by means of an ejection seat during wind drag deceleration at high ram pressures encountered in supersonic flight.

A simultaneous study of windblast effect due to impingement of ram pressure against the exposed body of the subject indicates that 7.7 pounds per square inch, or 1,108 pounds per square foot of ram wind pressure has no significant effect on a subject whose head is shielded by a complete enclosure, and whose head and extremities are restrained against flailing. Indications are that decelerations exceeding one second for higher than 25 g can be a limiting factor requiring modification of the deceleration reaction of seat and occupant to supersonic ram pressures. On the basis of these and previously reported human experiments it is postulated that a refractory period of one-tenth seconds with respect to hydraulic displacement effects within the body determines very high impact tolerance.
In this range tissues fail in the same manner as inert materials by exceeding physical characteristics of tensile, compression or shear strength. Beyond this range, tolerance to mechanical forces is determined by reaction to hydraulic displacement of fluids. Hydraulic pressure rupture of blood vessels and pressure damage to cell membranes set the limit to tolerance. Hydraulic pressure values, on the other hand, tolerable to living tissues but lasting more than three seconds can produce a secondary hypoxia due to circulatory stasis. Such hypoxia in nervous tissue can reach a duration limit for uninjured survival. These responses represent a continuous spectrum of reaction to mechanical force related to rate of application, magnitude of force, duration of application, and its direction.

4,795

Stapp, J. P. 1955 TAPE RECORDING OF SPEECH AT TEXAS TECH., LUBBOCK, TEXAS.

4,796

Stapp, J. P. 1956 BIODYNAMICS OF HUMAN FACTORS IN AVIATION. Rocket sled tests on 5,000 foot track. Project 7850.

4,797

Stapp, J. P. 1955 TOLERANCE TO ABRUPT DECELERATION
In Collected Papers on Aviation Medicine
(London: Butterworths Sci. Pub., 1955) AGARDograph No. 6, pp. 122-139

1.--On the basis of experimental exposure of human, chimpanzee and hog subjects to abrupt decelerative forces by means of linear decelerations, it has been established that tolerance limits for human subjects approximate 50 g peaks at 500 g per second rate of onset for 0.25 second duration, provided restraints are adequate and impinge on solid structures of the shoulders and hips, or against the back surface of the body.
2.--Adequately restrained chimpanzees and hogs exposed to abrupt deceleration sustained peaks of 80 g or more with minimal reversible injuries in all body orientations, and survived peaks of more than 200 g in the forward facing seated position.
3.--The rate of change of deceleration, the body area impinged upon and the configuration of the webbing or bulk-head restraints are the limiting factors to tolerance and survival of exposure to linear decelerative forces.
(Author)

4,798

Stapp, J. P. 1956 BIODYNAMICS OF HUMAN FACTORS IN AVIATION. MISSILE TEST DATA AND INSTRUMENTAL REQUIREMENTS, PROJECT 7850.
(Holloman AFB, New Mexico) 15 October 1956.

ABSTRACT: A group of problems have arisen in the Field of Aviation Medicine concerning the effects of mechanical force on living tissues. The title Biodynamics of Human Factors in Aviation covers this special area of research in Aviation Medicine.

A short history of research in human tolerance to crash type forces includes that research done by Germany before World War II. The history follows research through that done recently with the high performance rocket sled.

4,799

Stapp, J.P. & S.T. Lewis 1956 CRITERIA FOR CRASH PROTECTION IN ARMED FORCES GROUND VEHICLES. (Holloman AFB, New Mex.) HADC TN, April 1956

ABSTRACT: An evaluation of the problem of crash protection for ground vehicle occupants involved in accidents is presented. Modification of ground vehicles in order to improve their crash protection characteristics is recommended. Specifications for lap belts and lap belt installations are described and the use of these belts on a trial basis with the Office of Ground Safety as the monitoring agency is recommended. This report will assist in solving the problem of reducing injuries to occupants of vehicles involved in accidents.

4,800

Stapp, J.P. and C.D. Hughes 1956 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. II. SUPERSONIC DECELERATION AND WINDBLAST. (Paper, 1956 Meeting of Aero Medical Association, Chicago, Ill., April 16-18)

ABSTRACT: Anesthetized chimpanzee subjects were exposed to accelerations exceeding 25 g lasting for two seconds or more with no injury except in experiments where an axillary belt restricted the chest. During deceleration, abrupt impingement of straps against the chest elevated intrathoracic pressure in those cases where the axillary belt pressure prevented displacement. This pressure was transmitted hydrostatically to the subject's head resulting in facial edema and ocular hemorrhage. The onset of windblast in not less than 50 milliseconds to more than 2800 pounds per square foot was sustained without injury as long as the subject's head was enclosed in a wind-proof helmet and head and extremities from supersonic aircraft in flight are discussed.
(J. Aviation Med. 27(1):172-173, April 1956)

4,801

Stapp, J. P., and C. D. Hughes, 1956. EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. II. SUPERSONIC DECELERATION AND WINDBLAST. J. Aviat. Med. 27(5):407-413.

SUMMARY: Previously reported experiments have demonstrated that the maximum velocity of Mach.9 attainable with 4,500-pound thrust, five second duration rockets within the 3,500 track length was below the threshold for windblast effects. A new 1,400 pound sled propelled by up to 9 each 1.8 second duration 7,800 pound thrust rockets, and having ejection catapult actuated canopy for jettisoning in 50 milliseconds at maximum speed was developed and used in the experiments reported. Velocities of up to Mach 1.3 (1,461 feet per second) were attained in eleven progressively higher speed experiments.

Anesthetized chimpanzee subjects were exposed to accelerations exceeding 28 G during 1.8 seconds or more. The onset of windblast in not less than 50 milliseconds to more than 2800 pounds per square foot was sustained without injury so long as the subject's head was enclosed in a wind proof helmet and head and extremities were adequately secured. Application of these findings to methods of escape from supersonic aircraft in flight are discussed.

4,802

Stapp, J. P. 1956 HUMAN REQUIREMENTS FOR ESCAPE FROM HIGH PERFORMANCE AIRCRAFT (Aero. Medical Field Laboratory, Hollman AFB, New Mexico)

ABSTRACT: Minimum requirements for escape from such aircraft during inflight emergencies include: (1) Effectiveness in accomplishing escape under all conditions of flight, (2) keeping the factors imposed by the escape process within limits of human tolerance, (3) making the least demands on the operator by automatic sequencing of all steps in the process,

and (4) the maintenance of, or emergency replacement of a viable environment during transition from aircraft to earth.

Accompanying charts show USAF operational experience with ejection escape systems (Aug. 1949 - Mar. 1956), air speed relationship to injury, safe ejection by type aircraft, ejection accelerations, and human tolerance to linear deceleration. (CARI)

4,803

Stapp, J.P. 1956 MEASUREMENT FOR SURVIVAL
Ordnance 40(216):975-979, May-June 1956.
(Paper, presented before the American Ordnance Association, Watervliet Arsenal, Watervliet, New York, Jan. 1956.

ABSTRACT: The propulsion, braking, and instrumentation systems of several high speed linear decelerators designed for the investigation of problems of tolerance to forces incurred in aircraft crashes and during ejection from high-speed aircraft are described. The decelerators include (1) a rocket-propelled sled braked by pressurized gripping units, on which tolerance limits for primates have been established for avarious body positions, and harness configurations developed; (2) a monorail suspended decelerator braked by collision, on which high tolerance limits to impacts of high rate of onset and short duration have been established for hogs, and the comparative vulnerability of body parts to impingement by simulated cockpit components evaluated; and (3) a high performance rocket sled with water brakes, in which human velocities up to 632 mph have been obtained.

4,804

Stapp, J.P., R.J. Heymans, & R.M. Stanley 1956 PROGRESS IS STEADY TOWARD SOLUTION OF ACUTE PILOT-ESCAPE PROBLEMS. SAE J. 64(13):44-48, Dec. 1956

ABSTRACT: Considerations of importance in the development of pilot escape devices from disabled aircraft at high speeds and altitudes include the possibility of incapacitation resulting from fear, injury, hypoxia, or tumbling; the necessity for a high escape velocity to avoid collision with aircraft parts and the possibility of attendant spinal injury; the effects of air blast and acceleration; the necessity for oxygen and perhaps pressure during descent; the danger of injury during parachuting either from enemy action or from impact; and the problem of the storage of survival equipment. It is suggested that a capsule or pod-type ejection device would provide protection against most dangers, but would present serious engineering difficulties, require a greater escape acceleration, and be more susceptible to survivable battle damage (with the necessity for a further escape system).

4,805

Stapp, J.P. and S.T. Lewis 1956 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. IV. TIME MOTION STUDIES ON ESCAPE FROM AIR TRANSPORT FOLLOWING EXPOSURE TO CRASH FORCES.
(Paper, 1956 Meeting of Aero Medical Association, Chicago, Ill., April 16-18)

ABSTRACT: Human volunteers were subjected to decelerations of 6 g and 12 g in an aft facing and forward facing, seated position on the crash restraint demonstrator. This device consists of an aircraft seat mounted on a small platform moving on rails. Abrupt release of stretched shock cords catapults the platform, seat, and occupant about 10 feet along the rails into preset mechanical pinch brakes that stop the motion in less than 2 feet, imparting the desired decelerative force to the subject. Immediately after exposure, each subject released the seat belt manually and proceeded along an aisle from 10 to 50 feet in length to an emergency exit. Time motion studies were made beginning at the instant of seat deceleration to successful completion of exit through a door. High speed motion pictures and electronic timing in addition to accelerometer and strain gauge measurements of decelerative forces were accomplished. Comparison of the reactions of more than twenty subjects are discussed. Recommendations are made regarding seating of transport passengers in relation to escape from survivable crashes. (J. Aviation Med. 27(1):173, April 1956)

4,806

Stapp, J.P. 1956 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUES. IV. TIME MOTION STUDIES ON ESCAPE FROM AIR TRANSPORT FOLLOWING EXPOSURE TO CRASH FORCES. (USAF, Air Development Center, Holloman AFB, N. Mexico)

ABSTRACT: Previously reported experiments in this series demonstrated that the maximum velocity of Mach .9 attainable with 4500 pound thrust five second duration rockets within the 3500 foot track length was below the threshold for windblast effects. A 1400 pound sled propelled by up to 9 each 1.8 second duration 7800 pound thrust rockets, and having ejection catapult actuated canopy for jettisoning in 50 milliseconds at maximum speed was developed and used in the experiments reported. Velocities of up to Mach 1.3 (1461 feet per second) were attained in eleven progressively higher speed experiments.

4,807

Stapp, J.P. 1956 HUMAN FACTORS OF SUPERSONIC ESCAPE
Preprint no. 748 (SAE 1956)

4,808

Stapp, J. P. 1957 HUMAN TOLERANCE TO DECELERATION.
Amer. J. Surg. 93(4):734-740. April 1957.

ABSTRACT: In order to accomplish precisely controlled exposures of living organisms to predetermined configurations of mechanical force with reasonable safety, the chosen instrument has evolved as a rocket or catapult-powered sled, slipper mounted on rails, carrying the subject, recording and transmitting instrumentation and braking devices, which can be accelerated to the required velocity and then decelerated according to plan. It can be concluded from the results that the structural strength of the human body, its energy absorbing characteristics with respect to brief applications of high dynamic loads, its tolerance to abrupt wind blast of nearly explosive violence facilitate salvaging the victims of high speed transportation accidents. The application of this knowledge can lead to a great saving of lives and prevention of disabilities.

4,809

Stapp, John P. 1957 ROLE OF THE AIR FORCE VETERINARIAN IN RESEARCH
(Paper, Veterinary Section Meeting of the Association of Military Surgeons of the United States, Washington, D.C. November 13, 1956.)
(Reprinted from Military Medicine, Vol. 120, No. 3, March, 1957)

ABSTRACT: The objectives of veterinary medicine in Air Force Research are twofold. First is to provide a standby group of qualified staff officers who are capable, in the event of emergency, to serve air commanders and surgeons as technical advisors in certain defensive and protective aspects of nuclear, biological, and chemical warfare. Secondly, veterinarians support Air Force research by providing professional service and assistance for all projects involving foods or animals, and further by having veterinary officers with special qualifications actively participating as research team members on such projects. A discussion is included of the requirements and general areas of interest in which veterinary officers are qualified in veterinary research. Some of the current research projects in which animals are employed as human substitutes are also included.

4,810

Stapp, J. P. 1957 FROM HYPOTHESIS TO REALITY IN SPACE FLIGHT
In Proceedings of the National Symposium on Human Factors in Systems Engineering, Philadelphia, Pennsylvania, December 3-4, 1957.
(Human Factors Society of America, Arlington, Va. & Institute of Radio Engineers, Philadelphia, Penn.) Pp. 82-83, Dec. 1957.

ABSTRACT: This address consisted of some introductory remarks on the unrealities, e.g., flying saucers, versus realities, e.g., Sputnik, in space flight and the showing of the motion picture film of Major D. Simon's balloon flight. (Tufts)

4,811

Stapp, J. P. 1957 HEARINGS BEFORE A SUBCOMMITTEE OF THE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, HOUSE OF REPRESENTATIVES, 85th CONGRESS, FIRST SESSION ON CRASHWORTHINESS OF AUTOMOBILE SEAT BELTS. #97108, U.S. Government Printing Office, 5-8 August 1957.

See Also U.S. House of Representatives. 1957.

4,812

Stapp, J. P. & S. T. Lewis 1957 HUMAN FACTORS OF CRASH PROTECTION IN AUTOMOBILES. SAE Transactions 65:488-492.

4,813

Stapp, J. P. 1957 HUMAN TOLERANCE FACTORS IN SUPERSONIC ESCAPE. In Problems of Escape from High Performance Aircraft: A Symposium. The Journal of Aviation Medicine 28:77-82, February 1957.

ABSTRACT: The following escape conditions in the subsonic range need to be provided for: (1) Fatal or injurious inadvertent ejections through the canopy with the aircraft standing still, usually with engine idling. (2) Escape from an aircraft on the ground in motion. (3) Low-level ejections at subsonic speeds in flight.

Human tolerance factors in ejection include tumbling and spinning and windblast. Supersonic escape requirements are an important part of the rocket sled technique of investigations.

4,814

Stapp, Col. John P., and Lt. Wilbur C. Blount 1957 EFFECTS OF MECHANICAL FORCE ON LIVING TISSUE III. A COMPRESSED AIR CATAPULT FOR HIGH IMPACT FORCES. J. Aviation Med. 28(13):281-290 (June 1957).

ABSTRACT: The experiments that have been conducted indicate that the short tract facility will provide experimentally controlled G forces within the following parameters: 5 G with an onset of 100 G per second, to 90 G with an onset of 12,000 G per second. Maximum deceleration patterns obtained with ejection seat catapult propulsion indicate that the proposed maximum performance range can be attained with adequate propulsion.

Linear decelerations of 92 G lasting for a period of 0.11 second have been endured by animal subjects orientated with the spinal column parallel to the acceleration vector, without anatomic damage or abnormal clinical neurologic findings. Volunteer human subjects orientated with the vertebral column at 60 degrees to the acceleration vector sustained a deceleration of 10 G, for 0.083 second duration, without any symptoms of physical discomfort.

4,815

Stapp, J. P., & S. T. Lewis 1957 CRASH RESTRAINT DEMONSTRATOR. (Holloman Air Development Center, Holloman AFB, New Mexico) HADC TN 57-9, ASTIA AD 123733, June 1957.

4,816

Stapp, J.P. & S.T. Lewis 1957 EXPERIMENTS CONDUCTED ON A SWING DEVICE FOR DETERMINING HUMAN TOLERANCE TO LAP BELT TYPE DECELERATIONS. (Air Force Missile Development Center, Holloman AFB, New Mexico) AFMDC TN 57-1, ASTIA AD 135 005.

ABSTRACT: Anthropomorphic dummies and human volunteer subjects were decelerated while seated in a swing-seat device, facing forward, and being restrained by lap belts three inches wide. The swing consisted of an aircraft seat, suspended by cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable. Rate of onset, magnitude, and duration are tabulated for 21 dummy tests and 19 human tests. (Author)

4,817

Stapp, J. P. 1958 HUMAN TOLERANCE TO ACCELERATIONS OF SPACE FLIGHT Physics and Medicine of the Atmosphere and Space. (New York: John Wiley & Son, Inc. 1958).

ABSTRACT: Sustained flight can be accomplished by application of three basic principles of physics: 1. Displacement of the atmosphere by a lighter gas, 2. aerodynamic lift, 3. propulsive force sufficient to overcome the force of gravity.

4,818

Stapp, J. P. & D. L. Enfield 1958 LAP BELTS NEED SOUND DESIGN S.A.E. Journal 66(9):30-31, Part 2.

ABSTRACT: If a lap belt is to restrain a passenger in a manner to prevent bodily injury and limit his deceleration curve to human tolerance level, many human and mechanical factors must be observed. This is the finding of studies in which instrumented vehicles and anthropomorphic dummies were used in simulated collisions wherein the impact speeds and most frequent areas of contact in collision were those obtained from accident statistics supplied by the Office of Ground Safety Headquarters, USAF, and the Automotive Crash Injury Research Department, Cornell University. This paper contains a list of the human factors that must be considered in designing a seat belt. It also lists modifications to be made in car interiors if maximum safety is achieved.

4,819

Stapp, J. P. 1958 CRASH INJURY PREVENTION, Part 1. Cincinnati J. Med. 39(1):1-5.

ABSTRACT: A review of research on human tolerance to crash type forces. Mentions early German tests with swing-type deceleration and U. S. Navy aircraft barrier-crash-force measurements. Outlines some results of USAF experiments with the linear deceleration at Edwards AFB: In all cases where subjects were adequately restrained, findings were essentially negative below the level of 30 g with due allowance for mild abrasions, contusions, and transient effects due to excitement and exertion. At 30 to 35 g plateau, slight signs of shock were occasionally present with rate of change of deceleration above 1000 g per second. In two runs above 38 g at more than 1300 g per second rate of change of deceleration, definite shock levels of blood pressure, pulse, and respiration occurred, with near fainting in one case and with two brief episodes of fainting in the other. At the same 38 g level but with rate of change of 330g per second, and at 45.4g at 493g per second, blood pressures were elevated and pulse and respiration increased to exertion levels but there was no sign of shock. Subjectively, limits of voluntary tolerance were approached at about 46.0g with rate of change of deceleration of about 500g per second. Much higher levels can be survived. Although reversible injurious effects may occur.

Briefly describes USAF automobile-collision research and industry safety developments. Strongly advocates use of safety belts and other safety devices.

4,820

Stapp, J. P., et al. 1958 HUMAN TOLERANCE TO AIRCRAFT SEAT BELT RESTRAINT J. Aviation Med., 29(3):187-196 March 1958.

SUMMARY: Human volunteer subjects were decelerated while restrained by a lap belt three inches in width while seated forward-facing in three experimental devices:

1. An aircraft seat hanging by 20-foot cables forming a swing-pendulum, which could be raised and dropped through a measured vertical component and arrested by a steel cable;
2. A sled, on a 120-foot track, propelled by an ejection seat M1-A1 catapult and decelerated by water inertia brakes; and
3. A catapult accelerating a seat by means of rubber shock cords in an 18-foot distance and decelerating it with mechanical frition brakes in thirty inches or less.

Rate of onset, magnitude and duration of force are tabulated for 30 human experiments. Air transport crash protection is discussed as well as tolerance limits tothe application of crash-type mechanical forces of the magnitude investigated by these experiments.

4,821

Stapp, J. P., S. T. Lewis and J. J. Ryan 1958 PRELIMINARY INVESTIGATIONS OF A HYDRAULIC BUMPER AND ROLL-OVER STRUCTURE
(Air Force Missile Development Center, Holloman AFB, N. Mex.)
Rept. no. AFMDC TN-58-5 Feb. 1958 ASTIA AD 135 007

ABSTRACT: Data are presented from experimentation with (1) a bumper capable of absorbing the crash forces generated by the collision between a weapons carrier traveling at speeds up to 40 mph and fixed objects, and (2) a rollbar structure capable of supporting an open-topped vehicle, overturned or rolling over at speeds up to 40 mph. The bumper element consists of 2 closely-fitted telescoping cylinders which on impact, pass a liquid from one to the other through an orifice metered by a pin of variable diameter. The roll-bar structure was formed from an extra -strong steel pipe (2.75 in. od and 1.939 in. id) superstructure attached to the truck frame. Preliminary conclusions were that (1) bumpers for attenuating crash forces and roll-over structures capable of protecting occupants can be successfully constructed, (2) improvements in measuring techniques and parts-construction will improve the development of final designs, and (3) the proposed series of tests would provide sufficient information for the preparation of specifications for the modification of the equipment. (ASTIA)

4,822

Stapp, J. P. 1958 BIODYNAMICS OF MANNED SPACE FLIGHT.
The Human Factor in Space Travel, Air Univ. Quarterly Review 10(2):47-52, Summer 1958

4,823

Stapp, J. P. 1958 ACCELERATIONS OF SPACE FLIGHT
(Paper, American Rocket Society, 13th Annual Meeting, Hotel Statler, New York City, N. Y., Nov. 17-21, 1958) American Rocket Society Paper No. 700-58
See also Report of 3rd European Congress of Aviation Medicine, Jan. 1958

ABSTRACT: Man can endure the accelerations anticipated for attaining orbital or escape velocity by present 3 stage rocket propulsion systems, if he is optimally oriented in the transverse presentation for forces above 4 g and can sustain prolonged exposure to low acceleration required for reentry, but he is scarcely likely to enjoy either of these ordeals, until the design and operation of space vehicles advances to the point of complying with parameters of human effectiveness instead of imposing on survival limits.

4,824

Stapp, J. P. 1958 USAF HIGH ALTITUDE RESEARCH PROGRAM
(Lecture given at Univ. of Minn. Parachute Engineering Course, 18 July 1958)
(Armour Research Foundation of Illinois Institute of Technology)

4,825

Stapp, J.P. 1959 ACCELERATION: HOW GREAT A PROBLEM?
Astronautics 4(2):38-39, 98-100, Feb. 1959.

ABSTRACT: Studies to date indicate that man can tolerate for the necessary durations the acceleration forces anticipated for present 3-stage rocket systems if they do not exceed 10 G and if the subject can be optimally positioned for the ordeal. The transverse position facing the direction of acceleration with trunk bent forward at a 65^{o} angle with respect to the thighs proves best for sustaining such a stress. Immersion in water increases the duration of endurance and mobility of the extremities, but is redundant for present configurations of acceleration that will reach orbiting velocities. A more promising prospect from the standpoint of human effectiveness is found in extremely prolonged accelerations of less than 4 G. Tolerance that is not exceeded by more than one hour of exposure to 3 G attained by gradual onset in both the transverse and positive G orientations offers the possibility of exceeding escape velocity by tenfold. With means of propulsion for space vehicles that will provide continuous accelerations not exceeding 4 G, for durations to attain orbiting or escape velocity, the experience is within the range of physiologic adjustment and does not impose on the capacity for recovery.

4,826

Stapp, J. P. 1959 ESCAPE FROM AIRCRAFT.
In Medical Aspects of Flight Safety AGARDograph 30, Pp. 213-221.
(New York: Pergamon Press, 1959)

ABSTRACT: Combat mission is the primary basis for design requirements; that safety takes precedence over salvage, in terms of keeping the situations of flight requiring salvage to an absolute minimum; and that the salvage operation be as effective as possible over the entire spectrum of accident probabilities.

4,827

Stapp, J.P. 1959 MAN'S MISSION IN SPACE
Astronautics, 4 (11): 28-29, 130-131, Nov. 1959

ABSTRACT: Man's status as he enters into the space age is briefly examined and the problems associated with his requirements for survival in the closed environment of the future spaceship are reviewed. In addition, human tolerance to such space flight conditions as acceleration and radiation are noted.

4,828

Stapp, J. P. 1960 HUMAN TOLERANCE TO ACCELERATIONS OF SPACE FLIGHT. In Physics and Medicine of the Atmosphere and Space (New York: John Wiley & Sons, Inc., 1960)

ABSTRACT: Sustained flight can be accomplished by application of three basic principles of physics: (1) Displacement of the atmosphere by a lighter gas inclosed in a balloon, providing a free lift that is proportional to its relative density and total volume; (2) aerodynamic lift, resulting from unequal displacement of the atmosphere against the upper and lower surfaces of a moving wing, determined by wing configuration, lift-drag ratio, and atmospheric density; (3) propulsive force sufficient to overcome the force of gravity and the inertia of the vehicle.

4,829

Stapp, J. P. 1960 HUMAN FACTORS OF APPLIED SPACE TECHNOLOGY. In (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) PROCEEDINGS OF WADC SPACE TECHNOLOGY LECTURE SERIES, VOLUME 1 TECHNICAL AREAS. WADC TR-59-732; ASTIA AD-235 424; pp. 133-136

ABSTRACT: The compulsive challenge of space exploration offers the prospect of extending the scope of basic research directly to universal dimensions. The entire area from the upper limits of aerodynamic flight to the lower limits of orbital space flight can be investigated by a continuous progression in performance increments from aerodynamic flight. With such an approach, the development of more efficient propulsion systems would provide platforms for testing and developing all components of space weapons and space transports while training numbers of space pilots in real-time flight at comparatively low cost. However, failure to recognize the place of military research and development in the applied technical area could result in wasting the existing resources and capabilities that should be converted from past aircraft technology. (AUTHOR)

4,830

Stapp, J.P. 1961 THE "G" SPECTRUM IN SPACE FLIGHT DYNAMICS. Lectures in Aerospace Medicine, 16-20 Jan. 1961 (Conducted at the School of Aviation Medicine, Brooks AFB, Texas)

ABSTRACT: To attain a circular orbit 200 to 250 kilometers above the earth, an artificial satellite must be accelerated to a velocity approximating 8 kilometers per second before centrifugal force comes into equilibrium with the mass of the satellite along the orbital path. This would require a calculated constant acceleration of 828 g seconds. To reach escape velocity, a velocity of 11 kilometers per second must be attained. 1152 g seconds of calculated constant 1 g acceleration will be needed to attain this velocity.

4,831

Stapp, John P. 1961 ACCELERATION REVIEW (Presented at ARS Space Flight Report to Nation, New York) 9-15 October 1961

4,832

Stapp, J. P. and S. E. Neely 1961 EVALUATION ON HIGH SPEED AND THUNDER-STORM EFFECTS ON EJECTIONS.
Aerospace Medicine 32(3):248, March 1961.

ABSTRACT: Utilizing USAF aircraft accident reports, those accidents involving high speed ejections (both supersonic and over 500 knots) and thunderstorm ejections are analyzed. The influence of high speed and thunderstorm conditions on ejection are evaluated. Five accidents are briefed including a recent multi-jet accident in which both factors were present. Conclusions are drawn concerning the significance of the factors studied.

4,833

Stapp, J. P., & S. E. Neely 1961 EVALUATION OF HIGH SPEED AND THUNDERSTORM EFFECTS ON USAF EJECTIONS. (Data for this study were compiled from the records of the Deputy Inspector General for Safety, USAF, Norton AFB, Calif., 15 Feb. 1961)

4,834

Stapp, J. P. 1961 WORK OF THE UNITED STATES AERONAUTICAL LABORATORY ON THE FORCES SET IN MOTION AND WOUNDS INDUCED BY COLLISIONS.
In Sem. Med. Prof. 37:839-840, Dec. 2, 1961 (France)

4,835

Stapp, J. P. 1961 HUMAN TOLERANCE TO SEVERE, ABRUPT ACCELERATION. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). pp. 165-188.

4,836

Stapp, J. P. 1961 EFFECTS OF LINEAR ACCELERATION.
In Armstrong, H. G., ed., Aerospace Medicine (Baltimore, Md.: Williams & Wilkins Co., 1961)

4,837

Stapp, J. P., S. E. Neely, & A. B. Nutt 1961 CRASH PROTECTION OF AIR TRANSPORT PASSENGERS. (Presented at the Aerospace Medical Association 32nd Annual Meeting, 24-27 April, 1961).

CONCLUSIONS: An analysis of the air transport passenger crash protection problem from the standpoint of accident experience, deceleration experiments with aircraft, seats and human volunteers, points to the design and adoption of aft facing seats using new materials that will conserve weight while providing greater protection from abrupt crash forces. New standards for transport passenger seats and restraints should be established to permit uniform adoption of high strength aft facing seats. (AUTHOR)

4,838

Stapp, J. P. 1961 JOLT EFFECTS OF IMPACT ON MAN.
(Aerospace Medical Div., Brooks AFB, San Antonio, Texas)

(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas 27-29 November 1961)

ABSTRACT: The paper contains reports on several impact, acceleration, and deceleration experiments.

4,839

Stapp, J.P., J.D. Mosely, and C.F. Lombard 1962 "MEGABOOM" LINEAR WINDBLAST TESTS ON SUBJECTS AND PROTECTIVE EQUIPMENT.
(Northrop Space Labs., Hawthorne, Calif.) Contract AF 41(657)405, Proj. 7930, ARL TDR 62-6, July 1962. ASTIA AD 283 803

ABSTRACT: Information is presented on six rocket sled experiments to investigate the effects of supersonic windblast upon personnel and personal protective equipment. Five chimpanzees and one human dummy were used as test subjects. Velocities ranged from 1,330 to 1,922 fps (906.8 to 1,310.4 MPH); stagnation pressures of 18 to 42 pounds per square inch, or loads of 2,500 to 4,000 pounds per square foot. Standard restraints and garments proved inadequate and extensive injuries established the need for improvements. Restraints and garments were progressively improved until protection of the test subject was achieved. Injuries were caused by the subjects being displaced within the restraints, causing high non-uniform forces to act upon the various parts of the subjects' bodies. Other sources of severe injury were the frictional heat on and in the body surface areas and subcutaneous tissues, and by high velocity air penetrating wounds and body apertures. Protection can be achieved by adequate restraints and garments which would render the operational efficiency of the wearer marginal; but with careful development, satisfactory protection with working efficiency probably can be achieved. (Author)

4,840

Stapp, John P. 1962 JOLT EFFECTS OF IMPACT ON MAN
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 123-130

ABSTRACT: A survey of jolt effects of impact on man indicated that any attempt at stress analysis of man with respect to impact forces must take into account the responses of the body as a whole; the simultaneous responses of different kinds and different states of materials in body structure, such as the pneumatic and hydraulic behavior of gasis and fluids; plastic deformation of soft tissues; and the stretching of the masenteries and ligaments by displacement or organic masses. Since the object of human stress analysis is to determine reversible and irreversible, disabling and fatal criteria of the human structure, it is well to relate measurements to points of structural weakness or load concentration.

4,841

Stapp, J.P. 1962 MEDICAL PROBLEMS OF SPACE FLIGHT
Jour. Mississippi State Med. Assoc., 3 (9): 404-412. Sept. 1962

ABSTRACT: The Mercury space flight program methods for selecting, training, and physiologically adapting the astronaut for space flight are briefly reviewed. Discussion is presented of the preparation for both suborbital and orbital flight, flight observations of astronauts Shepard and Grissom (suborbital flight), and Glenn (orbital flight). Analysis of flight data and postflight examination were found to be normal except for changes comparable to the results of exertion in an athletic event of about the same intensity and duration.

4,842

Stapp, J.P. 1962 AFTER SEAT BELTS...WHAT?
In Cragun, M.K., ed., The Fifth Stapp Automotive Crash and Field Demonstration, Sept. 14-16, 1961, Pp. 259-263

4,843

Stapp, J. P. 1963 LANDING IMPACT STUDIES ON APOLLO CAPSULE. NASA MOTION PICTURE FILM. Presented at Seventh Annual Stapp Car Crash Conference, Sheraton Marina Hotel, Playa del Rey, Calif. 12 November.

4,844

Stark & Roth, tr., J.B. Bateman 1945 REVIEW: CATAPULT SEAT Do 335 (Dornier-Werke G.m.b.H., Friedrichshafen a. B., Div. of Research) Research Rept. 3240, Pages A-17206 to A-17240, 23 May 1944. Translated as Appendix 13 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft, ASTIA ATI No. 7245

SUMMARY: The catapult arrangement was used 200 times in all. No important drawbacks were apparent in these tests. The ejection velocity can be significantly improved by greasing the piston. According to wind tunnel measurements at D W (see Research Report No. 138 and investigations at the Heinkel factory, report No. ENS-88/32) with a total weight of 120 kg. an ejection velocity of about 17 meters per second is necessary in order to insure sufficient clearance of the tail. Such a velocity of ejection requires three compressed air reservoirs each two liters in capacity, a pressure of 120 atmospheres, and a greased piston in the cylinder. In the appendix will be found further theoretical deductions from these experiments made on the ground, from the measurements in the wind tunnel at the Dornier factory and from the measurements made by the Heinkel factory.

The experiments on human subjects showed that the D W catapult device can also be discharged at 120 atmosphere without endangering the person ejected. The subjects found the seat equipped with arm rests, head cushion, and upholstered back to be very comfortable. It is, however, recommended that the pads along the edges of the arm rests should be raised somewhat in order to prevent the arms from being jerked off the rests. The arm rests probably support a considerable fraction of the body weight and thus make possible ejection with the use of such high reservoir pressures. Dr Wiesehofer, D V L, is still carrying out exact investigations. The position of the operating levers with respect to the arm rests is satisfactory. Injury to the forearm and hand was never produced. It would be a good idea to provide a bumper on the arm rest or on the seat in roder to prevent the elbow from jerking back too far when the catapult lever is pulled. From the point of view of its mechanical properties, its mode of action and its physiological effects the D W catapult device fulfills the standards set up. (Author)

4,845

Starkiewicz, W. 1936 L'INFLUENCE DES VOLA ACROBATIQUES AUX PETITES ALTITUDES SUR L'ETAT FONCTIONNEL DE L'OEIL. (Effect of Acrobatic Flights at Slight Altitudes on the Functional Condition of the Eye.) Rev. pol. de la med. aeronautique, 5:86-102

ABSTRACT: A study of visual acuity following acrobatic flights at slight altitudes revealed an increase in visual acuity for reading black signs on a white ground (Landolt tables) in 91.5 per cent of all cases. In general this increase surpasses 0.1. Also an increase in visual acuity in reading white on a black ground (Snellen's tables) was noted in 81 per cent of the cases which did not, however, surpass 0.1.

No significant changes in accommodation were noted. The aviators examined had

not been exposed to anoxemia, which causes diminution of visual acuity, because they had not exceeded an altitude of 3,000 m.

A factor which may play an important part is increased irritability of the cerebral cortex, which is exposed to various influences during flight (noise of the motor, excitement, and vibrations of the plane) These influences affect the optic field of the cerebral cortex, exciting it and creates a visual sensation on the retina. ABSTRACT: (Limited) Journal of Aviat. Med. 8(2):113-114, Ju 1937

4,846

Starks, J. H. 1961 CRASH INJURY WORK OF THE ROAD RESEARCH LABORATORY OF THE UNITED KINGDOM, RESEARCH INTO ROAD SAFETY. (Paris) O.E.E.C. Publications No. 13,717, pp. 35-37

4,847

Starnes, A. H. 1942 FREE-FALL PARACHUTING
Canad. Air Cadet (Oct):14-15. Abstr: Aeronaut. Engng Ref. 1,(Dec.):51. 1942

4,848

Stasevich, R.A. 1947 K VOPROSU O BEZOPASNOSTI EKIPAZHA PRI AVARII (Safety of the Crew in Aircraft Crashes)
Tekhnika vozdushnogo flota 5: 18-23

4,849

Stasevich, R. A., & P. K. Isakov 1956 SKOROSTI, USKORENIIA, PEREGRUZKI (NEKOTORYE VOPROSY FIZIKI I FIZIOLOGII PRIMENITEL'NO K AVIATSII). (SPEED, ACCELERATION, G-FORCES. (SOME PROBLEMS OF PHYSICS AND PHYSIOLOGY APPLICABLE TO AVIATION) (Moskva: Voennoe Izdatel'stvo Ministerstva Oborony Soiuza SSR, 1956)

ABSTRACT: A discussion is presented for popular consumption on the speed of movement, acceleration, g-forces, and their effects on the human organism. The examples used are for the most part from aviation although some are also pertinent to space flight.

4,850

Státni Lékařská Knihova (National Medical Library) 1959 THE ANNUAL OF CZECHOSLOVAK MEDICAL LITERATURE 1957
Praha, Czechoslovakia: Statni Zdravotnicke Nakladatelstvi (Prague 1, Czechoslovakia: State Health Publishing House)

4,851

Státni Lékařská Knihovna (National Medical Library) 1961 THE ANNUAL OF CZECHOSLOVAK MEDICAL LITERATURE 1959
Praha, Czechoslovakia: Statni Zdravotnicke Nakladatelstvi (Prague 1, Czechoslovakia: State Health Publishing House)

4,852

Stauffer, F. R. 1948 FACTORS INFLUENCING THE CONCENTRATION OF THE BLOOD AS SUGGESTED BY FOOT/ARM RATIOS OF HEMATOCRIT AND PLASMA PROTEIN CONCENTRATIONS.
(Office of Naval Research, Washington, D. C.)
October 1948 Contract N6ori77

SUMMARY: Samples of blood were drawn simultaneously from the median arm and dorsal pedal veins of men who had just sat down after at least an hour's ambulatory activity. This blood was analyzed for red cell and plasma protein concentration and foot/arm concentration ratios determined. Some of the men were subjected to 15 seconds of 6 psi pressure to the abdomen, thighs and legs by means of a U. S. Navy Type Z-3 Anti-G suit after sitting down and before samples were taken.

The following conclusions were drawn. Ambulatory activity normally provides a dynamic equilibrium between the filtration from capillaries in the dependent areas and the return of fluid to the blood stream via the lymphaties. Cossation of activity, i.e., by quiet sitting, results in increased concentration of venous blood from the foot compared with that from the arm. Factors

4,853

Stauffer, F. R. and C. Hyman 1948 FLUID SHIFTS DURING EXPOSURE TO ACCELERATIONS: PRELIMINARY STUDY OF THE RAPID LOCAL CHANGES UNDER NEGATIVE G. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, 22 January 1948 See also; Am. J. Physiol. 153:(1):64-70 April, 1948.

ABSTRACT: 1. The increased intravascular pressures developed during exposure to increased acceleration cause a rapid and significant outward filtration of fluid from the circulation. 2. Blood returning from the head end of goats after exposureto negative G shows a short, rapid concentrating phase, followed by a somewhat slower phase of dilution, with respect to both hematocrit and plasma protein concentrations. 3. At peak concentration there is evidence of significant leakage of protein from the circulation, as calculated from the hematocrit and plasma protein values. 4. Several mechanisms involved in the fluid loss and protein leakage are discussed.

4,854

Stauffer, F. R. 1948 THE EFFECT OF AN INVERTED POSTURE UPON THE CONCENTRATION OF RED CELLS AND PLASMA PROTEIN IN THE HUMAN (Office of Naval Research, Washington, D. C.) November, 1948 Contract N6ori77

SUMMARY: Twelve subjects were subjected to thirty minutes of a 45-degree head-down position during which blood was taken from the median arm vein at 5-minute intervals. One sample was also obtained from the external jugular vein. The blood was analyzed for hematocrit and plasma protein content and concentration curves referred to time were drawn. The following conclusions have been made:

The mechanical hydrostatic effects of gravity on the blood in men are essentially the same in the inverted as in the erect position, differing in degree primarily as a result of the lack of compensating mechanisms to oppose the pooling of blood while in the inverted position. The systomic concentration, as measured by the plasma portein content, gradually approaches values 5% above horizontal values during 30 minutes of 45-degree head-down posture, as a result of filtration through the cephalad capillary beds. Red cells appear to be effectively removed from the active circulation during this period of inversion resulting in an erroneously low systemic concentration value when measured by the hematocrit. The return of the body to horizontal is followed by a gradual return to the previous horizontal position concentration values. The dilution appears to proceed at a faster rate than does the concentration.

4,855

Stauffer, F.R. 1949 THE RELATIONSHIP OF EXTERNAL PRESSURIZING SYSTEMS OF ANTI BLACKOUT SUITS TO THE FORMATION OF EDEMA AND PETECHIAE. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.12-0006.1.1., 5/17/49 ASTIA AD- 71808

ABSTRACT: Proposed improvements in standard U.S. Navy Anti-blackout equipment were investigated and evaluated. Forty-four series of 3 to 11 ten-sec centrifuge runs were made on 23 young male subjects wearing anti-blackout suits of varying pressurizing systems. The suits were analyzed from the standpoint of the incidence of subcutaneous edema and hemorrhages in the trunk and lower extremities. It was found that standard bladder pressure produces extravasation at the bladder borders on the thigh and calves, abdomen, ankles and insteps, and at the lumbo-sacral triangle and adjacent vertebral groove. Experimental suits incorporating flatter bladders with thickened marginal seams and higher pressure capacities, and upward progressive-pressure-application principles, both bladder and capstan, seem desirable.

4,856

Stauffer, F. R., & R. E. Kelley 1949 A DEVICE FOR THE AUTOMATIC CONTROL BY G-FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. (School of Aviation Medicine, U. S. Naval Air Station, Pensacola, Fla.) SDC Project 9-U-37a, Project NM 001 059.02.05 (formerly NM 001.010)

4,857

Stauffer, F.R. 1949 FACTORS IN HEMOCONCENTRATION: THE EFFECTS OF CIRCULATORY STAGNATION AND OF ANTI-G SUIT PRESSURE. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Project Nr 161-014, Task order 1, June 1949 ATI 208 704

ABSTRACT: Serial samples were taken during a 5 minute period from the median veins of 26 men subjected to quiet sitting after ambulatory activity Some were exposed for 15 seconds to anti-G suit pressures of 6 psi applied to the legs or to the legs and abdomen combined.

No significang change in plasma protein concentration was observed.

In all three groups there was a slight but significant decrease in the hematocrit, more so following the application of external pressure.

The mechanisms by which red cells undergo apparent dilution is discussed. Emphasis is placed upon the part played by circulatory stagnation arising from the cessation of ambulatory activity and by the application of external pressure.

4,858

Stauffer, F. R. 1949 THE EFFECT OF THE INVERTED POSTURE IN YOUNG GOATS WITH SPECIAL REFERENCE TO THE INTRAVASCULAR-EXTRAVASCULAR FLUID BALANCE. (Office of Naval Research, Washington, D. C.) June 1949 Contract N6ori77

SUMMARY: Six male goats under 2 weeks old were placed in a vertical head-down position for several hours during which time periodic blood samples were obtained from large vessels in the neck.

The difference between simultaneous hematocrits of carotid and jugular blood was not very great.

The difference between simultaneous plasma protein concentrations of carotid and jugular blood was less than the difference between the hematocrits.

The hydrostatic intravascular pressure, increased in the head region, caused a marked passage of fluid outward from the blood as demonstrated by the uniform increase in arterial plasma protein concentration.

On the basis of plasma protein concentration changes, an estimated hematocrit change was calculated as the "expected" hematocrit.

The failure of actual red cell concentration to approximate or surpass this "expected" concentration indicated a fairly extensive packing of red cells trapped in stagnant capillary loops.

The maintained inverted posture caused serious respiratory embarrassment apparently of a combined anoxic-anemic-stagnant anoxia type.

The maintained inverted posture reduced not only the total blood volume but also the effective circulating blood volume, thereby decreasing the margin of safety in blood sampling.

4,859

Stauffer, F. R. 1949 THE EFFECT OF PROLONGED EXPOSURE OF GOATS TO NEGATIVE 2 G RADIAL ACCELERATION WITH SPECIAL REFERENCE TO INTRAVASCULAR-EXTRA-VASCULAR FLUID BALANCE.
(Office of Naval Research, Washington, D. C.)
June 1949 Contract N6ori77

SUMMARY: Seven goats were subjected to negative 2 G on the University of Southern California centrifuge at an effective radius of 18 feet.

The results found suggest that, in general, the effects of negative 2 G are similar to those of negative 1 G differing primarily by being more rapid in their onset and development.

Respiration ceases under these conditions in a matter of minutes, here 20 or less.

Serial artorial blood samples taken during and following centrifugation and analyzed for hematocrit and plasma protein concentration show that a marked loss of fluid from the capillary bed occurs in the stressed end of the animal. This produces a decrease in the total blood volume and a high concentration of the blood remaining.

Larger animals lose appreciable protein through the capillary wall along with the increase in oxtravasation of fluid.

A mechanism for removing red cells from the effective circulation by packing them in stagnant capillaries develops. This removal may terminally by of serious proportions.

Six of the seven animals were spun until one minute after they became apneic. Three died a few minutes after contrifugation ceased. Some of the possible mechanisms of their death and the recovery of the others have been discussed.

4,860

Stauffer, F.R. 1949 FURTHER EVIDENCE OF FLUID TRANSLOCATION DURING VARIED ACCELERATION STRESSES: GROSS PATHOLOGICAL FINDINGS AND WEIGHT CHANGES IN SPECIFIC TISSUES. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Project NR 161-014, June 1949

ABSTRACT: Three groups of young goats exposed to: (1) short-duration, high-

magnitude negative G; (2) long-duration, low-magnitude negative G: and (3) a normal unstressed group from the standpoint of gross pathological findings, the percentage of body weight of various organs, and the percentage water content of various tissues.

In general, short-duration high-magnitude G stresses, either positive or negative, produce hamorrhagic changes in the stressed end of animal. Edema and congestion are less prominent and less lasting. Positive G stresses in general produce less intravascular-extravascular changes than negative G stresses of equivalent numerical magnitude.

Long-continued low negative G stresses produce little or no hemorrhage, but a marked increase in filtration with the formation of edema in the stressed end constantly occurs.

Under any form of G there is a tendency for congestion to occur in very vascular tissues which are sideloops of more essential circulating paths.

4,861

Stauffer, F. R., E. L. Beckman, & J. I. Thorn 1949 THE EFFECT OF EXTERNAL FLUID PRESSURE DURING POSITIVE ACCELERATION UPON THE RESPIRATORY RATE, PULSE RATE AND RIGHT INTRA-AURICULAR PRESSURE OF RABBITS. HIGH ACCELERATION STUDY IN ANIMALS. (School of Aviation Medicine & Research, Pensacola, Fla.) Rept. No. 1, Proj. NM 001 048; 25 July 1949 ATI 64855

SUMMARY AND CONCLUSIONS: (1) The comparative effects of water and saturated zinc chloride solutions as protective fluid baths for rabbits have been studied from the standpoint of changes in pulse rate, respiratory rate and right intra-auricular pressure during and after one-minute exposures to high positive (8-12 G) radial acceleration. (2) Water was considerably less effective than a saturated zinc chloride solution in preventing the dependent pooling of blood, but the post-run recovery of animals immersed in water was considerably faster and more complete. (3) During positive acceleration the respiratory rate of rabbits in a water bath decreased slightly. Post-run there was a rapid increase in the respiratory rate usually to levels considerably above that of control rates. When a saturated zinc chloride solution was used as the protecting fluid, respiratory inhibition was much more marked, frequently to the point of apnea. Recovery, when it occurred, was a slow process. (4) During high positive acceleration the pulse rate of rabbits in a water bath was variable, but usually decreased slightly. The post-run recovery to normal rates was almost immediate. When saturated zinc chloride solution was used as a protecting bath, the pulse rate during acceleration fell further and was more irregular. Recovery, post-run, was less satisfactory. (5) the right intra-auricular pressure fell slightly during high positive acceleration in those animals immersed in water. In those immersed in a saturated zinc chloride solution the right intraauricular pressure consistently rose on an average of 40 mm. Hg during high positive acceleration. (6) These findings have been correlated with previous studies of the comparative physiological changes occurring with and without anti-blackout protective devices. (7) The dangers of right heart failure resulting from over-protection against blackout

have been discussed. (8) Anti-blackout protecting devices should be restricted in their functioning to levels of 3 G protection or below until more definite knowledge of the human physiology has been obtained. To this end it would be interesting to know the intracardiac pressure of man during acceleration with and without anti-blackout protection. (AUTHOR)

4,862

Stauffer, F. R., C. Hyman, D. R. Drury, & C. F. Lombard 1949 INTRAVASCULAR-EXTRAVASCULAR FLUID SHIFTS OCCURRING IN YOUNG GOATS FOLLOWING 30-SECOND EXPOSURES TO RADIAL ACCELERATION OF 5 G. (Depts. of Aviation Medicine & Physiology, Univ. of Southern Calif., School of Medicine, Los Angeles, Calif. Contract N6ori77, Project NR 161-014, Task 1, July 1949, ATI-208 702

SUMMARY AND CONCLUSIONS: Some of the mechanisms of intravascular-extravascular fluid exchange have been studied by following the changes in the hematocrit and plasma protein concentrations of young goats subjected to radial acceleration. A total of 32 animals, all under two weeks old, were employed by division into five fairly uniform groups. In these animals blood samples were obtained from the carotid artery, abdominal aorta, jugular vein and inferior vena cava after 30 secs of either positive or negative 5 g. With the onset of radial acceleration an increase in hydrostatic pressure in both the artery and vein of the outward end of the animal, resulted in a marked rise in intracapillary hydrostatic pressure. Single 30-sec. exposures, therefore, caused a rapid outward shift of large quantities of water. This resulted, almost at once, in local (venous) red cell and plasma protein concentrations 10 to 15% above pre-run control values. The subsequent systemic (arterial) concentration increased 3 to 6% within 1½ to 2½ mins. Besides causing hemoconcentration, the outflow of fluid apparently produced a considerable rise in tissue pressure directly outside the blood vessel. Capillary distension to the point of physical rupture was, thereby, largely counteracted.
As the accelerating force was removed, the intravascular hydrostatic pressure fell. Since the tissue pressure was still elevated, there developed steep pressure gradient from outside in. It is believed that packed red cells prevented the collapse of the vessels. Consequently, a rapid inward filtration followed. This was observed as a swift post-run dilution, both of venous and, later, arterial blood. Except in cases where considerable plasma protein leakage had taken place during the stress, even the systemic concentrations were back to control levels within 5 mins. An intravascular increase in colloidal osmotic pressure during centrifugation probably played a significant role in this post-run dilution process. The findings indicated that during the short exposures at 5 G a considerable amount of plasma protein passed thru the capillary wall. This leakage was especially marked under positive G. It was further increased under experimental conditions which produced temporary anoxia in those capillary areas subsequently subjected to increased intravascular hydrostatic pressure. The findings indicated further that under short 5 G exposures, especially when positive in direction, reactions frequently took place to remove erythrocytes from the active circulation. This was probably accomplished by the packing of red cells in capillaries thru which concentrated plasma could still pass. Post-run vasoconstriction in the abdomen increased this trapping process regardless of whether the previous stress had been positive or negative. Protein leakage and red cell trapping, therefore, have made it difficult to draw any definite conclusions from

either the hematocrit or plasma protein concentration changes alone. A study of the simultaneous changes of these two variables, however, especially in simultaneous samples from a corresponding artery and vein, has allowed a fairly definite understanding of some of the characteristics of fluid exchange across the capillary wall. Finally, an impaired circulatory flow thru the congested areas was suggested by the relatively long time lag before the systemic concentration curves reached their maxima. (AUTHOR)

4,863

Stauffer, F.R. 1949 THE EFFECT OF HIGH ACCELERATION FORCES UPON CERTAIN PHYSIOLOGICAL FACOTRS OF HUMAN SUBJECTS PLACED IN A MODIFIED SUPINE POSITION (U.S. Naval School of Aviation Medicine and Research, Naval Air Station, Pensacola, Florida) SDC Project 9-U-37a, 13 October 1949, ASTIA ATI 70 858

ABSTRACT: The effect of acceleration forces up to 12 G resultant for 5-8 sec on the human centrifuge was determined with the human subjects placed in a modified supine position in which the bent knees placed the feet at a level somewhat below that of the rest of the body. During rotation of the centrifuge the seat pivoted so that the G force was supplied to the subject in a direction from chest to back. Consciousness, vision, and voluntary finger movements at highest G obtainable not impared under these conditions. The cardiovascular system according to the heart rate and electrocardiogram, did not show severe enough changes to consider it as one of the important facotrs of human tolerance to G force. The practicality of this position for aircraft personnel is discussed an the major items indicating its advantages over all other known anti G protecting devices are presented.

4,864

Stauffer, F. R. & E. O. Errebo-Knudsen 1950 POSITIVE ACCELERATION AND URINE OUTPUT.
J. Aviation Med. 21(6):500-506.

SUMMARY: 1. The effect of positive radial acceleration on the urinary output has been studied in ten men.

2. In water-loaded subjects an exposure to positive 3 g for one minute caused a significant reduction in urinary output and an increase in the specific gravity of the urine.

3. When these water-loaded subjects were exposed to positive 5 g for one minute with antiblackout suit protection, the reduction in urine output was much greater and lasted longer. There was a concomitant greater increase in the specific gravity of the urine.

4. The physiological mechanisms which may be involved have been discussed.

4,865

Stauffer, F. R., & E. O. E. Knudsen 1950 POSITIVE ACCELERATION AND URINE OUTPUT. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. MR005.15-0001.1.4., 3/24/50
See also J. Avia. Med. 21:500-506; 525, Dec. 1950

ABSTRACT: (1) The effects of positive radial acceleration on the urinary output has been studied in ten men. (2) In water-loaded subjects an exposure to positive 3 G for one minute caused a significant reduction in urinary output and an increase in the specific gravity of the urine. (3) When these water-loaded subjects were exposed to positive 5 G for one minute with anti-blackout suit protection, the reduction in urine output was much greater and lasted longer. There was a concomitant greater increase in the specific gravity of the urine. (4) The physiological mechanisms which may be involved have been discussed. (DACO)

4,866

Stauffer, F.R. 1950 CERTAIN PHYSIOLOGICAL RESPONSES IN MAN CHANGING FROM THE SITTING TO SUPINE POSITION DURING RADIAL ACCELERATION (Naval School of Aviation Medicine, Naval Air Station, Pensacola, Florida) NM 001 059.02.02,9Feb. 1950, ASTIA AD-208 679

ABSTRACT: The back portion of the controllable supine seat, DDC Project 9-U-37a, takes less than 2 seconds to move from an upright to a horizontal position when the seat was exposed to radial acceleration.
This mechanism was used to study the effect in man of changing from a sitting to a supine position while under going radial acceleration up to 5.0 G. For this study certain physiological responses have been observed on adult males.
When the G level was below the blackout threshold for the subject in a seated position, the change of position to the supine produced no deleterious effects either subjectively or objectively.
When the G level was above the blackout threshold for the subject in the seated position, the impending functional disturbances disappeared as the subject's position changed from seated to supine.
These experiments have demonstrated, therefore, that there is no physiological contraindication for aircraft personnel to change from a seated to a supine position during radial acceleration. If the supine position were to be used to protect the pilot against the effects of high radial acceleration, prepositioning of the seat by the pilot would not be necessary. Instead, a G-controlled mechanism set at a specific G level could be employed to change the seat position automatically.

4,867

Stauffer, F. R. 1950 COMPARATIVE EFFECTS OF HIGH RADIAL ACCELERATION ON MAN IN MODIFICATIONS OF THE SUPINE POSITION. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Proj. MR005.15-0001.1.6.; Rept. NM 001 059.02.06; 5/17/50 ASTIA ATI-86 955

ABSTRACT: (1) Three more modifications of the supine position have been tested to determine human tolerance to high radial accelerations of five-second duration

(2) As long as the head and heart of a subject are at the same G-level, minor adjustments in the position of his thighs and legs do not limit his tolerance below 12-13 G for five secons. (3) Comfort and respiratory ability, not blackou nor circulatory insufficiency, are the factors which appear most active in limiting human tolerance in all tested modifications of the supine position. (4) Comfort and respiratory ability are somewhat improved if slight flexion is present in the hips. (5) The results leading to these conclusions and the physiological problems inherent in high acceleration of subjects in the supine position have been discussed in considerable detail.

4,868

Stauffer, F.R. 1951 STUDIES ON THE EFFECTIVENESS OF AUTOMATIC SUPINATION IN PROTECTING MAN AGAINST HIGH RADIAL ACCELERATION. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.) Project NM 001 059.02.07. 29 Jan. 1951. ASTIA ATI 108815.

ABSTRACT:

1. Seventeen adult males have been subjected on the Pensacola Human Centrifuge to radial acceleration stresses up to 12 G for five seconds.

2. At the beginning of these exposures the subjects were in a conventional seated position, i.e., subject to positive acceleration effects. Protection against blackout and associated positive acceleration effects was provided by a changeable seat automatically controlled by G forces acting in the direction head to hips of a seated individual. When the G force exceeded 3.9 G the back rest of the seat rotated backward to place the subject in a modified supine position. The position was maintained until the G force had dropped below 2.7 G at which time the back rest and subject returned to their original positions.

3. The physiological changes during such stresses have been discussed from the standpoint of the practicability of using such a protective device position during radial acceleration. If the supine position were to be used to protect the pilot against the effects of high radial acceleration, prepositioning of the seat by the pilot would not be necessary. Instead, a G-controlled mechanism set at a specific G level could be employed to change the seat position automatically for pilots exposed to positive acceleration in aircraft.

4,869

Stauffer, F.R. 1951 CURRENT STUDIES ON DEVELOPMENTAL ANTI-BLACKOUT EQUIPMENT. (Naval School of Aviation Medicine, Pensacola, Fla.) MR005.12-0006.1.2, Feb. 5, 1951.

4,870

Stauffer, F.R., C. Hyman, Dr. Drury and C.F. Lombard 1951 INTRAVASCULAR EXTRAVASCULAR FLUID SHIFTS OCCURRING IN YOUNG GOATS FOLLOWING 30-SECOND EXPOSURES TO RADIAL ACCELERATION OF 5 G.
(University of Southern Calif., School of Mediciae, Los Angeles)
Contract N6ori77, Task 1, 31 March 1951

ABSTRACT: Some of the mechanisms of intravascular- extravascular fluid exchange have been studied by following the changes in the hematocrit and plasma protein concentrations of young goats subjected to radial acceleration A total of 32 animals, all under two weeks old, were employed by division into five fairly uniform groups. In these animals blood samples were obtained from the carotid artery, abdominal aorta, jugular vein and vena cava after 30 seconds of either positive or negative 5 G.

The findings indicated that during the short exposures at 5 G a considerable amount of plasma protein passed through the capillary wall. This leakage was especially marked under positive G. It was further increased under experimental conditions which produced temporary anoxia in these capillary areas subsequently subjected to increased intravascular hydrostatic pressure.

The findings indicated further that under short 5 G exposures, especially when positive in direction, reactions frequently took place to remove erythrocytes from the active circulation.

Protein leakage and red cell trapping, have made it difficult to draw any definite conclusions from either the hematocrit or plasma protein concentration changes alone. A study of the simultaneous changes of these two variables, however, especially in simultaneous samples from a corresponding artery and vein, has allowed a fairly definite understanding of some of the characteristics of fluid exchange across the capillary wall.

Finally an impaired circulatory flow through the congested areas was suggested by the relatively long time lag before the systemic concentration curves reached their maxima.

4,871

Stauffer, F.R. 1951 FACTORS IN HEMOCONCENTRATION: THE EFFECTS OF CIRCULATORY STAGNATION AND OF ANTI-G SUIT PRESSURE. (University of Southern Calif., School of Medicine, Los Angeles) Contract N6ori77, Task 1, March 31, 1951

ABSTRACT: Serial samples were taken during a 5-minute period from the median veins of 26 men subjected to quiet sitting after ambulatory activity. Some were exposed for 15 seconds to anti-G suit pressures of 6 psi applied to the legs or to the legs and abdomen combined.

No significant change in plasma protein concentration was observed.

In all three groups there was a slight but significant decrease in the hematocrit, more so following the application of external pressure.

The mechanism by which red cells undergo apparent dilution is discussed. Emphasis is placed upon the part played by circulatory stagnation arising from the cessation of ambulatory activity and by the application of external pressure.

4,872

Stauffer, F.R 1951 THE EFFECT OF THE INVERTED POSTURE IN YOUNG GOATS WITH SPECIAL REFERENCE TO THE INTRAVASCULAR - EXTRAVASCULAR FLUID BALANCE
(University of Southern Calif., School of Medicine, Los Angeles)
Contract N6ori77, Task 1, 31 March 1951

ABSTRACT: Six male goats under 2 weeks old were placed in a vertical head-down position for several hours during which time periodic blood samples were obtained from large vessels in the neck.

The difference between simultaneous hematocrits of carotid and jugular blood was not very great.

The difference between simultaneous plasma protein concentrations of carotid and jugular blood was less than the difference between the hematocrits

The hydrostatic intravascular pressure, increased in the head region, caused a marked passage of fluid outward from the blood as demonstrated by the uniform increase in arterial plasma protein concentration.

On the basis of plasma protein concentration changes, an estimated hematocrit change was calculated as the "expected" hematocrit.

The failure of actual red cell concentration to approximate or surpass this "expected" concentration indicated a fairly extensive packing of red cells trapped in stagnant capillary loops.

The maintained inverted posture caused serious respiratory embarrassment apparently of a combined anoxic-anemic-stagnant anoxia type.

The maintained inverted posture reduced not only the total blood volume but also the effective circulating blood volume, thereby decreasing the margin of safety in blood sampling.

4,873

Stauffer, F. R. 1951 FURTHER EVIDENCE OF FLUID TRANSLOCATION DURING VARIED ACCELERATION STRESSES: GROSS PATHOLOGICAL FINDINGS AND WEIGHT CHANGES IN SPECIFIC TISSUES
(Office of Naval Research, Washington, D. C.)
Contract N6ori77

SUMMARY: Three groups of young goats exposed to: (1) short-duration, high-

magnitudt negative G; (2) long-duration, low-magnitude negative G; and (3) short-duration, high-magnitude positive G stresses have been compared with a normal unstressed group from the standpoint of gross pathological findings, the percentage of body weight of various organs, and the percentage water content of various tissues.

In general, short-duration high-magnitude G stresses, either positive or negative, produce homorrhagic changes in the stressed end of animal. Edema and congestion are less prominent and less lasting. Positive G stresses in general produce less intravascular-extravascular changes than negative G stresses of equivalent numerical magnitude.

Long-continued low negative G stresses produce little or no homorrhage, but a marked increase in filtration with the formation of edema in the stressed end constantly occurs.

Under any form of G there is a tendency for congestion to occur in very vascular tissues which are sideloops of more essential circulating paths.

4,874

Stauffer, F.R. 1951 RADIAL ACCELERATION AND THE URINARY OUTPUT OF SUPINATED MAN. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 059. 02.08; MR005.15-0001.1.8; Aug. 1951. ASTIA ATI 112 894 See also J. Aviation Med. 22(5):391-402, 428, Oct. 1951.

ABSTRACT: (1) The urinary output has been studied in 15 normal adult males before, during, and after exposure to forces of 3, 5, and 7 G lasting for one minute and directed from front to back (subject supine). (2) The results of exposures to 3 and 5 G forces were similar to 1 G controls. After a force of 7 G supine for one minute there was a slight and temporary decrease in the subject's urinary output (cc./min.) with a slight transient increase in the urinary specific gravity. There was a slight increase in urinary chloride concentration (mgm. per cent) but no change in the rate of chloride excretion(mgm./min.). (3) A review of the literature, in the light of these experiments, has suggested that these changes were the result of an increased tubular reabsorption of water, primarily on an osmotic pressure basis, because of the hemoconcentration produced during the stress. (4) Further analysis has suggested that the mechanisms causing a decreased urinary output following positive G stresses may be quite similar although aided by a marked shunting of cardiac output away from the kidney. (5) These experiments add to the evidence which suggests (a) that vasovagal syncope, fainting', has different physiological repercussions from unconsciousness during positive G stress, and (b) that there is no hormone relegated solely to the renal tubular reabsorption of water. (SAM, Brooks AFB, Texas)

4,875

Stauffer, F. R. 1951 RADIAL ACCELERATION AND THE URINARY OUTPUT OF SUPINATED MAN. J. Avia. Med. 22(5):391-402, 428, Oct. 1951
See also (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. NM 001 059.02.08.; MR005.15-0001.1.8., 8/7/51

ABSTRACT: (1) The urinary output has been studied in 15 normal adult males before during, and after exposure to forces of 3, 5, and 7 G lasting for one minute and directed from front to back (subject supine).
(2) The results of exposures to 3 and 5 G forces were similar to 1 G controls. After a force of 7 G supine for one minute there was a slight and temporary decrease in the subject's urinary output (cc./min.) with a slight transient increase in the urinary specific gravity. There was a slight increase in urinary chloride concentration (mgm. per cent) but no change in the rate of chloride excretion (mgm./min.)
(3) A review of the literature, in the light of these experiments, has suggested that these changes were the result of an increased tubular reabsorption of water, primarily on an osmotic pressure basis, because of the hemoconcentration produced during the stress.
(4) Further analysis has suggested that the mechanisms causing a decreased urinary output following positive G stresses may be quite similar, although aided by a marked shunting of cardiac output away from the kidney.

4,876

Stauffer, F.R., & L.B. Cochran 1951 PRELIMINARY STUDIES ON THE EASE WITH WHICH PILOTS CAN GRASP AND PULL THE EJECTION SEAT FACE CURTAIN HANDLES. (Naval School of Aviation Medicine, Pensacola, Fla.)
Project MR005.13-4002.2.2., 6 Nov. 1951.
See also Project NM001.059.22.02, 8 Nov. 1951. ASTIA ATI 135023

ABSTRACT: Determinations were made of the level of g force at which the average pilot can perform the muscular actions necessary to reach and pull the face-curtain handles, thus simulating the procedure required to actuate the ejection seat firing mechanism. Twelve naval fighter pilots of various physical build were tested on the Pensacola human centrifuge for the ability to actuate the Martin-Baker (model F2h-2) ejection-seat mechanism. The subjects were protected with anti-g suits and exposed to levels of positive radial acceleration about 2.0 g. Above their relaxed black-out tolerance level. The mean black-out level of the subjects' control runs for 10-sec. exposure was 4.7, with a range of 3.3 to 5.8 g. Eleven of the subjects were able to actuate the ejection-seat mechanism at 6.6 g (range of 5.2 to 7.4g), and within an average time of 4.6 sec. (varying from 2.5 to 8.0 sec.). The failure of the twelfth pilot was attributed to fatigue. The results suggest that most suit-protected pilots should be able to actuate the mechanism at 2.0 g above their control black-out level, providing that the g levels are constant. Proper indoctrination on the effects of g forces is recommended.

4,877

Stauffer, F. R. . 1952 ACCELERATION PROBLEMS OF NAVAL AIR TRAINING; I. NORMAL VARIATIONS IN TOLERANCE TO POSITIVE RADIAL ACCELERATION. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 059.02.09; MR005. 15-0001.1.9., 3/20/52; ASTIA AD-149 480
See also J. Avia. Med. 24(3):167-188, June 1953

ABSTRACT: One phase of acceleration as a problem in Naval Air Training, has been presented. There is a relatively high incidence of blackout and unconsciousness occurring in personnel engaged in routine flight training maneuvers. Possible solutions have been mentioned but the lack of definitive data has been demonstrated as a major factor responsible in preventing a feasible solution at this time. Data are presented on 215 subjects to show the normal variations in tolerances to certain positive G stresses. These data show: (a) The range in tolerance of the normal population is fairly large. (b) The tolerance of the average population is fairly low. (c) The individual tolerance fluctuations under "normal" conditions are fairly large. (d) Critical symptoms (blackout and unconsciousness) are separated in the average individual by only small G-levels, and short time intervals.

Some of the uses of the Human Centrifuge, as an aid to flight training have been presented. It has been pointed out that selection of pilots for G-tolerance cannot be done as yet on the Human Centrifuge although this machine can supply valuable practical training for certain selected individuals. Determination of a man s ability to "fly G" must still be made in actual flight. (DACO)

4,878

Stauffer, F.R. 1952 CERTAIN PHYSIOLOGICAL RESPONSES IN MAN CHANGING FROM THE SITTING TO SUPINE POSITION DURING RADIAL ACCELERATION. (Naval School of Aviation Medicine Naval Air Station Pensacola, Fla.) NM 001 059.02.02, 9 Feb. 1950. ASTIA ATI 208 679.

ABSTRACT: The back portion of the controllable supine seat, DDC Project 9-U-37a, takes less than 2 seconds to move from an upright to a horizontal position when the seat was exposed to radial acceleration. This mechanism was used to study the effect in man of changing from a sitting to a supine position while undergoing radial acceleration up to 5.0 G. For this study certain physiological responses have been observed on 12 adult males. When the G level was below the blackout threshold for the subject in a seated position, the change of position to the supine produced no deleterious effects either subjectively or objectively. When the G level was above the blackout threshold for the subject in the seated position, the impending functional disturbances disappeared as the subject's position changed from seated to supine. These experiments have demonstrated, therefore, that there is no physiological contraindication for aircraft personnel to change from a seated to a supine position during radial acceleration. If the supine position were to be used to protect the pilot against the effects of high radial acceleration, prepositioning of the seat by the pilot would not be

4,879

Stauffer, F. R. 1953 ACCELERATION PROBLEMS OF NAVAL AIR TRAINING; I. NORMAL VARIATIONS IN TOLERANCE TO POSITIVE RADIAL ACCELERATION. J. Avia. Med. 24(3):167-188, June 1953. See also (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. NM 001 059.02.09; MR 005.15-0001.1.9., 3/20/52; ASTIA AD-149 480.

ABSTRACT: One phase of acceleration as a problem in Naval Air Training, has been presented. There is a relatively high incidence of blackout and unconsciousness occurring in personnel engaged in routine flight training maneuvers. Possible solutions have been mentioned but the lack of definitive data has been demonstrated as a major factor responsible in preventing a feasible solution at this time. Data are presented on 215 subjects to show the normal variations in tolerances to certain positive G stresses. These data show: (a) The range in tolerance of the normal population is fairly large. (b) The tolerance of the average pupulation is fairly low. (c) The individual tolerance fluctuations under "normal" conditions are fairly large. (d) Critical symptoms (blackout and unconsciousness) are separated in the average individual by only small G-levels, and short time intervals.

4,880

Stech, E. L. 1963 CALCULATION OF HUMAN SPINAL FREQUENCY FROM CADAVER DATA AND COMPARISON WITH TESTS ON LIVE HUMAN SUBJECTS. (Frost Engineering Dev. Corp., Colo.) Tech. note 122-100, Jan. 1963.

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Stech, E. 1962 STANDARD ACCELERATION EXPOSURE (Preliminary Data Sheet, Frost Engineering Co.) Aug. 1962

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Stech, E.L. 1963 THE EFFECT OF AGE ON VERTEBRAL BREAKING STRENGTH, SPINAL FREQUENCY, AND TOLERANCE TO ACCELERATION IN HUMAN BEINGS. (Frost Engineering Development Corp., Englewood, Colo.) Technical Note 122-101, Jan. 1963.

4,883

Stech, E. L. 1963 THE USE OF A SUBJECTIVE ACCELERATION SEVERITY INDEX IN RESTRAINT SYSTEM TESTS.
(Frost Eng. Develop. Corp. Colo.) (Life Support Systems Lab., Wright-Patterson AFB, Ohio.) BD Tech. Rept. 122-102, Jan. 1963.

ABSTRACT: A review was made of data collected and made available by the Civil Aeromedical Research Institute on live human subject drop tests. During the data review, it was noted that subject comments might be useful as a measurement of acceleration severity. The subject reports were quantified through the use of a rating scale and then averaged for each drop height and cushioning condition. When plotted against the impulsive velocity change involved, the averaged subjective index illustrated results which would be predicted by support system dynamic models. Therefore, the index scale can be considered valid. The scale also showed a reasonably good accuracy in terms of differentiating between various impact-cushion conditons. In addition, an average subjective endpoint at 11.2 fps for pure impact was obtained from the data which also indicated that the head becomes the controlling factor in tolerance to short rise time acceleration pulses. (Author)

4,884

Stech, E.L. 1963 AN ANALYSIS OF FREE FALL ACCIDENT DATA INVOLVING THE HUMAN BODY IN THE TRANSVERSE DIRECTION.
(Life Support Systems Lab., Aerospace Medical Lab., Bioastronautics Div., AFSC, Wright-Patterson AFB, Ohio) BD Tech. Rept. TN-122-108, April 1963.

ABSTRACT: Accidents involving free falls during mountain climbing are evaluated using a numerical injury severity scale. Zones of minor injury, major injury, and lethal injury are developed from the data, and a velocity change of 53 fps is calculated to represent the 50% probability of major injury in the transverse direction. A comparison with DeHaven's earlier free fall data shows that DeHaven's points represents specially selected examples and should not be considered typical of transverse injury probabilities.

4,885

Steel, F. L. 1962 EARLY GROWTH OF RATS IN AN INCREASED GRAVITATIONAL FIELD.
Nature (London) 193:583-584, Feb. 10, 1962.

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Steele, J.E. 1955 MOTION SICKNESS.
In U.S. Assistant Secretary of Defense (Research and Development) Washington D.C., Shock and Vibration Bulletin No. 22, Supplement.
ASTIA AD- 94 697

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Steele, Jack E. 1961 MOTION SICKNESS AND SPATIAL PERCEPTION. A THEORETICAL STUDY. (Wright-Patterson Air Force Base) ASD TR 61-530; ASTIA AD 273 602.

ABSTRACT: Theories of motion sickness are reviewed and compared with a new theory in which the activity of the central nervous system is more important than the intensity or modality of sensory stimulation. Concepts treated are the development and validation of an inertial reference frame; the perceptual transformation of sensory data, which reduces its content, increases its reliability and can incorporate compensations for environmental variables; and the consequences of perceptual inadequacy. (Author)

4,888

Stehling, K. R. 1960 LUNAR LANDING PROBLEMS.
Interavia 15:1428-1430, Nov. 1960

ABSTRACT: The propulsion problems of a lunar soft landing mission are discussed. A rocket system is considered for use in the slowdown for the soft landing, since no other braking forces are available. The characteristics of a rocket retro-system are studied, assuming an ideal system. It is concluded that a composite propulsion system is ideal for a soft landing, and that a solid rocket should be used to cancel out about 90% of the approach velocity, with some simple hypergolic or monopropellant liquid system used for trimming the residual velocity, maintaining attitude control, and final touchdown maneuvers. The characteristics are described of a hypothetical propulsion system for landing a net instrument package of about 200 lbs. on the lunar surface. Information on the SURVEYOR program is included.

4,889

Stehling, K. R. 1960 LANDING ON THE MOON.
Space/Aeronautics 33(2):42-45, Feb. 1960

ABSTRACT: "Hard" and "soft" impact landings on the moon are briefly considered. Hard impact velocities with no braking will approximate 7000-10,000 fps and the shock may reach 500,000 g's. "Soft" impact landings using rocket control may produce shock as little as 10 g's. Problems of descent perturbation, braking, ground blast, and impact, with respect to nature of the lunar surface are all reviewed. Additional problems must be considered if solid rockets are used for the lunar landing. It is concluded that "soft" landings will be very hard to simulate here on earth and thus the first "soft" moon landings will probably be unmanned.

4,890

Stehling, K.R. 1961 THE MANNED LUNAR PROJECT
Interavia (Geneva) 16 (12): 1654-1655. Dec. 1961

ABSTRACT: Unmanned lunar explorations during the next five years will yield considerable information about the lunar surface structure, radiation levels near the moon's surface, and other physical constants pertaining to the moon. Although much of this information will be used in support of manned lunar landing activity, a substantial fraction will be used for the general advancement of lunar science. The research program of the National Aviation and Space Agency is subdivided as follows: (1) Ranger lunar probe for hard landing; (a) Surveyor lunar probe for soft landing; (3) Prospector, a mobile instrument unit which can travel on the lunar surface over limited distances; and (4) Apollo, manned space vehicle for a three-man crew. Description of htese programs is presented and illustrations are included of the Ranger and Surveyor probes.

4,891

Steinberg, I. I. 1959 MEDICAL ELECTRONICS: BLACK BAG IN SPACE
Astronautics 4(6):26-27, June 1959

ABSTRACT: Description of specially designed electronic devices to determine the physiological and psychological responses of the first man in space.

4,892

Steiner, S.H. 1959 STANDARDIZATION OF THE ENDPOINT FOR CENTRIFUGE EXPERIMENTS DURING POSITIVE ACCELERATION.
(Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, 27-29 April 1959.)

ABSTRACT: A plea has been made to standardize the endpoint in human centrifuge experiments at all installations. Light loss is usually taken as a standard endpoint, particularly for experiments involving G protective equipment. The British group use a blackout point which is below that usually obtained at other centers. The advantage to the subject is obvious. At the Aero Medical Association Meetings in 1958 it was agreed that all centrifuge centers would compare this system with a white light panel commonly used at many installations in this country. This system involves visualization of 760 mu red filtered light, in a dark adapted subject, adjusted to 0.5 log units above visual threshold for this wave length. A gradual onset run of 0.1 g/sec is used to prevent temporary blackouts due to slowness of cardiovascular adaptation. Each member of our subject panel was consecutively run to blackout with red light and our standard white light panel. Three runs of various combinations completed one series.

4,893

Steiner, S. H. 1959 STANDARDIZATION OF AN ENDPOINT TO POSITIVE ACCELERATION ON THE HUMAN CENTRIFUGE. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 59-426; ASTIA AD-240 876; Dec. 1959

ABSTRACT: The experimental variables in acceleration research should be standardized among all of the different centrifuges. This would make similar data comparable from one laboratory to another. The purpose of this study is to establish an objective and standardized endpoint for positive acceleration experiments. A comparison was made of blackout thresholds to a red filtered light of 760 mu, raised 0.5 log units above visual threshold in dark adapted subjects to a white light in the same subjects. A significant difference was found for each subject ($p<.02$). Differences between white and red light varied 1.1 to 2.8 g for this group. The differences observed would vary from one centrifuge to another depending on the intensity and transmission spectrum of the white light used. Physiological implications, advantages, and possible sources for error are discussed. (AUTHOR)

4,894

Steiner, S. H., G. C. E. Mueller, and J. L. Taylor, Jr. 1960 HEMODYNAMIC CHANGES DURING FORWARD ACCELERATION. Aerospace Medicine 31(11): 907-914 November 1960.

ABSTRACT: Chloralose anesthetized mongrel dogs were accelerated at 6, 10, and 14 G for ten-minute time periods, in the forward facing position, on the Wright Air Development Division centrifuge. Cardiac output, heart rate, circulation time, blood pressure, respiratory rate, and qualitative appearance of arterial blood were recorded.

Only minimal changes in cardiac output occurred. These changes correspond closely to decreases in heart rate, and increases in circulation time, resulting in unimpaired stroke output. Blood pressure related to midchest surface anatomy fell slightly, but probably does not represent physiologically important alterations in the vital cardiac regulatory areas.

Respiratory frequency was increased and all arterial blood samples showed qualitative evidence of desaturation accompanied by marked clinical cyanosis of the mucous membranes.

4,895

Steiner, Sheldon H., Gustave C.E. Nueller, et al 1960 HEMODYNAMIC CHANGES DURING TRANSVERSE ACCELERATION
Paper: 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel Bal Harbour, Miami Beach, Fla., May 9-11, 1960

ABSTRACT: The measurement of the cardiac output using a dye-dilution technique has been made in dogs during transverse acceleration stresses of 6, 10 and 14 G

for ten minutes at each G level. Arterial samples drawn before and during the stress were analyzed for oxygen saturation. Preliminary observations of data reveal no essential change in cardiac output, and peripheral resistance is maintained without significant changes. At 6 G the oxygen saturation remains within normal limits and at higher G levels there is a progressive diminution of arterial oxygen saturation.

4,896

Steiner, S. H., & G. C. E. Mueller 1961 HEART RATE AND FORWARD ACCELERATION. J. Appl. Physiol. 16(6):1078-1080, Nov. 1961

ABSTRACT: Cardiac rate was measured in 6 human subjects during forward acceleration at 8 g and compared with changes in head position while maintaining the remainder of the body in the same position. There was no change in cardiac rate for the 20-second duration the plateau with the head in a neutral position (fully supine). The heart rate increased 20% with the head elevated and decreased 16% with the head depressed. Changes in rate are produced by altering the position of the carotid baroreceptors in relation to those located in the trunk, presumably due to alteration produced by acceleration forces in the perfusion pressures in the carotid arteries. (AUTHOR)

4,897

Steiner, S. H., & R. H. Behnke 1961 PULMONARY VENOUS ADMIXTURE IN MAN DURING NEGATIVE PRESSURE RESPIRATION. J. Appl. Physiol. 16(6):1047-1049, Nov. 1961

ABSTRACT: Arterial blood gases were measured after 10 mins of full-phase negative pressure breathing at a guage pressure of -40 mm. Hg. Oxygen capacity increased slightly, and oxygen saturation fell from 96.9% to 92.6% in the seated position and from 96.0% to 92.2% in the recumbent position. At this transthoracic pressure differential there would be expected only an 8-10 mm. decrease in oxygen tension resulting in a 1% decrease in arterial saturation. pH and calculated carbon dioxide tension were not altered. The physiological shunt appeared to increase as evidenced by the arterial saturation. If blood is redistributed away from poorly ventilated regions, the redistribution is not complete during negative pressure breathing at this magnitude. Although there appears to be an increased shunting, it is quite small compared to that reported in the anesthetized dog at only - 20 mm. Hg. The differences are probably related to the effects of anesthesia causing a decrease in lung volume and tidal volume. However, the arterial saturation at 8 g was 75%, and 8 g has been estimated as being equivalent to -28 mm. Hg (-3.5 mm. Hg/g). Therefore, the degree of arterial desaturation during forward acceleration is more reasonably related to the hydrostatic effects than to possible negative pressure breathing effects. (AUTHOR)

4,898

Steiner, S. H., & G. C. E. Mueller 1961 PULMONARY ARTERIAL SHUNTING IN MAN DURING FORWARD ACCELERATION. J. Appl. Physiol. 16(6):1081-1086, Nov. 1961

ABSTRACT: The arterial blood gases were determined during forward acceleration 90 degrees to the acceleration vector at 6 g and 8 g breathing room air and 8 g breathing 100% oxygen. Arterial saturation fell to 84% at 6 g and 75% at 8 g. Prebreathing oxygen for 15 mins prior to acceleration with continued inhalation during the acceleration plateau only partially corrected the undersaturation to 86% at 8 g. Recovery was not complete in 3 mins unless oxygen therapy was used. Whole blood carbon dioxide content was depressed at 6 g and 8 g on room air, but this was corrected by oxygen inhalation. However, during the recovery period while breathing oxygen the carbon dioxide content was depressed. pH was reduced and carbon dioxide tension elevated slightly during each acceleration period. Since cardiac output and alveolar ventilation have been reported to be essentially unaltered during forward acceleration at these magnitudes, the observed effects must represent substantial alterations in the individual ventilation to blood flow ratios throughout the lung, with approximately 50% of the cardiac output shunted thru totally nonventilated areas at 8 g. There also must be some inadequately perfused or nonperfused peripheral areas, as evidenced by the fall in carbon dioxide contant and pH and the accumulation of a substantial oxygen debt previously reported during acceleration. (AUTHOR)

4,899

Steiner, S. H. et al 1961 PULMONARY GAS TRANSPORT AS INFLUENCED BY A HYPERGRAVITATIONAL ENVIRONMENT.
J. Appl. Physiol. 16:641-643, July 1961.

4,900

Steiner, S.H., G.C.E. Mueller, A. Caton and J.L. Taylor EFFECTS OF FORWARD ACCELERATION UPON ARTERIAL BLOOD OXYGEN, CARBON DIOXIDE AND pH IN MAN. (In preparation).

4,901

Steiner, S.H., G.C.E. Mueller, and J. Prine THE PATHOLOGY OF CANINE SUBJECTS EXPERIENCING FORWARD ACCELERATION. (In preparation).

4,902

Steiner, S.H. and G.C.E. Mueller THE CAROTID BARORECEPTORS AS DETERMINANTS OF HEART RATE DURING FORWARD ACCELERATION. (In preparation).

4,903

Steinkamp, G. R., W. R. Hawkins, G. T. Hauty, R. R. Burwell, & J. E. Ward 1959 HUMAN EXPERIMENTATION IN THE SPACE CABIN SIMULATOR: Development of Life Support Systems and Results of Initial Seven-Day Flights. (School of Avia. Med., USAF Aerospace Medical Center, (ATC) Brooks AFB Texas) Research Rept. No. 59-101, Aug. 1959.

4,904

Steinhoff, , Fehlke, & Buss, tr., J.B. Bateman, & V.J. Wulff 1945 FUNCTIONAL AND FLIGHT TESTS OF THE COMPRESSED AIR EJECTION SEAT INSTALLATION OF THE He 219. (Rechlin Testing Ground) Interim Rept. No. 1, 3 Aug. 1944. Translated as Appendix 11 to Lovelace, W.R., E.J. Baldes, & V.J. Wulff, The Ejection Seat for Emergency Escape from High Speed Aircraft ASTIA ATI 7245

SUMMARY: The function of the compressed air emergency catapult seat installation of the He 219 was tested on the ground and during flight. Forty ejections were made with dummies and three with human beings during flight. The assembly is fit for operation. Maximum permissible ejection pressures determined from the results of ejection experiments on ten human beings on the ground are as follows: For the pilot's seat, 100-105 atm.; For the observer's seat, 85-90 atm. With these pressures it is certain that the tail can be cleared at velocities of flight up to 500 km/h and at any altitude. (Author)

4,905

Stembridge, V. A., W. M. Crafft and F. M. Townsend 1958 MEDICAL INVESTIGATION OF AIRCRAFT ACCIDENTS WITH MULTIPLE CASUALTIES J. of Aviation Medicine 29(9):668-675, September, 1958

ABSTRACT: Suggested methods for handling multiple casualties from aircraft accidents are outlined including: permission for postmortem examination; handling of bodies at the scene; identification problems; external examination; autopsy with histopathologic and toxicologic studies; and liaison with other accident investigators. A case is presented illustrating the actual performance of these steps.

4,906

Stepanov, B. 1960 ON THE WAY TO THE STARS Krasnaya zvezda P. 3; 18 May 1960

4,907

Stephenson, W. B. 1962 INVESTIGATION OF HIGH-SPEED IMPACT: A TECHNIQUE Aerospace Engineering 21(11):10-16

4,908

Stephenson, W.B. 1962 PERFORMANCE OF A SMALL TWO-STAGE, LIGHT-GAS GUN USED FOR IMPACT TESTING. (Arnold Engineering Development Center, Air Force Systems Command, U.S. Air Force) ASTIA AD-270 170, January 1962

ABSTRACT: The performance of a small, two-stage, light-gas model launcher used for high velocity impact testing is estimated for the practical range of operating varibles. Hydrogen and helium are compared as propellants. The effects of powder charge, piston weight, and pump tube gas charge pressure are shown. Experimental results are included.

4,910

Stern, M.I. 1949 DETERMINATION OF URINARY TOTAL NEUTRAL 17 and 20 KETOSTEROIDS IN "STRESS". (RAF, Institute of Aviation Medicine, Farnborough) FPRC 719, July 1949.

4,911

Sternick, S., D.T. Stimmel, and I.J. Sattinger 1961 HUMAN REACTION TO MILITARY VEHICLE RIDE (Institute of Science and Technology, University of Michigan, Ann Arbor, Michigan) Report No. 2889-17-F, Jan. 1961, ASTIA AD 250 099

ABSTRACT: The results of an investigation conducted at Willow Run Laboratories (now Institute of Science and Technology), of The University of Michigan, into the effects of ride on both passengers and crewmembers of military ground vehicles are described. A general analysis of these effects is given as a basis for defining the problems associated with vehicle ride and of recommending an experimental program to obtain quantitative information on the effects of ride on comfort and performance. Test techniques and test equipment requirements for comfort tests using the Method of Adjustment and for performance tests using tracking, driving, visual recognition, and information handling tasks are outlined. These tests are based on the use of a vehicle-motion simulator which would subject human beings to prescribed sinusoidal and transient motions. As an example of how the various test phases can be performed, a suggested first year's test program is developed to obtain data on the subjective evaluations of sinusoidal and nonsinusoidal motions in pitch and roll.

4,912

Steuberm M.F. 1949 COMPARISON OF OVERALL IMPACT LOADS OBTAINED DURING SEAPLANE LANDING TESTS WITH LOADS PREDICTED BY HYDRODYNAMIC THEORY. (National Advisory Committee on Aeronautics) Technical Note 1781, January 1949

4,913

Stevens, H.L. 1939 PROPOSED CENTRIFUGE
(RAF, Institute of Aviation Medicine, Farnborough)
FPRC 43, July 1939

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Stevenson, S.A. 1960 A BIBLIOGRAPHY OF AEROSPACE MEDICAL DIVISION REPORTS IN THE FIELDS OF ENGINEERING PSYCHOLOGY AND TRAINING PSYCHOLOGY 1945-1960. (Wright Air Development Division, Wright-Patterson AFB, Ohio)
WADD Bibliography Q-Z; May 1960.

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Stewart, W.K. 1940 FINAL OBSERVATIONS ON THE VALUE OF CROUCHING AS A PREVENTATIVE OF BLACKING-OUT. (RAF, Institution of Aviation Medicine, Farnborough) FPRC No. 177. ASTIA ATI 164 410

ABSTRACT: Eleven subjects made 100 man-runs undergoing centrifugal force in planes. Nine subjects were able to raise their blackout thresholds one to two "g' by crouching; two showed no improvement. An accessory rudder bar to facilitate the crouch position is described.

4,916

Stewart, W.K. 1940 OBSERVATIONS ON THE EFFICIENCY OF ABDOMINAL BELTS IN THE PREVENTION OF BLACKING OUT. (Farnborough) FPRC No. 176. ASTIA ATI 206389

ABSTRACT: All tests conducted in planes by a small number of subjects.
(a) Elastic belts do not raise blackout threshold, may shorten period between blackout and unconsciousness. Although they produce a feeling of confidence at low values of "g", they are potentially dangerous.

(b) Pneumatic belts inflated at pressures exceeding 50 mm Hg prevent fastening of Sutton harness. Even pressures of 80 to 100 mm Hg (of therapeutic value according to Armstrong) do not elevate blackout threshold.

(c) Hydrostatic belts are uncomfortably cold even at altitudes as low as 10,000 feet. At 6 "g" belts are a serious hindrance due to increased effective weight. Water does not drain out of belts after exposure to "g" and is very uncomfortable. Hydrostatic belts elevate "g" threshold at least 0.5 "g", but disadvantages outweigh the gain. It is recommended that experiments on belts as anti "g" devices be discontinued.

4,917

Stewart, W.K. 1940 NOTE ON EXPERIMENTS CARRIED OUT IN BATTLE K.9289. Report F.P.R.C. #212-A, December 1940

4,918

Stewart, W. K. 1940 AN INVESTIGATION INTO THE EFFECT OF A RECLINING POSTURE ON THE ABILITY TO WITHSTAND HIGH "G" (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 212; 10 Dec. 1940. ASTIA ATI 206318

ABSTRACT: One subject made experimental runs exceeding 5 "g" for 10 to 20 seconds. Peak run was 6 "g" for 6 to 9 seconds. This resulted in unconsciousness when subject was unprotected. When cockpit seat was inclined 45 degrees from vertical and feet raised to level of seat, complete visual protection was obtained.
The venous and arterial hydrostatic levels were reduced only one inch by this maneuver, but the decrease in the leg-thigh and thigh-spine angles promoted venous return. Visual fields were not markedly reduced by this procedure, but tilting sufficient to protect from higher values of "g" would produce definite visual impairment.

4,919

Stewart, W. K. 1941 REPORT ON BLACKING-OUT (RAF, Institute of Aviation Medicine, Farnborough) FPRC Report 233, Jan. 1941.

4,920

Stewart, W.K. 1941 REPORT ON ACCELERATION.
(Flying Personnel Research Committee, England) Report No. 136a
ASTIA ATI 153 560, May 1941.

ABSTRACT: To investigate pooling of blood in the legs, a metal oncometer in the form of a boot was constructed in order to investigate the effect of high G on the total volumes and blood flows in the lower limbs. Using the standard technique of Hewlett and Van Zwaluwenberg, considerable work was carried out on the ground to determine the total increase in leg volume due to a venous stasis, produced by a pressure in the sphygmomanometer cuff of 60 - 80 m. Hg. However, it was unfortunately found to be impossible to use the oncometer in the air owing to disturbance from the increase in the external air pressure as height is lost. This is at present inevitable when producing high G in the Battle. Consequently this method has had to be temporarily abandoned.

Work has also been commenced on the influence of moderate G on ocular reaction times and on the localisation of the failure of vision. In connection with the latter, atropinasion of the pupils does not effect the threshold value.

4,921

Stewart, W. K. 1941 INFLUENCE OF DRUGS ON ABILITY TO WITHSTAND CENTRIFUGAL FORCE (RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 338, 11 Aug. 1941

ABSTRACT:
(a) CYCLITON (like coramine and camphor) produces a rise in respiratory rate and blood pressure. 2 cc injected in human subjects have no effect on blackout threshold but alleviate fatigue due to "g" in flight tests.
(b) BENZEDRINE. 25 mg injected have no effect on "g" tolerance.
(c) GLUCOSE. Injection of 80 gms in 500 cc water has no effect on "g" tolerance.
(d) EPHEDRINE and ADRENALINE. Have synergistic effect on the sympathetic nervous system. Ephedrine alone has no effect on "g" tolerance but ephedrine plus adrenaline produce a slight improvement.
(e) ARENAL CORTICAL EXTRACT (ESCHATIN). When 10 cc (250 dog units) are injected, they produce a very variable rise in blood pressure and in "g" tolerance.
CONCLUSION: None of the drugs tested have any immediate application to the problems of "g".

4,922

Stewart, W. K. 1941 FINAL REPORT ON EFFECT OF ABDOMINAL COMPRESSION ON ABILITY TO WITHSTAND G (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 300. ASTIA ATI 206 420.

ABSTRACT: The Valsalva maneuver becomes less effective with increasing altitude. Thus one subject was able to produce only 42 mm Hg rise in blood pressure at 35,000 feet as compared with 65 mm at sea level. Another produced only 10 mm Hg rise at 31,000 feet as compared with 26 mm at sea level.
It is concluded that increased intra-abdominal pressure has 2 effects:

(1) an immediate beneficial effect on cerebral circulation which is maximally effective after 60 seconds, and
(2) a retardation of blood flow from the lower limbs which leads to a decrease in the minute volume of the heart, hence to syncope. Therefore increased intra-abdominal pressure of long duration will lower the "g" threshold. An increase shortly before exposure to "g" will raise the threshold but will not prevent blackout or syncope if the "g" is applied for a sufficient period of time. The discomforts and dangers of abdominal belts are believed to outweigh the slight protection afforded.

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Stewart, W. K. 1942 NOTE ON SPENCER ACCELERATION BELT AND LEGGINGS USA FIRM. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 458, May 1942.

4,924

Stewart, W.G. 1943 THE EFFECT OF TILTING THE HEAD BACK ON THE INCIDENCE OF SICKNESS ON THE 4-POLE SWING. (RCAF no. 2 Clinical Investigation Unit.) June 1943.

4,925

Stewart, W.G., G.W. Manning and A.J. Sutherland 1943 CORRELATION BETWEEN SWING REACTION AND AIRSICKNESS. (National Research Council, Canada) Report #C-2873, 30 April 1943

ABSTRACT: Considered as a group (492 swing subjects) and regardless of body position 32 (11.5%) Type I, 10(24.4%) Type II and 68 (40.2%) Type III swing reactors become airsick. From this general group of 492 swing experiments it was found that 3 Type I, 1 Type II and 13 Type III swing reactors ceased training from airsickness. The 4 Type I and Type II reactors were, however, Type III swing reactors when swung again in the sitting and not the original supine position.

Group 4, the sitting, eves open position, when analysed per se, reveals that 11 (13.6%) Type I, 3 (16.7%) Type II and 29 (51.8%) Type III swing reactors became airsick. Only 10 men in Group 4 (all Type III) ceased training for airsickness. This number represent 17.9% of the Type reactors and 34.5% of these Type III reactors who became airsick any number of times. Six (12.8%) of these men were at Elementary Flying Training Schools and 4(44.4%) were at Air Observer Schools. The ceased training rate for all reasons among men in Group 4 (Types I, II and III swing subjects) was found to be 25.2% including 6.5% for airsickness. Among Type III reactors of Group 4 who ceased training for all reasons, airsickness acounts for 58.9% of the ceased training cases.

4,926

Stewart, W. K. 1945 SOME OBSERVATIONS ON THE EFFECT OF CENTRIFUGAL FORCE IN MAN. J. Neurol. Psychiat. 8:24-33.

4,927

Stewart, W. K. 1945 INVESTIGATIONS ON CENTRIFUGAL FORCE
(R. A. F. Physiological Laboratory)
(Paper, Meeting of the Physiological Society, 10 February 1945)

ABSTRACT: This problem has been studied in four general ways: (1) by experienced subjects in experimental aircraft, (2) by physiologists piloting various aircraft, e.g. Diringshofen, Davidson, (3) by mass study of pilots and their reactions, (4) in man-carrying centrifuges.
The major effects of centrifugal force on man result from the increased weight of his body components, especially the blood. Carotid blood pressure and cardiac output are lowered, with impairment of circulation and of central nervous functions. Of these, vision suffers first owing to the retinal circulation being opposed by the intraocular pressure which, if artificially raised, lowers the G threshold for blacking-out. Total failure of vision may be preceded by a progressive rise of threshold and light sense may outlast visual acuity. In a large group of pilots, large unaccountable differences in threshold occur. The average difference between greying of vision and black-out is 0-7 G. Central circulatory failure results in brief unconsciousness (not necessarily preceded by black-out if G is excessive and suddenly applied) followed on recovery by marked confusion or disorientation.
Raised blood sugar, benzedrine or adrenal cortical hormone scarcely influence visual impairment, and since susceptibility to the cerebral effects of G is increased during flight by O_2 lack (if severe or reinforced by CO) the effects described are attributed to retinal and cerebral anoxia. Occlusion of the leg circulation raises and reactive hyperaemia lowers the black-out threshold to G. During the partial visual impairment of a prolonged manoeuvre, muscular effort (abdominal straining) may raise the blood pressure and restore normality. A pilot's resistance to the stress may depend on his general circulatory reactivity.
Duration is important. 20 G for 0·01 sec. or 12 G for 0·1 sec. causes no visual or neurological disturbance. (Tolerance of brief large forces probably depends on the structural strength of the body). Several minutes of acceleration insufficient to impair vision cause only fatigue. In flight, the acceleration which affects vision usually reaches its maximum before reflex compensation (autonomic or somatic) can occur.
Increased weight may immobilize the trunk, but the limbs if supported are movable at right angles to the acceleration. Rapid rotation of the head (or a turret) at about 20 degrees/sec. under high G may cause temporary disorientation, otherwise vestibular disturbances are uncommon in experienced pilots.
(J. of Physiology 104:7P-8P, 10 Feb. 1945)

4,928

Stewart, W. K. 1945 SOME OBSERVATIONS ON THE EFFECT OF CENTRIFUGAL FORCE IN MAN.
J. Neurol., Neurosurg., Psychiat. N.S. 8(1):24-33.

ABSTRACT: (1) Some observations are presented which support the view that there is minimal impairment of cortical function at the "black-out" threshold.
(2) Application of centrifugal force as a method of experimental investigation holds marked possibilities for the study of fatigue, physiology of vision, of cortical function as well as circulatory problems.

4,929

Stewart, W.K. & H.L. Roxburgh 1945 GERMAN OCCUPATION DISARMANENT: AVIATION MEDICAL ASPECTS IN SCHLESWIG-HOLSTEIN
(Flying Personnel Research Committee, Air Ministry, Gt. Britain) FPRC 627, Appendix 14, May 1945.

ABSTRACT: Results of the interrogation of German personnel.
In response to questions about the ejection seat, the Squadron Commander gave the following information:
Experiments were first carried out on a ground test rig at the Heinkel aircraft works. This rig, essentially constructed from inclined rails, would appear to have been similar to the Martin-Baker test rig, and to have a vertical height of at least 10 m.
A compressed air system of propulsion was first investigated and abandoned in favour of an explosive charge.
Accelerations of 4-6 g were first investigated and gradually increased to 14 g which was the acceleration necessary for clearance from the Me. 162.
The duration of the acceleration was not known but the distance of propulsion at ground level was stated to be 10 m. and it is considered that these figures are reasonable consistent with present R.A.F. knowledge. At this acceleration, it was necessary to hold the head back and to place the feet on supports. The Squadron Commander did not himself notice any marked difference between the acceleration values of 6 and 14 g.
The highest of g reached in the tests was 26; a few cases of back injury occurred but these had not been observed by the officer.
He stated that the apparatus had actually been used in emergencies on two to three occasions and he thought that the maximum air speed had been 800 Km/hr. (500 mph). No difficulty had been commented on, either in separating from the seat or in autorotation after ejection. He could not state whether any masks had been dislodged in the air blast.

4,930

Stewart, W.K. 1946 EJECTION OF PILOTS FROM AIRCRAFT: A REVIEW OF THE APPLIED PHYSIOLOGY. (Air Ministry, Flying Personnel Research Committee) Rept. No. 671, Sept. 1946. ASTIA AD 222 472

ABSTRACT: For seat ejection two general stages are envisaged. Firstly,

ejection from the aircraft, which in itself is a great advance but implies a conscious pilot for preservation of life; secondly, development of ejection with ancillary automatic mechanism to ensure that an unconscious pilot will avoid severe injury. Cabin jettisoning is of primary importance for very high altitudes or very high speed aircraft and should be thoroughly investigated. If it proves acceptable physiologically, the final provisions for escape should include both jettisoning and ejection, but where this proves impossible in any given case, it should be the function of some central authority or committee to state which system has to be installed.

4,931

Stewart, W. K. & Pekarek 1946 IMPROVED ESCAPE FACILITIES IN FLIGHT FOR PILOTS AND AIRCREWS IN SERVICE AIRCRAFT. (RAF, Ministry of Supply, Great Britain) Scientific and Technical Memo., November 1946.

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Stewart, W. K. 1952 THE PHYSIOLOGICAL EFFECTS OF GRAVITY.
In Lectures on the Scientific Basis of Medicine (London) 2:334-342, 1952-1953, passim.

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Stewart, W. K. 1952 PHYSIOLOGICAL PROBLEMS OF HIGH PERFORMANCE MILITARY AIRCRAFT.
Advancement of Sci. (London) 9:378-381.

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Stewart, W.K. 1955 LUNG INJURY BY IMPACT WITH A WATER SURFACE
Reprinted from Nature, 175: 504-505, Jan.-Mar., 1955

ABSTRACT: Medical findings during the inquiry into the recent Comet disasters have suggested that the possibility of lung damage by impact with a water surface at the terminal velocity of fall should be investigated. It is known from observations on the effects of explosive blast that severe lung damage occurs when the impulses communicated to the chest wall exceeds a certain limit.

4,935

Stewart, W.K., H.P. Ruffel Smith, and D.J. Williams 1955 ROLE OF THE NERVOUS SYSTEM IN ADAPTATION TO HIGH PERFORMANCE FLYING (PROC. ROY. SOC. MED. 48, MAY 5, 1955) (Flying Personnel Research Committee, Air Ministry) F.P.R. C. Report No. 942, May 1955

4,936

Stewart, W. K. 1956 HIGH ALTITUDE AND SPACE TRAVEL Royal Society for the Promotion of Health Journal (London) 76 (8) August 1956.

4,937

Stewart, W. K. 1959 BEHAVIOR IN CONVENTIONAL AND EXTRA-TERRESTIAL FLIGHT. SOME FUTURE ASPECTS OF AVIATION MEDICINE. Nature (London) 184:578-582, Aug. 22, 1959

ABSTRACT: Reviews physiological, psychologic, and biochemical aspects of behavior and reactions of man and animals during conventional and space flight.

4,938

Steyer, W.A. 1950 TRACK OPERATED TEST VEHICLES, DESCRIPTION AND PERFORMANCE FOR EJECTION SEAT EXPERIMENTATION (Northrop Aircraft, Inc., Hawthorne, Calif.) Rept. No. SP-5, 3 Oct 1950, ATI 95 213

ABSTRACT: This report is a detailed presentation of test equipment preparations and operations performed by Northrop Aircraft, Inc. for the Aircraft Laboratory, Engineering Div., Air Materiel Command pursuant to ejection seat experimentation in accordance with Contract AF33(038)-3096. As part of Air Force Project MX-864 ejection seat tests were conducted on track operated vehicles on the 10,000 ft. aerodynamic research track facility located at Edwards Air Force Base, Muroc, California. The services rendered by the Contractor included design and fabrication of rocket-propelled test carriages and seats, carriage velocity recording instrumentation and seat actuation mechanisms, together with all preparations and actual operations of test carriages with seat configurations as directed by AMC Aircraft Lab personnel. Instrumentation operations pursuant to performance of the ejection seat test articles were performed by personnel of AMC Instrumentation and Photographic Laboratories.

4,939

Stickle, J. W., & N. S. Silsby 1960 AN INVESTIGATION OF LANDING-CONTACT CONDITIONS FOR A LARGE TURBOJET TRANSPORT DURING ROUTINE DAYLIGHT OPERATIONS. NASA TN D-527

4,940

Stickle, J. W. 1961 AN INVESTIGATION OF LANDING-CONTACT CONDITIONS FOR TWO LARGE TURBOJET TRANSPORTS AND A TURBOPROP TRANSPORT DURING ROUTINE DAYLIGHT OPERATIONS. (National Aeronautics & Space Admin. Washington, D. C. NASA TN $-899.

SUMMARY: The report presents statistical results of an investigation to determine the vertical velocity, airspeed, rolling velocity, bank angle, and distance from the runway threshold, just prior to ground contact. A total of 395 landings of two turbojet transports and a turboprop transport were made on a dry runway at the Los Angeles International Airport. (NASA)

4,941

Stieglitz, W. I. 1950 A NOTE ON CRASH-WORTHINESS.
Inst. Aero. Sci. Preprint No. 266

(Paper, Annual Meeting of the Institute of Aeronautical Sciences, 1950.)

4,942

Stiehm, E. R. 1961 ACCELERATION PROTECTION BY MEANS OF STIMULATION OF THE RETICULO-ENDOTHELIAL SYSTEM.
Aerospace Medicine 32(3):248, March 1961.

ABSTRACT: An animal's non-specific resistance to stress is intimately associated with the reticulo-endothelial system (RES). Hypertrophy of these cells is associated with increased resistance to a wide spectrum of stresses, including bacterial invasion, drum trauma, hemorrhage, and X-irradiation. Thus, it was of interest to see if resistance to acceleration stress could be enhanced by such means. Bacterial endotoxin, a potent RES stimulator, was given to rats and their ability to withstand 20 positive G was measured. Tolerance to acceleration was increased 100 per cent in some cases without reaical alteration in the animal's metabolism. The conditions for such enhancement of acceleration resistance are presented and the underlying mechanisms discussed.

4,943

Stiehm, E. R. 1961 HOST FACTORS IN RESISTANCE TO ACCELERATION STRESS. In Bergeret, P., ed., Bio-Assay Techniques for Human Centrifuges and Physiological Effects of Acceleration. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 48. Pp. 130-139.

4,944

Stiehm, E. R., & J. M. Lyle 1961 THE EFFECT OF COBALT POLYCYTHEMIA ON THE ACCELERATION TOLERANCE OF THE RAT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6102; ASTIA AD-252 886; 1 Mar. 1961
See also Aerospace Medicine 32(7):630-633, July 1961

ABSTRACT: Twenty-five animals were made polycythemic by cobalt administration. The action of cobalt resulted in some growth retardation and an average increase in hemoglobin from 16.9 gm./100 ml. to 21.9 gm./100 ml. The tolerance to positive acceleration was then measured using a physiologic end point approaching death. Nine animals were centrifuged immediately after cobalt administration and 16 were centrifuged 10 days after cessation of cobalt, at which time any toxicity due to cobalt has disappeared but polycythemia persists. No significant difference of tolerance to acceleration was noted in either cobalt group as compared to control rats, suggesting that increasing the amount of oxygen to the tissues does not result in a reversal of the cellular anoxia caused by positive acceleration.

4,945

Stiehm, E. R. 1961 ACCELERATION PROTECTION BY MEANS OF STIMULATION OF THE RETICULO-ENDOTHELIAL SYSTEM. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-6129, 22 June 1961. ASTIA AD 260 549
NOTE: CARI P&S
See also J. Appl. Physiol. 17(2):293-298, March 1962

ABSTRACT: Stimulation of the rats' reticulo-endothelial system (RES) was found to be effective in enhancing the tolerances to high G acceleration stress. Utilizing 10 daily consecutive intraperitoneal injections of endotoxin at increasing doses from 100 to 1200 gms, the median survival time of 122 rats undergoing 20 positive G acceleration was increased from a control level of 9.7 min to 14.2 min. One group of 48 rats had a median survival of 23.6 min compared to a control level of 11.3 min. The protective action of RES stimulation and the inhibitory action of RES blockade was found to be effective in rats with normal or prolonged survival but not in rats with diminished tolerance before stimulation or blockade. An analysis of factors for optimal RES stimulation is presented as are possible mechanisms of action. (AUTHOR)

4,946

Stiehm, E. R., & J. M. Lyle 1961 THE EFFECT OF COBALT POLYCYTHEMIA ON THE ACCELERATION TOLERANCE OF THE RAT. Aerospace Medicine 32(7):630-633, July 1961
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6102; ASTIA AD-252 886; 1 Mar. 1961 (F)

ABSTRACT: Twenty-five animals were made polycythemic by cobalt administration.

The action of cobalt resulted in some growth retardation and an average increase in hemoglobin from 16.9 gm./100 ml. to 21.9 gm./100 ml. The tolerance to positive acceleration was then measured using a physiologic end point approaching death. Nine animals were centrifuged immediately after cobalt administration and 16 were centrifuged 10 days after cessation of cobalt, at which time any toxicity due to cobalt has disappeared but polycythemia persists. No significant difference of tolerance to acceleration was noted in either cobalt group as compared to control rats, suggesting that increasing the amount of oxygen to the tissues does not result in a reversal of the cellular anoxia caused by positive acceleration.

4,947

Stiehm, E. R. 1962 THE EFFECT OF HYPOTHERMIA ON THE RAT'S TOLERANCE TO HIGH POSITIVE ACCELERATION WITH EVIDENCE FOR THE EXISTENCE OF DIFFERENT ACCELERATION SYNDROMES AT HIGH AND LOW G. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-6203, May 31, 1962. ASTIA AD 277 704

ABSTRACT: The tolerance to high positive acceleration at levels of 20 to 80 g was studied in normal and hypothermic rats. Normal rats have a mean survival time at 20 g of 680 seconds but this decreases to 105 sec. at 30 g. Only slight further decreases are noted at higher g, suggesting that 30 g is the point at which cerebral circulation is interrupted. Hypothermia at 22.5 degrees C. decreases the tolerance of rats to 20 g positive acceleration but markedly increases their tolerance to 30 g and above. The beneficial effect of hypothermia was most pronounced at 40 g at which level hypothermic rats have a mean survival time of 252 sec. compared to that of control rats of 75 sec., an increase of 236 per cent. The ECG is useful as an indication of death at 20 g but not at 30 g or above. Animals that do not survive high g levels die of respiratory paralysis despite good heart action. Hypothermia must make the respiratory center less sensitive to the deleterious effect of hypoxia. There seem to be two distinct syndromes of physiologic failure during positive acceleration. One is a "cardiac" syndrome, occurring at 20 g and below, characterized by partial maintenance of cerebral circulation until cardiac failure ensues, and the other is a "cerebral" syndrome, occurring at 30 g and above, characterized by immediate interruption of cerebral circulation. Agents such as hypothermia, which increase tolerance at one level of positive acceleration, will not necessarily be of benefit at another level.
(Aerospace Medicine 33(11):1397, Nov. 1962)

4,948

Stiehm, E. R. 1962 ACCELERATION PROTECTION BY MEANS OF STIMULATION OF THE RETICULO-ENDOTHELIAL SYSTEM. J. Appl. Physiol. 17(2):293-298, Mar. 1962 See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-6129, 22 June 1961

ABSTRACT: Stimulation of the rats' reticulo-endothelial system (RES) was found

to be effective in enhancing the tolerances to high G acceleration stress. Utilizing 10 daily consecutive intraperitoneal injections of endotoxin at increasing doses from 100 to 1200 gms, the median survival time of 122 rats undergoing 20 positive G acceleration was increased from a control level of 9.7 min to 14.2 min. One group of 48 rats had a median survival of 23.6 min compared to a control level of 11.3 min. The protective action of RES stimulation and the inhibitory action of RES blockade was found to be effective in rats with normal or prolonged survival but not in rats with diminished tolerance before stimulation or blockade. An analysis of factors for optimal RES stimulation is presented as are possible mechanisms of action. (AUTHOR)

4,949

Stiehm, E. R. 1963 DIFFERENT EFFECTS OF HYPOTHERMIA ON TWO SYNDROMES OF POSITIVE ACCELERATION.
J. Appl. Physiol. 18:387-392, March 1963.

4,950

Stigler, R. 1912 VERSUCHE UBER DIE BETEILIGUNG DER SCHWEREEMFINDUNG AN DER ORIENTIERUNG DES MENSCHEN IM RAUME (Experiments about the participation of the gravity sensation on the orientation of humans in space)
Archiv. Physiol. (Bonn) 148:573

4,951

Still, E.W. 1960 EQUIPPING MAN FOR A FLIGHT TO THE MOON
Engineering, (London) 189(4907): 634-635, May 6, 1960

ABSTRACT: A review is presented of a paper read before the British Interplanetary Society on April 28, 1960. A resume of the United States Space Program was given, followed by a discussion of the environmental requirements for interplanetary travel and the engineering techniques being developed to meet these requirements. (Aerospace Medicine 31(10): 869, Oct. 1960)

4,952

Stiltz, H. L. 1961 AEROSPACE TELEMETRY. (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1961)

chemistry of the chimpanzee's response to simulated acceleration-deceleration flight profiles of the project mercury flights and to expose all programmed orbital flight animals to simulated acceleration-deceleration profiles to determine psychometer response ability.

4,956

Stingely, N. E. 1961 COUNTDOWN AND PROCEDURES FOR PROJECT MERCURY FLIGHT MR-2 (CHIMPANZEE SUBJECT). (AF Missile Development Center, Holloman AFB, New Mexico) AFMDC TR 61-20, June 1961. ASTIA No. AD-261652

ABSTRACT: This report presents a countdown in abbreviated form with detailed procedure sheets necessary to define specific actions. These actions are necessary to ready a chimpanzee subject and couch for flight in the Project Mercury capsule and the post-flight release and care of the subject. The countdown and procedures not only describe the mechanics of preparing the subject and couch for flight, but also include a plan for obtaining a maximum of useful research data. Thus the biomedical adequacy of the Project Mercury capsule and a verification of ground, flight and recovery procedures could be determined, and the chimpanzees' physiology, biochemistry and psychomotor performance could be studied. During the preliminary phases of the Project Mercury Animal Support program, chimpanzees were subjected to temperature-humidity tests, psychomotor training and acceleration-deceleration studies on a centrifuge and deceleration tracks. Considerable knowledge of the chimpanzees' physiology and behavior and invaluable experience in the use of Project Mercury hardware was gained during these exercises. The first drafts of this report were based on the above experiences. The final copy was updated from the experiences gained during dry runs and the actual MR-2 flight. (Author)

4,957

Stingely, N. E. 1962 THE PHYSIOLOGICAL RESPONSES OF CHIMPANZEES TO SIMULATED LAUNCH AND RE-ENTRY ACCELERATIONS. (6571st Aeromedical Research Lab., Holloman AFB, N. Mex.) Rept. No. ARL TDR 62-11; Proj. 6892; July 1962 ASTIA AD-282 883

ABSTRACT: Five male chimpanzee subjects were exposed to simulated space flight conditions of launch acceleration and atmospheric re-entry deceleration. Heart and respiration rates showed significant differences for the three conditions of launch. The conditions of launch were: launch acceleration only, launch acceleration with vibration and noise, and launch acceleration with noise, vibration, urinary tract catheterization and arterial and venous catheterizations. Physiological responses associated with launch and re-entry differed significantly from the baseline period that preceded each of the launches. Physiological changes associated with re-entry were not as severe as those seen with launch. The subjects recovered from the environmental stressors of both launch and re-entry very rapidly. The resultant responses should be good predictors of chimpanzee cardiac and respiratory activity during the critical acceleration phases of space flight and also serve as a baseline for the study of the effects of weightlessness following launch acceleration and prior to re-entry deceleration. (AUTHOR)

4,958

Stingely, N.E. 1962 COUNTDOWN AND PROCEDURES FOR PROJECT MERCURY ATLAS-5 FLIGHT (CHIMPANZEE SUBJECT). (Aeromedical Research Lab., Holloman AFB, New Mexico) ARL-TDR-62-17 Oct. 1962. ASTIA AD 288 921

ABSTRACT: This report presents the countdown and detailed procedures followed to prepare the chimpanzee subject and couch for flight in the Project Mercury capsule, and the post-flight release and care of the subject. It summarizes experiences gained during the Mercury Redstone-2 and the Mercury Atlas-5 flight programs.

4,959

Stirman, J.A. & B.J. Wilson 1957 TRAUMATIC RENAL FAILURE: A POSSIBLE ETIOLOGY. (School of Aviation Medicine) Rept 58-8. Sept. 1957.

ABSTRACT: The present study was undertaken to quantitate and define in experimental animals the changes in renal function incident to the hypovolemia which attends an acute extracellular fluid volume deficit, and the subsequent repair of this deficit with a balanced salt solution or with compatible whole blood. The results based on ten dogs indicated that a balanced salt solution was more effective than whole blood in repairing the glomerular filtration rate and urine flow in conditions of extracellular fluid deficiency. 24 hours after treatment with whole blood the blood urea level was significantly elevated.

4,960

Stivers, R.H. 1957 RANDOM ACCELERATION TEST FACILITY DESIGN CRITERIA (Sandberg-Serrell Corp., Pasadena, Calif.) Rept. No. R324-5, Contract AF(611) 2047, 15 Oct. 1957. ASTIA AD 145 649.

ABSTRACT: Design requirements are presented for a random acceleration test facility which will be located in the vicinity of the Hydrodynamics Laboratory at the Rocket Test Laboratory, Edwards AFB. The facility will conform, in general, to sizes, locations, types of construction, and equipment indicated the planning drawings and criteria, insofar as such are applicable and practicable when subsurface conditions are known. Structural callouts, evaluations, and other information shown on planning drawing will be verified during the final design phase. The facility will include a tower equipped with a soft mount and shaker, a pumphouse containing power supply equipment for the soft mount and shakers, a shop with boiler and terminal rooms, a control building, provisions for future installation of temperature conditioning facilities, and other necessary back-up facilities. Missiles to be tested will be subjected to controlled vibrations (amplitudes to $\pm$ 1 in., frequencies to 1000 c); these vibrations will simulate selected in-flight vibrations. Nonhazardous liquids will be circulated in the propulsion system during tests in lieu of actual propellants to minimize hazards and to simulate in-flight propellant mass and dynamic effects; nonfiring tests only will be conducted.

4,961

Stocker, J. 1961 A CRASH NEED NOT BE FATAL
Popular Mechanics 115(1): , Jan. 1961

4,962

Stoeckel 1942 SPECIAL SEAT AND CONTROLS DESIGNED FOR HIGH ACCELERATIONS (Sitzanlage Mit Steuerungslinrichtung Fuer Hohe Flugbeschleunigungen) ASTIA ATI-51 067, 23 February 1942

ABSTRACT: A discussion of the technical and physiological problems arising when the crew of an airplane are placed on horizontal position. This is a part of the intensive research as to the limits of endurance of the human organism which are underway at various places. The endurance limits seem to depend mainly on the magnitude, postition, and duration of the acceleratior vector which acts upon the human organism, as well as on the individual well-being of the airman. The aerotechnical conclusions of this aeromedical observations are that in normal upright sitting position radial accelerations beyond 6 g and longer than 4 seconds generally cannot be endured without causing blackout. With prone position, no such limit exists.

4,963

Stoll, A. M. 1953 HUMAN TOLERANCE TO COMBINED ACCELERATIONS - INVESTIGATIONS OF PHASE II - PRELIMINARY STUDY ON PRIMATES SUBJECTED TO MAXIMUM SIMPLE ACCELERATION LOADS. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-5201, 22 May 1953.

4,964

Stoll, A. M. 1952 HUMAN TOLERANCE TO COMBINED ACCELERATIONS. (Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5207, s Dec. 1952.

4,965

Stoll, A , B.M. Lewis, & D.H. Lewis 1955 MEASUREMENTS TO EVALUATE THE EFFECTIVENESS OF THE FULL PRESSURE HALF SUIT IN APPLYING EXTERNAL PRESSURE TO THE BODY. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5502, 21 March 1955

4,966

Stoll, A. M. 1955 HUMAN TOLERANCE TO POSITIVE G AS DETERMINED BY PHYSIOLOGICAL END POINTS. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5508; ASTIA AD-75 326
See also J. Avia. Med. 27:356-367, 1956

ABSTRACT: A method of analysis adapted to the use of data covering a wide range of acceleration rates is described. This method is used in the analysis of the accumulated data available at the Aviation Medical Acceleration Laboratory on tolerance to a wide range of levels of positive G resulting in grayout, blackout, and unconsciousness in unprotected humans. The data are plotted as a strength-duration curve of maximum G vs. total time of exposure to G. The curve is found to conform to the usual physiological patterns except in the range of low G for exposure times longer than 6 seconds, in which area cardiovascular reflexes become effective in increasing G tolerance. Comparisons with similar data from other laboratories indicate that good agreement is obtained when the time required to reach maximum G, as well as time at maximum, is taken into consideration. Because of the precision of the experimental procedure employed and the agreement obtained in areas where comparable independent data exist, it is concluded that in spite of the relatively small number of individual end points (forty), the tolerance curve as drawn here may serve as a valid standard of reference for protection studies and for animal studies employing similar patterns of acceleration. A nomogram derived empirically from the experimental data is presented from which may be found the approximate tolerance time for various levels of G attained at various constant, linear rates of acceleration. This chart may serve as an instruction device and a guide in experimental design. (AMAL)

4,967

Stoll, A., B. M. Lewis, & D. H. Lewis 1955 A STUDY OF THE EFFECTS OF EXTERNAL PRESSURIZATION OF THE LEGS AND ABDOMINAL CAVITY UPON THE CARDIOVASCULAR SYSTEM WHEN APPLIED DURING EXPOSURE TO HIGH POSITIVE ACCELERATION. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 302; TED ADC AE 1401; 31 Dec. 1955

ABSTRACT: There has been completed a series of experiments in which measured external pressure was applied to the lower half of the body of the dog while pressures were measured from the carotid artery, the pulmonary artery, the rectum and the surface of the abdomen. Analysis of the data shows that: (1) cardiovascular pressures both above and below the diaphragm rise with increasing external pressurization and there is a transfer of blood from the abdomen to the thorax; (2) external pressures above 3 psi produce hemorrhages in the capillaries of the lungs, liver and spleen.

4,968

Stoll, A., R. Lawton, L. Greene, R. Zabelicky, & E. Kephart 1955 THE EFFECT OF INCREASED FORCES OF ACCELERATION UPON THE BLOOD FLOW AND DISPLACEMENT OF INTRAVASCULAR FLUID. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 313; 31 Dec. 1955

ABSTRACT: The development of two forms of instrumentation for the study of blood flow are under way, the first utilizing the thermostromuhr principle, and the second the dye dilution technique. Instrumentation of the thermistor thermostromuhr has proceeded through one pilot model which indicated the unit to be insensitive at body temperature (37 degrees C). Attempts are being made to secure, at this time, high resistance thermistors which will be sensitive at the temperature of the blood. The construction, design, and procurement of all the equipment for the dye dilution technique have been completed. Calibration of all components has been carried out, as well as numerous experiments at 1 G level.

4,969

Stoll, A.M. 1956 HUMAN TOLERANCE TO POSITIVE G AS DETERMINED BY PHYSIOLOGICAL END POINTS. J. Aviation Med. 27(8):356-367, Aug. 1956. (See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA5508, 30 Aug. 1955.

ABSTRACT: A method of analysis of experimental data covering a wide range of acceleration rates and positive G levels is described. The data are plotted as a strength-duration curve and found to conform to the usual physiological pattern except in the range of low G for exposure times longer than 6 seconds, wherein cardiovascular reflexes become effective. Comparisons show agreement among the data from the Aviation Medical Acceleration Laboratory, Wright-Patterson Air Force Base, Naval School of Aviation Medicine at Pensacola, and Mayo Clinic centrifuges. A nomogram relating approximate tolerance times to various G levels attained at various acceleration rates is derived empirically and discussed with respect to the influence of the rate of attaining G level on the total tolerance time. (DACO)

4,970

Stoll, A.M. 1957 SOME PHYSIOLOGICAL AND PATHOLOGICAL EFFECTS IN CHIMPANZEES EXPOSED TO 40 TRANSVERSE G FOR 15 AND FOR 60 SECONDS (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR27, August 30, 1957

ABSTRACT: The purpose of this study was to determine some of the physiological and pathological effects in chimpanzees to approximately 40 G applied transversely from chest-to-back and from back-to-chest, simulating the supine and the prone pilot positions respectively, with maximum G maintained for 15 seconds in each position. Four adult chimpanzees were used and each animal was subjected to only one exposure. All animals were given a physical examination before the run and autopsied at a time between 18 and 44 hours following exposure. All 4 animals survived. Only provisional gross diagnoses are available from the

autopsies at this time; however, these indicated that none of the pathologic changes observed were sufficiently severe to constitute a lethal injury. Tentative conclusions are: (a) the position of less trauma is that in which the G force is applied from chest to back (supine); (b) in the position of less trauma, the heart rate is nevertheless profoundly reduced and some abnormalities in conduction are evidenced; and (c) while the animals survived, the EKG events recorded allow for the possibility that permanent damage to the conductive system of the heart may have occurred.

4,971

Stoll, A. M. 1957 INVESTIGATION OF HUMAN TOLERANCE TO COMBINED ACCELERATIONS (Naval Air Development Ctr., Johnsville, Pa.) July 1957

4,972

Stoll, Alice M. and J. D. Mosely 1958 PHYSIOLOGIC AND PATHOLOGIC EFFECTS IN CHIMPANZEES DURING PROLONGED EXPOSURE TO 40 TRANSVERSE G J. of Aviation Medicine 29(8):575-586, August 1958

ABSTRACT: Chimpanzees were used in acceleration tests to determine the maximum forces to which it was anticipated that man might be exposed. The immediate effect of the present study was to extend the experimentally observed survival limit for the chimpanzee to at least 40 G for sixty seconds at maximum G with relatively little damage resulting when the animal sustains the G force in the fully supine position. Undoubtedly from the evidence obtained, it may be inferred that a shorter exposure at this G level could be endured without loss of consciousness or incurrence of an incapacitating injury.

4,973

Stoll, A. M., & J. D. Mosely 1958 PHYSIOLOGIC AND PATHOLOGIC EFFECTS IN CHIMPANZEES DURING PROLONGED EXPOSURE TO 40 TRANSVERSE G. J. Avia. Med. 29(8):575-586, Aug. 1958

ABSTRACT: To learn more of the effects of accelerative forces, five chimpanzees were exposed to 40 transverse G for periods up to 60 seconds in length. Electrocardiographic and respiration measurements were made during exposure and pathological effects were noted during autopsy 18 to 44 hours after exposure. The condition of the animals after exposure was evaluated clinically also. Certain conclusions in regard to preferential position during exposure to acceleration are also given.

4,974

Stone, Gerald 1961 A STUDY OF THE STATIC STRENGTH CHARACTERISTICS OF THE HUMAN NECK. (Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961.

ABSTRACT: This paper is concerned with the development of procedures and techniques for determining the maximum static exertive force of the human neck. Detailed description of a specialized device fabricated for the purpose of determining maximum neck moments is presented along with experimental results obtained using this device.

In all, ten subjects were utilized to obtain the experimental data. The subjects were all well motivated and typical of the general pilot population.

The data obtained details static maximum exertive neck moments which are pertinent to engineering design in connection with ejection from high speed aircraft. Of particular interest in the presented data is the large difference extension moments, the extension moments being approximately four times the flexion moments. Also shown is a trend which indicates greater muscle strength exists on the left side of the neck.

A requirement is shown for more detailed studies to enable a better biomechanical understanding of the complex structure which comprises the human neck. Included in these studies should be dynamic analysis of the neck under the influence of impulse and cyclic loading conditions.

4,975

Stone, I. 1955 HELMET DESIGNED FOR SUPERSONIC BAILOUTS. Aviation Week, pp.33-35 , 12 Dec. 1955

ABSTRACT: A new full-face helmet has been developed to afford complete head and face protection for the pilot of today's high-speed aircraft. Retention of the conventional helmet and oxygen mask combination is among the prime requisites for survival in high-speed high-altitude bailouts and other emergencies, pilots say. North American Aviation will be the first to evaluate the new helmet, developed by Protection, Inc. The two firms have been collaborating on the project since the supersonic bailout of NAA test pilot George F. Smith (AW Nov. 14, p.14). Frequently, windblast has ripped away helmet and oxygen mask, exposing pilots to hypoxia (lack of oxygen) and head and face injuries. Integration of the helmet and mask could eliminate the loss of these components in the face of strong windblast.

4,976

Stone, I., & E. Clark 1956 USAF REVEALS NEW X-2 CRASH DETAILS. Aviation Week 65(19):26-27, 5 Nov. 1956

ABSTRACT: New details on the loss of the Bell X-2 rocket research plane and the death of USAF Capt. M. G. Apt are revealed. Apparently high-speed pitching of the aircraft caused the pilot to eject the capsule. There is some indication that blackout due to excessive negative g forces may have prevented the pilot from completing the ejection procedures.

4,977

Stone, I. 1958 GRAVITY, HEAT, AFFECT SPACE CABIN DESIGN. Aviation Week 69(14):30-31, 6 Oct. 1958.

4,978

Stone, R. W., Jr. and W. Letko 1962 THE EFFECTS OF ANGULAR MOTION OF ROTATING SPACE VEHICLES ON THE ABILITY OF AN ASTRONAUT TO PERFORM SIMPLE TASKS Paper, Annual Meeting of the Inst. of Environmental Sciences, Chicago, Ill., 10-13 April 1962.

ABSTRACT: Use of angular motion to simulate effects of gravity in weightless space is a possible solution to the prevention of deterioration of muscle tone, muscle atrophication, and debilitation of the cardiovascular system that man may face when exposed to long periods of weightlessness. Tests are conducted to determine the maximum rotational rate that will not induce motion sickness by head and body movement when rotating a space vehicle 24 feet in diameter. Test results showed that stimulation of the vestibular organs of the inner ear can be caused by rotational rates beyond 10 r.p.m. The cross-coupled dynamics involved when moving the head or body in a rotating vehicle may cause the vestibular stimulation. Also there was a decrease in effectiveness in task performance as the vehicle rate of rotation increased. Thirteen of 29 subjects tested failed to complete the entire experiment. Also, the subjects that completed the tests experienced a reduction in efficiency at the higher rotational rates (beyond 10 r.p.m.). All subjects experienced malaise and nystagmus, both being particularly bothersome beyond 10 r.p.m. The results furthee suggest the need for experiments wherein the head motion is controlled to remain below certain of the tolerance boundaries suggested, so as to determine if efficiency can be maintained below the tolerable limits.

4,979

Strand, O. T. May 1950 IMPACT EFFECT OF TWO TYPES OF PROTECTIVE HELMETS. (U. S. Air Force, Air Materiel Command, Wright Field, Ohio) AFTR 6020.

4,980

Streltsov, V.V. 1942 AVIATION MEDICINE AND PHYSIOLOGY IN RUSSIA DURING THE LAST 25 YEARS. Byull. Eskper. biol i med., (5-6)14:7-15

ABSTRACT: Russian aviation medicine did not exist under the Czars. In 1924 the first psychophysiologic laboratory for the study of the aviation problems of the Red Army was founded. This group first studied the physiology and hygiene of high flight - oxygen need under reduced barometric pressures, physiologic role of accelerated motion, and night vision in relation to the lighting of the cabin interior. In 1929 to 1930 there were studies on the ear and its relation to aviator's disease. Other studies took up the function of the heart and circulatory system. In 1931 began the studies in the barometric chamber on breathing, metabolism, digestion and function of the central nervous system and receptors.

In 1933 the first flight instruction in the barometric chamber was established and other such schools soon followed. Investigations were pursued on the influence of oxygen starvation on the central and vegetative nervous systems. Other experiments studied the effect of oxygen starvation on the digestive tract. Another field of study was the physiology of parachuting, begun in 1931, particularly a kinocyclographic analysis of parachute falls.

4,981

Streltsov, V. 1944 THE FUNCTION OF THE EYE IN AVIATION. Am. Rev. Soviet Med., 2:126-133, Abstract: Quart. Rev. Ophth., 1:44, 1945

ABSTRACT: Acute visual disturbances occur in pilots who perform high velocity turns at high altitude or take an airplane out of a dive. Two types of visual disorder result from increased force of gravity. When this force is directed caudad, the pilot has the sensation of a dark veil moving past the eyes from below upward; as speed is accelerated the visual field is greatly obscured or completely blacked out. This is due to an acute anemia of the retina, following a rush of blood from the head. When the force is directed cephalad, red spots appear before the eyes or on surrounding objects, and the sky appears to be colored red; this is due to vascular engorgement of the choroidal vessels.

The ocular function under flying conditions is also affected by high powered sources of light such as searchlights. Experiments have shown that when the eyes are exposed to the beam of a searchlight, the person is unable to see illuminated objects previously distinctly perceptible for 20 to 30 minutes. So far no ideal light filter to overcome this has been found.

4,982

Strickland, B.A. and G.L. Hahn 1949 THE EFFECTIVENESS OF DRAMAMINE IN THE PREVENTION OF AIRSICKNESS. Science, 20 :371

4,983

Strickland, B. A., Jr., G. L. Hahn & H. Adler 1950 STUDIES ON AIRSICKNESS. J. Aviation Med. 21(2):90-97.

SUMMARY: 1. Observations on the symptomatology of motion sickness during these studies have left the impression that the terms vagotonia and sympatheticotonia as applied to this condition are rarely applicable. No such distinct differentiation in symptmotology was noted among 485 subjects subjected to motion stimuli.

2. A new method of research on airsickness, the use of experimentally produced aircraft motion in actual flight, has been devised.

3. Dramamine (B-dimethylaminoethyl benzohydryl ether 8-chlorotheophyllinate) is a very effective preventive of airsickness.

4. Based on a preliminary controlled study of twenty susceptible subjects, Dramamine appears to be no more effective than a placebo in preventing swing sickness.

5. Under the conditions described, hyoscine hydrobromide in doses of 0.65 mg. is from 10 to 12 per cent better than Dramamine in preventing experimentally produced airsickness.

6. Among 206 subjects given 100 mg. doses of Dramamine there occurred an 8.7 per cent incidence of undesirable side effects. With 0.65 mg doses of hyoscine hydrobromide the only undesirable side effect noted among eighty-eight subjects was dryness of the mouth which occurred in 15 per cent.

7. In a controlled study of thirty subjects, Dramamine did not adversely affect the performance of a complex coordination test or a reaction time test.

4,984

Strickland, B. A., Jr., & G. L. Hahn, & H. Adler 1951 EFFECTS OF DRAMAMINE ON AIRSICKNESS. (School of Aviation Medicine, Randolph Field, Texas) Project No. 21-32-007, Rept. No. 1, Feb. 1951; ASTIA AD-98 533

SUMMARY: 1) A new technique of research on airsickness, namely, the simulation of flight under turbulent conditions by experimentally produced aircraft motion in actual flight, has been devised. 2) Dramamine proved to be a moderately good preventive of airsickness, reducing the sickness rate to 28.7 percent in contrast to 55.6 percent for subjects receiving placebos. 3) From a preliminary study of 20 susceptible subjects, dramamine appeared to be no more effective than placebo in preventing swing sickness. 4) Under the conditions described, hyoscine hydrobromide in doses of 0.65 mg. was superior to 100 mg. doses of Dramamine in preventing experimentally produced airsickness. 5) Of 206 subjects receiving Dramamine (100 mg) 8.7 percent experienced undesirable side effects. With hyoscine hydrobromide (0.65 mg) the only undesirable side effect noted among 88 subjects was dryness of the mouth in 15 percent. 6) In thirty subjects, Dramamine did not affect adversely the performance of a complex coordination test or that of a reaction time test. 7) When placebo only was administered, the incidence of airsickness was influenced by the time interval between the last meal and the flight. Time since last meal was of little consequence in influencing incidence of airsickness in subjects given Dramamine. 8) When placebo was administered the subject's expectation of becoming airsick influenced his chances of actually becoming airsick. When Dramamine was given as a preventive, the subject's expectation of becoming airsick did not affect his chances of becoming airsick. (AUTHOR)

4,985

Strollo, M. 1955 VARIOUS EXPRESSIONS OF INSTINCTIVE LIFE IN RATS AND THEIR RELATION TO ACCELERATION: EXPERIMENTAL STUDY. Riv. Med. Aeronaut. 18 (4).

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Strollo, M. 1957 TREND OF BIMANUAL COORDINATION IN SUBJECTS EXPOSED TO DECELERATION AFTER ANGULAR ROTATION. (Andamento della coordinazione bimanuale in soggetti sottoposti a decelerazione dopo rotazione angolare) Rivista di medicina aeronautica (Roma), 20(4): 641-663, Oct. - Dec. 1957

ABSTRACT: Thirty subjects of a mean age of 27 years performed a bimanual coordination test to evaluate their tolerance to deceleration following angular rotation. Studies were made with a modified Casella's chrono-accelero graph connected to an instrument for the free bimanual coordination test. Tolerance was ascertained from two basic values, (1) the time which elapsed from the moment of deceleration to the moment of task performance, and (2) changes in task performance deduced from the number of errors and from the observed behavior. This test is valuable in presenting relative data of personal psychophysical characteristics, under the stress of brisk deceleration, which are essential for piloting and for selection of flying personnel. It also constitutes an efficient instrument for objective training by an exact determination of a candidate's capacities.

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Strollo, M. 1959 PROSPETTIVE DI INTERESSE PSICOLOGICO IN MATERIA DI VOLO SPAZIALE (PSYCHOLOGICAL ASPECTS OF SPACE FLIGHT) Minerva Medica 50(31): 1141-1146
NOTE: Reel 11, Flash 6

ABSTRACT: A number of problems of applied physiology connected with the feasibility of launching a manned vehicle into space, probably with the intention of reaching other planets, are discussed and a brief review is made of the serious problems involved. The need for studying a number of particular aspects of man in space is stressed, in the first place from the standpoint of "survival", and secondly, of 'operativeness". A preliminary picture is also drawn of the presumable psychological reactions of man to space flight. This picture is forcedly limited and fragmentary on account of the uncertainty of the first, tentative, experimental approaches and the lack of reliable data. These psychological changes are classified according to three different structural levels of the human personality: 1) psycho-physiological (senso-perceptive reality); 2) emotional-affective (psycho-emotional resonances and balance); 3) intellective (performance and operativeness). (Minerva Medica 50(31):1157, 1959)

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Strollo, M. 1961 [SOME EFFECTS PRODUCED BY RADIAL ACCELERATIONS OF DIFFERENT SIGNIFICANCE AT THE VISUAL-MOTOR LEVEL.]
Rev. Med. Aero (Paris) 2:40-43, Dec. 1961

4,989

Strong, H.L. 1952 THE AIR FORCE BOX SCORE PRESENTATION
(Conference on High Speed Escape, Wright Air Development Center, Wright-Patterson AFB, Ohio, 29-30 September 1952).

ABSTRACT: Experiences with conventional bailout are compared with bailout by means of an ejection seat on the basis of U.S. Air Force records and questionaires. The majority of fatalities due to ejection occurred in bailout below 2000 ft. A device for the automatic separation of the pilot from the ejection seat would alleviate this problem. Failure of the canopy jettisoning system was another cause of fatal or delayed escape. If the pilot could eject through the canopy, the number of accidents would be reduced. Standardization of releases and other devices, as well as elimination of unnecessary equipment might remove mental obstacles often responsible for accidents. Accidents could be further reduced by ejection seat training particularly when procedures and location of releases are changed; improvement of parachute training (over 50% of all escape injuries are connected with landing) is badly needed; and adequate oxygen training under the supervision of a specialized technician, who could also cope with problems related to the use of altitude suits, would be most important.

4,990

Strong, James 1955 1 G IN ALL DIRECTIONS
Aeroplane 88:676, May 20, 1955

ABSTRACT: A half-humorous review of space travel aspects of acceleration. The author believes that space ships should be designed for 1 G acceleration and deceleration in spite of fuel economics.

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Strughold, H. 1936 LUFTFAHRTMEDIZINISCHE FORSCHUNG (Aeronautical Medicine Research)
Internationaler Sportarzte-Kongress, II. (Berlin) 2: 212-215

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Strughold, H. 1946 SPEED IN AERIAL WARFARE AND PHYSIOLOGIC REACTION TIME. (War Dept., Air Forces) TSEAA-660-99, Appendix A, 28 Feb. 1945

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Strughold, H. 1950 THE MECHANORECEPTORS OF SKIN AND MUSCLES UNDER FLYING CONDITIONS. In German Aviation Medicine, World War II (Washington, D. C.: U. S. Government Printing Office, 1950) pp. 994-999

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Strughold, H. 1951 THE HUMAN TIME FACTOR IN FLIGHT I. THE LATENT PERIOD OF OPTICAL PERCEPTION AND ITS SIGNIFICANCE IN HIGH-SPEED FLYING (School of Aviation Medicine, USAF Randolph AFB, Texas) Special Report, January 1951

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Strughold, H. 1955 THE MEDICAL PROBLEMS OF SPACE FLIGHT. International Record Med. 168:570-575

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Strughold, H. 1956 A SIMPLE CLASSIFICATION OF THE PRESENT AND FUTURE STAGES OF MANNED FLIGHT. In School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 31
See also J. Avia. Med. 27:328-331 , August 1956

ABSTRACT: An examination of environment, speed, and distance as factors in the evolution of rocket-powered space flight.

SECOND ABSTRACT: The final achievement of a space flight to the moon or to Mars will be the end result of a gradual evolution. The stages of this evolution are examined under three main categories in this article: (1) the physiological and mechanical properties of the environment; (2) the speeds attained by rockets; (3) and distances they travel over and away from the earth. (CARI)

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Strughold, H. 1956 MEDICAL PROBLEMS INVOLVED IN ORBITAL SPACE FLIGHT
In School of Aviation Medicine, Randolph AFB, Texas, Epitome of Space Medicine, Item 32
See also Jet Propulsion 26:745-748, 756, 788, Sept. 1956

ABSTRACT: Discussion of medical problems involved in circumplanetary or orbital space flight including: the state of weightlessness, its sensomotor effect, and its effect upon the general wellbeing of satellite-vehicle occupants; the optical properties of the environment and the visual appearance of light sources; physiological day-night cycling; and problems of human engineering of the space cabin involving pressurization, supply of oxygen, removal of carbon dioxide, photosynthetic gas exchange, and the event of sudden decompression of the cabin. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

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Strughold, H. 1958 FROM AVIATION MEDICINE TO SPACE MEDICINE
Air University Quarterly Review, Summer 1958
See also J. Avia. Med. 23(4):315-318, 329, 1952

ABSTRACT: A brief outline of the development of space medicine is given. The lower layer of the atmosphere supports propeller (up to 60,000 feet) and jet (up to 80,000 feet) flight and is the realm of conventional aviation medicine. Space medicine is concerned with additional dimension, vertical, and its province is rocket flight which has no vertical limit. The transition from lower atmosphere to space conditions is gradual and various physiological functions of the atmosphere cease at different altitudes. These 'space-equivalent' altitudes are: for anoxia, 52,000 feet; body fluids boil at 65,000 feet; heavy primaries of cosmic radiation penetrate to 120,000 feet; ultraviolet solar radiation, to 135,000 feet; optical appearance of the sky, 400,000 feet; and penetration of meteorites, 500,000 feet. The so-called upper atmosphere of physicists is, for all physiological purposes, equivalent to free space. Aviation at present is in an amphibious stage, in a transition between conventional flight and space flight. (Literatuuroverzicht (Over Ruimtevaartgeneeskunke) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

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Strughold, H. 1958 MAN IN SPACE Flug-Revue 9:12-14 Sept. 1958.

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Strughold, H. 1959 BIOASTRONAUTICS ADVANCES IN RESEARCH (USAF School of Aviation Medicine) Document 47999(U), March 1959

ABSTRACT: In this publication fifteen special progress reports are published which deal with problems immediately applicable in rocket flight and satellite flight. Other reports about progress in fields which will be of usefulness in more advanced space operations. All of these special reports may serve as a source of information for physiologists and physicians working in a space medicine or bioastronautics, and also to the physical scientists, rocket engineers, military officials and government administrators concerned with the national space program.

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Strughold, H., & O. O. Benson 1959 SPACE MEDICAL RESEARCH New England J. Med. 261(10):494-502, 3 Sept. 1959

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Stubbs, R. A. 1951 MOTION RECORDING DEVICES USED BY THE RCAF AND THE DEFENCE RES. MED. LAB. IN MOTION SICKNESS STUDIES. (Defense Res. Med. Lab., Toronto) October 1951.

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Stubbs, R.A. 1953 DYNAMIC CENTRIFUGE TRIALS OF ANTI-G VALVES J. Aviation Med. 24(4):334-339, 370

ABSTRACT: The effects of various input pressures and ambient temperatures on the Aro M-8 and Clarke M-4 anti-g valves were investigated using wooded dummies and human subjects (wearing G-4A and G-4B anti-g suits) on the RCAF centrifuge. The valves were subjected to centrifugal accelerations of 3 to 8 g at 1 g increments. Each valve was subjected to more than 1,200 centrifuge runs. The results indicated that the Aro M-8 valve has some advantages over the Clarke M-4 valve in meeting the anti-g valve requirement of a modern, high speed aircraft.

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Strumza, M. V. 1961 [PROBLEMS POSED BY SPEED (ACCELERATION, DECELERATION)] Presse. Med. 69:317-320, Feb. 11, 1961