

were detached in a prescribed manner during re-entry. Results obtained indicated that for a sphere alone or a sphere with one parachute, the maximum angle of re-entry was 2° in order to keep the deceleration under $10g$. For the configuration consisting of 4 parachutes and a sphere, the maximum angle of re-entry was 6° . This latter configuration appeared to be a feasible means of re-entering the earth's atmosphere. A reference bibliography covering all of the problems of manned space flight is included.

1,220

Danaher, James W. and Anthony Sylvestro 1961
AVIATOR ESCAPE SYSTEM TRAINING
(Courtney and Co., Philadelphia, Penn.)
March ASTIA AD 256 342

ABSTRACT: The purposes of this study were to investigate Naval escape system training needs and to provide information upon which recommendations could be made to improve training procedures and devices. These data were gathered by means of a literature study; a Pilot Questionnaire; interviews with equipment manufacturers and training specialists; review and analysis of ejection accident data; and a training film survey. Recommendations were made regarding: the standardization of equipment and procedures involved in ejection, parachuting ditching and survival; dissemination of accident information to all pilots; added realism in training devices; and a more holistic approach to escape training. (AUTHOR)

1,221

Daniel, G. A., & C. F. Kasperek 1961 COMPREHENSIVE BIBLIOGRAPHY OF RESEARCH REPORTS ISSUED OVER A NINETEEN-YEAR PERIOD BY THE U.S. NAVAL SCHOOL OF AVIATION MEDICINE. (Naval School of Aviation Medicine, Pensacola, Fla.) Bureau of Medicine & Surgery Proj. MR005.13-3001; Subtask 5; Rept. No. 3; ASTIA AD 258 940.

ABSTRACT:

The Problem: Inasmuch as a complete listing under one cover of all research reports issued by the U. S. Naval School of Aviation Medicine had not been published since 1 May 1953, it seemed advisable that such a task be undertaken.

Findings: The 772 reports listed cover many aspects and phases of aviation and space medicine and show the trend which research has taken since formal entrance of the School into the field of research in 1942.

1,222

Daniels, G. S. 1952 HUMAN FACTORS OF EXTENDED RANGE FLIGHT.
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WCRD TN 52-57,
Sept. 1952.

1,223

Danilevko, V. I. 1962 PHYSIOLOGICAL REACTION OF THE ORGANISM OF SMALL
ANIMALS TO (PROLONGED TRANSVERSE ACCELERATION) Fiziologichnyi Zhurnal
(Journal of Physiology -- of the O. O. Bogomolets Physiology Institute of
the Ukrainian SSR Academy of Sciences) 8(2):220-230, Mar.-April 1962

ABSTRACT: This article was submitted for publication on 8/20/60, but the work was done in 1957 and 1958. The test animals were 259 albino rats, 49 albino mice, 20 siberian marmots, 12 pigeons, 10 sparrows, and one swamp turtle. Groups of these animals were variously subjected to transverse and longitudinal accelerations of 18.1, 20.1, 21.7, and 23.5 G,s for periods ranging from 15 seconds to 90 minutes in a special centrifuge with a radius of 0.65 meters. In some cases, ECG,s were recorded and hystological investigations of heart and lung preparations performed. The results are given in detail. White rats easily withstand 20.1 G,s chest-to-back for 10 minutes. White mice took 23.5 g,s for 50 minutes, side-to-side without ill effect. Most animals died after 35 seconds of 18.1 G,s head-to-tail. Forces of 20.1 G,s chest-to-back for longer than 5 minutes killed the pigeons but the sparrows supported this for 30 minutes. The turtle managed to survive 20.1 G,s chest-to-back for 60 minutes without harm. Barbamil narcosis and hypothermia --rectal temperature 24.0 to 26.0 c -- in white rats and hybernation in the marmots increased the endurance to acceleration but dibazol tried on the mice had no effect.

1,224

Danilin, B.S. 1958 VTORZHENIE V KOSMOS (INVASION OF THE COSMOS)
Nauka i zhizn' 1957, No. 12, p. 4-8.
English Translation: Soviet Bloc International Geophysical Year
Information, (13):2-10, 4 March 1958.

1,225

Danilin, B. 1959 LIFE IN THE COSMOS
Nauka i Zhizn' (Moscow) (7):34-36, July 1959.

ABSTRACT: In this article the author discusses the possibility of man flying in space. He states that experiments have shown that the forces of acceleration can be best withstood in a back-to-chest direction. The ability to withstand acceleration increases sharply if a man is immersed in water. The difficulty of controlling the space ship is increased by the state of complete weight

lessness which immediately replaces the high G-stresses. The best method to counter the effects of weightlessness is to fasten oneself in the seat at the beginning of the flight. For ensuring the required physical load, rubber tractions in the region of the joints, and special G-suits can be used. Also studied is the possibility of creating artificial gravitation by rotation of the cabin. (CARI)

1,226

Danilin, B. 1959 LIFE IN COSMOS (Zhizn' v Kosmose)
Trans. of Tekhnika Molodenzhi (USSR) 27(7):34-36.
(Office of Technical Services, Washington, D. C.)
Oct. 20, 1959. PB No. 59-22211

1,227

Danson, J.G. 1934 THE SYMPTOMS OF VERTIGO.
J.R. Army M. Corps., 63:167-68. Also; J.R. Nav. M. Serv., 20:205-16

1,228

Darby, T. D., L. I. Goldberg, P. C. Gazes, & S. R. Arbeit 1954 METHOD OF
OBTAINING DIRECT-BODY DISPLACEMENT-VELOCITY-ACCELERATION BALLISTOCARDIOGRAMS
OF THE DOG, Proc. Society Experimental Biology & Medicine 86:673-676
NOTE: Reel 7, Flash 7, Item 35

SUMMARY: A method of obtaining direct-body displacement, velocity and acceleration ballistocardiograms of the dog has been described. Ballistocardiograms obtained by this method are similar to those of the human. (AUTHOR)

1,229

Davey, C. T. and R. C. Good 1959 RESEARCH AND DEVELOPMENT ON A HIGH-G
STRAIN GAUGE ACCELEROMETER.
(Laboratories for Research and Development, Franklin Inst., Philadelphia,
Pa.) Rept. No. 4, 10 Jan - 9 Feb 59. AD 212 737.

Abstract: Studies relating to the experimental determination of strain distribution were continued. Scale model No. 1 was instrumented and a number of static tests were made on it. Static measurements on scale Model No. 2 were repeated with a swivel head fixture in the test machine to obtain better alignment of load. Both models were loaded under conditions of distributed and concentrated loading. The scale factors of models 1 and 2 were checked and found to be in agreement in two positions for distributed loading and in five positions for concentrated loading. All of the positions where

agreement occurred were on the center line of the side struts. The regions of the cylinder and hole surfaces around an angle of 30 degrees to a horizontal plane through the hole axis were investigated with six additional strain gauges on Model No. 1. A tensional strain was found at this location on the hole surface. The central axes of the struts appear to be the best location for strain gauges in that they appear to be less sensitive to asymmetrical loading and would therefore be more applicable to the accelerometer. (Author)

1,230

David, H. 1960 X-15 MOVES NEARER SPACE FLIGHT
Missiles and Rockets 7(22):18-19, Nov. 28, 1960

ABSTRACT: This article discusses the biomedical instrumentation package which telemeters and records data on the pilot's physical condition and his reaction to space-equivalent conditions.

1,231

David, H. M. 1961 HOW TO MAKE MAN EFFICIENT IN SPACE?
Missiles and Rockets 8(1):19, Jan. 2, 1961

1,232

Davidson, S. 1944 EVALUATION OF METHODS OF RESISTANCE TO THE EFFECTS
OF G. (RAF, Institute of Aviation Medicine, Farnborough)
FPRC 599, Oct. 1944.

1,233

Davidson, S., & W. K. Stewart 1944 NOTE ON SOME PHYSIOLOGIC EFFECTS OF LOW
VALUES OF CENTRIFUGAL FORCES ENCOUNTERED IN FLIGHT. (RAF, Institute of
Aviation Medicine, Farnborough) FPRC No. 573, 29 Feb. 1944

ABSTRACT: Used 6 experimental subjects.

(a) Operational tests show that values of 2-½ to 3 "g", if frequently repeated, cause fatigue, GI disturbances.

(b) Immediate fatigue is increased by factors such as unsuitable aerodynamic properties and structural design of aircraft.

(c) Reduction in frequency of exposure and alleviation of monotony of flight patterns help symptoms somewhat.

(d) Protection afforded by anti-"g" suits (FFS) is extremely important.

(e) In the design of anti-"g" devices it is important to have full protection against the lower values of centrifugal acceleration as well as to prevent blacking out at higher values.

1,234

Davis, P. K. 1959 A STUDY OF THE CRITERIA FOR DAMAGE DUE TO CONTROLLED IMPACT ON A SINGLE-DEGREE-OF-FREEDOM SYSTEM. (Master's Thesis, The University of Texas)

1,235

Davis, W. O. 1956 FUNDAMENTAL BASIS OF SPACE FLIGHT
Jour. Astronautics 3(1):9-10, 25. Spring 1956.

ABSTRACT: In addition to the engineering aspects of space flight, the psychological and physiological problems related to survival of the crew under the conditions of space (weightlessness, ultraviolet light, vacuum-type environment) are briefly considered. Mention is made of the problems of nutrition, sewage disposal and conversion, air conditioning and powering of auxiliary equipment related to the thermodynamic cycle.

1,236

Davydov, V. D., & N. Gurovskiy 1962 SCIENCE AND LIFE (SELECTED ARTICLES)
Nauka i Zhizn' 1961(9):34-36, 78-79
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio) FTD-TT-62-185/1+4, 19 June 1962

CONTENTS:

Davydov, V. D., From the Window of an Interplanetary Station,
Gurovskiy, N., Hypoxia,

1,237

Day, R. E. 1961 X-15 SIMULATION AND THE X-15 FLIGHT PROGRAM.
(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.)

1,238

Dearborn, C. H. and H. W. Kirschbaum 1931 MANEUVERABILITY INVESTIGATION OF AN F6C-4 FIGHTING AIRPLANE. NACA TR-386, App. 497, in Seventeenth Annual Reports, NACA, 1931. (Wash., D. C.: U. S. Govt. Printing Off., 1931).

1,239

Dearnaley, E. J., J. T. Reason, & J. D. Davies 1962 THE NATURE AND DURATION OF AFTER-SENSATIONS FOLLOWING THE CESSATION OF TURNING IN A CHIPMUNK AIRCRAFT. Aerospace Medicine 33(10):1224-1229, Oct. 1962

SUMMARY AND CONCLUSIONS: (1) Ten students and four instructors observed the nature and duration of their after-sensations following the cessation of a 45 degree banked turn at 90 knots in a Chipmunk Aircraft. (2) Observations were made under three conditions: (a) eyes closed, (b) eyes open under an instrument hood, and (c) eyes open with attention directed towards the horizon. (3) The after-sensations always included a component described as rotation in the opposite direction to the stimulus turn. (4) Some observers reported a component of descent and described their after-sensations as a slipping turn or spiral dive. (5) The after-sensations gradually decreased in intensity and the end points were difficult to detect. (6) The durations of the after-sensations experienced with closed eyes were in general accord with the published psycho-physical data. (7) The durations of the after-sensations diminished as the amount of visual information about the true state increased. (8) The more experienced pilots reported after-sensations of shorter duration. (9) It was suggested: (a) that the experience of a slipping turn or spiral dive was the result of interpreting the decrease in the resultant acceleration as descent and compounding this with the after-sensation of rotation, and (b) that learning to fly involves the gradual establishment of veridical perception by reducing vestibular sensations learnt to be misleading and that failure of this system may account for some cases of disorientation reported by experienced pilots. (AUTHOR)

1,240

DeBra, D. B., & E. V. Stearns 1958 PROBLEMS OF ATTITUDE CONTROL OF SATELLITES AND INTERPLANETARY VEHICLES. (Tech. paper No. 58-961, read at AIEE Space Flight Symposium, Buffalo, 24 June 1958)

1,241

De Cilla, F., & P. Italiano 1957 ALCUNE CONSIDERAZIONI SULLE LESIONI TRAUMATICHE VERTEBRALI DA INCIDENTE DI VOLO (CONSIDERATIONS OF TRAUMATIC VERTEBRAL LESIONS CAUSED BY AIRPLANE ACCIDENTS) Revista di Medicina Aeronautica (Roma) 20(2):262-268, April/June 1957

1,242

Dee, P. 1962 A 900,000 G-POUND COMBINED ENVIRONMENTAL CENTRIFUGE. (Institute of Environmental Sciences, Mt. Prospect, Ill.) Reprint 62-161

ABSTRACT: The need for thorough and accurate testing of missile propulsion components under simulated operational conditions prior to their actual integration into the missile system is imperative in order to gain a reliable and effective weapon or space vehicle.

During 1957, the U. S. Air Force Air Research & Development Command (now Air Force Systems Command) initiated a component improvement program which called for an accelerated effort to design, develop and test new and advanced components for ballistic missile systems as well as an extensive test program to determine the maximum performance range for existing missile components.

One phase of this program involved developing test facilities at the Edwards AFB Rocket Site, located in the northwest corner of the Mojave Desert.

One of the major facilities to be developed was a Combined Environmental Centrifuge. The purpose of this paper is to describe the design considerations, construction details, instrumentation and operating techniques for this facility, which to the best of my knowledge is the largest in the United States.

1,243

de Gaulejac, M. R. 1939 [PERILS OF THE PARACHUTE]
Presse Med. 47:1035.

ABSTRACT: Apart from really bad accidents the parachutist may suffer injury to the abdomen and thorax through the shock of arrest when the parachute opens. The force felt by the airman may be anything from 300 to 1,000 kg.; in the French Air Force it must not exceed 900 kg. Research is being undertaken to lessen the shock, and the suggested means include a special arrangement of the silk panels, and elastic valve at the top of the parachute, and check-straps to make the opening gradual. The arrangement of the harness is very important. If it confines only the upper part of the body the man is in considerable danger, but if it holds the lower limbs as well and forms a seat he can withstand a much more abrupt opening without damage.

1,244

De Haven, F. 1941 MEASURES FOR INCREASING SAFETY OF FLYING PERSONNEL
IN CRASHES.
(National Research Council, Committee on Aviation Medicine, Washington,
D. C.)
CAM Report no. 34, 14 November 1941.

1,245

DeHaven, H. 1941 MIRACULOUS SAFETY
Air Facts 4(3):21-26.

ABSTRACT: Many valuable facts have remained unknown which can be studied by relating injury results to forces expressed under circumstances to which the

body is accidentally exposed. The study of lack of injury and of relating injuries to established forces offers a unique field for investigation, one involving a number of sciences, but specific to none. However, it becomes more nearly being the science of safety. Deceleration experiments have proved that proper positional distribution of pressure can reduce injury during an impact. Several cases are cited on the velocity-to-pressure conversion with its resultant lack of injury effect on the body.

Safety in light planes is a tremendous MUST for the entire aircraft industry if it is to meet the years just ahead. This fact will unquestionably hurt the whole aircraft industry in the very near future, for Young America wants to fly and will. But pilots in the future will be mostly civilian "week-end pilots." "Week-end pilots" will, of course, make plenty of mistakes, and these mistakes in quantity are going to set up a propaganda result which will cost the aircraft industry millions in planes, motors, tires, and instruments not sold - and Air-line passengers not carried. Happily there is evidence on every hand that the velocity involving most of the light plane crashes is not too great to be handled through safety engineering.

1,246

De Haven, H. 1942 MECHANICAL ANALYSIS OF SURVIVAL IN FALLS FROM HEIGHTS OF FIFTY TO ONE HUNDRED AND FIFTY FEET.
War Med. (Chicago) 2(4):586-596.

ABSTRACT: Seven cases of free fall in which height of fall was exactly known and speed conservatively estimated are analyzed. It is concluded that the human body can tolerate and expend forces up to 200 times gravity for brief intervals during which the force acts in transverse relation to the long axis of the body.

1,247

DeHaven, H. 1943 INJURIES IN 30 LIGHT-AIRCRAFT ACCIDENTS. Medical Data and Crash Details from Field Investigations of the Civil Aeronautics Board. (National Research Council, Div. of Med. Sciences acting for the Committee on Medical Research of the Office of Scientific Res. and Dev. Committee on Avn. Med.) Report No. 230, 17 November 1943.

1,248

DeHaven, H. 1944 CAUSES OF INJURY IN LIGHTPLANE ACCIDENTS.
Aero Dig., 44(5):51-55,206.

ABSTRACT: The ability of the human body to survive crash forces which exceed the strength of aircraft structures seems remarkable, yet in one series of

accidents studied, 77% of the planes were washouts, with another 17% requiring complete overhauling, while only 47% of them resulted in fatalities. The main factors in the construction of safe planes are the use of rugged resilient structure which will not shatter completely and the locating of controls, braces tube clusters and panels where the head and body will not strike them in time of crashes. It has been suggested that the occupants be seated a foot or so further back in the fuselage, and it must be remembered that in crashes of two-seater tandem type planes injuries to the front occupant are 1-1/2 as common as injury to the rear occupant. Some head injuries to the passenger occur because his head strikes the front seat. Greater space should be allowed here. Also to be considered in view of the increasing popularity of the pusher-type plane is the fact that this type has three times as many fatal accidents as the tractor type, and at least twice as many serious accidents.

1,249

DeHaven, H. 1944 MECHANICS OF INJURY UNDER FORCE CONDITIONS.
Mech. Engng., 66:264-268

ABSTRACT: Studies have indicated that a human being can withstand more than 100 g, and be stopped from a velocity of 50 miles an hour within a distance of six inches without injury if the force of contact is sufficiently spread out. On the other hand a speed of 15-miles per hour can cause death if the momentum of the head is not checked during rapid deceleration of surrounding structures. If a ten-pound object (the approximate weight of a human head) falls one foot, and strikes an area about one inch square, it undergoes a force of 480 quarter-inch pounds spread out over this area. Deformation of the skull would be very slight. If, however, the head under the same conditions strikes an object one centimeter square, the force would be 2800 lbs./cm.² This would cause a puncture fracture.

In addition to skull fractures, injuries to the spine are almost unavoidable if the momentum of the head is not checked in crashes. Shoulder-harnesses, bulky as they are, protect the operator by stopping this forward momentum.

1,250

DeHaven, H. 1945 THE RELATIONSHIP OF INJURIES TO STRUCTURE IN SURVIVABLE AIRCRAFT ACCIDENTS. (National Research Council, Committee on Aviation Medicine) Report No. 440, 9 July 1945.

ABSTRACT: This report is supplement to CMR-CAM Report 230 issued November 17, 1943 in which relative injuries in the forward and rearward seats of 30 light-aircraft accidents were analyzed.

These 30 accidents are now included in a larger body of material. Trends indicated by the limited data of the first report are studied in relation to 110 accidents in fore and aft seating and 75 accidents in the side-by-side seating arrangement.

The conclusions reached are that:

(a) In accidents where cabin structure is distorted but remains substantially intact the majority of serious and fatal injuries are caused by dangerous cabin installations.

(b) Crash force-sufficient to cause partial collapse of present cabin structure--often is survived without serious injury.

(c) The head is the first and often the only vital part of the body exposed to injury.

(d) Fundamental causes of head injury are set up by heavy instruments, "solid" instrument panels, seat backs, and unsafe design and arrangement of control wheels.

(e) The probability of severe injuries of the head, extremities, and the chest is increased by failure of safety belt assemblies or anchorages. In one type of aircraft studied, safety belt failure occurred among 70% of the survivors.

(f) Failure of the 1000 pound safety belt occurred in 94 cases among 260 survivors. Only survivors showed evidence of injury of abdominal viscera; 2 of the injuries were classed as serious.

1,251

DeHaven, Hugh 1945-49 MONTHLY REPORTS AND PERIODIC BULLETINS FROM
CRASH INJURY RESEARCH PROJECT. (School of Medicine, Cornell University,
New York, N. Y., 1945-49)

1,252

DeHaven, H. et al. 1946 CRASH INJURY PROJECT.
(National Research Council, Committee on Aviation Medicine)
Special CAM Report OEMcmr-121. 31 January 1946.

1,253

De Haven, H. 1946 CRASH RESEARCH FROM THE POINT OF VIEW OF CABIN DESIGN.
In Aero. Eng. Rev. 5(6):11-17, June 1946.

1,254

DeHaven, H. 1947 CRASH INJURY RESEARCH REPORT, JULY 1, 1946 - JUNE 30, 1947
(National Research Council, Cornell University Medical College)

1,255

DeHaven, H. 1947 INFORMATIVE ACCIDENT -- 1 JANUARY 1947.
(Crash Injury Research, National Research Council, Washington, D.C.)

1,256

DeHaven, H. 1947 INFORMATIVE ACCIDENT -- 12 FEBRUARY 1947.
(Crash Injury Research, National Research Council, Washington, D.C.)

1,257

DeHaven, H. 1947 INFORMATIVE ACCIDENT, NO. 3 -- 5 MARCH 1947.
(Crash Injury Research, National Research Council, Washington, D.C.)

1,258

DeHaven, H. 1948 FINAL REPORT, NATIONAL RESEARCH COUNCIL CRASH INJURY
RESEARCH. (Cornell University Medical College) 30 June 1948

1,259

De Haven, H. and R. M. Petry 1948 INFORMATIVE ACCIDENT NO. 7, CRASH
INJURY RESEARCH
(Cornell University Medical College, New York, N. Y.)
May 7, 1948

1,260

DeHaven, H. 1950 CRASH INJURY RESEARCH. SUMMARY REPORT FOR THE FISCAL YEAR
1 JULY 1949 TO 30 JUNE 1950. (Air Materiel Command, Wright-Patterson AFB,
Ohio) AF TR 6007, Sept. 1950; ATI No. 94 824

ABSTRACT: At present, investigation of aircraft (and automobile) accidents is

aimed chiefly at determination of causes of accidents rather than causes of injuries. In spite of measures to prevent accidents the number of people injured and killed annually continues to mount.

The Crash Injury Research project has developed an accident reporting system to obtain accident data and related injury details. The data are recorded and analyzed to determine repeated causes of serious and fatal injuries in survivable accidents. Findings are made available to manufacturers, designers, and aircraft engineers. Manufacturers are increasingly interested in "crashworthiness" as a design feature in aircraft, and three new civilian planes are now being built which incorporate most of the safety features recommended by CIR.

CIR urges that crash tests be undertaken to determine the energy-absorbing capacities of various types of lightplane structure under crash conditions.

Twenty-six recommendations are made for increasing crash protection in personal aircraft. (AUTHOR)

1,261

DeHaven, H. 1950 CRASH DECELERATION, CRASH ENERGY, AND THEIR RELATIONSHIP TO CRASH INJURY. (Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio)
AF TR 6242, Dec. 1950; ATI-104 127
NOTE: CARI P&S 1.8aa

ABSTRACT: Crash energy, energy absorption by structure, and crash forces are discussed; the relationship of these factors in providing protection from serious or fatal injury in survivable aircraft accidents is illustrated by theoretical cases which are compared with actual crash results.

Although considerable data now is available on causes of injury among survivors of aircraft accidents, the magnitude and duration of forces occurring in crashes remain unknown. It is proposed that crash tests be undertaken to study factors now contributing to safety or injury in accidents and to provide engineering data whereby safety in survivable accidents can be increased by structural design.
(AUTHOR)

1,262

De Haven, H. 1951 CRASH INJURY RESEARCH. SUMMARY REPORT FOR FISCAL YEAR 1 JULY 1950 - 30 JUNE 1951.
(USAF, AMC, Wright-Patterson AFB, Ohio)
AF TR no. 6523.

1,263

De Haven, H. 1951 HANDBOOK FOR AIRCRAFT ACCIDENT INVESTIGATORS COOPERATING IN CRASH INJURY RESEARCH.
(Crash Injury Research, Cornell University Medical College, New York, N.Y.)
CIR H-2

1,264

DeHaven, H. 1951 INFORMATIVE ACCIDENT RELEASE NO. 13, 30 AUGUST 1951.
(Crash Injury Research, Cornell University Medical College, New York,
New York) 30 August 1951.

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DeHaven, H. 1951 A STUDY SPONSORED BY THE DEPARTMENT OF THE NAVY
AND AIR FORCE: SEMI-ANNUAL PROGRESS REPORT.
(Crash Injury Research, Cornell-University Medical College)
January 1951.

1,266

De Haven, H. 1952 PACKAGING THE PASSENGER
SAE Journal 60(6):55-56, June 1952

ABSTRACT: During the last ten years, there has been a slow but steady increase in the deliberate use of aircraft configuration to protect pilots and passengers in accidents. Many of the developments should be useful in cutting the crash-injury rate in passenger cars.

The most frequent injuries in survivable aircraft and automobile accidents are fractures of the skull, lesions of the brain, smashing of facial bones, and other dangerous head injuries. Studies in 1942 on impact velocities and data from plane accidents led to studies of the injury potential of objects commonly struck by the head. Shoulder harness does an amazing job of protecting the head, but is not even on the horizon for autos. The safety belt does not effectively check the velocity of the head but modifies the injury-potential area.

Crash-engineering has been built into the instrument panels, windshields, flooring, rudder pedals, controls, et cetera, of aircraft. In six new planes crash-engineering has been extended to the cabin and its adjacent structures. The use of structures to protect the body in accidents is a very young engineering art. Without specific crash-injury data, engineers cannot understand the factors responsible for dangers and cannot judge the need for safer design. The only way to find out is to extend the scope of present accident investigations and, in addition to getting reports on typical causes of accidents, get reports on typical and repeated causes of injury. (Journal of Aviation Medicine 23(5):533-534, October 1952)

1,267

DeHaven, H. 1952 ACCIDENT SURVIVAL--AIRPLANE AND PASSENGER CAR
(Society of Automotive Engineers) Preprint No. 716, 1952.

1,268

De Haven, H. 1952 ACCIDENT SURVIVAL— AIRPLANE AND PASSENGER AUTOMOBILE.
(Paper Annual Meeting, Society of Automotive Engineers, Jan. 1952.
Part of a symposium of "Packaging the Passenger")

ABSTRACT: Efforts to increase "crashworthiness" and provide greater "crash safety" by the improvement of details in aircraft and automobiles are not new. Because the principles used to provide greater safety in aircraft are closely related to principles used by packaging engineers for increasing the protection and safety of valuable goods in transit, the author discusses the concepts of crash safety in relation to basic concepts used by packaging engineers.

1,269

DeHaven, H. 1952 THE SITE, FREQUENCY AND DANGEROUSNESS OF INJURY SUSTAINED BY 800 SURVIVORS OF LIGHTPLANE ACCIDENTS. (Dept. of Public Health & Preventive Medicine, Cornell University Medical College, New York, N.Y.) July 1952.
ATI-172 675

ABSTRACT: Absence of injury in the Hi-G deceleration tests at Muroc, and limited body damage in many severe airplane crashes suggest that injuries are not a direct function of crash force. Herein analyzed are injuries sustained by 800 survivors of lightplane crashes; each of the survivors used only a safety belt as a restraining and protective means in crashes.

Five analytical procedures are followed to provide basic material from which to draw conclusions: (1) a segment of current data is compared with data from an early CIR report to determine whether early trends now are statistically confirmable; (2) the site and frequency of injuries are examined in order to determine the relative constancy and variability of the injury pattern produced by survivable aircraft accidents; (3) the frequency characteristics of the injury pattern are investigated and interpreted; (4) dangerous-to-life injuries are examined and discussed; (5) the degree of correlation between injury seriousness and accident severity is established.

Statistical analyses show that (1) the trends demonstrated in early CIR data are confirmed; a low incidence of strains of the neck and damage of cervical vertebrae, and a high frequency of damage to the head and extremities is established; (2) there is a distinct and constant pattern of injury among survivors of lightplane crashes who wear only safety belts; (3) a positive relationship exists between the frequency of injuries and the distance of damaged body areas from the safety belt; bruises of the hips and evidence of intra-abdominal injury are surprisingly rare, despite violent snubbing action by standard two-inch safety belts with holding capacities of 1000 to 2000 pounds; injury to one body area usually is not dependent on the occurrence of injury in another body area; (4) dangerous head injuries are sustained by nearly 18% of survivors; spinal injuries are likely to endanger life far more frequently than lower torso injuries; (5) of all the variance in seriousness of injury, only 22% of this variance is dependent upon variation in accident severity.

The statistical evidence provided in this report shows that injuries are not a direct function of crash force; the data indicate that injuries in survivable accidents are largely subject to control by engineering and design. (AUTHOR)

De Haven, Hugh, Boris Tourin, & Salvatore Macri 1953
 AIRCRAFT SAFETY BELTS: THEIR INJURY EFFECT ON THE HUMAN BODY
 (Crash Injury Research, Cornell U. Medical Coll., New York)
 July ASTIA AD-14 643

ABSTRACT: An examination was made of the injuries sustained by 1039 survivors of 670 lightplane crashes. Chi-square methods were employed in statistical analyses to relate the use of the belt and body injuries of survivors. Safety belts were shown to be an infrequent cause of injury and to serve as effective protection. Severe snubbing action of safety belts as seen in 80 cases showed no significant correlation with the occurrence of intra-abdominal and lumbar spine injuries. Critical intra-abdominal and lumbar spine injuries appeared related to each other and to vertically acting forces. Bruises and minor contusions were attributable to safety belts. Injuries which occurred without any signs of snubbing were jolt loads transmitted by supporting structures and seats. Injuries of the upper and lower torso were associated with and increased by failure of safety belt installations. The percentage of all trunk injuries sustained by users and nonusers of safety belts were similar. No increased frequency was observed in injuries to the torso, neck, and spine by the use of the belt. Survivors not using safety belts suffered more serious injury than those that used them. Upper and lower torso injuries were also related to failure of belt installations. Dangerous-to-life injuries of head and body were associated and increased with vertical crash forces. (ASTIA)

1,271

DeJadicibus, C. and L. Carbonara 1961 CHARACTERISTICS OF THE NYSTAGMIC
 RESPONSE TO ACCELERATIVE STIMULI OF DIFFERENT PHYSICAL VALUE.
 In Boll. Mal. Orecch. 79:635-640, Nov.-Dec. 1961 (Italy).

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Delapchier 1917 BILATERAL FRACTURE OF ASTRAGALUS AFTER A PARACHUTE JUMP.
La Presse medicale, Paris, June 4, 1917

1,273

Denisov, V. and M. Klevtsov 1961 BIOTELEMETRY
 Trans. of Radio, Moscow (USSR) (10):16-17, 1961.
 (Joint Publications Research Services, New York, N. Y.) JPRS 12074, Jan.
 26, 1962.

1,274

Dempsey, C.A. 1961 HUMAN PROTECTION IN ABRUPT ACCELERATION ENVIRONMENTS
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. 365-370

ABSTRACT: The accelerations encountered in space flight are divided into three distinct segments: vibration, abrupt acceleration and long term acceleration. When these forces are acting as an integrated function they produce a singular subjective experience to the individual. The various maneuvers of manned space flight which produce abrupt accelerations are soft surface landings, emergency escape, air deceleration and hard surface landings. In addition, the potential hazard of explosion is significantly increased in space vehicles and forms another major source of high transient accelerations.

The human body can be categorized as a complex combination of systems which respond to the abrupt acceleration forces in accordance with the laws of a viscous/elastic system under the action of a constant unbalanced force or harmonic motion. While the body might at first appear to act as an integrated whole; it in reality, is segmented into four different parts which respond individually to the force and then in turn transmit their response to the other segments. These individual segments are: dorsal cavity, thoracic cavity, pelvic cavity, and body extremities. Vital body organs can sustain high transient accelerations when the force vector is oriented in the proper direction and the body is completely supported throughout the load period. Present research efforts are dedicated to the premise of completely understanding the protective requirements which are necessary to sustain the astronauts during abrupt acceleration conditions in all areas of aerospace operations.

1,275

Denisov, N. and S. Borzenko 1961 GAGARIN'S FLIGHT.
Trans. of mono. Polet Gagarina; Materialy, Opublikovannye v Pravde, Moscow, 1961.
Sept. 17, 1962 ASTIA AD 287 715

CONTENTS:

The first flight of man into outer space
Communist Yuri Gagarin: the first Cosmonaut

1,276

Denisov, N. & S. Borzenko 1962 POLET GAGARINA (MATERIALY, OPUBLIKOVANNYYE v "PRAVDE") GAGARIN'S FLIGHT.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio) FTD-TT-62-844 from Izdatel'stov "PRAVDA", Sept. 1962.
ASTIA AD 287 715

ABSTRACT: It was on 12 April 1961 that the Soviet Union carried out the first

manned flight into outer space. The spaceship "Vostok, " with the USSR pilot cosmonaut Yu. A. Gagarin on board, was placed into orbit as a satellite of the earth. The satellite vehicle without the last stage of the rocket-carrier, weighed 4,725 kilograms. On the basis of refined data obtained through the evaluation of all measurements, the perigee was at 181 kilometers, and the apogee was at 327 kilometers; the inclination of the orbit was 64° and 57 minutes. Having completed the orbital flight, the satellite vehicle returned to earth successfully, landing in a designated area of our country. This publication contains a detailed account of the flight and relates the great significance of the journey to the entire world.

1,277

Denny-Brown, D. 1943 THE PRINCIPLES OF TREATMENT OF CLOSED HEAD INJURY
Bulletin from New York Academy of Medicine 19: 3.

1,278

Denova, A. A., A. M. Zakharov and V. E. Kolla 1960 THE EFFECT OF CARLINA
BIEBERSTEINII ON THE TOLERANCE OF WHITE MICE TO RADIAL ACCELERATION,
(Vliianie Koliuchnika Bibershteina Na Vynoslivost Belykh Myshei Po
Otnosheniiu K Radial Nym Uskoreniyam).
Farmakol. i Toksikol. (Moscow) 23(2):177, March-April 1960.

ABSTRACT: A series of experiments were conducted on raising resistance to radial acceleration in white mice by aqueous infusions of seeds of the carline thistle (Carlina Biebersteinii Bernh). In the first series each subject received a 1% infusion before being subjected, together with a control, to radial acceleration in a centrifuge at a speed of 1000 r.p.m. for 5 seconds. The average time required by the controls to resume normal posture was 34 sec., to start running in a straight line, 90.4 sec.; for the experimental animals the values were 23.5 sec. and 64 sec., respectively. In the second series the experimental animals received a 10% infusion prior to acceleration under the same conditions. Normal posture was resumed by the controls in 26 sec., running in 52 sec.; and by the experimental animals in 14 sec. and 19 sec., respectively. In a third series, in which rotation was carried out for 10 sec., the experimental animals again recovered faster than the controls.

1,279

Denny-Brown, D. & W. R. Russell 1940 EXPERIMENTAL CEREBRAL CONCUSSION.
J. Physiol. 99:153, 20 December, 1940.
See also Brain 64:93-164, Sept. 1941.

ABSTRACT: Experimental concussion is a condition well known from early investigation to be associated with a cessation of respiration and rise of blood pressure, of duration corresponding to the intensity of the blow.

Re-investigation of the phenomenon in cats under nembutal anaesthesia confirms its appearance in severe degree, and ability to result in death, without macroscopic lesions of the brain stem. It is further established that the phenomenon can be elicited in the decerebrate animals, and corresponds with a passing depression of all bulbar reflexes.

The respiratory centre is the most sensitive to percussion. Acceleration in movement resulting from the blow is the essential factor in the stimulus, for if the head is prevented from moving when struck the phenomenon fails to occur. Momentary deformity of the skull, and stimulation of superficial structures, therefore appear to play no part.

Labyrinthine stimulation likewise appears to have slight if any part in the phenomenon, for it is obtained after section of both eighth nerves. Rise of intracranial pressure does not accompany the phenomenon, though it is possible under certain circumstances to reproduce a similar effect by a shock-like rise of intracranial pressure alone.

The nervous effect of a blow is thus considered to be due to the physical acceleration directly transmitted to each and every centre.

1,280

Denny-Brown, D. & W. R. Russell 1941 EXPERIMENTAL CEREBRAL CONCUSSION.
Brain 64:93-164, Sept. 1941.
See also J. Physiol. 99:153, 20 Dec. 1940.

1,281

Denny-Brown, D. 1943 THE EFFECT OF HIGH EXPLOSIVES ON THE POST TRAUMATIC SYNDROME Trans. Amer. neurol. Assn. 69:98-102

1,282

Denny-Brown, D. 1945 CEREBRAL CONCUSSION.
Physiol. Rev. 25:296-325.

1,283

Denzin, E. C. 1946 INVESTIGATION OF BRAKE SHOES FOR CREW DECELERATION CARRIAGE, PROJECT NO. 27. A Resume Report of Tests Conducted at the American Brake Shoe Company. (Sargent Research Lab., Mahwah, N.J.) 12-20 September 1946.

Denzin, E. C. 1950 A DECELERATOR FOR HUMAN EXPERIMENTATION.
 (U.S.A.F. AMC, Wright-Patterson AFB, Ohio). USAF TR No. 5973
 Note: CARI P&S 2.12

ABSTRACT: A device has been designed, built, and tested for producing and studying the effects of controlled decelerations up to 50 g for a duration of 0.1 second. A 1500-lb. carriage is mounted on slippers on a 2000-ft. standard gauge rail track. The human subject or test object is mounted on the carriage in the desired orientation. The carriage is accelerated to a predicted velocity by one to four 100-lb. thrust, 5-second solid fuel rockets. The carriage can be decelerated by brakes fixed between the track for a distance of forty-five feet. Forty-five sets of brake shoes clamp two metal keels 5 inches wide and 11 feet long, mounted under the carriage. Each set of brakes is preset to the desired pressure and is tripped by a trigger on the carriage. A system of AM-FM telemetering has been built for transmitting data from the carriage and subject to the recorder.

1,285

Dermksian, G. 1959 THE PROBLEM OF LOSS OF CONSCIOUSNESS IN FLYING PERSONNEL.
 In: L. E. Lamb, Ed., The First International Symposium of Cardiology in Aviation, 12-13 November, 1959, pp. 83-92. (School of Aviation Medicine, Brooks AFB, Texas) ASTIA AD 244 389

ABSTRACT: A healthy young adult male population was surveyed in an attempt to determine the incidence of clinical syncope. The factors associated with 130 episodes of clinical syncope were reviewed in an attempt to determine their frequency. One hundred and five individuals (70 with and 35 without clinical syncope) were studied with special procedures designed to stress the cardiovascular mechanisms resulting in experimental syncope. In addition, it was hoped that such procedures might distinguish those cases with clinical syncope and thus have predictive value.

Thirty percent of the aviation cadets were found to have had previous syncopal episodes. The special cardiovascular stresses revealed a surprisingly high incidence of cardiac arrhythmias in normal healthy adult males. Of the 38 cases of experimental syncope some 68 per cent were associated with an arrhythmia. It was thought that the arrhythmias were secondary to cardio-inhibitory responses mediated through the vagus nerve. They could be abolished or prevented with intravenous atropine. The special procedures failed to distinguish between individuals with previous syncope and those without, and thus had no predictive value.

1,286

Derry, John D. 1951 HIGH-SPEED FLYING.
Journal of the Royal Aeronautical Society, 55:626-639, October 1951.

ABSTRACT: This paper is mainly concerned in conveying the pilot's own view of

the problems of high-speed flying. The paper is divided under the following main headings:

1. The obstacles to negotiate at high and low altitude.
2. The approach to high-speed investigation and means of obtaining test results.
3. Present and future requirements of research aircraft.
4. Pilot safety measures.
5. Some requirements of a pilot engaged in high speed research and development flying.

For the most part it is intended only to cover research and development flying.

1,287

Desaga, H. n.d. EXPERIMENTELLE UNTERSUCHUNGEN DER LUFTSTOSSWIRKUNG. (EXPERIMENTAL STUDY OF AIR BLAST EFFECTS.) Mitteilungen aus dem Gebiet der Luftfahrtmedizin, (Herausgegeben vom Inspekteur des Sanitätswesens der Luftwaffe.) Forschungsbericht 15/43.

1,288

Desaga, H. 1950 BLAST INJURIES.
In German Aviation Medicine, World War II. Vol. II, pp. 1274-1293.
(Washington, D. C.: U. S. Govt. Print. Off., 1950)

1,289

Devaux, P. 1940 LA RESISTANCE PHYSIOLOGIQUE AU CATAPULTAGE ET AUX ACROBATIES AERIENNES (THE PSYCHOLOGICAL RESISTANCE TO CATAPULTING AND TO AIRCRAFT ACROBATICS)
Nature (Paris) 67: 299-302

1,290

DeVost, V. F. 1960 ACCELERATION, VELOCITY, DISTANCE, TIME.
Machine Design, Aug. 4, 1960.

1,291

DeVost, V.F. 1960 NOL COPPER-BALL ACCELEROMETERS
(U.S. Naval Ordnance Laboratory, White Oak, Maryland) NAVORD Report 6925,
July 27, 1960, ASTIA AD 248 282

ABSTRACT: This report describes conventional and discriminating copper-ball accelerometers currently in use at the Naval Ordnance Laboratory. Their operation as peak reading accelerometers and velocity meters is discussed. Theoretical dynamic response curves are presented to assist in analysis and interpretation.

1,292

DeVost, V.F. 1962 TEST SET, DROP SHOCK, WOX-126A.
(Naval Ordnance Lab., White Oak, Md.) Rept. No. NOLTR 61-106,
ASTIA AD-297 401, 20 November 1962

ABSTRACT: The report describes a portable 70-inch, free-fall drop tester, presents operating instructions, and contains calibration curves. The tester is an adaptation of the Mk 209 Mod 0 Test Set, which it replaces. A wide range of shocks is produced with felt, rubber, and plastic shock pads. At maximum drop height and for payloads of 1 lb., shocks range in amplitude from 170 g for the softest pad to 3200 g for the hardest pad. The durations of these shocks are 12 ms and 0.6 ms respectively. The maximum allowable load for the test set is 4 lb. For a 4-lb. pay-load the maximum impact velocity change experienced by the carriage is 35 fps. The report includes complete drawings on the WOX-126A Test Set and calibration information on the Mk 209 Mod 0. (Author)

1,293

deVries, H.I. 1949 STRUCTURE AND POSITION OF THE TECTORIAL MEMBRANE IN THE
COCHLEA
Acta Oto-Laryngologica (Stockholm) 37: 334-338

1,294

DeWeese, D. D. 1954 DIZZINESS—AN EVALUATION AND CLASSIFICATION.
(Springfield: C. C. Thomas, Publisher, 1954)

BOOK REVIEW SUMMARY: This publication is of special significance to flight surgeons. Vertigo, spatial disorientation and the motion sickness syndrome of dizziness are peculiarly related to the profession of flying and, therefore, are everyday problems of aviation medicine. They must be separated from the systemic disturbances resulting in dizziness; and these in turn must be subdivided into those conditions amenable to current therapy and those which are not. Particular

care is essential in this separation, for the flight surgeon's decision directly affects the career of both pilots and crew members. In this small monograph, the physician may find concisely reviewed the anatomy and physiology, classification and differential diagnosis of dizziness. The care reports in chapter nine add little to the value of the presentation.

1,295

de Wit, G. 1953 SEASICKNESS; (MOTION SICKNESS) A LABYRINTHOLOGICAL STUDY.
Acta oto-laryng. (supp. 108) pp. 1-56

ABSTRACT: Cupulometric examination and examination with the parallel swing demonstrate an abnormality in the labyrinthine functions in every sufferer from sea-sickness. Only the small group in which the affection is completely psychic in nature forms an exception to this rule. However, these patients do not suffer from genuine seasickness, but they are neurotics. The seasick can be divided into:

a. The specific seasick (80% of the total). This group is characterized by a steep cupulogram, and by a rise of the pressure in the central retinal artery after stimulation of the otolith system. They lack the normal tendency to inhibition of strong labyrinthine stimuli.

b. The unspecific seasick (20% of the total). This group can be subdivided into one with mild labyrinthine abnormalities, in the sense of a slight difference in excitability between the right and left labyrinths, and the group of the deficiencies. Persons belonging to the latter group show an irregular cupulogram. Suprimal (benadryl-chlorotheophyllinate) decreases the central excitability of the labyrinth. Atropine does the same, and moreover abolishes the endocranial vasolability.

c. The methods described in this monograph enable recognition of persons liable to seasickness at the beginning of their career at sea.

1,296

Diamond, H., J. R. Mott, & H. J. Smith 1962 DEVELOPMENT AND MANUFACTURE OF THE
THREE-AXIS INTEGRATING ACCELEROMETER. (Sperry Gyroscope Co., Great Neck, N.
Y.) Rept. No. CA-4230-0102-6; Contract DA 30-069-ORD-3420; Proj. TN2-8106;
ASTIA AD-281 838

ABSTRACT: A three-axis integrating accelerometer is described which utilizes a single test mass to sense acceleration components in any direction. Principles of operation, error compensations, and constructional features of the accelerometer are described. A detailed analysis and parameter study of the pump-restoration servo is included. Detailed test results are tabulated. (AUTHOR)

1,297

Diamond Ordnance Fuze Labs. 1960 MEASUREMENT OF DISPLACEMENT, VELOCITY AND ACCELERATION: BIBLIOGRAPHY WITH ABSTRACTS AND INDEX
(Diamond Ordnance Fuze Labs., Washington, D. C.) Aug. 22, 1960

1,298

Dias Campos, F. 1945 INFLUENCIA DAS ACELERACOES SOBRE O ORGANISMO, EN AVIACAO
(Acceleration; Influence on Organism)
Rev. med. RioGrande do Sul. (Brazil) 1: 278-287, May-June 1945

1,299

Dickerson, K. H. and G. H. Kydd 1961 EFFECTS OF HIGH ACCELERATION ON RATS.
(Paper presented at 32nd annual meeting, Aerospace Medical Assoc., 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Interest in recovery of biological payloads from ballistic probes and orbital satellites has created a need for information on the effects of re-entry accelerations on animals. Some of the forces involved lie in the range between 50 and 100 G and are of short duration. Studies have been conducted in which rats were subjected to a selected range of high accelerations for short time intervals. The results indicate that where the criterion for a successful test is survival without gross pathology, rats can survive these forces. (Aerospace Med. 32(3):228.)

1,300

Dickson, E.D.D. 1940 INCIDENCE OF AIRSICKNESS AMONGST AIRCREWS
(DETAILS OF 23 CASES CATEGORISED UNFIT ON ACCOUNT OF DISABLING SYMPTOMS)
(Flying Personnel Research Committee, Canada) F.P.R.C. Report No. 220b,
December 1940

1,301

Dieckmann, D. 1957 EINFLUSS VERTIKALER MECHANISCHER SCHWINGUNGEN AUF DEN MENSCHEN (Effects of Vertical Mechanical Vibration Upon Man)
Int. Z. Angew. Physiol. (Berlin) 16: 519-564.

1,302

Dieminger, W. 1951 WELTRAUMFAHRT UND IONOSPHERE (Space Travel and the Ionosphere)
In Merten, R. ed. HOCHFREQUENZTECHNIK UND WELTRAUMFAHRT (Zurich: S. Hirzel, 1951), pp. 7-14.

ABSTRACT: A survey of conditions to be encountered by an escape rocket. The problem of meteors as well as temperature and ionization effects are discussed.

1,303

Di Giorgio, A. M. 1951 LOCALIZZAZIONE OTTICA ASSOLUTA IN CONDIZIONI STATICHE E NELLA ACCELERAZIONE RETTILINEA E CENTRIFUGA. (Absolute Optic Localization In Static Conditions and In Rectilinear And Centrifugal Acceleration)
Rivista di Medicina Aeronautica, (Rome) 14:190-208, April-June 1951.

1,304

Dill, D. B. 1942 PHYSIOLOGY OF FLYING. HAZARDS AND REMEDIES.
J. Lab. and Clinical Med. Vol 28, Part I, pp. 585-589.

ABSTRACT: A brief delineation of six hazards of flight: anoxia, aeroembolism, acceleration, cold, vibration and fear or anxiety.

1,305

Dill, D. B. April 1942 EFFECTS OF PHYSICAL STRAIN AND HIGH ALTITUDES ON THE HEART AND CIRCULATIONS. American Heart Journal 23(4):441-454

1,306

Dill, D. B. 1943 SYMPOSIUM ON WAR MEDICINE: PHYSIOLOGY OF FLYING: HAZARDS AND REMEDIES. J. Lab Clin Med. 28:585-598, Feb. 1943.

ABSTRACT: Flying hazards that are physiological in nature are those facing aviation medical personnel. Remedies are discussed for the hazards of anoxia, aeroembolism, acceleration, vibration, and anxiety.

1,307

Dion, M. G. 1956 EQUIPMENT FOR MEASUREMENT OF AIRSPEEDS, MACH. NUMBERS AND TEMPERATURES.
Tech. Sci. Aeron. 3:118-124.
R. A. E. Translation No. 645

1,308

District of the Army Corps of Engineers, Office of the District Engineer, Los Angeles District Aug. 1945 MUROC AIR FORCE BASE JOB NO. ESA 210-23 DRAWINGS NOS. 1037/25, 1037/26, 1037/27, and 1037/28 PREPARED UNDER USAF CONTRACT W-04-353 ENG-795A. 8 Aug. 1945 (Detail drawings of 2000 ft. rocket launching track installation)

1,309

Di Taranto, R. A., & J. J. Lamb 1958 THE SPACE ENVIRONMENT - - A PRELIMINARY STUDY. Elect. Mfg., Oct. 1958

1,310

Dixon, Frederick, & J. L. Patterson, Jr. 1953 DETERMINATION OF ACCELERATIVE FORCES ACTING ON MAN IN FLIGHT AND IN THE HUMAN CENTRIFUGE. (Naval School of Aviation Medicine, Pensacola, Fla.) Project. No. NM 001 059.04.01; ASTIA AD-39 383

ABSTRACT: Chapter I: The concepts of force and acceleration are discussed. Physical units and coordinate systems are also covered. Chapter II: The external force patterns acting on man in flight and in the human centrifuge are treated. Methods are given for calculating the magnitude and direction of the resultant external force in various types of airplane maneuvers. Chapter III: A classification of centrifuge types is presented along with analyses of characteristic external force patterns which can be simulated. Chapter IV: The concept of apparent physiological force is introduced. Theoretical considerations are presented which show that the application of simple relativity principles permits the straightforward force analysis of classical physics to be applied to the biological organism considered as the reference frame. Chapters V and VI: Formulas are derived for the physiologic force patterns which act on man in flight and in the human centrifuge. Chapter VII: A discussion of acceleration measuring instruments is presented, with special emphasis on inertial-type linear accelerometers. Chapter VIII: Methods are given for converting force components which are readily determined along anatomical axes of the structures supporting man in flight and in the centrifuge, into force components along defined physiologic axes through a subject. (ASTIA)

1,311

Dixon, F. and J. L. Patterson, Jr. 1961 DETERMINATION OF ACCELERATIVE FORCES ACTING ON MAN IN FLIGHT AND IN THE HUMAN CENTRIFUGE.
In Gauer, O. H. and G. D. Zuidema, Gravitational Stress in Aerospace Medicine (Boston: Little, Brown, and Co., 1961) Pp. 243-256.

1,312

Dixon, F. P. and L. D. Stimpson 1963 A SYSTEMS APPROACH TO VEHICLE DESIGN FOR EARTH RE-ENTRY FROM AN INTERPLANETARY MISSION.
Paper: American Astronautical Society Symposium on the Exploration of Mars, Denver, Colorado, June 6-7, 1963. Preprint 11

ABSTRACT: Earth return from Mars and Venus manned ventures during the 1970's places stringent requirements upon the earth re-entry vehicle design. These requirements are related to the high approach velocities ranging from 13 to 19 km/sec and include the possibilities of retro-propulsion, modulated lift and drag, heavy heat shields, advanced materials, control techniques which include maneuverability for landing site selection, and necessary safety provisions. Feasibility studies are presented for earth re-entry of a six-man crew by three basic vehicle configurations which include an Apollo-type, a Drag-Brake, and a High Lift-to-Drag vehicle with the main emphasis being placed upon the minimization of total re-entry vehicle weight.

The effect of radiative heating in conjunction with convective heating upon vehicle design is analyzed, and coupled with the modulated lifting requirement, results in optimum tradeoffs between heat shield and retro-propulsive weights. Realistic ablation technology limitations place upper bounds upon purely aerodynamic re-entry based upon present knowledge of radiation heating behavior and advanced materials technologies.

The three vehicle types remain competitive in total weight; however, they differ considerably as to re-entry corridor depth, landing site selection, g-loading and control complexity. The High L/D vehicle is recommended for further study since it appears to have superior performance over the Apollo and Drag Brake vehicles for earth re-entry from possible Early Manned Planetary and Interplanetary Round-Trip Expeditions in the 1970-75 period.

1,313

Dobies, E. F. 1957 THE EQUATIONS OF MOTION OF A TUMBLING RE-ENTRY BODY.
(Jet Propulsion Lab., Calif. Inst. of Tech.)
JPL Prog. Rept. No. 20-339, Pasadena, 22 Nov. 1957.

1,314

Dobronravov, V. 1957 ON THE WAY TO THE COSMOS
In Soviet Bloc International Geophysical Year Information 12:4-7.
First published: Kryl'ya Rodiny No. 6, pp. 20-22, June 1957.

1,315

Dobrotin, B. M. and I. N. Kostev 1935 PARACHUTE JUMPING INTO WATER
Vyestn. Vozd. Flota 17(8):23.

1,316

Dodge, C. H., & C. C. Wunder 1962 SURVIVAL AND GROWTH OF JUVENILE TURTLES
EXPOSED TO CONTINUOUS CENTRIFUGATION. Physiologist 5(3):130, Aug. 1962

ABSTRACT: With hatchling Red-Eared Turtles (Pseudemys scripta elegans), growth could be either enhanced or retarded depending upon field intensity. During 9 weeks of centrifugation at 5 g, turtles grew 112+26% more than their controls. At still higher fields, growth decreased as the field increased. However, at fields as intense as 28 g, a few turtles displayed measurable growth. Times for 50% mortality were 3, 7, and 31 days at 28, 24, and 21 g respectively. At 6, 10, and 13 g there was no significant mortality. The superior ability of turtles to survive high gravity can be attributed to their aquatic environment and the shell, which acts as a natural anti-g suit. (AUTHOR) (Aerospace Medicine 34(3):276, March 1963)

1,317

Dodge, C. H. & C. C. Wunder 1963 GROWTH OF JUVENILE RED-EARED TURTLES AS
INFLUENCED BY GRAVITATIONAL FIELD INTENSITY.
Nature (London) 197:922-923, March 2, 1963.

1,318

Dodge, R. 1923 HABITUATION TO ROTATION
J. Experimental Psychology 6(1):1-35, Feb. 1923.

ABSTRACT: The question of whether the objective and subjective effects of rotation are modified by habituation is a serious one in aviation. The first scientific observations of habituation to rotation in man were published by C. R. Griffith. The present experiments involved the use of photographic records. They furnish complete confirmation of Griffith's results together with important additional data. Another field of interest covered in this paper is the adaptation to repeated vestibular stimulation. The effect of repeated stimulation on the vestibular mechanism is of particular importance to an understanding of human variability.

1,319

Dodge, R. 1923 THRESHOLDS OF ROTATION.
J. Experimental Psychology 6(1):107-137, Feb. 1923.

ABSTRACT: Under experimental conditions, the threshold for rotation of rapid onset seems to be somewhere between one and two degrees per second, but a velocity of four degrees per second was too slow to produce uniformly correct judgments of rotation. Real assurance of the correctness of judgment of rotation obviously depends on angular velocity exceeding four degrees per second.

The difference between rotations of sudden onset and rotations of similar maximum velocity whose acceleration had the form of sine waves appears to be negligible within the limits of our experiments. Arithmetical acceleration, on the contrary, presented unfavorable conditions for the perception of rotation in the case of subject RD and favorable conditions for subject F.

The most irregular results occurred in connection with the oscillatory rotations.

1,320

Dolbnin, T. V. 1934 SHOES REQUIRED BY PARACHUTE JUMPERS
Vyestn. Vozd. Flota 17(12):13-15.

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Dolbnin, T. V. 1938 PARACHUTE TRAUMA AND MEANS OF PREVENTION
Vo.-sanit. Dyelo (2):49-57. 1938

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Dolbnin, T. V. 1938 ZUR FRAGE DER URSACHE VON MISSLUNGENEN FALLSCHIRM-
ABSPRÜNGEN (On the Question of Causes of Unsuccessful Parachute Jumps)
Vo.-sanit. Dyelo 10(7):49-52.

1,323

Dole, S. H. 1958 ENVIRONMENTAL REQUIREMENTS FOR EXTENDED OCCUPANCY
OF MANNED SATELLITES.
(The RAND Corporation, Santa Monica, Calif.) P-1577, Dec. 12, 1958

ABSTRACT: A review of the physical environmental conditions needed to keep a man functioning efficiently in an earth satellite. The main environmental conditions considered are composition and pressure of the atmosphere, gravitational forces, temperature, and radiation. Illustrative examples of the associated payload weights required per man as a function of mission duration are given.

1,324

Dole, S.H. 1960 DESIGN CRITERIA FOR ROTATING SPACE VEHICLES.
(Rand Corp., Santa Monica, Calif.) Research Memo No. RM-2668,
Contract AF 49(638)700, Proj. RAND, 18 Oct. 1960. ASTIA AD 249 503.

ABSTRACT: Several undesirable physiological side effects can arise from rotating a manned space vehicle in order to provide a simulated gravity field. The phenomena that may produce these side effects are herein analyzed to determine in each case the design restrictions that should be accepted in order to avoid adverse conditions. Based on this set of restrictions, a design envelope, which allows the designer considerable latitude, is based on the following limits: (1) maximum angular velocity, 4 rpm; (2) maximum head-to-foot difference in g's, 15%; (3) minimum rim velocity, 10 ft/sec; (4) maximum simulated gravity field, 1.5 g's; and (5) minimum simulated gravity field 0.01 g. (Author)

1,325

Doll, R. E. and J. R. Berkshire 1961 BIBLIOGRAPHY: PSYCHOLOGICAL RESEARCH IN THE U. S. NAVAL SCHOOL OF AVIATION MEDICINE -- JULY 1950-JUNE 1960.
(USN School of Aviation Medicine, Pensacola Air Station, Fla.)
Feb. 6. 1961

ABSTRACT: This bibliography covers those inservice research publications of the USN School of Aviation Medicine which might be of interest to psychologists. The period of publication covered is from July, 1950, through June 1960. The report titles are grouped by subject matter as follows: acoustics, anxiety, attitudes, grades and standards, morale, peer ratings, perception, selection, methodology, safety, tests, training, vision, and miscellaneous. An author index is included. (Tufts)

1,326

Domanski, T. J. 1956 HUMAN STRESS RESPONSE IN JET AIRCRAFT OPERATIONS.
(School of Aviat. Med., Randolph AFB, Tex.)
Rept. No. 57-16 ASTIA AD 128 591

1,327

Doolittle, J. H. 1925 AIR RACING
National Aeronautic Association Review 3(11):163-164, Nov. 1925

1,328

Doolittle, J. H. 1925 ACCELERATIONS IN FLIGHT
(National Advisory Committee for Aeronautics, Washington, D. C.)
Rept. No. 203, Feb. 28, 1925

SUMMARY: The accelerations in suddenly pulling out of a dive are greater than those due to any maneuver started at the same speed. The accelerations obtained in suddenly pulling out of a dive with a modern high-speed pursuit airplane equipped with well-balanced elevators are shown to be within 3 or 4 per cent of the theoretically possible accelerations. How close this agreement would be in the case of a similar airplane equipped with unbalanced elevators would be determined by additional experiments. Accelerations due to flying the airplane in average "rough air" do not exceed 2.5 g. The maximum acceleration which a pilot can withstand depends upon the length of time the acceleration is continued. It is shown that the pilot experiences no difficulty under the instantaneous accelerations as high as 7.8 g., but that under accelerations in excess of 4.5 g., continued for several seconds, the pilot quickly loses his faculties. While this is disconcerting to the pilot, it is not necessarily dangerous for one in good physical condition unless continued for a period of 10 to 12 seconds. (AUTHOR)

1,329

Dorcus, R. M. 1927 A COMPARISON OF POST-ROTATION NYSTAGMUS DURATION FOR REPEATED STIMULATION WITH THE HEAD FIXED AND FREE. J. Comp. Psychol. 7:177-179

1,330

Dorcus, R. M. 1932 THE EFFECT OF CONTINUOUS ROTATION ON THE ALBINO RAT. J. Comp. Psychol. 13:7-10

1,331

Dorcus, R. M., & O. H. Mowrer 1936 AN EXPERIMENTAL ANALYSIS OF THE VESTIBULAR POINTING TEST. Ann. Otol. Rhinol. Laryngol. 45:33-58

1,332

Dorcus, R. M. 1942 THE INFLUENCE OF PHYSIOLOGICALLY EFFECTIVE DOSES OF EPINEPHRINE ON VESTIBULARLY INDUCED NAUSEA. (Civil Aeronautics Administration, Washington, D. C.) Rept. No. 5; Nov. 1942

CONCLUSIONS:

1. The obtained results are that epinephrine produces no changes in frequency

of nausea or vomiting in response to vestibular stimulation under the conditions of this experiment.

2. This may safely be interpreted as demonstrating that under these conditions epinephrine does not facilitate nausea and vomiting.

3. It does not, however, exclude the possibility that epinephrine may tend to prevent or alleviate nausea.

4. It was found, incidentally to the main problem, that the normal resting blood pressures of those who were subsequently nauseated, were on the average equal to those of the non-susceptibles, and that their blood pressure changes from epinephrine were equal.

5. The results cast doubt on one aspect of the hypothesis that motion sickness is a consequence of fear. If fear actually increases the frequency of air sickness, the effect, insofar as it can be gauged from this experiment, does not seem to be a direct physiological result of the increased secretion of epinephrine, known to occur during fear. (CAA)

1,333

Dorman, P. J., & R. W. Lawton 1956 EFFECT ON G TOLERANCE OF PARTIAL SUPINATION COMBINED WITH THE ANTI-G SUIT. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5606

See also J. Avia. Med. 27(6):490-496, Dec. 1956

ABSTRACT: A total of 305 runs on nine trained centrifuge subjects and 233 runs on twenty-four Navy pilots were performed. Using grayout (peripheral light loss) as an endpoint, 66.7 per cent of the fleet pilots were able to withstand 7 g for 15 to 30 seconds sitting upright, wearing a standard Navy Z-2 suit inflated to 7-9 p.s.i. pressure. The remainder failed the 7 g, 30-second run. The 65 degree supine position alone failed to improve the performance of this latter group. All of these subjects were then retested in the 65 degree supine position wearing an inflated Z-2 suit (7-9 p.s.i. pressure). One hundred per cent of subjects thus tested successfully withstood 7 g for 30 seconds, although the unprotected tolerance in some subjects was as low as 2.5 g. (AUTHOR)

1,334

Dosch, V. F. 1956 MEASUREMENT OF THE DYNAMIC RESPONSE OF THE AMAL HUMAN CENTRIFUGE.

(Aeronautical Computer Laboratory, USN ADC)

Report TC-26-56, Oct. 1956.

1,335

Dostal, R. and T. Kersey 1960 SPACE MEDICINE
The Iowa Engineer 60(5):18-20. Feb. 1960.

ABSTRACT: This is the second in a series of two papers. This paper explains the psychological effects of confinement, hypoxia, excess oxygen, ecological food systems, and space hibernation.

1,336

Douglas Aircraft Co. GRAPH: TOLERABLE DECELERATION DISTANCE VS APPROACH
ANGLE (Douglas Aircraft Co., Inc., El Segundo, Calif.) ES 157042

1,337

Douglas Aircraft Co. GRAPH: ACCELERATION TOLERANCE
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. ES 141880

1,338

Douglas Aircraft Co. FLIGHT FITNESS
(Douglas Aircraft Co. Inc., El Segundo, Calif.)

1,339

Douglas Aircraft Company 1951 ACCELERATION AND THE HUMAN BODY.
(Douglas Aircraft Company, Inc., El Segundo Division, Calif.)

A Graph.

1,340

Douglas Aircraft Co. Engineering Dept. 1953 ACCELERATION AND THE HUMAN BODY.
In Proceedings of Symposium on Frontiers of Man-Controlled Flight, Institute
of Transportation and Traffic Engineers, Univ. of Calif., Los Angeles, April
1953.

1,341

Douglas Aircraft Co. 1956 DOUGLAS-TULSA TEST FACILITIES.
(Douglas Aircraft Co., Inc., Tulsa, Oklahoma) TU-24168, June 1956.

1,342

Douglas Aircraft Col, Inc. 1962 NOTES ON THE EFFECTS OF HUMAN ACCELERA-
TION TOLERANCES ON DESIGN FOR THE TERRAIN FOLLOWING AIRCRAFT.
(Douglas Aircraft Co., Inc., El Segundo, Calif.) Rpt. no. ES- 40621
ASTIA AD-278 653

1,343

Douglas, D. W. and H. R. Seal 1961 INTERNALIZED ANIMAL TELEMETRY SYSTEM —
ELECTRONIC CONSIDERATIONS.

ABSTRACT: A single-channel biological telemetry system is described, in which a miniature solid-state transmitter is surgically implanted permanently in experimental animals, its carrier being modulated by physiological information and transmitted through the intact skin to a remote receiver and demodulator, where the physiological data are then recorded. Discussed are such problems as RF propagation through electrolytes which are at circuit ground, recharging a surgically implanted battery by use of an external low frequency RF field, and obtaining high modulation sensitivity with optimum stability. Also discussed are the relative merits of various telemetry techniques when applied to physiological monitoring of this type and the problems associated with multiple data transmission. (Aerospace Med. 32(3):229. March 1961)

1,344

Douglas, W. K. 1960 SELECTION AND TRAINING OF SPACE CREWS.
Lectures in Aerospace Medicine, 11-15 January 1960 (Conducted at the School of Aviation Medicine USAF Aerospace Medical Center.)

1,345

Douvillier, J.G., Jr., H.L. Turner, J.D. McLean & D.R. Heinle 1960 EFFECTS
OF FLIGHT SIMULATOR MOTION ON PILOTS' PERFORMANCE OF TRACKING TASKS
(National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-143
February, 1960. ASTIA AD 231 341

ABSTRACT: The effect of motion of a flight simulator on pilots' performance of a tracking task has been investigated by comparing the air-to-air tracking performance of two pilots in flight, on a motionless flight simulator, and on a flight simulator free to roll and to pitch. Two different attack displays were used. It was found in tracking a maneuvering target that (1) the results from the moving flight simulator resembled the results from flight much more than did those from the motionless simulator; and (2) that in flight the conventional circle-dot display was superior to a drone display. For simpler tracking tasks it was not possible to detect these differences.

1,346

Douvillier, J. G., and R. E. Coate 1962 THE COORDINATE-TRANSFORMATION
EQUATIONS FOR A PILOTED FLIGHT SIMULATOR WITH SEVERAL DEGREES OF FREEDOM.
(National Aeronautics and Space Administration, Washington, D. C.)
NASA Technical Note D-1150; ASTIA AD 270 086

ABSTRACT: A method for developing coordinate-transformation equations for a

multiple-degree-of-freedom flight simulator is presented. The equations are applicable in particular to the NASA five-degree-of freedom piloted flight simulator; in general, however, the method of their development is applicable to transformation equations for other, similar simulators of fewer or of more degrees of freedom. Because the NASA simulator has a very limited range of displacement in one of its modes of motion the equations are written for four degrees of freedom. Examination of the singularities of the equations showed it possible to reproduce any combination of four of the six components of motion, three angular and three linear, of the vehicle being simulated. In most cases, there is more than one way to simulate each combination, the most desirable was determined by the restrictions imposed by the singularities of the equations. (Author)

1,347

Dowd, G. L., Jr. 1931 CAN MAN PILOT ROCKET PLANES AT 5,000 MILES AN HOUR?
Pop. Sci. Mon. 118(2):42-43, 134.

1,348

Downey, V. M., F. V. Lorentzen and E. H. Lambert 1949 EFFECT OF THE CROUCH POSITION ON THE INCREASE IN TOLERANCE TO POSITIVE ACCELERATION AFFORDED BY AN ANTI-BLACKOUT SUIT.
J. Aviation Med. 20(5):289-299.

ABSTRACT: A change from the upright sitting position to a crouch position in which the eye level was lowered 11 cm. increased the tolerance of centrifuge subjects to positive acceleration by an average of 1.2 G as determined by use of visual symptoms, blood content of the ear and the ear pulse as criteria of G tolerance.

The protective value of the G-4 anti-blackout suit was 54 per cent greater when assayed in the crouch position than it was in the upright sitting position.

Four of ten subjects were unable to support their heads in the crouch position employed at accelerations of 7 G and greater.

1,349

Downing, Theodore O. 1961 FAT EMBOLI IN GOATS - I. PULMONARY FAT EMBOLISM IN GOATS DYING FROM THE EFFECTS OF MASSIVE TRAUMA.
(U. S. Army Chemical Research and Development Laboratories, Maryland)
CRDLR 3106, Nov. 1961. Project 4C99-02-002.

ABSTRACT: Lung tissues from goats that died from the effects of massive

trauma were examined, in order to establish the incidence of fat embolism in goats, to ascertain the effect on the goat of the embolic involvement, and to determine the relationship between fat embolism severity and the concentration of clostridial organisms in wound exudates.

1,350

Draeger, R.H., J.S. Barr et al. 1945 A STUDY OF PERSONNEL INJURY BY "SOLID BLAST" AND THE DESIGN AND EVALUATION OF PROTECTIVE DEVICES
(U.S. Naval Med. Res. Instit. & U.S. Naval Hosp., Bethesda, Md.)
Res. Proj. X-517; Rept. No. 1; March 1945.

1,351

Draeger, R. H., J. S. Barr, and W. W. Sager 1946 BLAST INJURY.
J.A.M.A. 132:762-767.

1,352

Draeger, R.H. 1947 SHOCK OR BLAST INJURIES
In Shock and Vibration Bulletin No. 2
(Office of Naval Research, Naval Research Lab., Washington, D.C.)
Pp. 7-9, March 1947.

ABSTRACT: The problem of shock or blast is logically divided into two categories, namely, the effects upon material and the effects upon personnel. The problem of damage to material, including ships, planes, guns, instruments, and equipment of all kinds has been partially solved. Damage or injuries to personnel which result from shock or blast are less well understood, and very little has been done regarding methods of study. This article reviews the injuries caused by pressure waves during explosion. These injuries discussed include air blast injuries, water blast injuries, and solid blast injuries.

1,353

Draeger, R.H., D.E. Goldman, & C.B. Cunningham 1947 SHOCK AND VIBRATION
BULLETIN NO. 2 - MARCH 1947. (Office of Naval Research, Naval Research Laboratory, Washington, D.C.) ASTIA ATI 75123.

ABSTRACT: Topics covered at a symposium on shock and vibration are presented. A committee was set up to clarify and unify ideas and to report such terminology

definitions, and standards as will help in the uniformity, understanding, and progress in the field of science. The effects of personnel shock, blast, and vibration were also discussed. It was demonstrated that the purpose of such investigations was to provide protection for human beings and structures involved in Fleet operations. In addition, a detailed description together with photographs is given of the German Askania vibrograph.

1,354

Draeger, R.H., R.H. Lee, & B.E. Jennings. 1956 SOLID BLAST STUDY OF PROTECTIVE SHOES AND MATS. (Navy Mine Defense Lab., Panama City, Fla.) Evaluation Rept. ASTIA AD 124 203, Dec. 1956.

1,355

Dranetz, A. I., & J. L. Upham 1955 A PHASE MODULATED TRANSISTORIZED PRESSURE OR ACCELERATION TELEMETERING CHANNEL. (Paper, 1955 National Telemetering Conference, Chicago, May 18-20, 1955)

ABSTRACT: A phase modulated system has been designed for the telemetering of airborne recording of accelerations and pressure in missiles and aircraft. Utilizing differential transformer transducers as the sensing devices, this system can be used to telemeter accelerations up to ± 180 g having frequency components from 0 cps to more than 500 cps, and pressure up to ± 30 psi over the same frequency range.

1,356

Drone, K. C. 1961 DESIGN STUDY FOR AN ACCELERATION RESEARCH DEVICE. Rept. for 1 July 60 - 20 Jan. 61 on Biophysics of Flight. (Wright-Patterson, AFB, Ohio) ASD TR 61-425, August 1961. ASTIA AD 268 621

ABSTRACT: Starting with the presently recognized requirements of accelerations, levels of various exposure conditions, and combinations of stresses in aerospace systems, a design study was made of an acceleration research device which would simulate these conditions. It was required that this accelerator use proven construction methods and be economically feasible. In simulating the various performance requirements there were certain areas that were quite significant in the over-all design: (1) Power requirements during the first second of maximum centrifuge onset is approximately 86,000 horsepower and necessitates a stored energy means to keep electrical power requirements below 20,000 horsepower; (2) Gyroscopic actions plus simulated vibration conditions at the end of the centrifuge arm dictate that major attention be given to arm natural frequencies and dampening qualities; (3) Resultant acceleration effects plus cab

inertias necessitated some reduction in cab RPM's and onset rates to keep torque and horsepower requirements within feasibility limits; and (4) Coriolis forces must be considered in both the effect upon the subject being tested and cab structure. (Author)

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Brooker, J.C. 1954 WARTIME EXPERIENCE WITH SKULL INJURY AND BLAST AND THEIR EFFECT UPON THE EAR Arch Otolaryng., Chicago 58:546-574

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Drury, D.R. and G.H. Scott et al 1944 INVESTIGATIONS IN AVIATION PHYSIOLOGY WITH PARTICULAR ATTENTION TO THE EFFECTS OF ACCELERATION, DECOMPRESSION, ANOXIA, AND COLD AND METHODS TO COMBAT THESE EFFECTS.
(National Research Council, Committee on Aviation Medicine, Committee on Acceleration) Final Rept. OEMcmr-288. 26 April 1944.

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Drury, D. R. 1947 HUMAN CENTRIFUGE
Stanford Med. Bull. 5:148-150.

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Drury, D.R. 1947 PHYSIOLOGICAL, BIOCHEMICAL, AND ANATOMICAL EFFECTS OF ACCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH SPEED AIR-CRAFT. (University of Southern Calif., School of Medicine, Los Angeles)
USN Contract No. N6ori77, Task Order 1, Project no. 161-014, January 1947

1,361

MOTION PICTURE

Drury, D.R., et al. 1948 STUDIES OF THE PATHOLOGY PRODUCED UPON GOATS BY EXPOSURE TO HEAD TO FOOT RADIAL ACCELERATIONS: NEGATIVE G.
(Presented at the Nineteenth Annual meeting of the Aero Medical Association in Toronto, Canada, June 1948)

1,362

Duane, T.D., E. L. Beckman & K.R. Coburn n.d. LIMITATION OF OCULAR MOTILITY DURING POSITIVE ACCELERATION (Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)

1,363

Duane, T. D., R. L. Wechsler, J. E. Ziegler, & E. L. Beckman 1952 EFFECTS OF ACCELERATION UPON THE CEREBRAL METABOLISM AND CEREBRAL BLOOD FLOW. PHASE II. STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5204, 21 May 1952, ASTIA ATI 157 813

ABSTRACT: A survey of the effects of repeated exposures to 12 negative G for 40 seconds was carried out on the monkey, and his response to this imposed stress evaluated. Cerebral circulation was measured by recording the passage of fluorescein through cortical vessels with the use of a photofluorometer attached to a cranial lucite window previously placed in the monkey's skull. Respiration was recorded via a thermocouple within the tracheal cannula. A quantitative measurement of the blood gases was performed upon blood withdrawn from the cerebral circulation during maximum G; electroencephalographic and electrocardiographic recordings were obtained by several methods; and the vascular pressure gradient across the brain was measured by pressure transducers in the carotid artery and in the confluens sinuum. Whenever possible, all recordings were made concurrently.

At 12 negative G for 40 seconds there was evidence of continuing cerebral circulation, apnea with secondary arterial anoxemia, and a lowering of the cerebral venous oxygen content suggesting cerebral anoxia. A transient enhancement of the electrical activity of the cortex was followed by gradual depression of varying degrees. The arterial and venous pressures were elevated, but their A-V gradient decreased severely during stress. Cardiac irregularities occurred with abnormally high T waves suggestive of severe cardiac anoxia. A failure of the cerebral venous oxygen content to return to the pre-run level ten minutes after acceleration indicates either an abnormality of cerebral metabolism or a decreased cerebral blood flow. (DACO)

1,364

Duane, T. D., J. E. Ziegler and H. Hunter 1952 HUMAN TOLERANCE TO COMBINED ACCELERATION. (Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pa.) Report no. NADC-MA-L5207, 3 Dec. 1952. ASTIA AD 54 282

ABSTRACT: Experiments were carried out on human subjects and primates (chimpanzees) seated in an F9F ejection seat, which was mounted on the deck of the gondola of a human centrifuge. Transverse g (back to chest and chest to back) were applied up to 15 g for 5 seconds, resulting in physical discomfort, such as pressure on the rib cage, and petachiae on the back. However, this body loading was well within the voluntary human tolerance and installation of a padded body support reduced discomfort. Following preliminary explorative experiments with primates, subjects were exposed to positive (head to seat) g forces up to a maximum of 15 g. The subjects were first tested under normal accelerations (3 to 4 g per second increase or decrease) in order to establish their blackout level, and then subjected to g levels higher than their blackout level. It was shown that by stepping up the acceleration levels, the blackout levels could be increased, while the time intervals of consciousness were reduced.

1,365

Duane, T. D. et al 1952 STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G.
J. Aviation Med. 23(5):479-489, 544. October 1952.

ABSTRACT: A survey of the effects of repeated exposures to 12 negative G for forty seconds was carried out on the monkey, and his response to this imposed stress evaluated. Cerebral circulation was measured by recording the passage of fluorescein through cortical vessels with the use of a photofluorometer attached to a cranial lucite window previously placed in the monkey's skull. Respiration was recorded via a thermocouple within the tracheal cannula. A quantitative measurement of the blood gases was performed upon blood withdrawn from the cerebral circulation during maximum G; electroencephalographic and electrocardiographic recordings were obtained by several methods; and the vascular pressure gradient across the brain was measured by pressure transducers in the carotid artery and in the confluens sinuum. Whenever possible, all recordings were made concurrently.

At 12 negative G for forty seconds there was evidence of continuing cerebral circulation, apnea with secondary arterial anoxemia, and a lowering of the cerebral venous oxygen content suggesting cerebral anoxia. A transient enhancement of the electrical activity of the cortex was followed by gradual depression of varying degrees. The arterial and venous pressures were elevated, but their A-V gradient decreased severely during stress. Cardiac irregularities occurred with abnormally high T waves suggestive of severe cardiac anoxia. A failure of the cerebral venous oxygen content to return to the pre-run level ten minutes after deceleration indicates either an abnormality of cerebral metabolism or a decreased cerebral blood flow.

1,366

Duane, T. D., R. L. Wechsler, J. E. Ziegler, and E. L. Beckman 1952 STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G, PHASE II.
J. Avia. Med. 23:479-489.

See also American Journal of Medical Science 224:112 (1952).

ABSTRACT: Anesthetized healthy monkeys (Macaca mulatta) with lucite calvaria, were subjected to 12 negative g on a centrifuge while various physiological measurements were taken. Repeated exposures of 40 seconds each resulted in cerebral edema and in subcutaneous and submucosal hemorrhages in the head and neck region, but were not fatal to the animals. At - 12 g, cerebral circulation continued at a somewhat slower rate compared to unexposed controls (9.4 and 7.1 seconds, respectively). During maximum g, respiratory movements ceased but were resumed spontaneously 15 seconds after completion of exposure. While there was a decrease in the cerebral arteriovenous difference during negative g, this difference rose above the pre-run level 10 minutes after the experiment. The electroencephalogram revealed a trend toward progressive depression, with individual variations. The arterial and venous pressures increased but the pressure gradient decreased severely during stress. Bradycardia and high T wave were both suggestive of severe anoxia.

1,367

Duane, T. D., R. L. Wechsler, J. E. Ziegler and E. L. Beckman 1952 STUDIES ON CEREBRAL PHYSIOLOGY OF MONKEYS AT 12 NEGATIVE G, PHASE II.

American Journal of Medical Science 224:112

See Also J. Aviation Med. 23:479-489.

ABSTRACT: Cerebral circulation, respiration, blood gases, and vascular pressure gradients across the brain were measured on monkeys exposed to 12 negative g for 40 seconds. Electroencephalogram and electrocardiogram were also recorded. The findings were as follows: (1) cerebral circulation continued throughout the experiment; (2) apnea set in with secondary arterial anoxemia and a lowering of the cerebral venous oxygen content, indicating cerebral anoxia; (3) arterial and venous pressures were elevated, but the arterio-venous pressure gradient decreased severely during the stress; (4) cardiac irregularities were observed, suggesting cardiac anoxia; and (5) the cerebral venous oxygen content failed to return to the original level after the experiment, indicating a disturbed cerebral metabolism or decreased cerebral blood flow.

1,368

Duane, T. D. 1953 PRELIMINARY INVESTIGATION INTO THE STUDY OF THE FUNDUS OCULI OF HUMAN SUBJECTS UNDER POSITIVE ACCELERATION. PHASE III.

(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5303; ASTIA AD-20 519

ABSTRACT: The literature was surveyed with respect to 2 prevalent theories concerning blackout. Experiments verified the hypothesis that blackout is a retinal ischemic phenomena. Blackout in humans subjected to positive acceleration was accompanied by a retinal arteriolar ischemia. A close correlation was noted between subjective visual losses and the 3 stages of ophthalmoscopic changes: arteriolar pulsation, arteriolar exsanguination and collapse, and return of arteriolar pulsation and transient venous distention. A correlation was found between the systolic pressure and the symptoms and signs of blackout. Observations of the fundus oculi of chimpanzees subjected to positive and negative g forces indicated that under negative g, a venous engorgement and narrowing of the arteriolar trees occurred. In rabbits a decrease in intracranial and intraocular pressures occurred during positive g, and an increase in pressures occurred during negative g. (ASTIA)

1,369

Duane, T. D., E. L. Beckman, et al 1953 SOME OBSERVATIONS ON HUMAN TOLERANCE TO EXPOSURES OF 15 TRANSVERSE G.

(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.) Report no. NADC-MA-5305; ASTIA AD 20 518.

ABSTRACT: The physiological effects of positive and negative G applied transversely in supine and prone positions were investigated. The 50-ft human centrifuge with a standard F9E ejection seat was used in all the test runs. Normal, healthy, male volunteers experienced 99 runs between 3 G for 2 sec and

15G for 5 sec in the supine position; 53 runs of the same magnitudes were experienced in the prone position. Ear pulse, ear opacity and modified Lead 1 of ECG were recorded. Conventional lap belts and shoulder harnesses were used. Head fixation was maintained by a perforated face curtain with handles modified to provide signal buttons for central and peripheral lights as well as a distress buzzer. Black-and-white motion pictures were taken during some of the runs. In the supine position, the pulse wave which began to flatten at 5 G was absent at 9 to 10 G, and all subjects responded rapidly to peripheral and central lights at 15 G for 5 sec. Occasional moist rales and hoarseness occurred in 1 subject at 13 G for 3 sec, and a few subjects deviated to the right when attempting 1-foot stands. One subject received a submucosal hemorrhage in the tympanic membrane. Vertigo, stiffness, and weariness were experienced by all subjects. ECG, EEG, and ear opacity recordings were inadequate for satisfactory analysis. In the prone position, a slight sinus arrhythmia was present in some subjects during the postrun period, and petechiae appeared in the legs of subjects not protected by elastic bandages. Motion pictures revealed body displacement, and the subjects experienced burning pains in the knees and calves during 15-G runs. ECG, ear-pulse, ear-opacity, and signal-light recordings were inadequate for satisfactory analysis. (ASTIA)

1,370

Duane, T. D. 1954 OBSERVATIONS ON THE FUNDUS OCULI DURING BLACKOUT.
A.M.A. Arch. Ophth. 51:343-355.

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Duane, T. E., E. L. Beckman, J. E. Ziegler and H. Hunter 1955 SOME OBSERVATIONS ON HUMAN TOLERANCE TO ACCELERATIVE STRESS. III. HUMAN STUDIES OF 15 TRANSVERSE G.
J. Aviation Medicine 26(4):298-303, August 1955.

ABSTRACT: Five subjects were exposed to 15 transverse g for five seconds in the supine position. Also, five subjects were placed in the prone position and exposed to the same accelerative conditions. Blackout and unconsciousness did not occur and the physiological effects produced were of a transient nature. An adequately stressed seat was sufficient protection for the supine position. Since the conventional shoulder harness and lap belt were not suitable for levels above 7 g when the stress was applied in the prone position, additional thorax and leg barriers were employed. (Author)

1,372

Duane, T. D., E. L. Beckman and K. R. Coburn 1962 LIMITATION OF OCULAR MOTILITY AND PUPILLARY DILATION IN HUMAN BEINGS DURING POSITIVE ACCELERATION.
In Invest. Ophthalmol. 1:136-141, Feb. 1962.

1,373

Duane, T. D., D. H. Lewis, S. D. Weeks and J. F. Toole 1962 THE EFFECTS OF APPLIED OCULAR PRESSURE AND OF POSITIVE ACCELERATION ON PHOTIC DRIVING IN MAN.

(Naval Air Development Center, Johnsville, Pa.)

NADC-MA-6214, 28 Dec. 1962. ASTIA AD 298 112

ABSTRACT: Several subjects who demonstrated the phenomenon known as photic driving of the electroencephalogram were employed in experiments with the ophthalmo-dynamometer and with positive acceleration on the human centrifuge. In both of these forms of stress when the intraocular pressure exceeded the retinal arteriolar diastolic pressure a direct correlation was demonstrated to peripheral field constriction and loss of the previously apparent photic driving in the electroencephalogram. The latter did not reappear when the intraocular pressure exceeded the retinal arteriolar systolic pressure but did reappear as soon as the intraocular pressure was beneath the retinal arteriolar diastolic pressure. This suggests that photic driving is related to the rod portion of the human retina, since with retention of central vision, which is primarily a cone function, photic driving remained inhibited. (Author)

1,374

Duane, T. D., D. H. Lewis, S. D. Weeks & J. F. Toole 1963 THE EFFECTS OF APPLIED OCULAR PRESSURE AND POSITIVE ACCELERATION ON PHOTIC DRIVING IN MAN.

Neurology (Minneap) 13:259-262, March 1963.

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DuBois, E. F. and W. R. Miles 1945 FIFTH CRASH INJURY CONFERENCE.

(National Research Council, Committee on Aviation Medicine, Washington, D. C.) Special CAM Report, 30-31 October 1945.

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DuBridge, L.A. 1961 ADVENTURES IN SPACE.

Calif. Inst. Technol. Quart., 2:2-8, Spring 1961

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Dugas, D.J. 1962 TARGET-SEARCH CAPABILITY OF A HUMAN OBSERVER IN HIGH-SPEED FLIGHT. (Rand Corp., Santa Monica, Calif.) Memo No. RM-3226-PR, December 1962. ASTIA AD 294 599

ABSTRACT: The necessary conditions for the visual process are presented, and two modes of search are discussed in detail. One mode is an example of the

familiar sector-scan pattern, and the other is a more specific method adapted to searching for rail-mobile targets. The limitations placed by speed-and-altitude combinations on visual performance in these two situations are summarized. Curves are presented which represent the capabilities of an observer under ideal conditions; but in a real search mission, allowances must be made for factors unique to the situation that tend to degrade the performance of the observer (e.g., fatigue, poor visibility, and vibration of the aircraft). In comparing the two modes of search it was found that some of the difficulties encountered in searching for small targets can be alleviated by using an appropriate search pattern. It is important to acquire as much information as possible about the targets beforehand so that the observer can employ the most effective search procedures. The human optical system apparently will not constitute the most serious speed limitation on the reconnaissance aircraft except at very low altitudes (less than 1500 ft). It can be expected that structural limits of the aircraft will generally be encountered long before the maximum tolerable speed for vision is reached. (Author)

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Duguet, J. 1946 EFFETS PHYSIO-PATHOLOGIQUES DES ACCELERATIONS SUR L'ORGANISME DE L'AVIATEUR (THE PHYSIO-PATHOLOGICAL EFFECTS OF ACCELERATION ON THE ORGANISM OF THE AVIATOR)
Biologie Medicale 35 (11): 197-219

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Dunlap, J.W., 1947 HUMAN PROBLEMS IN THE OPERATION OF HIGH SPEED AIRCRAFT.
(Office of Naval Research, Special Devices Center, New York, N.Y.)
August 1, 1947

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Dunlap, K., and R.M. Dorcus 1926 THE EFFECT OF RATE OF RETARDATION ON POST-ROTATION NYSTAGMUS. J. Comp. Psychol. 6:329-335

1,381

Dunlavey, E. O. 1956 CENTRIFUGE TESTING OF SINGLE DEGREE OF FREEDOM GYROS (Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.) Rept. no. GM-TN-41; GM 43.5-57; WDD Document no. 7-883, Contract AF 18(600)1190, 7 Nov. 1956; ASTIA AD 217 310

ABSTRACT: A discussion is presented on some of the problems associated with centrifuge testing of single degree of freedom gyros. Direct attachment of

the gyro to the centrifuge arm, with the gyro output axis parallel to the centrifuge axis, is shown to be a simple, yet accurate, way to obtain wheel-off mass unbalance and compliance torque data. These wheel-off type gyro tests can be performed on commercially available equipment and they should provide much useful gyro design data. Further refinement in accuracy can be accomplished by measuring and correcting for misalignment between the gyro case and centrifuge axes. Two methods are presented for measuring this misalignment during centrifuge operation. Accurate wheel-on type gyro tests require the use of a stable platform, since a counter-rotating table can introduce excessive misalignment errors. Centrifuge arm vibration can subject the test gyro to both translational plus rotational vibrations. These inputs may cause significant errors if the arm motion contains frequency components above the centrifuge frequency. (Author)

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Duval, R. A. 1944 A FLYING ACCIDENT POSSIBLY DUE TO THE EFFECT OF
CENTRIFUGAL FORCE.
J. R. Nav. Med. Serv. 30:54-56.

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Duvoisin, R. C., F. Kruse, Jr., and D. Saunders 1961 CONVULSIVE SYNCOPES
INDUCED BY THE VALSALVA MANEUVER IN SUBJECTS EXHIBITING LOW G-TOLERANCE.
(Paper, 32nd Annual Meeting of the Aerospace Medical Assoc., Palmer
House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: The authors studied a group of patients who, by voluntarily performing a Valsalva maneuver, could reproduce episodes presenting the EEG and clinical features observed by Gastaut in convulsive syncope due to cardiac asystole. The group included two student pilots referred because of "convulsions" occurring in flight under positive G-stress. Their case histories are presented to demonstrate a mechanism of syncope important to aviation medicine and to illustrate the differentiation of convulsive syncope from epilepsy. (Aerospace Medicine 32(3):229. March 1961)

1,384

Dvorák, J. 1951 URAZOVOST PŘI SESKOKU PADÁKEM (Injuries during Parachute Jumps)
Vojenské Zdravotnické Listy, Prague, 20:135-136, May-June 1951.

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Dvorak, Josef 1958 ZDRAVOTNICKE PROBLEMY LETU V KOSMICKEM PROSTORU (Health Problems of Flights in the Cosmic Space)
Prakticky lekar 38(10): 401-403.

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Dvorak, J., P.K. Isakov, & J. Hospodar 1960 CLOVEK V MEZIPLANETARIM PROSTORU (MAN IN INTERPLANETARY SPACE) (Prague: Orbis, 1960)

ABSTRACT: The book is based mainly on Soviet data and presents the physical aspects of outer space from the biological point of view. Attention is given to the effect of space factors on the body and methods and equipment for human flight in outer space are described. Details of the first experiment with the dog Layka in space flight are given. Return to the Earth, the selection and training of astronauts, scientific results of space flights, and space medicine are treated. No personalities are mentioned. There are 7 references, all Czech. (CARI)

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Dvorak, J., P. K. Isakov and J. Hospodar 1960 MAN IN INTERPLANETARY SPACE - A SMALL MODERN ENCYCLOPEDIA (Clovek v Meziplanetarnim Prostoru) Ceskoslovenska Spolecnost Pro Sireni Politickych A Vedeckych Znalosti, Prague, pp. 1-160, 169-211. (Trans. by Aerospace Technical Intelligence Center, Wright-Patterson AFB, Ohio, Trans. No. MCL-907.) ASTIA AD 261 786

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Dvorak, J., Isakov, P. K. & J. Hospodar 1961 MAN IN INTERPLANETARY SPACE - A SMALL MODERN ENCYCLOPEDIA (Clovek v Meziplanetarnim Prostoru) (Foreign Technology Division, Wright Patterson Air Force Base, Ohio) MCL-907/1+2, 23 May 1961. ASTIA AD 261 786.

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Dvorak, J., P. K. Isakov & J. Hospodar 1961 EFFECT OF COSMIC VELOCITIES ON THE ORGANISM.
In: Man In Interplanetary Space - A Small Modern Encyclopedia.
ASTIA AD 261 786

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Dvorak, J., P. K. Isakov & J. Hospodar 1961 INFLUENCE OF OTHER FLIGHT FACTORS
In: Man In Interplanetary Space - A Small Modern Encyclopedia.
ASTIA AD 261 786

1,391

Dvorak, J., P. K. Isakov & J. Hospodar 1961 EFFECT OF WEIGHT CHANGES.
In: Man in Interplanetary Space - A Small Modern Encyclopedia.
ASTIA AD 261 786.

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Dybowski, W. 1936 WPLYW SZYBKOSCI I JEJ ZMIAN NA ORGANIZM LOTNIKA
(L'INFLUENCE DE LA VITESSE AT DE SES CHANGEMENTS SUR L'ORGANISME DE
L'AVIATEUR) (The Influence of Speed and the Changes Upon the Organism
of the Aviator)

Lekarz Wojskowy (Warsaw) 27: 335-342 (with French summary)

See also: Polisk. Przegl. Med. Lotn. (Varsovie) 4: 183-190; 1935.

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Dye, E.R. 1949 KINEMATIC BEHAVIOR OF THE HUMAN BODY DURING CRASH
DECELERATION (THIN MAN PROJECT).
(Cornell Aeronautical Lab., Inc., Buffalo, N.Y.) Report No. OM-596-J-1
10 Oct. 1949. ASTIA ATI 78582.

ABSTRACT: A piece of experimental apparatus consisting of a jointed full scale proportionally weighted sheet metal man was designed and built. This dummy was placed in a two dimensional cockpit and the cockpit accelerated by shock cords to simulate crash conditions. Co-planar motions of the major joints of the body and head are traced on paper and uniform time intervals are marked on the scribed motion paths by a spark device. Energy of the impact blow to the head is measured with a simple energy gauge. Data can be taken for various seat strap and shoulder harness arrangements and for the unrestrained body condition. Preliminary test runs were made to establish the effectiveness of the equipment.

Tests were conducted on human subjects to determine muscular restraint to joint rotation so that the data could be used to simulate tense conditions in the "Thin Man" crashes.

1,394

Dye, E. R. 1953 PROTECTION OF THE HUMAN HEAD FROM BLOWS DELIVERED BY A
FLAT SURFACE.
Safety Education 32:8-11.

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Dye, E. R. 1954 CORNELL UNIVERSITY TESTS SHOW JUST WHAT HAPPENS IN A CRASH
. . . AND HOW TO PROTECT YOURSELF. Woman's Day 18(2):32-33, 85-86, Nov. 1954

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Dye, E. R. 1956 KINEMATICS OF THE HUMAN BODY UNDER CRASH CONDITIONS.
Clinical Orthopaedics 8: 305-309, 956.

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Dytrt, L. F. and W. Specht 1945 IMPACT DETERMINATIONS.
General Electric Review 48(6):50-54, June 1945.

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Dzendolet, E. 1960 MANUAL APPLICATION OF IMPULSES WHILE TRACTIONLESS
Hum. Factors 2(4):221-227, Nov. 1960.

ABSTRACT: To determine what types of impulses could be applied by a S while tractionless, 20 naive Ss were tested on an air-bearing "scooter" and a strain gauge transducer or force bar. The task was to push the plunger, with one motion, as far as it would go in the tube while sitting on the scooter and grasping a handhold with the left hand. The task was performed with air blowing through the air-bearing pads of the scooter making the S tractionless, and under normal frictional conditions. Forces against which, and travel distances through which the plunger was pushed were varied. Both quantitative and qualitative results were presented. (Tufts)

ACCELERATION

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1,399

Eakin, B.H. 1946 INSTRUCTIONS FOR USE OF ACCELEROMETER MK 2 (U.S. Naval Gun Factory Washington 25, D.C.) Naval Ordnance Laboratory Memorandum 8494, 9 Oct. 1946, AD 115 113

ABSTRACT: This publication contains a description of the Accelerometer MK 2 and instructions in preparing it for use. It also gives instructions for loading and presetting the accelerometer and mounting and reading it.

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Eccles, J.C. n.d. REPORT ON PHYSIOLOGICAL PERFORMANCE AND ACTION OF HUMAN CENTRIFUGES, AS REQUESTED BY ANTI-G SUB-COMMITTEE OF THE F.P.R.C., 17 JULY 1943. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF FR52

1,401

Eckel, W. 1954 ELEKTROPHYSIOLOGISCHE UND HISTOLOGISCHE UNTERSUCHUNGEN IM VESTIBULARISKERN GEBIET BEI DREHREIZEN (Electrophysiological and Histological Investigations of the Vestibular Nucleus During Rotary Stimuli) Arch. Ohren- Nasen- u. Kehlkopfh. (Berlin) 164:487-513.

1,402

Ecker, P.G., R.J. Crosbie, and H. Hunter 1953 AN INVESTIGATION OF THE EFFECTS OF ACCELERATION FORCES ON A PILOT DURING AN AUTOMATIC INTERCEPTOR ATTACK (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5304, June 2, 1953. ASTIA AD 13 805

ABSTRACT: An F9F ejection seat was installed in the gondola of the human centrifuge and subjects were exposed to acceleration runs from 1 to $3 \frac{1}{2}$ G, accompanied by an oscillating roll over in amplitude of $54^\circ \pm 20^\circ$ at a frequency of 0.5 to 0.75 cycles per second and an oscillating pitch in amplitude of $+36^\circ$ to -36° at a frequency of 0.6 cycles per second. It is felt that, under the present conditions of the run, the pilot will have no difficulty in recovering control of the aircraft following the roll away from the target.

1,403

Eckstrand, G. A. & M. R. Rockway 1961 SPACECREW TRAINING: A REVIEW OF PROGRESS AND PROSPECTS. (Wright-Patterson Air Force Base) ASD TR 61-721; ASTIA AD 274 190.

ABSTRACT: Current progress and future prospects in the field of spacecrew training are reviewed. Descriptions of all current astronaut training programs are presented, and a number of general conclusions with reference to such training are drawn, based upon the manned space operations which have been conducted to date. In addition to the actual experience which has been gained in training spacecrew personnel, a review is presented of recently completed and current research which is directly relevant to this problem. Areas in which research should be accelerated are identified. (Author)

1,404

Edelberg, R., et al. 1952 COMPARISON OF EFFECTS OF HUMAN TOLERANCE TO ACCELERATIONS OF SLOW AND RAPID ONSET. J. Aviation Med. 27(6):482-489, Dec. 1952. ASTIA AD 208 151

ABSTRACT: Reflex activity of the circulation during exposure to g has been recognized, but its full capacity has not been evaluated. The "gradual onset run" (GOR) allows evaluation of this capacity and its magnitude turns out to be greater than commonly believed. It can add up to 3.5 g to the conventional blackout level, (average increment, 1.9 g). A hypothesis is presented to show how the GOR produces this increment. The increment has a high correlation with the amount of protection received from a g-suit for any given subject, a relationship which is interpreted as implying a reflex mechanism in g-suit protection. The GOR has application in predicting changes in a pilot's g-tolerance in the g-suit and in evaluating student pilots with a history of low g-tolerance. (Author)

1,405

Edelberg, R., and H. S. Weiss 1952 CENTRIFUGATION OF ANIMALS ABOUT AN AXIS THROUGH THE BODY. Federation Proceedings, 11 (1^L): 40.

Abstract: Dogs, anesthetized with Nembutal and lying on either side, were spun on a horizontal turntable with the heart at the center of rotation. Respiratory rate, EKG, and direct measurement of blood pressure from 4 vessels were recorded simultaneously. The centrifugal force induced by the spin about the heart opposes venous return, resulting, at speeds above 120 r.p.m., in a picture of acute hypoxia. Cardiac output is decreased as indicated by the marked reduction in arterial pressure pulse pressure and A-V pressure differences. Tachycardia develops and is primarily attributal to the abrupt acute fall in carotid pressure. Breathing ceases in the inspiratory phase probably as a result of a caudad displacement of the diaphragm. Animals survived exposures to 200 r.p.m. for 2 minutes but developed subendocardial and cerebral subarachnoid hemorrhages. Similar Subendocardial Hemorrhages have been produced by the beating of an "empty" heart. The subarachnoid ecchymoses are attributed to the sudden rise in systolic pressure from zero to almost 450 mm. Hg immediately after the run.

1,406

Edelberg, R. 1952 TUMBLING (paper, conference on "Problems of Emergency Escape in High Speed Flight," Sept. 29-30, 1952, at Wright-Patterson AFB, Ohio) ASTIA AD 14 346

ABSTRACT: Tumbling motions were simulated on a turn-table capable of speeds up to 200 r.p.m. Speeds of 100 r.p.m. did not produce unconsciousness in human test subjects when the center of rotation was located at the lower portion of the heart. Above 100 r.p.m., pain was perceived and hemorrhages occurred, but mental and physical performance remained unimpaired. Experiments with dogs showed that the impairment of the circulation becomes less at any given speed as the center of rotation is moved toward the lower abdomen. Human experiments with the center of rotation at the level of the abdomen are in progress. From the dog experiments it appears desirable that the center of rotation be applied at heart level for short-duration spins. Since production of vertigo is contingent on stimulation of the semicircular canals by some changing force, at spins of constant rate no vertigo is experienced because the radial forces are constant. The resulting sensation is that of being in a strong gravitational field acting toward the head and feet at the same time, rather than one of being rotated. A "strength-duration curve for human tolerance" indicating threshold values for conjunctival hemorrhage is presented.

1,407

Edelberg, R. and H. S. Weiss 1953 THE PHYSIOLOGY OF SIMPLE TUMBLING. PHASE II. HUMAN STUDIES.
(Wright Air Development Center, Wright-Patterson AFB, Ohio)
WADC TR 53-139, June 1953.

1,408

Edelberg, R., H. S. Weiss, & P. V. Charland 1953 HYDROSTATIC BEHAVIOR OF VASCULAR COLUMN DURING TUMBLING. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio)

ABSTRACT: During emergency escape from high speed aircraft, there often occurs a head-over-heels tumbling which may produce radial accelerations as high as 25 g, acting in opposite directions at each end of the body. The hydrostatic pressures developed in the vascular column should increase with the square of the distance from the center of rotation, a prediction validated by experiment, and the absolute pressure at any point would be expected to equal the central pressure plus the hydrostatic increment. However, when dogs were rotated on a spin-table with the center of rotation through the heart at speeds which either reduced or virtually eliminated cardiac output, peripheral pressures were considerably lower than expected. One possible explanation was the development of subatmospheric pressures at the center of rotation. Sub-ambient pressures at head level during positive acceleration have been reported (Henry, Gauer, Kety and Kramer, 1951) and in fact the pressures measured at the center of rotation by intra-aortic catheterization of the dogs fell as low as 80 mm Hg sub-ambient. They agree closely with the central pressures calculated from peripheral measurements.

Further, when water-filled columns of comparable dimensions were rotated, central pressures as low as 250 mm Hg below ambient were developed. Lastly, at moderate speeds, when some cardiac output is still maintained and the flow precludes an interrupted column, it is necessary to assume the development of sub-atmospheric central pressures to account for the low peripheral pressure values. (Federation Proceedings 12(1):37, March 1953)

1,409

Edelberg, R. 1953 PROBLEMS OF EMERGENCY ESCAPE IN HIGH SPEED FLIGHT: TUMBLING (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC Document #53WC-1470

1,410

Edelberg, R., H. S. Weiss, P. V. Charland & J. I. Rosenbaum 1954 THE PHYSIOLOGY OF SIMPLE TUMBLING. PART I. ANIMAL STUDIES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Tech. Rept. 53-139. Jan. 1954. ASTIA AD 36 304.

ABSTRACT: The tumbling that follows emergency escape from an aircraft by seat ejection or that occurs during prolonged free-fall poses a threat to the escaping crewman. Tumbling was simulated in the laboratory on a horizontal spin table using anesthetized dogs as subjects preliminary to human experimentation. The axis of rotation was through the heart or at various locations up to 20 cm caudad. The centrifugal forces proved effective in producing peripheral pooling with a consequent reduction in heart filling and cardiac output as evidenced by the reduced pulse pressure and arteriovenous pressure difference. The decrease in perfusion pressure and the accompanying apnea was enough to produce hypoxia at speeds greater than 140 rpm, as evidenced by oral cyanosis. Concurrently, the elevated hydrostatic pressures were sufficient to produce hemorrhage in the extremities. A tachycardia or bradycardia may occur, depending on the location of the center of rotation. In general, pathology is less when the center of rotation is at the heart than when located at the more caudad positions, but circulation is less impaired as the center is moved caudad. (DACO)

1,411

Edelberg, R. 1955 BLOOD PRESSURES DURING SIMULTANEOUS TUMBLING AND DECELERATION.

ABSTRACT: Immediately after emergency ejection, a pilot may be exposed to drag forces as high as 25 g in a negative g attitude. It has been suggested that

tumbling, if rapid enough, may decrease rather than increase the severity of the resulting negative g hydrostatic effects. The situation was simulated by rotating dogs up to 200 rpm on a spin-table located at the periphery of the human centrifuge. The centrifuge simultaneously imposed 'drag forces' up to 10 g which changed direction sinusoidally. It was found that superimposed tumbling between 60 and 200 rpm greatly reduced the edema and hemorrhage normally produced by negative g alone. Similarly the vascular damage and engorgement of combined accelerations was less severe than after tumbling alone. Up to \pm 10 g of drag force, the effects of jostling on the viscera were not significant. Blood pressures, measured with Gauer-Wetterer intra-vascular manometers to eliminate the need for hydrostatic correction, were often considerably lower than theoretical pressures. Furthermore, this difference became greater at higher rates of rotation. This effect may, under various circumstances, be due to the low natural frequency of the vascular column, to partial collapse of the column, or to the development of sub-ambient pressures at the center of rotation. The reduction of hydrostatic damage is not due to lower pressures but to the alternation in direction of force with the consequent change in duration of exposure. Circulation is less impaired than in simple tumbling, as evidenced by the smaller reduction in arterial-venous pressure difference. (Federation Proceedings 14:41-42, Mar. 1955)

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Edelberg, R. 1955 HYDROSTATIC EFFECTS OF COMBINED TUMBLING AND DECELERATION. Shock and Vibration Bull. 22:20-23.

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Edelberg, R., J.P. Henry, J.A. Maciolek, E.W. Salzman and G.D. Zuidema 1956 COMPARISON OF HUMAN TOLERANCE TO ACCELERATIONS OF SLOW AND RAPID ONSET. J. Aviation Med., 27(6):482-489

ABSTRACT: Reflex activity of the circulation during exposure to g has been recognized, but its full capacity has not been evaluated. The "gradual onset run" (GOR) allows evaluation of this capacity and its magnitude turns out to be greater than commonly believed. It can add up to 3.5 g to the conventional blackout level, (average increment, 1.9 g). A hypothesis is presented to show how the GOR produces this increment. The increment has a high correlation with the amount of protection received from a g-suit for any given subject, a relationship which is interpreted as implying a reflex mechanism in g-suit protection. The GOR has application in predicting changes in a pilot's g-tolerance in the g-suit and in evaluating student pilots with a history of low g-tolerance.

1,414

Edelberg, R. 1956 REFLEX ACTIVITY AS A DETERMINANT OF TOLERANCE TO ACCELERATION. (In Proceedings of Twentieth International Physiological Congress, Brussels, Belgium, 1956)

1,415

Edelberg, F. 1961 THE PHYSIOLOGY OF COMBINED ACCELERATIONS. In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 140-149.

1,416

Edelberg, R. 1961 THE RELATIONSHIP BETWEEN THE GALVANIC SKIN RESPONSE, VASOCONSTRICTION, AND TACTILE SENSITIVITY
J. Exp. Psychol. 62(2):187-195, Aug. 1961

ABSTRACT: The relationship over short periods of time between cutaneous tactile threshold and autonomic activity, as reflected in GSR or in degree of vasoconstriction, was determined by a method allowing continuous monitoring of the S's threshold to 250 cps vibration. The 28 Ss were tested, following a period of training and equilibrium, for a minimum period of five minutes during which three autonomic responses were deliberately elicited by a loud noise or asking the S to sniff sharply or take a deep breath. In addition, the effects of variation in attention, of stretching or relaxing of the skin, and the anatomical site tested on tactile threshold were explored. (Tufts)

1,417

Eden, K., and J.W.A. Turner 1941 LOSS OF CONSCIOUSNESS IN DIFFERENT TYPES OF HEAD INJURY.
Proc. Roy. Soc. Med. 34:685-691, Sept. 1941.

ABSTRACT:

1. A series of 200 cases of different types of head injury, both closed and open, have been examined with reference to the loss of consciousness sustained.

2. There are two different ways in which the brain may be injured by a blow to the head: there is a generalized effect in which the force is transmitted throughout the skull to the brain as a whole, which results in immediate unconsciousness - concussion; and a localized bruising effect, often with signs of focal damage to the brain - contusion. In the absence of concussion unconsciousness occurs only as a result of contusion of a severe degree, and may then be delayed in onset and prolonged in duration.

3. Injuries due to massive violence, such as road accidents and heavy falls, commonly cause concussion, with or without contusion. In a large proportion of wounds due to projectiles and small missiles (including scalp wounds, depressed fractures and penetrating wounds of the brain), concussion is absent, even in the presence of contusion.

4. Loss of consciousness following a penetrating wound of the brain may result from a superadded massive blow to the head, such as a fall to the ground, or a complication such as cerebral hemorrhage; or it may indicate widespread contusion from a wound deep in the base of the brain.

5. The important factor which determines the presence or absence of concussion in head injury is the area of skull struck, providing that there is adequate momentum.

1,418

Edholm, O. G. 1940 EFFECT OF GRAVITY ON THE BLOOD PRESSURE OF THE CAT.
J. Physiol. 98:79-96, 1940.

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Edholm, O. G. 1942 THE COMPENSATORY MECHANISM OF THE SPLANCHNIC CIRCULATION DURING CHANGES OF POSTURE.
J. Physiol. 101:1-10, 1942.

1,420

Edwards, A.S. 1949 THE EFFECT OF BODILY ROTATION UPON INVOLUNTARY SWAY AND FINGER TREMOR. Amer. J. Psychol. 62:590-591.

ABSTRACT: Using 50 college student subjects tested with the author's ataxia-meter, it was found that body sway was greatly increased following rotation. Statistically significant results were not obtained with 100 Ss when finger-tremor was tested with the tromometer before and after rotation.
(Psychol. Abs. 24:417, 1950)

1,421

Edwards, P. R., H. N. Hunter, & E. Kephart 1954 DATA SENSING AND RECORDING TECHNIQUES ESTABLISHED FOR THE HUMAN CENTRIFUGE. (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5306, 29 Jan. 1954

1,422

Edwards, P. R., H. N. Hunter, & E. Kephart 1955 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 303, 31 December 1955; PHASE I

ABSTRACT: A calibrated device consisting of a pressure chamber and hydrophone with a circuitry for frequency and amplitude control has been constructed, tested, and found to be satisfactory.

1,423

Edwards, P. R., R. Zabelicky, & E. Kephart, 1955 DEVELOPMENT OF BIOLOGICAL RESEARCH APPARATUS FOR USE IN ACCELERATION AND DECELERATION STUDIES. PHASE IV. (Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 303; 31 Dec. 1955

ABSTRACT: A complete system with a 16 mm Mitchell camera, x-ray apparatus and accessories has been subjected to tests on the centrifuge and it was found that 16 mm film was not feasible for the detail required. Another complete system with a modified 35 mm Mitchell camera and an F.71 Wray lens has been subjected to tests on the centrifuge and found to be satisfactory.

1,424

Eggers, A. J. 1957 SATELLITE RECOVERY PROPOSAL
Aviation Wk. 67:101, Nov. 18, 1957

ABSTRACT: Picture illustrates proposal for bringing a satellite back to earth made by A. J. Eggers of the NACA. "Hemispherical, finned vehicle would encounter deceleration and heating within human capacity if re-entry was made at a small angle with the horizontal."

1,425

Eggers, A. J., Jr. and T. J. Wong 1958 RE-ENTRY AND RECOVERY OF NEAR-EARTH SATELLITES, WITH PARTICULAR ATTENTION TO A MANNED VEHICLE. (National Aeronautics and Space Administration, Washington, D. C.) NASA Memo 10-2-58A, Oct. 1958

1,426

Eggleston, J.M., and D.C. Chestham 1959 PILOTED ENTRIES INTO THE EARTH'S ATMOSPHERE. (Paper presented at IAS Nat'l Summer Meeting 16-19 June 1959 Los Angeles, Calif.) IAS paper no. 59-98

ABSTRACT: A summary of research conducted at the Langley Research Center of the Nat'l. Aeronautics and Space Administration on the requirements of stability, control, deceleration, and piloting techniques necessary for a controlled descent from orbit into and through the earth's atmosphere.

1,427

Eggleston, J. M., S. Baron and D. C. Cheatham 1960 FIXED-BASE SIMULATION STUDY OF A PILOT'S ABILITY TO CONTROL A WINGED SATELLITE VEHICLE DURING HIGH-DRAG VARIABLE-LIFT ENTRIES
(National Aeronautics and Space Administration, Washington, D. C.)
NASA TN D-228, April 1960.

1,428

Eggleston, J.M., & H.D. Beck 1961 A STUDY OF THE POSITIONS AND VELOCITIES OF A SPACE STATION AND A FERRY VEHICLE DURING RENDEZVOUS AND RETURN.
(National Aeronautics & Space Administration, Washington, D.C.)
NASA TR R-87.

ABSTRACT: A study is made of the families of nonthrusting ascent trajectories during rendezvous with an orbiting space station and the descent trajectories to the earth's atmosphere. Equations of motion are derived and results are shown for two typical orbits of the station (one circular and one elliptic orbit). Boundaries of launch (at the time of booster burnout) and rendezvous conditions are given and the effects of delays in launch time are discussed.

1,429

Ehni, F.P. and W.F. Haldman 1962 STUDY OF SOFT RECOVERY FROM TWO-STAGE VEHICLES PART II. VERTICAL DESCENT TRAJECTORIES INCLUDING AERODYNAMIC HEATING
(Air Force Office of Scientific Research, Washington, D.C.) May 1962,
Rept. no. AFOSR/DRA 62-7, Proj. 7856, ASTIA AD-277 911

ABSTRACT: Vertical descent trajectories are presented in graphical form for bodies entering the earth's atmosphere starting at an altitude of 320,000 ft. with entry speeds varying from 35,000 to 7,500 fps. Two sets of trajectories were computed: one with fixed drag-area-to-weight ratios ranging from 10 to .001

and one set, where the drag-area-to-weight ratio is varying to achieve reentry with decelerations limited to 75, 30 and 15 g. The variation of the drag-to-weight ratio during descent was expressed in terms of a drag-area factor C. The computations were performed on an analog computer. Presented are graphs for velocity, deceleration, dynamic pressure, heating rate, total heat, temperature, and, for the limited deceleration case, the drag-area factor, plotted versus time and/or altitude. The physical equations are presented and their analog computer mechanization is discussed. (Author)

1,430

Ehricke, K. A. 1955 ON THE DESCENT OF WINGED ORBITAL VEHICLES.
Astronautica Acta 1:137-155

1,431

Ehricke, K.A. 1956 ASTRONAUTICAL AND SPACE-MEDICAL RESEARCH WITH AUTOMATIC SATELLITES In; Earth Satellites As Research Vehicles.
(Proc. of the symposium held 18 April 1956 at the Franklin Inst in Philadelphia) Monograph no. 2, June 1956

ABSTRACT: Discusses the use of automatic satellites for the advancement of manned astronautics. Based on the systems and operations concept, the discussion includes technical as well as scientific aspects. A distinction is made between technological satellites and biosatellites. The technical and scientific research aspects in conjunction with technological satellites are outlined and their correlation with various phases of manned astronautics is shown. The survey of the space-medical research by means of biosatellites also considers the relevant technical and scientific aspects.

Flight dynamic aspects are discussed, presenting the energy spectrum of terrestrial, cislunar as well as lunar satellites and of hyperbolic probes (limited to Venus and Mars reconnaissance).

An analysis of accuracy requirements leads to a discussion of the significance of earth-satellite-earth communication, including the possibility of terrestrial monitoring of satellite-earth communication (equipped with small propulsion systems) by over-riding the vehicle's guidance and attitude control system. Finally, trajectories, decelerations and temperatures of descending spherical satellites are presented.

1,432

Ehricke, K. A., & A. H. Pence 1957 RE-ENTRY CHARACTERISTICS OF RECOVERABLE SPHERICAL SATELLITES, SATELLOIDS, AND LUNAR VEHICLES. (Convair, Ft. Worth, Texas) Rept. No. AZP-001; June 1957

1,433

Ehricke, K. A. 1957 RE-ENTRY OF SPHERICAL BODIES INTO THE ATMOSPHERE AT
VERY HIGH SPEEDS.
(American Rocket Society, New York, N. Y.) ARS Preprint 428-57

1,434

Ehricke, K.A. 1959 A SYSTEMS ANALYSIS OF FAST MANNED FLIGHT TO VENUS AND MARS.
(Convair-Astronautics, Ft. Worth, Texas) Rept. No. AZM-072, Part I,
March 11, 1959.

1,435

Ehricke, D. A. 1962 THE LOGISTICS OF RE-LAUNCH FROM THE MOON.
In Lectures in Aerospace Medicine, January 8-12, 1962 (School of Aerospace,
Medicine, Brooks AFB, Texas)

1,436

Ehram, G.W., Jr. 1960 FEASIBILITY STUDY FOR AN ADVANCED DEVICE FOR
STUDYING THE EFFECTS OF ACCELERATION ON MAN. (Aerospace Med. Lab.,
Wright Air Development Div., Wright-Patterson AFB, Ohio) WADD Tech.
Report 60-187, March 1960. ASTIA AD 236 044

ABSTRACT: Present centrifuges cannot simulate adequately the types of acceleration patterns anticipated for future manned vehicles. Realistic simulation requires the production not only of a controlled radial acceleration field but also of the superimposed rotational motions of pitch, roll, and yaw and the vibratory translations encountered about these axes as a result of buffeting and other flight disturbances. Therefore, arm radius, inertia, and control problems are complicated by the requirement for oscillations which will permit study of true flight.

The analysis of a device to produce realistic simulation is presented by component areas. In a highly sophisticated centrifuge, the optimum selection of components may not be possible until the results of a more detailed design investigation are available. The analysis of each major area indicates, however, that the construction of the proposed device is feasible.

1,437

Eiband, A. M., S. H. Simpkinson & D. O. Black 1953 ACCELERATIONS AND PASSENGER HARNESS LOADS MEASURED IN FULL-SCALE LIGHT-AIRPLANE CRASHES. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 2991, August 1953, ASTIA AD-15 669

ABSTRACT: Full-scale light-airplane crashes simulating stall-spin accidents were conducted to determine the decelerations to which occupants are exposed and the resulting harness forces encountered in this type of accident. Crashes at impact speeds from 42 to 60 miles per hour were studied. The airplanes used were of the familiar steel-tube, fabric-covered, tandem, two-seat type. In crashes up to an impact speed of 60 miles per hour, crumpling of the forward fuselage structure prevented the maximum deceleration at the rear-seat location from exceeding 26 to 33g. This maximum g value appeared independent of the impact speed. Restraining forces in the seat-belt--shoulder-harness combination reached 5800 pounds. The rear-seat occupant can survive crashes of the type studied at impact speeds up to 60 miles per hour, if body movement is restrained by an adequate seat-belt--shoulder-harness combination, so as to prevent injurious contact with obstacles normally present in the cabin. Inwardly collapsing cabin structure, however, is a potential hazard in the higher-speed crashes. (NACA)

1,438

Eiband, A. M. 1959 HUMAN TOLERANCE TO RAPIDLY APPLIED ACCELERATIONS: A SURVEY OF THE LITERATURE. (National Aeronautics and Space Administration, Wash., D. C.) NASA Memo No. 5-19-59E; ASTIA AD-218 269; June 1959

ABSTRACT: Data applicable to space flight and to crash impact forces were obtained from a literature survey and analyzed and discussed. These data are compared and presented on the basis of a trapezoidal pulse to show the effects of body restraint and of acceleration direction, onset rate, and plateau duration on the maximum tolerable magnitude of rapidly applied accelerations. Recommendations indicated by the survey are made for increasing impact survivability by use of adequate body support in both the forward-and aft-facing seated positions. A categorized bibliography of information on human tolerance to rapidly applied accelerations is included. (AUTHOR)

1,439

Ek, J. L., B. W. Jongkees and J. Klijn 1959 THE THRESHOLD OF THE VESTIBULAR ORGAN. Acta Otolaryng (Stockholm) 50:292.

1,440

Ek, J., L. B. W. Jongkees, & J. A. J. Klijn 1960 ON THE EFFECT OF CONTINUOUS ACCELERATION. Acta oto-laryng. 51:416-419

1,441

Ekman, G. 1960 PSYCHOPHYSICAL RELATIONS IN THE PERCEPTION OF SPACE, TIME AND VELOCITY
(Stockholm U., Sweden) Project 9778(805); Contract AF 61(052)-300; AFOSR, DLS

ABSTRACT: The subjective variables of (perceived) space, time, and velocity have been separately investigated and have been found to be related to corresponding physical (stimulus) variable by power functions. This research will determine the interrelations among perceptual continua, e.g. determination of what function subjective velocity is of subjective space and subjective time. A series of experimental variations will be employed which will yield results concerning the constants of the power functions which are of interest. A few examples of the conditions which will be investigated are : (1) Direction of motion; various angles in all quadrants. This is an example of variations which are supposed to affect subjective distance and consequently subjective velocity; (2) Surrounding perceptual field; the motion will pass through patterns constructed according to the principles of certain geometrical illusions, and subjective distance (and velocity) are expected to be affected in predictable direction; (3) Length of motion track with time constant and vice versa; (4) Intensity and contrasts in the motion-background field; and (5) Relative motion.

1,442

Eldredge, D.H. 1955 THE EFFECTS OF BLAST PHENOMENA ON MAN: A CRITICAL REVIEW
(St. Louis: Committee on Hearing and Bio-Acoustics, Armed Forces- National Research Council) Project NR 140-069, Contract Nonr-1151(01), 1955.
ASTIA AD74028

ABSTRACT: A critical review has revealed that the open literature concerning the effects of blast on man is not extensive and is principally concerned with (1) injury to the ear; (2) body injuries severe enough to produce combat casualties; (2) cerebral blast concussion; and (4) battle fatigue or hysteric-anxiety state. An attempt is made to extract and organize the important studies and hypotheses encountered, and supplementary data are included from experience gained with high-intensity sound. A selected bibliography of 175 references, compiled by S.K. Hirsh, is included; it is mainly concerned with specific methods and techniques that have been used to measure possible impairment of function.
(AD abstract, modified)

1,443

Eleinknecht, D. S., W. M. Bland, Jr., and E. M. Fields 1962 SPACECRAFT AND SPACECRAFT SYSTEMS.
(In Results of the First U. S. Manned Orbital Space Flight, February 20, 1962)
(NASA Manned Spacecraft Ctr., Huston, Texas) Pp. 5-30

1,444

Ellingson, H.V. 1960 AVIATION MEDICINE. In; Piersol, G.M., and E.L. Bortz, ed., Cyclopedia of Medicine, Surgery and Specialties: Review Service. (Philadelphia, F.A. Davis Company, 1960) pp. 221-246

ABSTRACT: The scope and implications of aviation and space medicine are summarized. Consideration is given to the general and specific stresses which may be encountered, to medical and psychiatric problems, air travel and transportation of patients, pilot and astronaut selection, protective equipment and clothing, and to flying safety and accidents involving nuclear weapons.

1,445

Ellingson, H. V. 1962 AVIATION MEDICINE
In G. M. Piersol, et.al., ed., The Cyclopedia of Medicine, Surgery and Specialties, Review Service, 1962. (Philadelphia: F. A. Davis Co., 1962) pp. 213-237.

ABSTRACT: This chapter reviews the entire field of aerospace medicine and is aimed at providing current, revised information to the medical profession. General topics discussed include the following: space medicine (closed systems, weightlessness, artificial gravity, human engineering, psychological factors, radiations, instrumentation); aviation physiology (g-tolerance, vibration, pressure breathing, oxygen toxicity, motion sickness); personal equipment (pressure suits, oxygen equipment); the specialties (otorhinolaryngology, ophthalmology, neuropsychiatry, cardiology); aircrew selection and maintenance (selection tests, care of flyers, Federal Aviation Agency); air travel (epidemiology of air travel, private flying, transportation of patients, oxygen in transport, treatment of motion sickness); flying safety (accident investigation); and reactions to flight (dysbarism).

1,446

Ellis, W.H.B. 1955 STUDIES OF HUMAN RESPONSES TO LINEAR ACCELERATIONS DURING CARRIER TAKE-OFFS AND LANDINGS. (RAF, Instit. of Aviat. Med., Farnborough, Eng.) FPRC Rept. No. 905, Jan. 1955.

1,447

Ellison, A. E. 1960 SKI INJURY PROBLEM.
Ski Magazine 24:52-57

1,448

Elmadjian, F. 1963 BIOCHEMICAL STUDY OF LARGE PRIMATE RESPONSE TO SEVERE ENVIRONMENTAL STRESSORS
(Worcester Foundation for Experimental Biology, Shrewsbury, Mass.)
Contract AF 29(600)-2439. ARL-TDR-63-18, May 1963

ABSTRACT: Biochemical studies were conducted on immature chimpanzees undergoing 20 hours without food and water, at temperatures of 70°, 80°, 90°, 95°, and 100° F at 50 percent humidity; acceleration-deceleration tests; and the suborbital flight of chimpanzee No. 65 (HAM). Twelve urine determinations and seven plasma determinations were obtained with the view of evaluating respiration (acid-base balance), nitrogen metabolism, adrenal-pituitary and sympathico-adrenal systems. (Author)

1,449

Elwood, M. 1954 OBSERVATIONS ON THE USE OF RABBITS AS INDICATORS OF THE PHYSIOLOGICAL EFFECTS OF BLAST INSIDE A TANK UNDER ATTACK (Clothing and Equipment Physiological Research Establishment (Gt. Brit.) Technical memo no. 22; JSRP Control no. 561049; April 1954; ASTIA AD-112 086

1,450

Ender, W.K. 1949 STUDY- EJECTION SEAT TRAJECTORY - TIME REQUIRED TO APPROACH TERMINAL SPEED WITHOUT THE USE OF A DROGUE CHUTE.
(Douglas Aircraft Co., Inc., El Segundo, Calif.)
Report No. ES-15220

1,451

Ely, W. J. 1960 SIXTH ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE.
(Army Human Factors Engineering Conference, U. S. Army Engineer Research and Development Laboratories, Ft. Belvoir, Va.) ASTIA AD 251 312

ABSTRACT: This report consists of a series of abstracts of papers presented at the Sixth Annual Army Human Factors Engineering Conference.

1,452

Emme, A. 1962 COSMIC EXPLORERS.
Sovetskaya Rossiya, 20 Oct. 1960
(Translation Services Branch, Foreign Technology Division,
Wright-Patterson AFB, Ohio) FTD-TT 62-602/1-4, 8 May 1962.

ABSTRACT: Before flying into space we must know exactly how various representatives of life will react to everything connected with the flight. A branch of science being developed on earth is the science of space ecology. This deals with the relation of man to cosmic surroundings and his life on other planets. During a recent flight, a radio-television system made possible constant visual contact with occupants of the ship. The g-forces at launch greatly affected the heartbeat and respiration. During acceleration the animals required more oxygen than usual. However, they had no trouble eating under weightless conditions. Mice were used to test cosmic radiation. Another object of space study was nucleic acid, the hereditary factor of all organisms. These molecules can be called "bare genes" or "free genes." Impacts by cosmic particle can cause great disturbances in the structure of this acid; these will be studied physicochemically.

1,453

Enfield, D.L. 1959 ABRUPT DECELERATION STUDIES RELATED TO
AUTOMOBILE CRASH FORCES. (Paper, Meeting Aero Medical Association,
Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Anthropometric dummies and human volunteers have been exposed to experimental car crash deceleration. Statistically-determined typical accidents were duplicated using salvage vehicles and dummy passengers. The types of crash force thus measured were applied to human volunteers by test devices. Force magnitude was gradually increased until a human tolerance limit was reached. (J. Aviation Med. 30(3):183, March 1959.)

1,454

Engel, J.N. and Copp, M.R. 1959 ANALYSIS OF ACCELERATION, AIRSPEED, AND
GUST-VELOCITY DATA FROM A FOUR-ENGINE TRANSPORT AIRPLANE OPERATING OVER A
NORTHWESTERN UNITED STATES -ALASKA ROUTE. (National Aeronautics and
Space Administration) NASA Memo. 1-17-59L, February 1959

ABSTRACT: The data, which were obtained with an NACA VGH recorder, were evaluated and then compared with the results previously reported in NACA Technical Note 3475 for two similar airplanes operating over large variations in gust experience were noted for the three operations. In general, accelerations due to gusts occurred much more frequently than those due to operational maneuvers.

1,455

Engel'gardt, V. 1961 LIFE, REASON AND THE UNIVERSE
Izvestiya (USSR) 92(13638):3

ABSTRACT: Space flight is discussed, with reference to weightlessness, cosmic radiation, G-forces, and the new area of investigation, "exobiology".

1,456

Engstrom, B.A. 1957 THE EFFECTS OF SIMULTANEOUS DECELERATION,
TUMBLING AND WINDBLAST ENCOUNTERED IN ESCAPE FROM SUPERSONIC AIRCRAFT.
(Wright Air Development Center, Air Research and Development Command,
Wright-Patterson AFB, Ohio) WADC TN- 54-18, July 1957.
ASTIA AD 118 328.

ABSTRACT: As a continuation of the supersonic ejection seat program, two tests using live chimpanzees as subjects were performed. The ejections occurred at a velocity of Mach 1.5 at altitudes of 20,000 and 17,700 feet, using a standard Air Force ejection seat as modified by the Cook Research Laboratories. Both subjects were lost in spite of the fact that in the first test the subject was brought down by parachute. In this case, death resulted from breakup of the ejection seat upon entry into the windblast. Although the ejection seat retained its structural integrity, in the second test, this subject was lost because of premature deployment and resulting loss of the recovery parachute canopy.

1,457

Engstrom, B. A., & R. A. Meyer 1959 PERFORMANCE OF TRAILING AERODYNAMIC
DECELERATORS AT HIGH DYNAMIC PRESSURES. PART III. WIND TUNNEL TESTING OF
RIGID AND FLEXIBLE PARACHUTE MODELS. (Wright Air Development Division,
Wright-Patterson AFB, Ohio) WADC TR 58-284, Part III, ASTIA AD-248 951L

ABSTRACT: This report presents the results of the third phase of a continuing study of the Performance of Trailing Aerodynamic Decelerators at High Dynamic Pressures and covers experiments performed in the Unitary Plan Wind Tunnel at the Langley Research Center, Virginia. The work was also a continuation of the effort initiated under Contract No. AF 33(616)-3346. The major results of the Phase III test program were as follows: (1) solid metal canopies without suspension lines which were properly vented exhibited stable flow at all times regardless of changes in porosity, Mach number, dynamic pressure, and various other parameters; (2) the addition of suspension lines to the solid canopies caused unstable flow to exist at all times; (3) reducing the number of suspension lines or adding flow stabilizers did not improve flow patterns; (4) fabric canopies behaved poorly in general and appeared to be somewhat dependent upon the location of a conical interline shock wave; (5) a definite improvement was noted when the number of gores was increased; (6) average drag coefficient was a function of average

inflated area ratio; and (7) shaped gores improved behavior somewhat, the 45 degree conical ribbon giving the most stable performance of all fabric configurations tested. (AUTHOR)

1,458

Engstrom, B.A. 1962 PERFORMANCE OF TRAILING AERODYNAMIC DECELERATORS AT HIGH DYNAMIC PRESSURES. PHASES V AND VI.
(Cook Research Labs., Chicago, Ill.) Contract AF 33(616)7016, Project 6065,
WADC TR 58-284, pt. 5, Feb. 1962. ASTIA AD 275 423

ABSTRACT: A series of multistage rocket test vehicles was launched which deployed aerodynamic decelerators at predetermined altitudes and velocities. Tests were conducted using extended hemispherical shaped parachutes. Exploratory tests were accomplished and data collected over a test regime extending up to Mach 3.0 at 70,000 ft. In addition, data was presented on one test of a FIST ribbon parachute deployed at an altitude of 162,990 ft. and a Mach number of 1.022. Data was also presented on 2 tests conducted involving balloon type decelerators. Useful test data was presented for each parameter investigated. It was concluded that self inflatable aerodynamic decelerators perform satisfactorily up to a Mach number of approximately 2.0. At higher Mach numbers the flow conditions and shock wave interactions caused erratic performance which resulted in canopy damage of considerable magnitude. (Author)

1,459

Enkenhus, K. R., E. L. Harris et al 1961 THE SIMULATION OF RE-ENTRY CONDITIONS IN THE WIND TUNNEL.
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, 1961) pp. 489-502

1,460

Enslinger, N. R. and E. A. Brunauer 1958 FEASIBILITY AND DESIGN STUDY OF A CENTRIFUGE FACILITY
(Mechanics Res. Division, American Machine and Foundry Company, Chicago, Ill.) TN-MR-9415A, Aug. 1958.

1,461

Entres, S. L. 1955 A CONTACT ACCELEROMETER.
(Royal Aircraft Establishment, Farnborough) TECH MEMO GW 253, Aug. 1955

ABSTRACT: A device is discussed briefly in this paper which permits the measurement of the peak acceleration of a low impedant steady state vibration by a "chatter" method above and below the value of one g. The useful range of acceleration amplitude that can be measured is from about 0.1 g to 7 g and that of the frequency from about 4 c/s to 500 c/s. The significance of this "Contact Accelerometer" as it may be called, is its simplicity of design and operation, its stability, accuracy and absence of electronics. It may be used for calibrating or checking of accelerometers of the piezo and other types.

1,462

Errebo-Knudsen, E.O., et al 1953 VERDENS-RUMMETS EROBRING (CONQUEST OF SPACE)
(Copenhagen: Reitzel, 1953)

1,463

Errebo-Knudsen, E.O. 1953 MENNESKELEGEMET OG RUMMET (THE HUMAN BODY AND SPACE)
In: Errebo-Knudsen, E.O., et al, Verdens-rummets erobring (Conquest of Space)
(Copenhagen: Reitzel) Pp. 51-67.

1,464

Errebo-Knudsen, E. O. 1956 FLYVEMEDICIN: SAERLIG MED HENBLIK PA ORGANISATIONEN I DENMARK (AVIATION MEDICINE: WITH SPECIAL CONSIDERATION OF ITS ORGANIZATION IN DENMARK) Ugeskrift for laeger (kbenhavn) 118(17):495-499, 10 May 1956

ABSTRACT: Areas of research in aviation medicine and the experimental methods simulating flight conditions are described. The international status of aeromedical research and different agencies conducting this research are surveyed. A summary is presented of the historical development of aviation medicine in Denmark and the contemporary state of affairs.

1,465

Errebo-Knudsen, E.O. 1960 RUMFARTSMEDICIN: DE BIOLOGISKE PROBLEMER RED OPHOLD UDEN FOR JORDENS ATMOSFAERE (SPACEFLIGHT MEDICINE: BIOLOGICAL PROBLEMS OF TRAVELING OUTSIDE THE EARTH'S ATMOSPHERE)
Naturens Verden (Copenhagen) Pp. 1-8, 30-32, Jan. 1960 (In Danish)

ABSTRACT: The results of Russian and American studies in spaceflight, as presented in papers at the 2nd World and 4th European Congress of Aviation

Medicine in Rome, October, 1959, are summarized in this paper. The potential dangers in space flight are reviewed with details of Project Mercury. Various biological, neurological, and psychological problems are reviewed. The possibility of human life on other planets in our solar system is discounted.

1,466

Erskine, L. A. 1959 THE MECHANISMS INVOLVED IN SKIING INJURIES
American J. Surgery 97:667-671, May 1959
NOTE: Reel 7, Flash 7, Item 14

SUMMARY: I have tried to go over briefly the factors which are present when an injury takes place while skiing. In an effort to help the attending surgeon in his handling of these injured, the equipment, clothing, psychological factors and the ballistics have been mentioned. The pertinent accident statistics, which are sketchy to begin with, are summarized, and we must conclude that: (1) The injuries which occur at high speeds are the serious ones, that is, the spiral fractures of the shafts of the long bones, etc. (2) Skiing accidents occur in the younger age group (sixteen to twenty-eight years of age) at a statistically higher rate than in the older age groups. (3) As would be expected, most occur in those who have skied less than one year and/or who have not had professional instruction. Finally, it is obvious that skiing is on the increase, and its popularity will undoubtedly continue. We must accept an inevitable minimum of serious accidents among good skiers. If one is going to ski, he should use good equipment, receive professional instruction, and not ski beyond his ability; if so, he stands a reasonable chance of enjoying himself without being hurt. (AUTHOR)

1,467

Escanglon, E. 1950 SPACE-FLIGHT AND ITS CONNECTIONS WITH HUMAN
PHYSIOLOGY Astronomie, 64:279-287. July/Aug. 1950.
Abst.: J. Brit. Interplan. Soc., 11:294.

1,468

Esgar, J.B. and Morgan, W.C. 1960 ANALYTICAL STUDY OF SOFT LANDINGS ON
GAS-FILLED BAGS. (National Aeronautics and Space Administration)
NASA Technical Report. R-75, ASTIA AD-242 357.

ABSTRACT: An analytical procedure was developed that is valid for bags of various arbitrary shapes and is applicable to planetary or lunar landings for sinking speeds that are small compared to the sonic velocity of the gas within the bag. For landing on the earth at speeds consistent with normal parachute descent, the relative merits of four bag shapes were evaluated both with and without gas bleed from the bags. Deceleration and onset rates acceptable for well-supported humans seem feasible.

1,469

Esgar, Jack B. 1962 SURVEY OF ENERGY-ABSORPTION DEVICES FOR SOFT LANDING
OF SPACE VEHICLES
(National Aeronautics and Space Administration, Washington) NASA TN D-1308

ABSTRACT: Energy-absorption methods that may be useful for impact attenuation of space vehicles landing on lunar or planetary surfaces were surveyed. Relative merits of various systems are discussed, their effectivenesses are compared, and conclusions are drawn as to the more promising types of systems.

1,470

Esnault-Pelterie, Robert 1930 L'ASTRONAUTIQUE (ASTRONAUTICS)
(A. Lahure, Paris, 1930)

ABSTRACT: A classic French work on astronautics.

1,471

Esnault-Pelterie, R. 1935 L'ASTRONAUTIQUE COMPLEMENT. COMMUNICATION FAITE
A LA SOCIETE DES INGENIEURS CIVILS DE FRANCE LE 25 MAI 1934.
(The Astronautic Complement. Communication From the Society of Civil
Engineers of France on 25 May 1934.)
(Paris, 1935)

1,472

Esteban, M. 1942 SO-CALLED "BLACK VISION" AND "RED VISION" ON AVIATORS.
Arch. Soc. Oftal. Hispano-am 1:251-268.

1,473

Estep, R. 1959 A SPACE BIBLIOGRAPHY THROUGH 1958
(Documentary Research Division, Research Studies Institute, Air University,
Maxwell AFB, Ala.) AU-283-58-RSI

ABSTRACT: Lists 1832 references with subject and author indexes. Covers items in books and periodicals available at Air University, especially for the period from 1930 thru 1958.

1,474

Estes, E.H. 1954 TILT TABLE RESPONSE AND ITS RELATION TO "G" TOLERANCE. (U.S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla.) Research Report No. NM 001 059.30.03, 22 March 1954. ASTIA AD 35 223

ABSTRACT: A low to moderate correlation has been shown between the following measurements and "G" tolerance in a group of 50 men: a) Change in pulse rate with tilt, both immediately and over a period of time, b) Change in the magnitude of the frontal plane ventricular gradient with tilt, and c) Change in the frontal plane QRS-T angle with tilt. The control level of systolic blood pressure was also found to have a similar degree of relationship with the unconscious level of "G" tolerance. These various measurements were also found between the various measurements and "G" tolerance was not sufficient to be of predictive value in a given individual.

1,475

Estrin, L. M. 1938 PREVENTION OF PARACHUTE INJURIES
Khirurgiya (9):117-119.

1,476

Etkin, B. 1961 THE ENTRY OF MANNED MANOEUVREABLE SPACECRAFT INTO PLANETARY ATMOSPHERES: A LECTURE. (Lecture, Symposium on Interplanetary Explorations, Institute of Aerophysics, University of Toronto, Canada, Oct. 26-27, 1961) (University of Toronto, Canada, Institute of Aerophysics, Ontario) UTIA Review No. 20. ASTIA AD-273 699

ABSTRACT: Deceleration to which the vehicle and its occupants are subjected, heat resulting from temperatures developing in the skin and structure, and navigation or guidance of the vehicle to a desired point on the surface are discussed as they relate to the landing of space vehicles. It appears that none of these three major problem areas will present insuperable difficulties for the re-entry of manned space vehicles. The normal processes of applied research and engineering development may confidently be expected to lead to the successful accomplishments of such missions in the future. (J. Aerospace Medicine 33(10):1278, Oct.1962)

1,477

Ettelson, B. L., et al. 1960 INTERNAL ANIMAL TELEMETRY - A FEASIBILITY TEST PROGRAM. (Paper, American Rocket Society 15th Annual Meeting, December 1960) ARS Paper No. 1426-60

1,478

Ettelson, B. L. et. al. 1961 INTERNAL ANIMAL TELEMETRY: A FEASIBILITY TEST PROGRAM.
ARS J. 31(9):1190-1195, Sept. 1961.

ABSTRACT: An improved method of animal instrumentation is described. The method uses an implanted sensor and telemeter to allow transmission of physiological data from unencumbered, intact, test animals to a receiver-signal conditioner for subsequent air to ground telemetry. To explore further the potential advantages of this system in high stress situations, a single physiological parameter is transmitted through the intact skin of an internally instrumented simian under combined environmental conditions on a centrifuge. (Tufts)

1,479

Etter, K.R. 1961 GEOLOGICAL CONSIDERATIONS FOR PRECISION HIGH SPEED ROCKET TRACKS.
(U.S. Air Force Missile Development Center, Holloman AFB, N. Mexico)
Report no. AFMDC TR 61-21. ASTIA AD 259 631

ABSTRACT: The relationship of orogenic (mountain building) forces to the high earthquake incidence in California is shown to be directly connected through the mechanism of strong movements on living faults, especially the San Andreas fault system. Air Force Flight Test Center (AFFTC) is nearly surrounded by wrench fault zones, the loci of potentially destructive quakes. Air Force Missile Development Center (AFMDC) is bordered by gravity faults of essentially quiescent nature, which fact, along with a geologic history of relative stability as part of the continental nucleus, leads to the conclusion that destructive events of tectonic nature are much less likely to affect the facilities established in central New Mexico, than would be the case in Southern California. (Author)

1,480

European Office Air Research & Development Command 1960 SUPPLEMENT TO THE BIBLIOGRAPHY OF TECHNICAL NOTES AND TECHNICAL REPORTS. (European Office Air Research and Development Command, Shell Bldg., 47, Rue Cantersteen, Brussels, Belgium) ASTIA AD-243 250

1,481

Evans, B. H. 1961 INERTIAL COMPONENTS STUDY.
(Space Technology Labs., Inc., Los Angeles, Calif.)
Report no. 7205-0002-RU-000, June 30, 1961. ASTIA AD 261 607

ABSTRACT: The evaluation of the Autonetics VM-4 velocity meter was completed; evaluations of the Autonetics G6A gyro, the AC Spark Plug 25 PIGA accelerometer, the AC Spark Plug 2 FBG, and the AC Spark Plug 16 PIGA accelerometer were continued. The 16 PIGA evaluation included the first successful centrifuge evaluation of a pendulous gyro accelerometer. Studies of gyro and accelerometer testing methodology were continued. Evaluation of the Bell Accelerometer Model III-B and the Kearfott Gyro Model 2519 were concluded. (Author)

1,482

Evans, C. B. S., E. B. Konecni, and H. Glassner 1962 PHYSIOLOGY OF THE LABYRINTH: QUANTITATIVE STUDIES ON THE EFFECTS OF ANGULAR ACCELERATION IN EXPERIMENTAL ANIMALS.
(Paper presented at 33rd annual meeting of the Aerospace Medical Assoc., 9-12 April 1962, Atlantic City)

ABSTRACT: The purpose of this presentation is two-fold: (1) to report briefly our findings from experimental investigations of the labyrinth physiology in vertebrates under rotational accelerations and (2) to exhibit a motion picture incorporating the synchronous display, during rotation, of the (a) labyrinthine cupula motions, (b) the vestibular nerve action potentials as translated on the oscillograph accompanied by its sound recording, (c) view of the attached accelerometer and chronometer and (d) nystagmus movements of the eyes.

These studies are being conducted to determine quantitatively the reactions of the labyrinth's sensory components and their specific innervations to the effects of varying degrees of rotary acceleration and g-forces, and the presence (or absence) of the nystagmus reactions in terms of amplitude, frequency, duration and direction. (Aerospace Med., 33(3):335, March 1962)

1,483

Evans, F. G., & H. R. Lissner 1948 "STRESSCOAT" DEFORMATION STUDIES OF THE FEMUR UNDER STATIC VERTICAL LOADING. Anat. Rec. 100:159-190

ABSTRACT: Since Gurdjian and Lissner have clearly demonstrated the feasibility of the "stresscoat" technique for studies on the stresses and strains in bone as related to form and function; the present study, employing the same technique, was undertaken. The femur was chosen because it presents problems of bone architecture and mechanics not encountered in the skull, the only skeletal part so far studied by this technique. Furthermore, since it has been studied by other methods, the femur provides a means whereby the results obtained with the "stresscoat" technique can be compared with those in which other methods were used.

The results obtained from 16 "stresscoat" tests run on 10 adult human femora are presented. Six of the tests were run at one time and 10 at another. The average load borne before the first cracks appeared in the "stresscoat" lacquer was 720 pounds for the first series of tests and 646 pounds for the second series. The sensitivity of the lacquer in the first and second test series was 0.0018 and 0.0012 inches per inch, respectively.

1,484

Evans, F. G., H. R. Lissner, & H. E. Pedersen 1948 "STRESSCOAT" DEFORMATION STUDIES OF THE FEMUR UNDER DYNAMIC LOADING. (61st Annual Meeting Amer. Assoc. Anat.) Anat. Rec. 100:24-25

1,485

Evans, F. G., H. R. Lissner, & H. E. Pedersen 1948 DEFORMATION STUDIES OF THE FEMUR UNDER DYNAMIC VERTICAL LOADING. Anat. Rec. 101:225-241, June 1948

ABSTRACT: This paper is the second in a series of studies of femoral deformations. The first (Evans and Lissner, '48) dealt with deformations produced by static vertical loading, while the present one is concerned with those obtained under dynamic vertical loading.

The results of the studies are: (1) "Stresscoat" tests of 14 adult male femora under dynamic vertical loading produced deformation patterns on the superior aspect of the neck and the anterolateral (convex) aspect of the proximal and middle thirds of the shaft. (2) The deformation patterns consisted of cracks in the "stresscoat" lacquer. (3) The cracks arise from tension stress in the underlying bone and lie transverse to the direction of tension. (4) The diameter of the neck and of the shaft, as well as the curvature of the latter, influence the bone's degree of bending and the extent of the pattern, so that it is more concentrated in the middle of the bones with a relatively great curvature. (5) The location of the patterns obtained by dynamic vertical loading is essentially similar to those seen in static vertical loading. In both types of tests it is seen that the superior aspect of the neck and the anterolateral (convex) aspect of the shaft are under tension stress while the opposite aspects of the bone are under compression stress. (6) The tests clearly demonstrate that a relatively small load, 15.8 inch pounds of energy, dynamically applied can produce similar deformation patterns in the same parts of the femur as do loads of 400-715 pounds statically applied.

1,586

Evans, F. G. 1949 DEFORMATION STUDIES OF THE FEMUR UNDER STATIC AND DYNAMIC LOADING. Anales del Instituto de Biologia (Mexico) 20:473-491

1,587

Evans, F. G., J. F. Hayes and J. E. Powers 1953 "STRESSCOAT" DEFORMATION STUDIES OF THE HUMAN FEMUR UNDER TRANSVERSE LOADING.
Anat. Rec. 116:171-188

ABSTRACT: The present investigation is a continuation of previous studies (Pedersen, Evans and Lissner, 1949) on the mechanical behavior of the human femur under various conditions of loading and orientation. This paper deals with the strains and stresses produced by transverse loading of the anterior, posterior and medial aspects of the femoral shaft at points 1/4, 1/2 and 3/4 the length of the shaft measured from the tip of the greater trochanter. Corresponding loadings of the medial aspect of the shaft were not made as fracturing forces are rarely applied directly to that aspect of the bone.

1,588

Evans, F. G., & H. R. Lissner 1953 DEFORMATION STUDIES OF THE ADULT HUMAN PELVIS UNDER DYNAMIC LOADING. (66th Annual Meeting Amer. Assoc. Anat.)
Anat. Rec. 115:382

1,589

Evans, F. G., & H. R. Lissner 1954 STUDIES ON THE EFFECT OF STATIC LOADING ON THE LUMBAR INTERVERTEBRAL DISCS. (23rd Annual Meeting of Amer. Assoc. Phys. Anthropol.) Amer. J. Physical Anthropology 12:295

1,590

Evans, F. G. 1955 LES PROPRIETES BIOMECHANIQUES ET PHYSIQUES DES OS HUMAINS. VI Congres Federatif International d'Anatomie, Paris 25-30 Juillet, July, 1955, pp. 65-66

1,591

Evans, F. G., & H. R. Lissner 1955 STUDIES ON THE COMPRESSIVE STRENGTH OF HUMAN LUMBAR DISCS AND VERTEBRAE. (68th Annual Meeting Amer. Assoc. Anat.)
Anat. Rec. 121:290

1,592

Evans, F. G. 1955 STUDIES IN HUMAN BIOMECHANICS.
Dynamic Anthropol. Annals of the N.Y. Acad. Sci. 64:609-611.

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Evans, F. G., & H. R. Lissner 1955 PELVIC DEFORMATIONS UNDER DYNAMIC LOADING
(Proceedings 24th meeting Amer. Assoc. of Phys. Anthropol.) Amer. J. Physical
Anthropology 13:397, June 1955

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Evans, F. G., M. Lebow, & H. R. Lissner 1956 THE RELATION OF VELOCITY AND
ACCELERATION TO SKULL FRACTURE. (69th Annual Meeting of Amer. Assoc. of
Anatomists, Marquette Univ., Milwaukee, Wis.) Anat. Rec. 124:287, Feb. 1956

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Evans, F.G. and M. Lebow 1957 STRENGTH OF HUMAN COMPACT BONE UNDER
REPETITIVE LOADING.
J. Appl. Physiol. 10(1):127-130, Jan. 1957.

ABSTRACT: The fatigue life, under a constant load of 5000 lb/in.², was determined for 67 specimens of compact bone of a standardized size obtained from five above-knee amputations. The specimens were unembalmed and tested wet in a Sonntag flexure fatigue machine with an automatic counter and shut-off. The average fatigue life to failure was 1,982,650 repetitions for 47 tibial specimens; 1,188,453 repetitions for 15 femoral specimens and 2,841,400 repetitions for 5 fibular specimens. The tibial specimens were analyzed according to thirds and quadrants. The average fatigue life of the middle third was 57% greater than that of the distal third and 206% greater than that of the proximal third. The average fatigue life of the posterior quadrant was 7% greater than that of the lateral quadrant, 23% greater than that of the medial quadrant and 50% greater than that of the anterior quadrant. Immobilization greatly reduces the fatigue life of bone, the average for specimens from a tibia of a paraplegic man being 194% less than that for specimens from other tibias. When the specimens from the paraplegic man were excluded the average fatigue life of the remaining 36 tibial specimens rose to 2,378,211 repetitions to failure.

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Evans, F. G., H. R. Lissner and M. Lebow 1958 RELATION OF ENERGY, VELOCITY
AND ACCELERATION TO SKULL DEFORMATION AND FRACTURE.
Surgery, Gynec., and Obstet. 107(11):593-601.

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Evans, F. G., & H. R. Lissner 1959 BIOMECHANICAL STUDIES ON THE LUMBAR SPINE AND PELVIS. J. of Bone & Joint Surgery 41A-2(2):278-290, March 1959

ABSTRACT: (1) Eleven pelvises and lumbar spines (eight embalmed and three unembalmed) were tested under static vertical loading; five specimens of the sacrum and the lumbar spines and five to eight thoracic vertebrae and discs (two embalmed, three unembalmed) were tested by static anterior bending; and four specimens of the sacrum and lumbar vertebrae and discs (all embalmed) were tested by static lateral bending. (2) Embalming increased the average maximum load and energy absorbed during vertical loading but decreased the magnitude of the average deflection. (3) Specimens tested by anterior bending had a greater bending moment, regardless of the condition of the specimen (embalmed or unembalmed) than those tested by lateral bending. (4) Embalmed specimens tested by lateral bending had a greater average deflection than similar specimens tested by anterior bending. (5) The greatest average amount of energy (inch pounds) was absorbed during vertical loading and the least during lateral bending. Embalming increases the energy-absorbing capacity of the pelvis and lumbar spine during vertical loading. (6) Unembalmed specimens tested by anterior bending showed the greatest average deflection. (7) Among the embalmed specimens the load increased more rapidly than the deflection in most of the specimens tested by vertical loading and in all of the specimens tested by anterior bending. In embalmed specimens tested by lateral bending the load increased more rapidly than deflection at first but later leveled off. (8) The slope of the load-deflection curve was generally steeper for specimens tested by vertical loading than for those tested by anterior or lateral bending. The slope of the curves for embalmed specimens was usually steeper than those for unembalmed ones. (9) No apparent relationship was found between the age of the individual whose spine was tested and the various biomechanical phenomena studied.

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Evans, F. G., & G. O. Lease 1959 STRENGTH OF HUMAN METATARSAL BONES UNDER REPETITIVE LOADING. J. Appl. Physiol. 14(1):49-51

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Evans, F. G., & L. M. Patrick 1961 IMPACT DAMAGE TO INTERNAL ORGANS.
(Paper, Symposium on "Impact Acceleration Stress", San Antonio, Texas)

ABSTRACT: The paper presents statistics pertaining to the frequency of impact damage to thoracic, abdominal, and pelvic viscera. The damage or injury produced in the human body by acceleration is because the internal organs behave as visco-elastic materials. Furthermore, the magnitude of the stress and acceleration, or dynamic response, can be increased by the elasticity of the human torso as is known from the theory of elastic structures.

The proposed experimental program includes experiments on humans, animals, and cadavers. The types of injuries to be investigated include lacerations or lesions due to impact on sharp objects or from inertial forces or crushing from impact or restraint over large areas of the chest or abdomen. Hydraulic damage causing rupture of organs from internal pressure will also be investigated. The investigative techniques used will be drop tests and controlled acceleration. Instrumentation used in the experiments must not interfere with or modify the response of the organ. Pressure transducers, accelerometers, force measuring equipment and high speed photographic equipment will be a few of the instruments used in experiments.

1,600

Evans, F.G. & L.P. Patrick 1962 IMPACT DAMAGE TO INTERNAL ORGANS
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 159-172)

ABSTRACT: Contusions, lacerations and ruptures of internal organs may be produced by tensile, compressive and shearing stresses and strains arising from blows to various parts of the body. In hollow organs containing fluid or semi-fluid material hydrostatic phenomena are also involved. Internal injuries believed to be produced by various types of impacts will be illustrated and discussed. Areas where future research is needed will be emphasized.

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Evans, F. G. 1962 MECHANICS OF BONE FRACTURE. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 144-156.

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Evans, F. G., H. R. Lissner, & L. M. Patrick 1962 ACCELERATION-INDUCED STRAINS IN THE INTACT VERTEBRAL COLUMN. J. Applied Physiol. 17(3):405-409, May 1962

ABSTRACT: Results of more than 170 tests with the embalmed bodies of a 69-year-old white male and two Negro males 56 and 82 years of age which were subjected to a maximum acceleration of 20 g revealed an approximately linear relation between acceleration and strain in the sacral ala and lumbar vertebrae. This relationship was less linear for the thoracic and cervical vertebrae. The magnitude of compressive strain in the anterior aspect of the body of the third cervical vertebra (C_3) and the third lumbar vertebra (L_3) is a function of the degree of freedom of movement of the head and thorax. The strain in C_3 is progressively increased by increasing freedom of movement of the head and thorax but the opposite effect

occurs in L₃. The anterior aspect of the body of C₃ is subjected to compressive strain in the normal position of the head but extension of the head changes the strain to tension. Seating the cadaver on a polyurethane cushion 4 in. thick increased the peak strain in the vertebral column. No vertebral fractures or dislocations demonstrable by x-rays have been produced by maximum accelerations of 20 g. End-plate fractures of 28 fresh vertebrae were produced by an average load of 672 pounds (435-900 pounds) statically applied in a materials-testing machine. (AUTHOR)

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Evans, R. G., E. S. Gurdjian, W. G. Hardy, L. M. Patrick, and H. R. Lissner 1961
INTRACRANIAL PRESSURE AND ACCELERATION ACCOMPANYING HEAD IMPACTS IN HUMAN
CADAVERS.
Surg., Gynec., and Obst. 113:185-190, Aug. 1961.

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Eve, F.C. 1943 BLAST, SUDDEN DEATH AND THE EPIGLOTTIS.
Lancet 244:799-800, June 26, 1943.

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Everling, E. 1952 DIE BOGENGANGE ALS WINKELGESCHWINDIGKEITSMESSER
(Semicircular Canals as Meters of Angular Velocity)
(Trans. of Forschungen und Fortschritte (Germany) 25(11/12):126-128, 1949)
(SLA Translations Center, Chicago, Ill.) 61-16038

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Evrard, E. 1949 OBSERVATIONS EXPERIMENTALES RELATIVES AUX EFFETS DES VITESSES
ASCENSIONNELLES RAPIDES SUR L'ORGANISME DE L'AVIATEUR (Effects of Rapid
Ascentional Speed on Organism of Aviator: Experimental Studies)
Bruxelles médical (Brussels) 29: 3639-3657, 18 Dec. 1949 & 3689-3706, 25 Dec. 1949

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Evrard, E. 1956 PHYSIOLOGIE DU VOL; HYGIÈNE DE L'AVIATEUR: GUIDE PRATIQUE À
L'USAGE DU PERSONNEL NAVIGANT. (PHYSIOLOGY OF FLIGHT; AVIATOR'S HEALTH:
PRACTICAL GUIDE FOR THE USE OF FLYING PERSONNEL) (Bruxelles: Office de
Publicité, 1956)

ABSTRACT: A textbook dealing with the theory and practical aspects of the physiology of flight is presented for the instruction of aircrew members. Consideration

is given to the atmosphere and related physiological problems, basic respiratory and circulatory physiology, the physiological effects of hypoxia, changes in barometric pressure, acceleration, and extreme temperatures, principles and techniques of the use of oxygen as protection against hypoxia, pressure cabins and pressure clothing, problems connected with escape from aircraft, the basic physiology and special phenomena of vision, sensory phenomena associated with flight, the problems of noise and vibration, air-sickness, medical aspects of survival, the problem of intoxication by vapors from aircraft, flight equipment, general rules of hygiene, and first aid.

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Evrard, E., P. Bergeret and P.M. van Wulfften Palthe 1959 MEDICAL ASPECTS OF FLIGHT. (THE UNEXPLAINED AIRCRAFT ACCIDENT).
(New York, Pergamon Press, 1959) AGARDograph 30, pp. 308

ABSTRACT: Two symposia on the human element in the operation of an aircraft and the origin of aircraft accidents. This book presents a selection of 30 reports under the following chapter headings: 1) Flight safety and aircraft accidents, 2) Use of pathology in crash injuries, 3) In-flight protection, and 4) Some special problems.

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Ewing, E. G. 1951 LANDING OF SPACECRAFT
Pac. Rocket Soc. Bull. 4:B1-B6, Oct. 10, 1951

ABSTRACT: This paper, presented at the Second International Congress on Astronautics, surveys the possibilities of using parachutes.

ACCELERATION

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Fabing, H. 1947 CEREBRAL BLAST SYNDROME IN COMBAT SOLDIERS.
Archives of Neurology and Psychiatry 57(1):14-57, January 1947.

ABSTRACT: A study of 80 consecutive cases of blast injury in combat soldiers was carried out. It was found that the disorder occurs among men of all ranks, in new troops as well as in veterans of combat. All types of explosive agents can cause the disorder. The unconsciousness produced by blast is characterized by a retrograde amnesia for the sound of the explosion and by a period of anterograde unconsciousness of variable length, but lasting an hour in the usual case. The unconsciousness is marked by dissociated, aimless behavior. On return to consciousness, the patient complains of protracted headache. In addition, he complains of tinnitus. It was found that memory of the unconscious period could be recalled under chemical hypnosis and it was therefore an amnesia of the type seen in hysteria. Furthermore, it was noted that there was dramatic relief of symptoms in cases in which there was good conscious recall for the amnesic material. Clinical experimentation with the technic of chemical hypnosis led to a modification which proved successful in bringing about recovery of post blast amnesic material. The method employs intravenous injection of sodium pentothal to produce chemical hypnosis and exploration of the amnesic material, followed by rapid wakening with intravenous injection of nikethamide. It proved of therapeutic value in more than 90 per cent of patients.

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Fabing, H.D. 1947. BLAST SYNDROME IN COMBAT SOLDIERS
Arch. Neurol. Psychiat. 57:14-57

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Fabre, J. & Y. Houdas 1961 PHYSIOLOGICAL DETERMINATION OF FACTORS RESPONSIBLE FOR SEVERE LESIONS AT THE TIME OF SUPERSONIC EJECTIONS.
Rev. Med. Aero (Paris) 2:190-192, Dec. 1961 (Fr)

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Fabre, J. & Y. Houdas 1962 A PROPOS D'UNE OBSERVATION D'UNE SUJET AYANT SUBI UNE EJECTION SUPERSONIQUE (CASE REPORT OF A SUBJECT HAVING UNDERGONE A SUPERSONIC EJECTION

Revue des Corps de sante des armees (Paris), 3(2): 247-251. April 1962.
(in French)

ABSTRACT: This is the first French case, and the second or third known case, of ejection at supersonic speed (1,000 - 1,100 kilometers/hour) at an altitude of about 12,000 feet, in which the pilot survived. The pilot was comatose upon landing and his parachute torn during opening at high speed. Medical examination revealed left hemiplegia, right facial paralysis, and fracture of the 12th dorsal and 1st lumbar vertebrae. Coma persisted for 8 days; however, good psychomotor recovery followed. The origin of the disorders was attributed primarily to the effects of three factors: (1) blast, (2) deceleration, and (3) rotation of the seat and pilot.

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Fabre, J. R. Puccinelli, Y. Houdas & P. Pingannaud 1963 PHYSIOLOGICAL EFFECTS OF DECELERATION OBSERVED AT THE TIME OF AVIATION ACCIDENTS.

Rev. Corps. Sante Armees 4:237-255, April 1963 (France)

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Faget, M.A., B.J. Garland, and J.J. Buglia 1962 PRELIMINARY STUDIES OF MANNED SATELLITES, WINGLESS CONFIGURATION: NONLIFTING (National Aeronautics and Space Administration, Washington, D.C.) Technical note D-1254; March 1962; ASTIA AD-273 087

ABSTRACT: Consideration was given to a simple nonlifting satellite vehicle which follows a ballistic path in reentering the atmosphere. An attractive feature of such a vehicle is that the research and production experiences of the ballistic missile programs are applicable to its design and construction, and since it follows a ballistic path, there is a minimum requirement for autopilot, guidance or control equipment. After comparing the loads that would be attained with man's allowable loads, and after examining heating and dynamic problems of several specific shapes, it appears that, insofar as reentry and recovery are concerned, the state of the art is sufficiently advanced so that it is possible to proceed confidently with a manned-satellite project based upon the ballistic-reentry type of vehicle. (Author)

1,616

Fantham, H., & C. H. J. Daft 1956 APPARATUS FOR MEASURING AND RECORDING DECELERATION OF A VEHICLE. (U. S. Patent 2, 733, 116, Jan. 31, 1956)

ABSTRACT: Apparatus for measuring and recording deceleration of a vehicle comprising a base, two spaced parallel arcuate bars mounted on base in vertical plane

and with their lower ends substantially horizontal, the remainder of each bar curving upwards from said lower end, the first of said bars being of metal, angularly spaced insulated contact members mounted on the second of bars, an inertia member slidable on bars on deceleration of a vehicle in which the apparatus is placed, a record sheet, and electrical means for marking on record sheet the passage of the inertia member over each of contact members to establish an electrical connection between contact member and the arcuate metal bar.

1,617

Fasola, A. F., R. C. Baker and F. A. Hitchcock 1952 STUDIES OF DECELERATION
Amer. Jour. Physiol., 171(3):723.

Abstract: A study of the tolerance of the human pectoral girdle to rapid deceleration was undertaken to determine a more suitable and less vulnerable part of the body for the attachment of safety harnesses, since evidence previously reported showed the placing of these harnesses in the abdominal region produced both morphological and physiological damage. Static and dynamic tests were conducted to determine the strength of the following structural components of the axillary region: coracoid, acromion, and coraco-acromial ligament. Tests were likewise conducted on the shoulder joint denuded of muscles with and without the accessory socket intact and in the cadaver. Four methods were used to determine the magnitude of the force necessary to cause damage to these structures: (1) direct reading of calibrated spring balance, (2) static loading, (3) mathematical determination from coefficient of elasticity of system, (4) electronic recording with Ramburg Accelerometer. Samples were taken from normal human cadavers and tested in the fresh state. An over-all average of samples and methods shows the coracoid vulnerable to a force of 175 pounds, acromion 170 pounds, and coracoacromial ligament 150 pounds. A force of 150 pounds caused rupture of the shoulder joint capsule minus the accessory socket, and a force of 300 pounds caused damage with the accessory socket intact. 2300 pounds at each axilla caused damage in the cadaver when this force acted for 0.08 seconds. Fractures produced were similar in both the isolated and intact state.

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Farrer, D.N., M.E. Grunzke, et al. 1963 CHIMPANZEE PERFORMANCE ON A
CONTINUOUS AVOIDANCE TASK DURING ACCELERATION AT SUSTAINED LOW LEVELS
(Aeromedical Research Lab., Aerospace Med. Div., Air Force Systems Command,
Holloman AFB, New Mexico) Rept. No. ARL-TDR-63-6, March 1963.
ASTIA AD 402088.

ABSTRACT: Chimpanzee performance during 1G, 2G and 4G was evaluated with a pilot study (one subject) and a crossover design (four subjects). Each test lasted 90 minutes (30 minutes at 1G; 30 minutes at either 2 G or 4 G; 30 minutes at 1G). Performance, heart rate, respiration rate and body temperature were monitored. It was concluded that a performance decrement results during exposure to 4 G (Chest to back, +G_x) for 30 minutes. The heart rate was high throughout all tests, but it increases while the subject monitors the cue lights and decreases during rest periods. The respiration rate does not consistently change as a function of either G force or work. Body temperature consistently decreased during the tests.

1,619

Fasola, A. F., R. C. Baker, & F. A. Hitchcock 1955 ANATOMICAL AND
PHYSIOLOGICAL EFFECTS OF RAPID DECELERATION. (Wright Air Development
Ctr., Wright-Patterson AFB, Ohio) WADC TR 54-218; ASTIA AD-92 025

ABSTRACT: Research was conducted to provide information concerning the strength of the human skeleton and the effects of rapid deceleration which is produced by safety devices. An investigation of morphological damage and the force required to produce damage was conducted by testing the strength of structures which comprise the pelvic girdle, including the acetabulae and femurs. Analyses were made of the ultimate breaking strengths of bones in the isolated and intact states and of the ultimate breaking strengths of a series of bones, ligaments, and muscles which comprise the joint; tests were conducted in static and dynamic conditions on unembalmed human cadaver material. Results indicated that the strength of the pelvic ring is directly related to the strengths of the anterior and posterior walls. Primary fractures of the pubic rami, unilateral or bilateral, produced secondary fractures or disjunction of the sacroiliac joint by disrupting the integrity of the counter arch of the pelvis. Fractures of the femur did not occur when the force was applied by cables to the interior surface of the neck of the femur. Fractures of the lateral wall of the pelvis and acetabulum did not produce fractures or disjunction of the sacroiliac joint. Experiments indicated that the mechanism by which cardiac damage is produced in rapid deceleration involves the action of the safety belt in suddenly blocking abdominal blood flow, both in the vena cava and the abdominal aorta. Some minor damage was noted to the heart, liver, and kidney of dogs which were subjected to a 56-g deceleration. (ASTIA)

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Faubert, D. B., B. S. Cooper, & C. C. Clark 1963 TOLERANCE AND PERFORMANCE
UNDER SEVERE TRANSVERSE (+Gx) VIBRATION. (Life Sciences Department, Martin
Company, Baltimore, Md.) Rept. ER 12838; Feb. 1963

ABSTRACT: Seven male subjects, exposed to vertical vibration while in the supine position in a prototype Mercury couch, made 115 runs at peak couch accelerations ranging from $1Gx \pm 1Gx$ to $1Gx \pm 3.5Gx$ at 11, 22, 140, and $22 + 70$ cps, and $(1Gx \pm 0.5Gx)$ at 11 cps + $(1Gx \pm 4Gx)$ at 140 cps. Tasks consisted of: (1) push button responses after detecting changes of two linear meters, parallel to the body y and z axes, which moved with the subject; (2) reporting meter number changes; and (3) response times to a panel abort light requiring manual operation of a panel switch. After familiarization runs, mean meter change response times were 0.5 seconds at rest, 0.7 seconds at $1Gx \pm 1Gx$ at 11 cps, 1.0 second at $1Gx \pm 2Gx$ at 11 cps, and greater than 1.5 seconds at $1Gx \pm 3.5Gx$ at 11 cps, for a short duration, after which time subject discomfort precluded further meter response. Accelerometers located on the couch and also on the chest, helmet, and hip showed acceleration ratio amplifications (to 4x at the head) which can occur in this restraint system. Blurring of the vision was judged less severe than when under equivalent Gz vibration conditions. Blurring and body acceleration ratios decreased progressively at the higher

frequencies. At 1Gx:2Gx at 11 cps, some subjects experienced severe chest pains and headaches even when straining. At 1 Gx:1Gx peak at 11 cps, which we recommend designating as 1Gx:0.7Gx RMS with an accompanying power spectrum, here all at 11 cps, simple adequate performance was maintained for 60 seconds. Problems of vibration isolation are discussed. (Aerospace Medicine 34(3):254, March 1963)

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Fearing, F. S. 1926 POST-ROTATIONAL HEAD NYSTAGMUS IN ADULT PIGEONS.
J. Comp. Psychol. 6:115-131

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Fearing, F., & O. H. Mowrer 1934 THE EFFECT OF GENERAL ANAESTHESIA UPON THE
EXPERIMENTAL REDUCTION OF VESTIBULAR NYSTAGMUS. J. Gen. Psychol.
2:133-144

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Feder, H. C. 1960 NOMOGRAPHS FOR MULTIPHASE ACCELERATION PROFILES.
(Air Force Missile Development Ctr., Holloman AFB, N. Mex.) AFMDC TR 60-9,
June 1960. ASTIA AD 239 708.

ABSTRACT: Experimental investigations of the technological and physiological effects of unidirectional accelerations require the computation of the parameters of the acceleration pattern. This report develops explicit equations between distance, velocity, acceleration, and time, thus greatly reducing the computational work of test analysis and evaluation.

Two nomographs were designed which permit reading distance with an error of less than 2 percent and velocity with error less than 0.2 percent. The three principal phases of the acceleration pattern are used to define a set of descriptive parameters. An impulse-dependent onset parameter, called relative onset rate, is discussed and, if used as a standard, would facilitate the comparison of tests made by different investigators.

1,624

Feder, Hubert C. 1960 CIRCULAR TRACK-CHAMBER -- A PROPOSED FACILITY FOR TESTING MAN-MACHINE SYSTEMS UNDER CONDITIONS OF SPACE FLIGHT AND LUNAR HABITATION (Air Force Missile Development Center, Holloman AFB, New Mexico) AFMDC-TN-60-14. ASTIA AD 247 541

ABSTRACT: The circular track-chamber as proposed, combines a 100-foot diameter circular track and a 100-foot diameter hemispherical vacuum chamber into one composite test facility. The purpose of this facility is to test the compatibility of man-machine systems. The anticipated test procedure encompasses the simultaneous and continuous testing of most of the parameters of a complete space flight history from launch through planet life to re-entry and recovery. The facility will handle payload-load factor products up to 2,000,000 pounds and can accommodate a crew of 20 men living and working in a planetary environment.

1,625

Feder, Hubert C. 1963 THE FLYWHEEL AS A CENTRIFUGAL ACCELERATOR (6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico) Technical Documentary Report No. ARL-TDR-63-9, April 1963. ASTIA AD 401 767.

ABSTRACT: Subjected to investigation is a flywheel accelerator as a component of a 160 to 200-foot diameter circular track. The 22 spoke, box-construction flywheel could be made from commercially available steel plates. Based on optimal design conditions, the upper application limit, governed by the welding property of the material used, was found to be a test weight - load factor capacity of 230,000 pound - 300 g. The discussion, based on a linear dependence of flywheel weight, moment of inertia, power and cost on test weight, and cross-section of box members, at constant radius and stress, shows that the lower application limit of the flywheel reaches far into the application range of proposed, arm-type centrifuges and that the flywheel is a logical necessity, if the test capacity of existing centrifuges needs to be exceeded.

1,626

Feder, E. I., & E. J. Straus 1961 INCREASED RELIABILITY OF PIEZOELECTRIC ACCELEROMETERS FOR SHOCK MEASUREMENTS. 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. 565-569

SUMMARY: With the advent of higher and higher shock measurement requirements, the environmental engineer must be extremely careful in selecting his instrumentation. It must be recognized that the piezoelectric accelerometer can be used for both vibration and shock measurements; however, the characteristics of the instrument must be suited for the application. The introduction of damping of high resonant frequency seismic systems into an accelerometer serves to further increase the reliability of a particular measurement. The overall system of accelerometer, cathode follower, filter and recording instrument must be integrated and matched. Each unit represents an electric component through which the signal generated by the piezoelectric crystal must pass with a minimum of distortion or loss. When this condition is met, a faithful reproduction of the applied force will be obtained. (AUTHOR)

1,627

Feddersen, W.E. 1961 SIMULATOR RESEARCH: VALIDATION AND MOTION STUDIES.
In U.S. Army Signal Corps, Combat Communications and Surveillance Report
of the Seventh Annual U.S. Army Human Factors Engineering Conference,
3-6 October 1961. ASTIA AD 267 153

ABSTRACT: The research was undertaken as a first step in the validation of the Bell dynamic simulator and supporting equipment against the helicopter. The purpose of this study was to demonstrate with experimental data the extent to which performance results on the simulator approximate those obtained from the helicopter when the tasks are equivalent.

In line with these objectives, the approach was a three-pronged one in which various types of motion upon operator performance were investigated. The contribution of motion cues relative to no-motion in the simulator tracking situation is also under investigation. The third area has been an investigation of the various measures which can be used in the evaluation of operator performance as well as system performance.

Graphs are included to show the results of these three areas of investigation. The proficiency results are reported in terms of integrated absolute error scores about the various axes defining the hovering task, and the behavioral data, that is, the data indicative of the way in which the helicopter and simulator are controlled by the operator, are presented in the form of auto-correlation functions. (AUTHOR)

1,628

Feddersen, W. E. 1962 THE ROLE OF MOTION INFORMATION AND ITS CONTRIBUTION TO SIMULATION VALIDITY (Bell Helicopter Co., Ft. Worth, Texas) Rept. No. D228-429-001; ASTIA AD-281 855 o.

ABSTRACT: The use of a motion simulator in the evaluation and testing of those display and instrumentation concepts which are central to the objectives of the Army-Navy Instrumentation Program (ANIP) poses the same question that is asked of any testing device; namely, to what extent does the device allow a valid evaluation of the developments under consideration. The ultimate in validity in such a situation would be achieved when operator behavior in the simulator corresponds precisely to control behavior in the system being simulated which, in this case, is a helicopter in all of its different flight modes. Since it is unrealistic to expect exact behavior correspondence in the two situations the task is one of determining the extent or degree of approximation.

This report summarizes the results of a series of three investigations, both simulator and flight test, designed to determine the relative proficiency allowed by motion information in the simulator in a hovering flight mode and, secondly, to determine with appropriate measures the degree to which control behavior in the helicopter is approximated by behavior in the simulator when the tasks are equivalent.

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Federov, E.K. 1962 THE DECISIVE STEP IN THE CONQUEST OF COSMIC SPACE.
Science and Culture (Calcutta), 28(1):11-14, Jan. 1962.

ABSTRACT: Soviet space efforts preparatory to manned space flight included studies dealing with: (1) the conditions encountered during space flight (accelerations, temperature changes, weightlessness, radiations) and means of protecting the astronaut from their effects; (2) providing normal living conditions in the space cabin; and (3) medical selection techniques and training format for astronauts. The system devised for the constant medical supervision of both the pilot's health and working capacity in all stages of flight is discussed. Y.A. Gagarin's orbital flight (April 12, 1961) is briefly mentioned.

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Fedorov, Ye. 1961 ACCOMPLISHMENT OF THE CENTURY
Izvestiya 4 cols.; 13 April 1961.

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Fedotov, Yu. 1960 BEFORE TAKE-OFF INTO SPACE
Krasnaya zvezda P. 3; 18 May 1960.

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Fedotov, Yu. 1960 EARTH-SPACE-EARTH
Krasnaya zvezda Pp. 3-4; 2 December 1960

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Fellenz, D.W. & R.J. Harris 1963 INFLUENCE OF WEIGHT PARAMETERS ON THE
PROPULSION REQUIREMENTS OF ORBIT-LAUNCHED VEHICLES (National Aeronautics
and Space Administration) NASA Technical note D-1525, May 1963

ABSTRACT: The effects of thrust-to-weight ratio and structural weight assumptions on payload performance have been investigated for orbit-launched vehicles with lunar or escape missions. The propulsion systems considered were high-energy chemical and nuclear heat-exchanger systems. It is shown that the assumption of structural weights as being composed of terms pro-

portional to thrust level and propellant loading is necessary and practical for the discussion of the influence of thrust-to-weight ratio on payload performance. Results are given in parametric form showing payload ratio and related performance parameters as functions of thrust-to-weight ratio, representative engine and tankage specific weights for both propulsion systems tangential and circumferential thrust orientations, and different altitudes. The curves permit the rapid determination of maximum payload conditions as well as the discussion of performance parameters of off-optimum configurations

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Feltman Research and Engineering Labs., tr. 1959 ROCKET TECHNOLOGY AND SPACE RESEARCH. Raketentechnik und Raumfahrtforschung, 3(2) Apr.-June 1959. (Feltman Research and Engineering Labs., Picatinny Arsenal, N.J.) PA translation No. 61, ASTIA AD-228 967.

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The first artificial planetoid Mechta

Earth satellite Vanguard II with infra-red detectors

Space probe Juno II

Book reviews:

On the thermodynamics of combustion processes

Aviation medicine

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Fenichel, R.L., & G.H. Kydd 1958 ERYTHROCYTE HYDRATION UNDER POSITIVE ACCELERATION.

(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5805, Rept. No. 1, ASTIA AD 200 085.

See also J. Appl. Physiol. 13(3)393-396, Nov. 1958.

ABSTRACT: Rhesus monkeys were employed to study the effects of positive acceleration upon erythrocyte hydration. Blood samples were obtained from the monkey's carotid artery just before and immediately after exposure to a standard pattern of positive G. The mean corpuscular hemoglobin concentration (MCHC) fell an average of 5.8 percent. This striking fall in MCHC indicated that after

G exposure the monkey's erythrocytes were greatly increased in size. Fluid has shifted into the red blood cells. Since the MCHC measures the hemoglobin concentration within the red cell it was not surprising to find a mean decrease of 2.3 per cent in the hemoglobin concentration. The hematocrits remained constant during these experiments. A slight decrease in the relative viscosity of the blood was noted. This finding, however, was not statistically significant. Sulfhydryl concentration by itself and in relation to the hematocrit did not show a significant change after acceleration. (Author)

1,636

Fenichel, R.L., & G.H. Kydd 1958 ERYTHROCYTE HYDRATION UNDER POSITIVE ACCELERATION. J. Appl. Physiol. 13(3):393-396, Nov. 1958.
See also (Naval Air Development Ctr., Johnsville, Pa.)
NADC-MA-5805. ASTIA AD 200 085.

ABSTRACT: Rhesus monkeys were employed to study the effects of positive acceleration upon erythrocyte hydration. Blood samples were obtained from the monkey's carotid artery just before and immediately after exposure to a standard pattern of positive G. The mean corpuscular hemoglobin concentration (MCHC) fell an average of 5.8 percent. This striking fall in MCHC indicated that after G exposure the monkey's erythrocytes were greatly increased in size. Fluid has shifted into the red blood cells. Since the MCHC measures the hemoglobin concentration within the red cell it was not surprising to find a mean decrease of 2.3 percent in the hemoglobin concentration. The hematocrits remained constant during these experiments. A slight decrease in the relative viscosity of the blood was noted. This finding, however, was not statistically significant. Sulfhydryl concentration by itself and in relation to the hematocrit did not show a significant change after acceleration. (Author)

1,637

Fenichel, R.L. 1959 A STUDY OF THE EFFECTS OF POSITIVE ACCELERATION UPON ERYTHROCYTE HYDRATION IN HUMAN SUBJECTS.
(U.S. Naval Air Development Center, Johnsville, Pa.)
NADC-MA 5904, ASTIA AD 218 885.
See also Aerospace Medicine 33: 862-865, July 1962.

ABSTRACT: Human subjects were employed to study the effects of positive acceleration upon erythrocyte hydration. Venous blood samples were obtained just before the acceleration series was begun, after the third centrifuge run (2.5 G) and immediately after the subject was exposed to the last acceleration

run in the G series (5.5 G). The acceleration exposure began at the 1.5 G level and increased at 1/2 G increments, with 5 minute rest period between runs, and was terminated when the subject lost peripheral lights. The unprotected subject used in this study reached 5.5 G on the average, before losing peripheral lights. A decrease in Mean Corpuscular Hemoglobin Concentration (MCHC) was observed. A trend toward an increase in Mean Corpuscular Volume (MCV) and towards a decrease in Mean Corpuscular Hemoglobin (MCH) was noted. The trend toward the fall in MCHC indicated that after G exposure the erythrocytes of human subjects were increased in size. Fluid had shifted into the red blood cells. Comparison with the results obtained with humans at relatively low G levels with the results obtained from monkeys at overlapping and higher G levels indicated that with both species the MCHC decreased. (Author)

1,638

Fenton, F. H., Jr. 1960 MANUAL OF OPERATION FOR THE AMAL PUNCHED TAPE CENTRIFUGE CONTROL SYSTEM. (Aeronautical Computer Lab., U. S. Naval Air Development Center, Johnsville, Pa.) NADC-AC-6003, April 1960

1,639

Ferguson, J.K.W. 1942 TESTS ON OXYGEN MASKS AND FLYING GOGGLES IN A WIND TUNNEL. (National Research Council of Canada, Toronto) C-2278, 23 December 1942.

1,640

Ferguson, H. 1953 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 52-278, Suppl. 1; Sept. 1953. ASTIA AD 27 126.

ABSTRACT: Improvements are obtained for the upper-bound acceleration-time curves previously derived (AD-5010) by replacing the constant drag coefficient assumed earlier by a uniform 1-step drag coefficient. In this way, account is taken of the expected sharp drag coefficient change which occurs as the escape unit passes through $M=1.0$. This leads to a discontinuity in each curve of the family of acceleration curves and results in a restriction on the altitude range for which the bounding acceleration is not suppressed at the end; it refers to lower bounds of negative accelerations rather than upper bounds of acceleration magnitudes. (ASTIA)

1,641

Fernandez C., J.R. Lindsay 1960 POSITIONAL NYSTAGMUS IN MAN AND ANIMALS
J. Nerv. Ment. Dis. 130:499-95, June 1960

1,642

Fernandez, C., R. Alzate, & J.R. Lindsay 1960 EXPERIMENTAL OBSERVATIONS ON
POSTURAL NYSTAGMUS. LESIONS OF THE NODULUS.
(SAM, USAF Aerospace Medical Center, Brooks AFB, Texas)
Report No. 60-23, Jan. 1960.

ABSTRACT: This investigation supports the idea that the nodulus acts as an inhibitor of the vestibular centers. Disequilibrium and postural nystagmus in the vertical plane characterize the deficit following ablation of the nodulus. Unlike animals with lesions in the corpus cerebelli, these experimental animals exhibit no abnormalities in posture and no cerebellar ataxia.

1,643

Fernandez, C., & R. Schmidt 1962 HABITUATION OF NYSTAGMUS
(Paper, 33rd Annual Meeting of the Aerospace Medical Assoc., Chalfonte-Haddon Hall, Atlantic City, New Jersey, April 9-12, 1962)

ABSTRACT: Habituation of nystagmus elicited by repetitive caloric or rotatory stimulation was studied in cats with lesions in the central nervous system. Normal animals served as controls. Eye-movements were recorded by electro-nystagmography. Animals with ablation of either neocortex or anterior cerebellar lobe and animals with extensive damage to midbrain tegmentum exhibited habituation of nystagmus similar to that obtained in controls. Ablation of the cerebellar nodulus prevented acquisition of habituation until the cat compensates from cerebellar deficiency. Rate and extent of habituation varied from one parameter of nystagmus to another. Usually, but not always, amplitude and duration of the reflex were little modified while response decline was observed consistently in total number of jerks, frequency and velocity of both slow and fast component.

1,644

Fernandez, C., & R. Schmidt 1962 STUDIES ON HABITUATION OF VESTIBULAR REFLEXES.
II. EFFECT OF CALORIC STIMULATION IN DECORTICATED CATS. Annals of Otology, Rhinology, & Laryngology 71(2):299-320, June 1962
NOTE: Reel 7, Flash 7, Item 21

SUMMARY: Habituation of nystagmus elicited by repetitive caloric stimulation was studied in seven decorticated cats. The histopathologic studies revealed total ablation of neocortex, excepting small remnants in two cases, and extensive damage to basal ganglia and diencephalon.

All animals exhibited response decline of nystagmus demonstrating that neocortex and probably basal ganglia and diencephalon are not essential for inducing habituation. There was no conclusive data regarding transfer and long lasting retention of the response decline.

The locus and neurophysiological basis of the phenomenon are discussed.
(AUTHOR)

1,645

Fernandez, C., and R.S. Schmidt 1963 STUDIES IN HABITUATION OF VESTIBULAR REFLEXES. III. A REVISION. Aerospace Medicine, 34(4): 311-315, Apr. 1963

ABSTRACT: Habituation of nystagmus to repetitive caloric or rotatory stimulation was produced in the cat. This phenomenon, as in a negative learning process, presented the characteristics of acquisition, transfer and retention.

Total ablation of the neocortex with extensive damage to diencephalon did not interfere with acquisition of habituation but these structures may be important for retention of the response decline.

The phenomenon is apparently located in the vestibular centers, including vestibular nuclei and reticular formation of both medulla and pons.

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Filippi, Paolo 1949 THE UNIDIRECTIONAL PREPONDERANCE OF PROVOKED NYSTAGMUS. Riv. Oto-Neuro-Oftal. 24:340-368

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Filippovich, S.G. 1936 EVALUATION OF CONDITION OF INTERNAL ORGANS IN PARACHUTE JUMPERS. Klinicheskaya meditsina, (Moskva) 14:391-404

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Finan, J.L., S.C. Finan, & L.D. Hartson 1949 A REVIEW OF REPRESENTATIVE TESTS USED FOR THE QUANTITATIVE MEASUREMENTS OF BEHAVIOR--DECREMENT UNDER CONDITIONS RELATED TO AIRCRAFT FLIGHT. (USAF, AMC, Wright-Patterson AFB, Ohio) USAF TR 5830.

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Finney, J.W. 1961 RUSSIANS CONFIRM TITOV WAS SEASICK: CONDITION LAID TO PROLONGED STATE OF WEIGHTLESSNESS. New York Times, Oct. 5, 1961. Sec. C, p. 8.

ABSTRACT: Two Russian scientists confirmed the rumor that Maj. Gherman S. Titov felt seasick throughout most of his 25 hr. space flight in August, 1961. The sickness was attributed to prolonged weightlessness. There were indications during the weightless period of "a definite instability of central nervous system reactions." The astronaut experienced a feeling of disorientation and loss of balance normally supplied by the inner ear. The Russian scientists pointed out that the feeling of weightlessness can be removed by creating artificial gravity in the space ship. (CARI)

1,650

Finkelstein, B. and B. McGhee 1959 LIQUID DIETS FOR USE IN HIGH-ALTITUDE, HIGH-PERFORMANCE VEHICLES (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TR-59-32, March 1959

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Finninger, P.C. 1960 MEDICINA DE AVIACION. (Thesis to obtain Titulo de Medico-Cirujano, University of Mexico, Mexico, D.F., 1960)

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Firestone, C. 1935 AIR SPEEDS AND THEIR TRAUMATIC EFFECTS ON THE BRAIN. J. Aviation Med. 6(1):45-48

ABSTRACT: Injury to the brain from its pressure against the skull when flying at high speed has been discussed, and made much of. The experiments of Garsaux should not be adduced to this discussion, as he brought about a chain of events which originated in the vestibular tract.

Metal helmets will serve as an additional casing and cushioning, when higher speeds come and show necessity for such added protection. These helmets will also help protect the military flyer from rifle and to some extent from machine gun fire.

1,653

Fischer, C.F. and F.T. Nicholson 1959 ACCELERATION SIMULATIONS ON THE HUMAN CENTRIFUGE. In Symposium on Space Med. Electronics. (The Franklin Institute, May 1959), p. 32.

1,654

Fischer, J.C., Jr. 1961 THE EXPLOITATION OF THE MAXIMUM CAPABILITIES OF THE HUMAN BODY TO WITHSTAND MANEUVERING LOADS IN MANNED AEROSPACE VEHICLE DESIGN. (SAE, Natl. Aero. & Space Eng. & Mfg. Meeting, 9-13 Oct. 1961 Los Angeles, Calif.) Preprint 424 B

ABSTRACT: Discusses the design of future aerospace vehicles seeking to combine high maneuverability and minimum g-forces on pilots. A lenticular shaped vehicle, to be rotated before a turn so the pilot will face the new direction of acceleration, is proposed.

1,655

Fischer, L.J., and E.L. Hoffman 1957 DITCHING INVESTIGATIONS OF DYNAMIC MODELS AND EFFECTS OF DESIGN PARAMETERS ON DITCHING CHARACTERISTICS. (National Advisory Committee for Aeronautics, Washington, D.C.) NACA TN 3946. Feb. 1957.

ABSTRACT: Experimental results presented in tabular form. Data from other scale-model tests and reports on full-scale ditchings are discussed and various ditching aids are considered.

1,656

Fisher, Krohn, and Zuckerman 1941 RELATIONSHIP BETWEEN BODY SIZE AND THE LETHAL EFFECTS OF BLAST. (Ministry of Home Security, Research and Exper. Dept., Oxford, England) Rept. RC 284, 10 Nov. 1941. Also Report, Comm. Weapons, MPRC-BPC 14 6 /ws 11

1,657

Fisher, A.C. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE Journal of Aviation Medicine 26: 355
See also: Nat. Geog. Mag. 108(2): 241-278. Aug. 1955

ABSTRACT: A coverage of all aspects of space flight including acceleration, deceleration, and weightlessness.

1,658

Fisher, A.C., Jr. 1955 AVIATION MEDICINE ON THE THRESHOLD OF SPACE: SERVICE DOCTORS, FACING MEDICAL PROBLEMS UNKNOWN ON EARTH, MAKE POSSIBLE MAN'S EXPLORATION OF THE HOSTILE HEAVENS
The National Geographic Magazine 108(2): 241-278, August 1955

ABSTRACT: The author reports on his visits to several military and civilian institutions that work on research into the human factors of flight. He describes the effects of the centrifuge at Johnsville, Pennsylvania. Escape from aircraft ditched in water is a subject under investigation at Pensacola, Florida. The author discusses a weightless ride during his visit at Edward's Air Force Base, California. Heat resistant and pressure suits for pilots are under development at Wright-Patterson Air Force Base, Ohio, and at Randolph Air Force Base, Texas. Hyperventilation is another field of research at Randolph Air Force Base. Extreme acceleration and deceleration forces are the subject of a conversation between the author and Col. John P. Stapp. Pilot ejection and the effects of fatigue are being studied at Wright-Patterson Air Force Base. The article is very detailed about the research in all of the fields. (CARI)

1,659

Fisher, J.C. 1949 NAVAL ORDNANCE LABORATORY DROP TESTER (40') XD-1A, DESIGN, CONSTRUCTION AND CALIBRATION OF (Naval Ordnance Lab., White Oak, Md.)
14 June 1949; ASTIA AD-103 435

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Fisher, L.J. and R.P. Tarshis 1950 DITCHING TESTS WITH A 1/16 SIZE MODEL OF THE NAVY XP2V-1 AIRPLANE AT THE LANGLEY TANK NO. 2 MONORAIL.
(National Advisory Committee for Aeronautics, Langley Field, Va.)
NACA RM L50C23, May 1950.

ABSTRACT: Model investigations to determine the ditching characteristics of the Navy XP2V-1 airplane are described. Various landing configurations were simulated and the performance of the model was determined from visual observations, motion-picture records, and time-history accelerometer records. The results of the investigation indicate that the airplane should be ditched at the normal landing attitude with the flaps fully extended. Extensive damage to the fuselage will occur and the airplane probably will dive. If a trapezoidal hydroflap 4 feet by 2 feet by 1 foot is attached to the airplane at station 192.4, diving will be prevented.

1,661

Fisher, L. J. & E. L. Hoffman 1950 MODEL DITCHING INVESTIGATION OF THE DOUGLAS DC-4 AND DC-6 AIRPLANES (National Advisory Committee for Aeronautics, Langley Aeronautical Laboratory, Langley Air Force Base, Va.) NACA RM L9K02a, 4 May 1950.

ABSTRACT: Model investigations to determine the ditching characteristics and safest ditching procedures for Douglas DC-4 and DC-6 airplanes are described. Data were obtained by motion-picture and still-picture records and time-history deceleration records. It was concluded that the best ditchings with the DC-4 and DC-6 airplanes could be made by contacting the water at a nosehigh attitude with the landing flaps full down. The ditching behavior of both airplanes will be similar. In calm water or small waves, the attitude will decrease until the airplane stops in a slightly nose-down attitude. Little damage will be sustained at these conditions. In waves of the order of 6 feet high, considerable variation in behavior and damage may occur, depending on how the airplane contacts the waves.

1,662

Fisher, L.J. 1953 MODEL DITCHING INVESTIGATIONS OF THREE AIRPLANES EQUIPPED WITH HYDRO-SKIS. (National Advisory Committee for Aeronautics, Langley Field, Va.) NACA / RM L53G24A. Sept. 29, 1953.

ABSTRACT: Model investigations were made to determine the ditching characteristics of three typical multiengine airplanes equipped with possible arrangements of hydro-ski ditching gear. The behavior of the models was determined from visual observations, acceleration records, and motion pictures of the landings. It was concluded that a ditching gear of one or more hydro-skis would afford very satisfactory water landings as compared with landings without skis. The best landing with a hydro-ski ditching gear could be made in a near-level (slightly nose-up) attitude although any normal landing attitude would be satisfactory. It is possible that critical damage could be eliminated from ditching by using a hydro-ski ditching gear, thus greatly increasing the chances or survival and rescue.

1,663

Fisher, L. J., et al. 1957 DITCHING INVESTIGATIONS OF DYNAMIC MODELS AND EFFECTS OF DESIGN PARAMETERS ON DITCHING CHARACTERISTICS. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 3946, Feb. 1957

1,664

Fisher, Lloyd J., Jr. 1960 LANDING ENERGY DISSIPATION FOR MANNED REENTRY VEHICLES. (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-453

ABSTRACT: Analytical and experimental investigations have been made to determine the landing-energy-dissipation characteristics for several types of landing gear for both parachute-supported and horizontal-landing vehicles. It appears feasible to readily evaluate these landing gears for hard-surface or water landings by computation methods and freebody landing techniques with dynamic models. Acceptable landing gear can be developed along lines similar to those presented if stroke requirements and human-tolerance limits are considered.

1,665

Fisher, Lloyd J., Jr. 1961 LANDING-IMPACT-DISSIPATION SYSTEMS (National Aeronautics and Space Administration, Washington, D.C.) NASA TN D-975.

ABSTRACT: Analytical and experimental investigations have been made to determine the landing-energy dissipation characteristics for several types of earth-landing impact systems having application to reentry vehicles. The areas of study are divided into three velocity regions: (1) those having primarily vertical velocity, (2) those having both moderate horizontal and moderate vertical velocity, and (3) those having primarily horizontal velocity. The impact systems discussed are braking rockets, gas-filled bags, frangible metal tubing, aluminum honeycomb, balsa wood, strain straps, and both skid and skid-rocket landings on hard-surface runways and on water. It appears feasible to evaluate landing-gear systems for reentry vehicles by computational methods and free-body landing techniques with dynamic models.

1,666

Fitts, P. M., ed. 1947 PSYCHOLOGICAL RESEARCH ON EQUIPMENT DESIGN (Air Materiel Command, Aero Medical Lab., Wright-Patterson AFB, Ohio) Rept. No. 19; ATI-125 983

CONTENTS:

Introduction to Psychological Research on Equipment Design;
Survey of Display Problems in the Design of Aviation Equipment;
An Analysis of Human Motor Abilities Related to the Design of Equipment and a Suggested Program of Research;
The Relative Effectiveness of Presenting Numerical Data by the Use of Tables

and Graphs;
Psychological Factors Involved in the Design of Air Navigation Plots;
Design of Clock Dials for Greatest Speed and Accuracy of Reading in Military
(2400-Hour) Time System;
Speed and Accuracy of Dial Reading as a Function of Dial Diameter and Angular
Separation of Scale Divisions;
An Experimental Evaluation of the Interpretability of Various Types of Air-
craft Attitude Indicators;
Direction of Movement in the Use of Control Knobs to Position Visual Indicators;
A Study of the Most Effective Relationships Between Selected Control and
Indicator Movements;
Comparative Interpretability of Two Methods of Presenting Information by
Radar;
A Psychophysical Investigation of Ability to Reproduce Pressures;
The Coding of Airplane Control Knobs;
The Tactile Discrimination of Shapes for Coding Aircraft-type Controls;
A Study of Location Discrimination Ability;
Principles of Control Arrangement for Sequential Operation;
Efficiency of Several Types of Control Movements in the Performance of a
Simple Compensatory Pursuit Task;
An Experimental Comparison of the Accuracy of Sighting and Triggering with
Three Types of Gun-Sight Handgrip Controls;
The Effect of Anoxia on Visual Illusions;
Effect of Increased Positive Acceleration (G) on Ability to Read Aircraft
Instrument Dials;
Summary and Evaluation;

1,667

Fitzpatrick, F.L. and K.A. Stiles 1942 THE BIOLOGY OF FLIGHT.
(New York: The Macmillan Company, 1942)

NOTE: This textbook for students of pre-flight aeronautics covers the subject
of the effect of flight upon the human body. Each chapter is concluded
with a brief summary of its contents.

CONTENTS: Living things in the air. The nature of flight. Altitude effects.
Other pressure and temperature effects. Acceleration and the human body. The
sense organs and flight. Physical fitness for flight. Air travel and disease
control. Selected references. Selected motion pictures. Index.

1,668

Fitzpatrick, F.L. & K.A. Stiles 1942 ACCELERATION AND THE HUMAN BODY.
In The Biology of Flight (New York: The Macmillan Company, 1942)
Pp. 84-96.

ABSTRACT: From the foregoing statements it may be seen that both positive and negative accelerations present definite dangers, but that the former are more likely to be encountered in actual flying experience. The effects are primarily upon the circulation; positive accelerations result in blacking out, and negative accelerations bring about a congestion of blood in the head region. Transverse accelerations, on the other hand, are not likely to produce any ill effects.

Once more it may be observed that individual difference is an important part of the story. Some people are much more tolerant of accelerations than are others. A particular person may also vary in tolerance from day to day, depending on his physical condition at a given time. Ways and means of preventing ill effects have been studied with care, but not much can be maneuvers that produce dangerous accelerations, (2) to change the position of the body so that in effect the accelerations become transverse, and (3) to wear special equipment, such as an inflatable belt.

1,669

Fitzpatrick, F.L. & K.A. Stiles 1942 THE SENSE ORGANS AND FLIGHT.
In The Biology of Flight (New York: The Macmillan Company, 1942)
Pp. 97- 118

ABSTRACT: In this chapter the story of the sense organs in relation to flight experiences has been reviewed. The most important of these organs are clearly the eyes and the ears, but the sense of touch has a good deal to do with maintaining balance and orientation. One fact that emerges from the discussion is that the senses are often "tricked" in flight experiences, a fact that is particularly true when the pilot is flying "blind." This is one reason why instrument flying has become so important in recent years.

We have also noted that, while ordinary airsickness cannot be fully explained, it is clearly due to a confusion of many sensations that originate in the sense organs. Some people are more susceptible to airsickness than are others, and a few are probably never able to overcome the handicap. We should remember that airsickness may be developed at any level of flight; it is not one of the conditions that appear only at high altitude.

The causes of flight fatigue and its dangers have also been outlined. Undoubtedly it was more of a menace in the early days of aviation than is now the case. In recent years many improvements of aircraft, methods of handling air traffic, and greatly to the comfort and security of fliers. The various causes of flight fatigue, however, cannot be removed entirely. We shall always have to reckon with this factor.

1,670

Fitzpatrick, W.H. and C.W. DeLong, ed. 1961 SOVIET MEDICAL RESEARCH RELATED TO HUMAN STRESS: A REVIEW OF THE LITERATURE.
(Washington: U.S. Public Health Service, 1961) PHS Publication no. 853.

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Fitzsimons, J.T. and M.K. Browne 1957 ELECTROCARDIOGRAPHIC CHANGES DURING POSITIVE ACCELERATION. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 1009.

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Flack, M. 1919 "FLYING SICKNESS." A DISCUSSION OF ITS CAUSE AND THE BEST MEANS OF COMBATTING IT. Sci. Amer. Suppl. 87:262

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Flack, M. & A.P. Bowdler 1920 THE SELECTION OF CANDIDATES FOR FLYING. British Air Medical Investigation Committee Rept. VI., March 1918. Reprinted in The Medical Problems of Flying (London: H.M. Stationery Office, 1920)

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Flack, M. 1930 AIR-SICKNESS AND SEA-SICKNESS.
Proc. R. Soc. Med., 24(2)635-641

1,675

Flack, M. 1930 AIR-SICKNESS AND SEA-SICKNESS.
Proc. Royal Soc. Med. 24:635-641, Pt. 1.

ABSTRACT: Air-sickness and sea-sickness have certain factors in common; they differ in the relative importance of the various factors. In both maladies the following may play a part: (1) Undue stimulation or hypersensitivity of the vestibular apparatus of the internal ear; (2) dilemma between visual, labyrinthine and deep-muscle sensations, accentuated by induced disturbance of ocular muscle balance; (3) physical factors such as stuffy atmospheres, smells, and lack of adequate ventilation; (4) anticipatory nervous anxiety; (5) the general health of the subject at the time of exposure to uneven movement, including the tone of the abdominal musculature.

1,676

Flaherty, B.E., D.E. Flinn, G.T. Hauty, & G.R. Steinkamp 1960 PSYCHIATRY AND SPACE FLIGHT. (USAF, School of Aviation Medicine, Aerospace Med. Ctr., Brooks AFB, Texas) Research Rept. 60-80, Sept. 1960, ASTIA AD 245 416.

ABSTRACT: The stresses of altitude, acceleration and dynamic weightlessness, temperature, radiation and meteorites, day-night cycle, and emotional factors are discussed as they relate to the man-machine system and space flight. The reactions of four subjects to thirty-six hours of confinement in the School of Aviation Medicine Space Cabin Simulator are described. Two of the subjects successfully completed the flight despite having experienced perceptual aberrations. The psychiatric evaluation of the two subjects are presented. The effects of isolation and sensory deprivation are discussed as they relate to the experiments.

1,677

Flaherty, B.E. 1961 PSYCHOPHYSIOLOGICAL ASPECTS OF SPACE FLIGHT. (New York; Columbia University Press, 1961)

ABSTRACT: A symposium on Psychophysiological Aspects of Space Flight, held 26-27 May 1960 at Brooks AFB, School of Aviation Medicine in four parts: Technical Background and Experience, Critical Problem Areas, Problems of Human Reliability, and Special Techniques of Control.

1,678

Flaherty, T.T. 1942 AIRSICKNESS DURING ACROBATICS.
U.S. Nav. M. Bull., 40:902-6

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Flam, E., & H. R. Fraiser 1960 INTEGRATED FLIGHT CAPSULE BOOST ROCKET REPORT. (Chance Vought Aircraft, Inc., Dallas, Texas) Rept. No. EOR-12844; Contract NOa(s) 59-6150-c; ASTIA AD-263 494L

ABSTRACT: Studies were made of propulsion systems for the capsule escape device. The performance requirements for capsule propulsion are best met by a solid rocket which is simpler, more reliable, and lighter than a liquid rocket for this application. The space envelope available in the capsule dictates the use

of two identical solid rockets each of which has performance as follows: 15,000 pounds thrust, 13,000 pounds total impulse, and 0.86 second burning time. The motor design utilizes a six-spoke wagon wheel grain. The grain burning surface will be dipped in inhibitor to keep the thrust build-up rate within limitations on G onset rate. Four nozzles are used on each motor in order to stay within the space envelope. This permits the entire installation to be contained inside the fuselage. Electrical initiation will be used. (AUTHOR)

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Flamme, A. 1930 LES LIMITES PHYSIOLOGIQUES DE LA VITESSE (THE PHYSIOLOGICAL LIMITS OF SPEED) 1. Congr. internat. Securite aer., Paris, 1930. Rapport Tome 2, p.5, Comm. IX.

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Flamme, A.L. 1931 INFLUENCE ET LIMITES PHYSIOLOGIQUES DE LA VITESSE ET DE SES DERIVES: (ACCELERATIONS, CHOCS, TREPIDATIONS). (The Effect and Physiological Limits of Force and Stress: (Acceleration, Impact, and Vibration) Arch. Med. Pharm Milit. 95:263-302.

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Flamme, A.L. 1933 INFLUENCE ET LIMITES PHYSIOLOGIQUES DE LA VITESSE ET DE SES DERIVEES (Influence and Physiological Limits of Speed and It's Accompanying Conditions) Revue des forces aériennes (Paris) 5(51): 1139-1151

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Flamme, A.L. 1936 CONSIDERATIONS MEDICALES SUR LE PARACHUTISM (Medical Considerations on the Parachutist) Revue de l'armee de l'air (Paris) 2:977-1006

1,684

Flaugherty, T.T. 1942 AIRSICKNESS DURING ACROBATICS U.S. Navy Med. Bull. 40:902-906

1,685

Flecker, J.F. 1958 MAN IN SPACE.
Air Force, 41(3):109-117, 120-123, March 1958.

ABSTRACT: Reviews the battery of psychological testings which Donald G. Farrell underwent in a U.S. Air Force space-cabin mock-up, and (2) a multi-g acceleration experiment carried out by Colonel John Stapp, in which effects of high speed blastoff were duplicated. The results suggest surprisingly high human tolerance levels. Weightlessness could be produced experimentally for short intervals only, but results indicate that proper training in and orientation about conditions of weightlessness would improve human performance during zero gravity. Padded "highchairs" for seats, squeeze tubes for feeding, and suction-cupped shoes for walking are recommended. The creation of artificial gravity by means of rotation of the craft is considered less desirable for combating weightlessness problems. A closed biological cycle system is recommended. Such a system would be necessary to meet the oxygen requirement on long space flights and may solve the problems of space-flight feeding and of human waste disposal. Hazards of cosmic radiation and meteorites must still be dealt with, and certain psychological problems have not as yet been solved. It is predicted that the data on heretofore unanswered questions. Its pilots will face longer periods of zero gravity and will be compelled to make quick decisions under near zero-gravity conditions. They will be exposed to speeds of from Mach 5 to Mach 7. In conclusion, the author presents some speculation concerning space stations, lunar trips from these stations, and, trips to some of the planets.

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Fleisch, A. 1931 VENOMOTORENZENTRUM UND VENENREFLEXE. II. MITTEILUNG.
BLUTDRUCKZUGLER UND VENENREFLEXE. (Venomotor Centers and Venal Reflexes.
Bloodpressure Regulator and Venal Reflexes)
Pflüg. Arch. ges. Physiol. (Berlin) 226: 393-410

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Flekkel' A.B. and E.V. Marukhanian 1959 (THE EFFECT OF LONG-ACTING RADIAL
ACCELERATION ON CERTAIN VISUAL FUNCTIONS IN MAN)
Voenna Med. Zh. 8:54-8, August 1959.

1,688

Fletcher, D.E., C.C. Collins, & J.L. Brown 1958 THE EFFECTS OF POSITIVE ACCELERATION UPON THE PERFORMANCE OF AN AIR-TO-AIR TRACKING TASK.
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA 5807,
2 June 1958. ASTIA AD 201 176.
See also J. Aviation Med. 29(2):891-897

ABSTRACT: Each of 4 subjects participated in 72 centrifuge runs, each of 141 sec, which were presented in random order. The runs varied as to the control stick used, the level of acceleration in the 91st to 111th sec, and the duration, level, and location of acceleration in the 30th to 90th sec. The subject was instructed to use the control stick to keep a target aircraft centered on an oscilloscope. The target moved in an erratic pattern with simulated banking motion. At the 91st second the subject was signaled to check target-centering and press a button on the control stick as quickly as possible. Response time was recorded. The error scores improved considerably and the time scores improved slightly during the experiment. An analysis of variance of the time scores indicated that only the subject variable was significant. For the tracking error scores, where a score was the cumulated absolute deviation of the target from the center of the scope, all main variables and many interactions were shown to be significant by analysis of variance. The right-hand control stick was associated with more accurate tracking than was the center stick. The duration of acceleration affected the error scores in that mean scores were lower for 10 sec of acceleration than for 30 sec. The occurrence of 2 or 3 g of acceleration in the first as compared to the second half of the period from the 30th to the 90th sec did not significantly affect the scores. The level of acceleration affected the scores significantly but the value of the difference was not great. For accelerations in the 91st to 111th sec, the increase from 1 to 2 g and from 3 to 4 g were not significant but the increase from 1 and 2 g to 3 and 4 g was significant. (Author)

1,689

Fletcher, D. E., C. C. Collins, & J. L. Brown 1958 EFFECTS OF POSITIVE ACCELERATION UPON THE PERFORMANCE OF AN AIR-TO-AIR TRACKING TEST.
J. Avia. Med. 29:891-897
See also (Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5807;
ASTIA AD-201 176

ABSTRACT: Each of 4 subjects participated in 72 centrifuge runs, each of 141 sec, which were presented in random order. The runs varied as to the control stick used, the level of acceleration in the 91st to 111th sec, and the duration, level, and location of acceleration in the 30th to 90th sec. The subject was instructed to use the control stick to keep a target aircraft centered on an oscilloscope. The target moved in an erratic pattern with simulated banking motion. At the 91st second the subject was signaled to check target-centering and press a button on the control stick as quickly as possible. Response time was recorded. The error scores improved considerably and the time scores improved slightly during the experiment. An analysis of variance of the time scores indicated that only the subject variables was significant. For the tracking error scores, where a score was the cumulated absolute deviation of the target from the center of the scope, all main variables and many interactions were shown to be significant by analysis of variance. The right-hand control

stick was associated with more accurate tracking than was the center stick. The duration of acceleration affected the error scores in that mean scores were lower for 10 sec of acceleration than for 30 sec. The occurrence of 2 or 3 g of acceleration in the first as compared to the second half of the period from the 30th to the 90th sec did not significantly affect the scores. The level of acceleration affected the scores significantly but the value of the difference was not great. For accelerations in the 91st to 111th sec, the increase from 1 to 2 g and from 3 to 4 g were not significant but the increase from 1 and 2 g to 3 and 4 g was significant. (AUTHOR)

The effects of different levels and durations of positive acceleration on the human centrifuge are studied in this experiment. Four subjects each participated in 72 runs of 141-seconds. The subjects' task was to keep the target aircraft centered during each run, center the target at the 91st second, then press a button on the control stick as soon as possible. The three variables which were manipulated during the runs were 1) the presence of either a centrally-located or a right-hand control stick, 2) the introduction of one of the following during the missile guidance phase of each run: 1, 2, 3, or 4 G of acceleration, and 3) the introduction of one of nine different patterns of acceleration in the target acquisition phase. The results discuss the interrelations of these variables.

1,690

Fletcher, E. R., R. W. Albright, V. C. Goldizen, & I. G. Bowen 1961 DETERMINATIONS OF AERODYNAMIC DRAG PARAMETERS OF SMALL IRREGULAR OBJECTS BY MEANS OF DROP TESTS. (Civil Effects Test Operations, U. S. Atomic Energy Commission) Report CEX-59.14, Oct. 1961

ABSTRACT: During the 1955 and 1957 Test Operations at the Nevada Test Site (NTS), masses and velocities were determined for more than 20,000 objects, such as glass fragments from windows, stones, steel fragments, and spheres, which were energized by blast winds resulting from nuclear explosions. Following the field tests, a mathematical model was devised to help explain quantitatively the experimental results. This model required certain aerodynamic-drag information in regard to the displaced objects. It was the purpose of the study outlined in this report to determine the necessary drag properties for the objects by means of drop tests. In addition to the objects mentioned above, small laboratory animals, mice, rats, guinea pigs, and rabbits, were used in the drop tests. The data obtained from these tests were extrapolated to estimate the drag properties for man, and the results compared favorably with data from other sources. Also a method was developed to estimate the average drag properties of man from his total surface area, assuming that every possible orientation of a straight, rigid man with respect to the wind was equally likely. (AUTHOR)

1,691

Flickinger, D. D. 1958 AIR FORCE HUMAN FACTORS PROGRAM FOR DEVELOPING MANNEI
SPACE OPERATIONS. Air University Quarterly Review, Summer 1958

1,692

Flickinger, D. 1959 RESULTS OF ANIMAL INVESTIGATIONS IN SPACE VEHICLES
TO DATE. (30th Annual Meeting Aeromedical Assoc., Los Angeles, Calif.,
April 27-29, 1959)

ABSTRACT: The material analyzed for this summary was contained in relatively few reports (literature dated 1949 through 1959, since the criteria set forth required that only those experiments be included which utilized rocket-engine thrust to propel the biopack into space equivalent atmospheres. This stipulation was made in order to provide pertinent data on not only the biological effects of the space environment itself but also those induced by the dynamic vehicular forces contained in the total flight. Three Russian (Galkin, et al., Bugrov, et al., and Chernov and Yakovlev) and three American (The Henry Group, Van der Wal and Young, and Army Navy Bioflight Project No. 1) reports of working groups are summarized, with major highlights abstracted in order of their date of publication.

1,693

Flickinger, D. 1959 GEN. FLICKINGER VIEWS SURVIVAL IN SPACE
A.M.A. Proceedings, April 1959

Abstract: Research on metabolic requirements in closed environments employing simulated space chambers, as well as balloon flights with man-carrying capsules, have revealed that (1) oxygen consumption for one man sitting and awake is just above the basal level (240 cc. per man hour); (2) during long periods of space flight, when man's usefulness is limited, supplies can be conserved by inducing hypothermia and artificial hibernation with chlorpromazine thus decreasing the metabolic level; (3) there may be some metabolic usefulness in nitrogen and trace components in the atmosphere which could be exploited; (4) a process of natural adaptation and acclimatization and the use of drugs will enable man to live easier and function better in a space-flight environment; and (5) the temperature range during orbiting and re-entry are estimated to be well within long term comfortable and short term livable limits. It is considered desirable to have the subject oriented in such a way that, during the orbital phase of the flight, he is facing toward the direction of flight with his feet toward the earth. Although a small capsule would be more advantageous, available data indicate that, since husky, hardy crewmen would be preferred,

larger space would be required. Biological instrumentation should yield the following information: cabin humidity, acceleration, tracking and reasoning ability, galvanic skin response, visual appearance, cabin pressure, oxygen and power reserves, electrocardiogram, respiration rate, visual appearance, and vocal comments. Monitoring devices to allow the pilot to have continuous knowledge of his performance and two-way vocal and visual communication will have a great deal of psychological usefulness.

1,694

Flickinger, D.D. 1961 THE STATUS OF MAN'S ADVANCE ON THE VERTICAL FRONTIER.
Lectures in Aerospace Medicine 16-20 January 1961, School of Aviation
Medicine, Brooks AFB, Texas

1,695

Flickinger, D. 1962 RECENT PROGRESS AND FUTURE PROBLEMS IN SPACE BIO-
MEDICINE
In Antonio Ambrosini, Ed. RENDICONTI DEL CONGRESSO INTERNAZIONALE--
L'UOMO E LA TECNICA NELL'ERA NUCLEARE E SPAZIALE, 18-21 APRILE 1962,
(Proceedings of the International Congress--Man and Technology in the
Nuclear and Space Age, 40th Trade Fair, Milan, April, 18-21, 1962)
(Rome, Italy: Associazione Internazionale Uomo nello Spazio)
Pp. 441-451

ABSTRACT: The principal problems which accompany manned space-flight are reviewed. The results of all space biomedical investigations obtained to date are presented and related to future progress in the biomedical field. To achieve this purpose the following are presented: (1) a brief clarification of terms such as space biosciences, space biomedicine, and space biotechnology; (2) a recapitulation of critical biomedical problems; (3) a review of biomedical requirements, both scientific and technological, which are critical to future programs; (5) a discussion of international space biomedical program possibilities. (N63-18936)

1,696

Flight Development Establishment n.d. INSTRUCTIONS FOR OPERATING AND MAINTAINING
THE NAPIER 100 g CENTRIFUGE (Flight Development Establishment, D. Napier &
Son Limited, Luton Airport, Bedfordshire, England) ASTIA AD 40785

ABSTRACT: In the design of conventional vehicles, forces due to accelerations are normally taken into consideration to ensure that they do not damage structures or prevent the moving parts from working correctly. Hitherto, most of these forces have arisen from linear acceleration and these have been conveniently

investigated by the use of established forms of test equipment and recording instruments. With the attainment of higher speeds, however, maneuverability requirements introduce the additional factor of high angular accelerations which impose additional radial loadings on the structures and mechanisms. The design and construction of parts to withstand these forces cannot be developed conveniently with conventional equipment, but the centrifuge permits the imposition of angular acceleration under laboratory conditions, and thus enables the testing of equipment under these new conditions to continue without excessive complication or cost. The centrifuge is capable of generating forces of unusual magnitude, and it will be found that time and effort can often be saved, if the design and operating data are fully understood, before the design of any test rig for attachment to the centrifuge arm is put in hand. This publication contains detailed information on the centrifuge including dimensions, counterweights, accelerations, test rig limitations, and auxiliary services and equipment.

1,697

Flight Research Engineering Corp. 1949 ACCELEROMETERS FOR TRANSPORT AIRCRAFT.
(Flight Research Engineering Corp.) 11 March 1949

1,698

Flight Safety Foundation ACCELERATION
Human Engineering Bulletin 55-5 H

1,699

Flinn, D. E. 1960 PSYCHIATRIC FACTORS IN ASTRONAUT SELECTION.
(Paper presented at the Symposium on Psychophysiological Aspects of Space Flight, School of Aviation Medicine, Aerospace Medical Center, Brooks AFB Texas, May 1960).

1,700

Flugge, W. 1952 LANDING-GEAR IMPACT
(National Advisory Committee for Aeronautics, Washington, D.C.)
NACA TN-2743, Oct. 1952.

1,701

Flying Personnel Research Committee n.d. PROPOSAL SCHEME FOR THE TRAINING, ETC., OF AIRCREWS AND MEDICAL OFFICERS ON THE EFFECTS OF ACCELERATION. (Flying Personnel Research Committee, Royal Australian Air Force)
RAAF FR53

1,702

Flying Personnel Research Committee 1940 AIRSICKNESS: AIR MINISTRY DISCUSSION: DATA ON 53 CASES ATTACHED. (Flying Personnel Research Committee, Farnborough) FPRC Rept. No. 220, 23 November 1940.

1,703

Flying Personnel Research Committee 1941 MINUTES OF THE IV MEETINGS OF THE R.A.A.F. FLYING PERSONNEL RESEARCH COMMITTEE. (Flying Personnel Research Committee, Farnborough) FPRC Rept. 358f (WAM-101-5) 6 Nov. 1941.

1,704

Flying Personnel Research Committee 1941 SYNOPSIS OF PHYSIOLOGY OF HIGH ALTITUDE FLYING. (Flying Personnel Research Committee, Farnborough) FPRC Rept. 305, June 1941.

1,705

Flying Personnel Research Committee 1942 REPORT NO. 2 ON "BLACKOUT" WORK AT SYDNEY UNIVERSITY. (Flying Personnel Research Committee, Farnborough) FPRC Rept No 358-j

1,706

Flying Personnel Research Committee 1942 BLACKING-OUT RESEARCH AT SYDNEY UNIVERSITY DURING 1941. (Flying Personnel Research Committee, Farnborough) FPRC Rept. 358h/ WAM-101-7, 8 Jan. 1942.

1,707

Flying Personnel Research Committee 1943 BULLETIN OF SUB-COMMITTEE ON ACCELERATION (NRC) EXCERPTS. DEVELOPMENT AND USE OF HUMAN CENTRIFUGE: EQUIPMENT AND COST. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF-FR49, 15 June 1943.

1,708

Flying Personnel Research Committee 1943 TRAINING AND SELECTION OF AIRCREW FOR SPECIAL DUTIES, ON THE EFFECTS OF HIGH "G" AND THE USE OF C.A.A.G. SUIT. (Flying Personnel Research Committee, Royal Australian Air Force) R.A.A.F-FR49. 15 June 1943.

1,709

Flying Personnel Research Committee 1943 COMPARISON OF SIDNEY AND AMERICAN CENTRIFUGES. (Flying Personnel Research Committee, Royal Australian Air Force) RAAF-FR 51. 17 July 1943.

1,710

Flynn, J.T. 1961 PROTECTION AGAINST CRASH INJURY
Flying, Sept. 1961. Pp. 47 & 77-78.

ABSTRACT: The author claims that even severe impact can be survived with proper safety gear and aircraft design. A detailed report of the effectiveness of the seat belt and harness is given with instructions on how they should be used.

1,711

Fogarty, L.E. & R.M. Howe 1961 FLIGHT SIMULATION OF ORBITAL AND REENTRY VEHICLES. PART II -- A MODIFIED FLIGHT PATH AXIS SYSTEM FOR SOLVING THE SIX DEGREE-OF-FREEDOM FLIGHT EQUATIONS. (Aeronautical Systems Div., Wright-Patterson AFB, Ohio) Oct. 1961. ASTIA AD 269 283.

ABSTRACT: The three translational and three rotational equilibrium equations for an orbital vehicle subject to aerodynamic and jet reaction forces are derived using a modified flight-path axis system for the translational equations. The dependent variables of the system are horizontal velocity component, vertical velocity component, and flight-path heading angle. The resulting equations are shown to have advantages for computer mechanization over alternative axis systems for the translational equations. Complete equations for determining vehicle orientation, instantaneous latitude and longitude, angle of attack, angle of sideslip, aerodynamic forces and moments, etc., are presented. Modifications in the translational equations which allow direct solution by an analog computer are also given. Analog computer mechanization of these equations in both real and fast time is described, including a novel technique for division which preserves favorable multiplier scaling. Specific machine results are presented which demonstrate accurate solution of close-satellite trajectories, including re-entry from satellite altitudes to sea level.

1,712

Foltz, E.L., F.L. Jenker and A.A. Ward 1953 EXPERIMENTAL CEREBRAL CONCUSSION.
J. Neurosurgery, 10:342-352

ABSTRACT: Acceleration concussion was studied in cats and monkeys with continuous recording of the electrical activity of cortex and certain brain stem structures, spinal fluid and blood pressures, and EKG respirations.

1,713

Foltz, E. L., R. P. Schmidt, L. B. Thomas, & A. A. Ward, Jr. 1957 STUDIES
ON THE PHYSIOLOGIC BASIS OF CEREBRAL CONCUSSION. (School of Aviation Medicine, Randolph AFB, Texas) Rept. No. 55-111; ASTIA AD-136 186

ABSTRACT: This report deals with the following restricted aspects of the problem: Changes in the central nervous system function induced by concussion; and the role of actylcholine metabolism in concussion and pharmacologic factors involved in therapy.

1,714

Ford, A. & J. L. Leonard 1958 TECHNIQUES FOR RECORDING SURFACE
BIOELECTRIC DIRECT CURRENTS
(USN Electronics Lab., San Diego, Calif.)
NEL Res. Rep. 839, May 1958.

ABSTRACT: This paper describes the techniques for recording surface bioelectric d.c. which have been adopted at the USN Electronics Laboratory. Some of the numerous uses for d.c. recording are indicated, e.g., EMG, EEG, EKG, as well as the problem of d.c. artifacts and bioelectric overlap. General principles for avoiding electrode artifacts, use of chlorided silver, and the detailed mechanics of electrode preparation are discussed, along with preparation of skin, methods of electrode placement, and effects of electrode area. Finally, the proper instrumentation for use with such electrodes is described. (Tufts)

1,715

Foreign Documents Div. 1963 BIOLOGY AND MEDICINE.
(Foreign Documents Div., Central Intelligence Agency, Washington, D.C.)
Scientific information, rept. Summary no. 4310, ASTIA AD 334 612,

ABSTRACT: This is a serialized report consisting of unevaluated information prepared as abstracts summaries, and translations from recent publications of the Sino-Soviet Bloc countries. (Author)

1,716

Foreign Tech. Div. 1961 AT SUPERSONIC VELOCITY
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson, Air Force Base, Ohio)
Trans. no. FTD-TT-61-203 . From Sovetskaya Litva, Pp. 3, 28 July 1961.
ASTIA AD 268 072

ABSTRACT: New types of ejection seats were developed in recent years. Instead of pyrotechnic cartridges, they use rocket engines. The most perfect samples allow ejections at velocities up to 24000 km/hr. Developed also were the first samples of special safety capsules. They are like small cabins formed by extensive walls. Such a capsule closes automatically and becomes hermetically sealed prior to catapulting, offering protection against counter stream of air, and safe landing. In addition, it serves as a container for rescue devices (parachutes, emergency supply, oxygen equipment etc.) and as a rescue raft in case of falling into the water. (Author)

1,717

Foreign Tech. Div. 1962 SCIENCE AND LIFE (SELECTED ARTICLES)
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. no. FTD-TT-62-1518 from Nauka i Zhizn, 9:2-10, 15-19 and 54-60.
ASTIA AD 294 530

1,718

Foreign Tech. Division 1963 DROPPING THE CARGO WITHOUT A PARACHUTE.
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. No. FTD-TT-62-1842 from Przeglad Techniczny, 14:2, 1962.
ASTIA AD 400 530.

1,719

Formelmer, F.J., & R.H. Seltz 1963 EFFECTS OF LOW ALTITUDE HIGH SPEED
FLYING UPON PILOT PERFORMANCE. (Paper, 34th Annual Meeting of the
Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif.,
April 28-May 2, 1963)

ABSTRACT: This study was conducted to determine the quantitative deterioration of human performance as a result of stress provoking airplane flights. Five Navy test pilots performed various tasks during 32 flights in a jet airplane at high speeds and low altitude. A bioelectric package from the NASA Ames Laboratory was used to monitor the ECG, blood pressure, respiratory rate and volume of the pilot during flight. Twelve airplane parameters were also recorded on the same magnetic tape to measure the effect of turbulence upon pilot performance. Pre- and post-flight blood and urine samples were collected for biochemical analysis. Since the most significant physiological change noted was a reduction in respiratory tidal volume during the latter portion of some flights, the respiratory response of each subject was analyzed by an analogue computer. This was a routine effect not limited to flights during which subjective fatigue was reported. Some blood serum enzyme changes have also been noted. There was a very appreciable degradation of pilot performance with high levels of turbulence. An integration of all this information has been attempted and should prove valuable in predicting man's ability to control supersonic airplanes and spacecraft. (Aerospace Medicine 34(3):260, March 1963)

1,720

Fortunato, A. 1941 FISIO-PATOLOGIA DELLA "PICCHIATA". (Physiopathology of
Dive Bombing) Rinascenza medica (Napoli), 18:91-92, Feb. 28, 1941.

ABSTRACT: Acceleration from the head to the feet may cause cerebral anemia with blackout. Acceleration from feet to the head may cause cerebral congestion, resulting in the pilot seeing red. Methods of counteracting the effects of acceleration are described.

1,721

Forster, B. 1958 ELECTRONYSTAGMOGRAPHIC STUDIES ON ROTARY ACCELERATION
NYSTAGMUS AFTER ALCOHOL ADMINISTRATION.
Deutsch. Z. Ges. Gerichtl. Med. (Berlin) 47(2):282-288.

1,722

Fowler, E. P., Jr. 1947 FORMATION VERTIGO. OCULO-VESTIBULAR DISORIENTATION IN FORMATION FLYING. Milit. Surg. 100:330-335.

ABSTRACT: Several things could be done to reduce the death rate from formation vertigo. (1) Instrument panels, especially the flight instruments, should be in standard positions and never obscured by other objects. It should never be necessary to duck the head to see the artificial horizon or the needle and ball. (2) the phenomenon should be explained to all pilots in detail for even ace pilots have suffered from the conditions when returning from a long and fatiguing mission. The practical points to remember are (a) keep orientation by glancing at one's own instruments (b) never fix on a single point on the lead plane, (c) lead planes should make all movements as gradual as possible, (d) fly tight enough formation in fog and overcast so that the lead plane can be easily seen, (e) possibly turn on the landing lights or have extra orange lights on the fuselage of the plane so they can be seen further, (f) last but not least, try to give the pilots some training in fog flying in training planes before sending them to a fog bound theater of operation.

1,723

Francois, M., I. Meyerson and H. Pieron 1925 DU TEMPS DE LATENCE DES REACTIONS D'EQUILIBRATION AUX BRUSQUES ACCELERATIONS LONGITUDINALES (Latency Reaction Time of Equilibration to Sudden Longitudinal Acceleration) C.r. Acad. Sci. (Paris) 181:1181-1183

1,724

Franke, E. K. 1948 MEASUREMENT OF THE MECHANICAL IMPEDANCE OF THE BODY SURFACE (Air Development Center, Wright-Patterson AFB, Ohio) MCREXD No. 695-71 C, June 1948

1,725

Franke, E. K. 1951 MECHANICAL IMPEDANCE OF THE SURFACE OF THE HUMAN BODY Journal of Applied Physiology 3:582-590, April 1951

1,726

Frankel, C. 1958 THIRD GREAT REVOLUTION OF MANKIND.
New York Times Mag., Feb. 9, 1958. P. 11

ABSTRACT: How and why the satellites symbolize a new "age of acceleration."

1,727

Frankenhaeuser, M. 1956 EFFEKTER AV RADIALACCELERATION PA PSYKISKA FUNKTIONER
(Effects of Radial Accelerations on the Psychic Functions)
Meddelanden fran flyg-och navalmedicinska namnden (Stockholm) 5(1):20-23

ABSTRACT: Time perception under acceleration was investigated on the human centrifuge. The stimuli used were auditory signals (1, 5, 10, 15, and 20 sec.) recorded on a magnetic tape and presented via earphones. The subject reproduced either the entire or half of the duration of stimulus (1) under normal conditions before acceleration, (2) during acceleration at 3 g, and (3) under normal conditions after the acceleration. The stimulus signal was underestimated to a greater extent during acceleration, the difference being statistically significant and the 1% level of confidence at the 10, 15, and 20-sec. stimulus durations. (ASTIA)

1,728

Frankenhaeuser, F. M. 1957 EFFECTS OF PROLONGED RADIAL ACCELERATION ON
PERFORMANCE. (Psychological Lab. of the Univ. of Stockholm) Rept. No. 48.,
Aug. 1957.

ABSTRACT: Effects of prolonged radial acceleration on performance were studied in eight series of experiments: (1) Visual choice reaction time, (2) Visual acuity, (3) Accuracy of movement, (4) Perceptual speed, (5) The Stroop Test, (6) The "100-3" test, (7) Multiplication and (8) Time perception.

Results obtained during 2 to 10 minute exposures to 3 g and under normal conditions before and after centrifugation, were compared. During radial acceleration performance was impaired in all but one of the tests used. (DACO)

1,729

Frankenhaeuser, M. 1957 EFFECTS OF GRAVITATIONAL STRESS ON TIME PERCEPTION
(Psychological Lab., University of Stockholm, Sweden) Rept. No. 52,
Oct. 1957.

ABSTRACT: The psychophysical method of ration setting was applied to the problem of time perception as affected by gravitational stress in a human

centrifuge. Auditory signals of durations varying from 1 to 20 seconds were used as a stimuli. It was shown that the positively accelerated function relating subjective to physical time under normal conditions, was more pronounced during exposures to 3 g. Possible reasons are discussed.

1,730

Frankenhaeuser, M. 1958 EFFECTS OF PROLONGED GRAVITATIONAL STRESS ON PERFORMANCE. Acta Psychol. (Amsterdam) 14(2):92-108, 1958
See also Nordisk Psykol. 10:48-64, 1958

ABSTRACT: Effects of prolonged radial acceleration on performance were studied by determining visual-choice reaction time, visual acuity, accuracy of movement, time perception, and perceptual speed. In addition, the following tests were carried out: (1) the Stroop test, estimating reading speed and color detection as well as reactions to self-induced stress; (2) the 100-3 test, measuring concentration ability; and (3) the multiplication test. Results obtained during 2- to 10-minute exposures to 3 G and under normal conditions before and after centrifugation were compared. During radial acceleration, performance was impaired in all of the tests with the exception of the test on perceptual speed. (AUTHOR)

1,731

Frankenhaeuser, M. 1960 SUBJECTIVE TIME AS AFFECTED BY GRAVITATIONAL STRESS. Scand. J. Psychol. (Stockholm) 1(1):1-6

ABSTRACT: Subjective time as affected by positive radial acceleration (from four to ten minutes at 3 g) in a human centrifuge was studied in seven subjects by a modification of the method of ratio production. The subjects were tested under three experimental conditions: (1) during normal conditions before the centrifuge experiments, (2) during exposure to three g, and (3) during normal conditions after the series of centrifuge experiments had been completed. Auditory signals of different durations (1.0, 5.0, 10.0, 15.0, and 20.0 seconds) were used as stimuli and subjects were asked to perform two different tasks: (1) to reproduce the entire duration, and (2) to reproduce half the duration of the stimulus signal. The results showed a marked change in subjective time during gravitational stress. Subjective time, as measured by the methods employed, was a positively accelerated function of objective time and the positive acceleration was enhanced during centrifugation. The demonstrated change in time experience was caused by a difference in retention of preceding time intervals, retention being impaired during centrifugation. (AUTHOR)

1,732

Frankenhaeuser, M., K. Sterky, and G. Jaerpe 1962 PSYCHOPHYSIOLOGICAL RELATIONS
IN HABITUATION TO GRAVITATIONAL STRESS
Perceptual and Motor Skills, 15 (1): 63-72. Aug. 1962

ABSTRACT: Habituation to acceleration in a human centrifuge was studied with four healthy individuals, observing changes in the subjective reactions and several physiological indices (heart rate, urinary adrenalin and nonadrenalin excretion). Positive acceleration below the threshold for loss of consciousness was applied. Subjective reactions were estimated on a ratio estimation scale using as a baseline each subject's most stressful experience. The results showed that upon consecutive exposures there was a progressive decrease in adrenalin excretion and subjective emotional reaction to gravitational stress. The intensity of the subjective reactions was almost proportional to the amount of adrenalin excreted. There were no systematic changes in noradrenalin excretion or heart rate.

1,733

Frankford Arsenal 1946 INTERNAL VIBRATIONS EXCITED IN THE OPERATION OF PERSONNEL EMERGENCY ESCAPE CATAPULTS. (Frankford Arsenal, Philadelphia, Pa.)
Memo Rept. MR-340; 26 Nov. 1946; ASTIA AD-51 792

ABSTRACT: Studies of the catapults, T2 and T4, emergency escape personnel, show that the accelerations transmitted throughout the body by the catapult differ in magnitude and phase from the acceleration applied to the center of gravity of the system. Typical acceleration measurements on dummy and human subjects are shown. Comparisons of these records with independent measurements of pressure-time in the catapult and with travel-time data show that strong internal vibrations of the several massive components of the ejected system are superimposed upon the motion of its center of gravity. As a consequence of these vibratory components, the internal elastic stresses in the body, depending on the phase of the vibration, at their peaks will exceed the values which would be required for the acceleration of an equivalent rigid body to the required terminal velocity under action of the same applied forces. Since the estimated safe limit for these elastic stresses is not very high compared to the stress level to obtain the required center of gravity acceleration, the excitation of such internal vibratory motion imposes a distinct limitation in the application of the catapult to personnel escape.

1,734

Frankford Arsenal 1953 FACILITIES OF THE ACCELERATION TEST LABORATORY BUILDING
(Frankford Arsenal, Philadelphia, Pa.) ASTIA AD-34 196

ABSTRACT: A description is given of the following equipment or facilities: (1) the high-g air gun, a modified 5-in. Naval weapon used to simulate the shock of a field weapon under laboratory conditions; (2) the drop test tower, facilities

for control arming or safety drop for various types of mechanical and electromechanical time fuzes; (3) the air-leakage test fixture, a device used for evaluation primarily of development fuzes with regard to resistance to water and air leakage; (4) the water-leakage test fixture; (5) the low-g centrifuge, a device used for testing acceleration and timing mechanisms up to 80 g; (6) the Tenney engineering temperature-humidity controlled chamber, a device used for testing artillery ammunition components under severe weather conditions; (7) the L. A. B. vibration tester, a device designed for vibration frequencies up to 4000 c/min; (8) the MB vibration tester; (9) the Parke-Thompson air-driven spinner; (10) equipment for the impregnation of sintered-iron rotating bands; (11) Atlas twin-arc weatherometer; (12) miscellaneous mechanical test devices; (13) a frequency standard unit; and (14) miscellaneous electronic equipment.

1,735

Frankl, V.E. & O. Potzl 1952 UBER DIE SEELISCHEN ZUSTANDE WAHREND DES ABSTURZES: EINE PSYCHOPHYSIOLOGISCHE STUDIE. (ON MENTAL CONDITIONS DURING FREE FALL: A PSYCHOPHYSIOLOGICAL STUDY.
Monatschrift fur Psychiatrie und Neurologie (Basel) 123(6):362-374

ABSTRACT: Psychological and pathophysiological aspects of free falling are illustrated by two examples (a worker falling from a scaffold and a mountain climber). These experiences manifest themselves as a continuous sequence of memory images arranged in order of their happening, from the earliest childhood up to the present.

1,736

Frankland, J. 1942 EFFECTS OF IMPACT ON SIMPLE ELASTIC STRUCTURES.
(United States Navy) Rept. No. 48, Project Meteor 653.1
April 1, 1942. ASTIA AD 40833.

ABSTRACT: Elementary terms and factors concerned in the problem of impact loading are defined and a number of representative cases of impact loading and their effects upon a simple undamped system with one degree of freedom are discussed in Section 2. For non-oscillating disturbances these effects are governed mainly by the abruptness of original application and by the duration of the disturbance in terms of the natural period of vibration of the system. For oscillating disturbances there is an added influence similar to resonance in the steady-state condition. Section 3 presents some means of judging to what degree the behavior of the idealized system of Section 2 is realized among actual ship and other structures. Applications of the foregoing to the strength of structures under impact are considered in Section 4, with a discussion of the variations in yield and ultimate strength of metals under high rates of loading. Suggestions are made for a basis of design of decks, superstructure, and gun foundations under blast and gun-recoil loads.

The application of these principles to the design of instruments for making observations during impact tests and to an interpretation of their records is considered briefly in Section 5. In the appendices a formal mathematical treatment of the subject is presented.

1,737

Franklin, George C. 1956 REPORT ON HUMAN CENTRIFUGE TEST.
(Convair, A division of General Dynamics Corp., San Diego, Calif.)
Rept. No. ZG-8-033, 29 Oct. 1956

1,738

Franklin Institute 1958 TEN STEPS INTO SPACE
(Franklin Institute) Monograph No. 6

ABSTRACT: Ten semitechnical lectures on astronautics were delivered in the period March-May 1958 under the sponsorship of the Franklin Institute:

"The Long History of Space Travel," W. Ley; "The Rocket and the Reaction Principle", K. Stehling; "Rocket Fuels-Liquid and Solid," H.W. Ritchey; "Satellite Instrumentation-Results for the IGY," S.F. Singer; "Celestial Mechanics-Orbits of the Satellites," P. Herget; "The Explorer," G. Heller; "Error Analysis of Single and Two-Force Field Spacecraft Orbits," K.A. Ehricke; "Probing the Atmospheres of Venus and Mars," J.I.F. King; "Space Medicine-The Human Body into Atmospheres of Venus and Mars," D.G. Simons; "Satellites and Travel in the Future," I.M. Levitt.

1,739

Franklin Institute 1959 SPACE MEDICINE ELECTRONICS.
(A Symposium, Franklin Inst., Philadelphia, Pa., 18 May 1959)

CONTENTS INCLUDE:

Fisher, C.F. and F.T. Nicholson, ACCELERATION SIMULATIONS ON THE HUMAN CENTRIFUGE.

Brown, J. L., SIMULATOR STUDIES OF THE EFFECTS OF FLIGHT ACCELERATION ON PILOT PERFORMANCE.

1,740

Franks, W.R. 1939 FURTHER EXPERIMENTS IN CONNECTION WITH AVIATION
MEDICAL RESEARCH. (National Research Council, Canada) Report #C-2827
September 1939

ABSTRACT: Experiments are suggested on combating the effects of maneuvering in space at high speeds. Problems arising from rapid ascent, problems arising from anoxia, and provisional expenses for the program of research are outlined.

1,741

Franks, W.R. 1940 PROGRESS REPORT ON WORK TO PROTECT PERSONNEL AGAINST THE PRESSURE EFFECTS OF ACCELERATION. (National Research Council, Canada) Report #C-2828, March 1940

ABSTRACT: The physical principles of accelerative forces are reviewed, the design of a hydrostatic suit for the amelioration of the effects of accelerative forces is outlined and progress in construction of such a suit is described and progress in the design of human centrifuge is reviewed.

1,742

Franks, W.R. 1941 REPORT OF ACTIVITIES AT PHYSIOLOGICAL LABORATORY, R.A.E. FARNBOROUGH.
(National Research Council, Canada) Report #C-2836; July 7, 1941

ABSTRACT: Demonstration by flight tests of the effectiveness of methods developed in Canada to raise the G tolerance of personnel, demonstration by flight that this does not interfere with proper handling of aircraft in all fighter maneuvers, demonstration by dog flights that pilots so protected have an increased maneuverability with resultant tactical advantage, and demonstration that gunners so protected have a G tolerance above that of the aircraft despite their unfavourable position are reported. An aircraftsman of the R.A.F. has been instructed in the principles and methods in fabrication of the appliance used. Modification of the appliance to simplify its design, make more practical and allow for combination with life preserver jackets and high altitude pressure suits is in progress.

1,743

Franks, W.R. 1941 MEMORANDUM-CANADIAN AVIATION MEDICAL RESEARCH.
(National Research Council, Canada) Report #C-2841, 15 Oct. 1941.

1,744

Franks, W.R. 1943 RECENT WORK OF THE ACCELERATOR UNIT AT TORONTO.
(National Research Council, Canada) Report #C-2919, October 1943

ABSTRACT: A progress report is made of research work conducted in the human centrifuge with particular reference to unconsciousness due to acceleration, posture and acceleration, effect of acceleration on reaction time, preliminary studies of negative accelerations, modifications of the Franks Flying Suit, protection with the Franks Flying Suit and preparation of film on F.F.S. for flying personnel.

1,745

Franks, W.R. 1943 REPORT ON THE WORK CARRIED OUT DURING 1942 AT THE
ACCELERATION SECTION NO. 1 I.T.S.
(National Research Council, Canada) Rept No. C-2441. Feb. 1943.

1,746

Franks, W.R. & W.R. Martin 1944 LIAISON REPORT ON MEETING OF SUBCOMMITTEE
ON ACCELERATION OF THE NATIONAL RESEARCH COUNCIL, WASHINGTON, JUNE 7, 1944.
(National Research Council, Canada) Report #C-2711

ABSTRACT: This liaison report covers discussion on American experience with
Anti-G equipment in the Pacific and the European theatres of war. The recent
designs of Anti-G suits, accelerations on parachute openings, blood pressure
changes produced by a negative G tilt-table and standardization of centrifuge
runs.

1,747

Franks, W. R. 1944 ACCELERATION. (Committee on Aviation Medicine, N.R.C.,
Washington) Bull. Sub. Com., 7 June 1944.

1,748

Franks, W.R. 1944 PROPOSED USE OF FLUID PRESSURE BANDAGING IN THE
PROPHYLAXIS AND TREATMENT OF SHOCK.
Proc. Comm. Shock and Blood Subst., (National Research Council of Canada,
Toronto). Appendix A. 28 July 1944.

1,749

Franks, W.R. 1944 LIAISON REPORT TO ACAMR, N.R.C., CANADA, ON VISIT
COMMANDER W.R. FRANKS TO THE UNITED KINGDOM DECEMBER 1 TO DECEMBER 22, 1944.
(National Research Council, Canada) Report #C-2799

ABSTRACT: A brief report is made of operational problems in aviation medicine
overseas, with particular respect to the status of the Franks' flying suits,
crash harnesses, cooling of ground crew in the tropics, special breathing
apparatus, oxygen film, operational problems in the Canadian squadrons, and
treatment of shock.

1,750

Franks, W. R., J. A. Carr, W. R. Martin & W. A. Kennedy 1944 USE OF INCREASE IN WEIGHT OF A MASS UNDER G TO PROVIDE SOURCE OF COMPRESSED AIR FOR F.F.S. (AB/BG SYSTEM).

(National Research Council, Canada) Rept. No. C-2722, Sept. 28, 1944.

ABSTRACT: The possibility of providing a suitable air pressure to actuate the F.F.S., under G resulting from the compression of an air bag by the increase in weight of mass under G has been explored and a prototype unit constructed using the standard aircraft battery as the mass. The system has been designated the AB/BG system. By superimposing the air pressure so obtained on the water pressure in the fluid lining of Mark III F.F.S., increased average protection against G was obtained. Mark III F.F.S. alone gave 1.8 G protection, combined with AB/BG 2.5 G was obtained. With the present unit equal protection was obtained when the Mark III F.F.S. was left empty of water about the trunk and the air pressure superimposed. The present unit was too small to fully explore the limits of protection obtained by such a system using air alone as the fluid in the Mark III F.F.S.

1,751

Franks, W. R., W. K. Kerr, & B. Rose 1945 SOME NEUROLOGICAL SIGNS AND SYMPTOMS PRODUCED BY CENTRIFUGAL FORCE IN MAN. (R.C.A.F., Toronto)

ABSTRACT: The neurological effects of centrifugal force in man were studied in 542 subjects during 5544 test runs at 2-10 G in the centrifuge. As a measure of performance during exposure to centrifugal force, the reaction time for manual responses to visual and auditory stimuli was recorded for 7853 stimuli during 626 tests at 2-8 G on 35 subjects, but it was not significantly increased, except for visual stimuli immediately before black-out.

As a result of exposure to increased G, however, convulsions frequently occurred, usually after loss of consciousness. (52% of 230 subjects had convulsions in 40% of 591 tests producing unconsciousness.) They were usually slight, clonic seizure involving all or some of the extremities, face and trunk. Less commonly, severe generalized convulsions were observed. These varied greatly and sometimes included a brief tonic state with neck and trunk in extension, occasionally with arms extended in pronation and legs drawn up in flexion. Conjugate movements of head and eyes to one side were sometimes observed. Usually violent jerks of the extremities and trunk terminated the seizure in 2-5 sec. Finally, a small number of slight convulsions were noted in fully conscious subjects. Dreams were frequently experienced, usually in association with convulsions. Paresthesias, confused states, amnesia and more rarely, gustatory sensations were noted with black-out and loss of consciousness, either with or without convulsions. Incontinence was never observed.

(The susceptibility to convulsions varied greatly and could not be correlated with any of the measured characteristics of resting electroencephalograms, which were normal for 51 subjects. Records of facial blanching and flushing, ear opacity and electrocardiograms showed that convulsions started during the recovery phase of the circulatory changes.)

Electroencephalograms taken from bipolar leads over the motor area of the cortex, during increased G, showed that alpha waves were replaced by high frequency, low-amplitude waves, in fully conscious subjects. With deep black-out and onset of unconsciousness, progressively slower waves (8-2 per sec.) of higher amplitude (50-200 μ V.) usually appeared and remained until shortly before consciousness was regained. This pattern was not altered by convulsions. Considering the small difference in specific gravities of cerebrospinal fluid and brain tissue and their anatomical dispositions, it is unlikely that the neurological effects described in this paper are due to any mechanical action of increased positive G on the brain other than diminished cerebral circulation. (J. of Physiology 104:10P-11P, 10 Feb. 1945)

1,752

Franks, W. R., W. K. Kerr, & B. Rose 1945 SOME EFFECTS OF CENTRIFUGAL FORCE
ON THE CARDIO-VASCULAR SYSTEM IN MAN. (R.C.A.F., Toronto)

ABSTRACT: By means of the centrifuge, the effects of increased positive G on the cardiovascular system were studied on seventy-two subjects during 690 tests at 2-10 G. Kodachrome motion pictures showed, as increased G was applied, blanching of the face and distension of the superficial leg veins which persisted until a few seconds after the G began to diminish. The leg veins then reverted to normal, but the facial blanching was followed by flushing which lasted 10-20 sec. The ear opacity (a qualitative measure of the blood content of the ear) began to decrease with the onset of increased G, reaching a minimum 4-6 sec. after G became constant. 0.5-3 sec. after the G began to decrease, the ear opacity rapidly increased. The increase continued above the initial level, coincident with the facial flushing. The decrease in ear opacity was directly but not quantitatively related to the amount of G applied. The heart rate increased rapidly with the onset of increased G, attaining a maximum of 120-190 beats/min., depending upon the amount of G and its duration. When the maximum G was maintained more than 10-20 sec., the maximum heart rate was relatively constant until the G was reduced. With the reduction of G in short runs there was a delay of 2-5 sec. before the heart rate suddenly fell to below its initial resting level. This bradycardia coincided with the flushing and increased ear opacity, and was frequently followed by a secondary rise in rate. Electrocardiograms from chest electrodes over base and apex of the heart showed the following changes during increased G. The P. R. Interval was shortened. The overall amplitude of the Q. R. S. complex decreased, usually with the main deflexion downward. The T wave flattened and sometimes disappeared. As the G was reduced, the P. R. interval and Q. R. S. complex reverted to their original form, but the T wave became greatly increased in amplitude and sometimes biphasic for 2-5 min. During this period sinus arrhythmia and, more rarely, ventricular extrasystoles appeared. Anterior-posterior X-ray films of the chest (1sec. exposure) taken during increased G showed a marked reduction in cardiac shadow as compared to that of control films. The circulatory changes described in this paper could not be related to the level of G at which a subject would black-out or lose consciousness. However, the pooling of the blood in the lower extremities, reduction in cardiac shadow, facial blanching, decrease in ear opacity and associated changes in heart rate appear to be dependent variables and throw some light on the action of increased positive G on man. (J. of Physiology 104:9P-10P, 10 Feb. 1945)

1,753

Franks, W.R. 1945 ACCELERATION STUDIES.
Proc. Assoc. Comm. Aviation Med. Research,
(National Research Council of Canada) Appendix C. 4 April 1945.

1,754

Franks, W.R. 1945 REPORT ON GRANT A.M. 5 ACCELERATION STUDIES.
(National Research Council, Canada) Report #C-2798, 5 April 1945

ABSTRACT: A brief review is made of progress in research work on acceleration during the previous year.

1,755

Franks, W. R., W. K. Kerr, & B. Rose 1945 DESCRIPTION OF A CENTRIFUGE AND ITS USE FOR STUDYING THE EFFECTS OF CENTRIFUGAL FORCE ON MAN. (R.C.A.F., Toronto)

ABSTRACT: In order to investigate the effects of centrifugal force on man, a centrifuge was constructed for the R.C.A.F. It is built into a circular concrete pit 12 ft. in depth and 31.5 ft. in diameter. To the central shaft which is supported above and below, a single, highly stressed horizontal arm, 8.5 ft. in length, is attached. The car which carries the subject and up to 200 lb. of apparatus has an inside diameter of 6 ft. 2 in. and is suspended from the distal end of the horizontal rotating arm. The centrifuge is stressed to support 15 times the weight exerted by a fully ladden car at 10 G. (1 G equals the force due to the pull of gravity. Centrifugal force is measured in unit of G.) The suspension of the car allows it to assume at all times a position which is in the direction of the resultant of the forces acting upon it. The subject sits in a chair equipped with a dummy control stick, and rudder bars which can be adjusted for height and length. Within the car, the chair can be rotated around its transverse axis even when the centrifuge is in motion. Thus the centrifugal force can be exerted from head to foot (positive G), foot to head (negative G), transversely (transverse G) or in any intermediate direction. During a run, with the subject seated in the upright position, the radius is 11.5 ft. from the central rotating shaft to heart level and usually 13.8 ft. to foot level. The G exerted at foot level is therefore 20% greater than the recorded G at heart level. The centrifuge is driven by an electronically controlled 200 h.p. electric motor and is capable of developing 20 G in 3 sec. The magnitude of G and its duration for a given run is predetermined by an automatic cam mechanism. For a standard run, it takes 4.5 sec. to attain 1.5 G, and 5 sec. to attain any maximum desired G. When this has been maintained for 5 sec., the run is terminated by reversing the above procedure. This pattern can be varied by using appropriate cams. Runs are designated as follows. A '6 G run for 5 sec.' implies that 6 G was exerted at heart level for a duration of 5 sec.

The subject is in constant view of an observer who rides on a seat fixed to the central shaft. Electrocardiograms, electroencephalograms, ear opacity tracings and respiratory tracings are all recorded simultaneously with the visual and auditory signals given to the subject, his responses, signals indicating grey-out, black-out, loss of consciousness, the amount of G and the time in seconds, by ink-writing pens on moving paper. Ciné films and X-rays of the subject can be taken during operation.

(J. of Physiology 104:8P-9P, 10 Feb. 1945)

1,756

Franks, W.R. Sept. 1959 SOME RECENT DEFINITIONS OF THE ACCELERATION
PROBLEM. (15th Meeting, AGARD-NATO Aeromedical Panel, Aachen, Germany,
21-26 September, 1959.) pp. 1-10.

ABSTRACT: The acceleration acting on a body is the resultant, of attraction between itself and other masses in the universe, and of change in direction and of speed of its velocity. With the increase in power available today, all of these three components may be varied over appreciable ranges to create an alteration in environmental acceleration which may pose limits in the operation insofar as man is concerned. This paper is a review of the present and future problems in the field of acceleration.

1,757

Franks, W. R. 1961 HUMAN ORIENTATIONS
Aerospace Medicine 32(3):230, March 1961.

ABSTRACT: Orientation may be defined as knowing how, when and where you are. Pertinent information is supplied by all the senses and normally is integrated to provide a conscious state. Accuracy of this will depend on (a) the validity of the information supplied by the senses; (b) the efficiency of the integration process. Information supplied by special senses can be subject to error due to inherent limitations, principally, (a) Events below a given threshold are not sensed; (b) Qualitative errors can arise due to the operation of Weber's Law. In addition, false integration can normally take place as in coriolis accelerations, altered visual perceptions, etc. Changed physiological states resulting from hypoxia, hyperventilation, positive acceleration, etc., can further alter the normal integration process. Finally, disorientation can itself be disorientating in a feedback system. To educate lay operators to exploit the capacities and limits of this vital system, it is essential that Aviation Medicine assess the physiology involved.

1,758

Franks, W.R. 1961 HUMAN ORIENTATION.

(Paper presented at 32nd annual meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.)

ABSTRACT: Orientation may be defined as knowing how, when and where you are. Pertinent information is supplied by all the senses and normally is integrated to provide a conscious state. Accuracy of this will depend on (a) the validity of the information supplied by the senses; (b) the efficiency of the integration process. Information supplied by special senses can be subject to error due to inherent limitations, principally, (a) Events below a given threshold are not sensed; (b) Qualitative errors can arise due to the operation of Weber's Law. In addition, false integration can normally take place as in coriolis accelerations, altered visual perception, etc. Changed physiological states resulting from hypoxia, hyperventilation, positive acceleration, etc., can further alter the normal integration process. Finally disorientation can itself be disorientating in a feed-back system. To educate lay operators to exploit the capacities and limits of this vital system, it is essential that Aviation Medicine assess the physiology involved. (Aerospace Med., 32(3):230, March 1961.

1,759

Franks, W.R. & H.B. Hay 1961 CANADIAN EXPERIENCE IN IMPACT ACCELERATIONS

(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: Accelerations which may be considered to come within the definition of impact, can arise practically from high speed bail-out, parachute openings, during crashes, and also from abrupt acceleration changes from aerodynamic gust and sound barrier turbulence, ejection seats, rocket take-off, and arresting gear, as well as atomic and other blast effects.

Dissipation of 300 knots is theoretically only equivalent to a 5°F rise in body temperature, thus the amount of kinetic energy which the human body can successfully absorb, when properly randomized, is considerable and represents a challenge for exploitation. This can only come from an intelligent and imaginative evaluation of the fundamental problems involved and their application to a solution. Animal experimentation can only be useful to a point, and accurate clinical or pathological measurements of ubiquitous human experiences are requisite and rewarding. From these parameters various Canadian developments in Crash Helmets, Ejection Seats, Crash Harness and other equipment will be discussed briefly, as well as current considerations of methodology and operational experience. Detailed reports by various authors will be tabled.

1,760

Franks, W. R. 1961 ACCELERATION RESEARCH IN CANADA

(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.)

1,761

Franks, W. R. 1961 SOME RECENT DEFINITIONS OF THE ACCELERATION PROBLEM.
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. 14-22.

ABSTRACT: Accumulated experience with accelerations and means of protection against these have served to define more closely some of the limiting factors concerned with this variant of modern man's environment. The compromises of the present g suit, including protection limited to heart level, lack of adequate pressure gradient and approximations in fit, have probably been fully exploited. Return to original design in which these compromises are minimized still leaves various limitations. Body-surface protection where adequate hydrostatic gradients is accomplished still implies an increased load on the unprotected heart which may be limiting, although gaseous increased intrathoracic pressure can minimize this. Complete fluid protection imposes problems of tactile sensation and orientation which can be troublesome. Discomfort from anatomical distortions within the thoracic cage yet can be limiting especially from transverse accelerations. Other difference in specific gravity between brain and cerebrospinal fluid, possible centrifugal sludging of blood and reciprocal shifts in body fluids generally. Reflex endocrine and vasomotor responses to these shifts may prove embarrassing when an increased g subsides. Individuals vary in respect to these various factors, and there is still room for selection and training for specialized assignments. (EDITORS SUMMARY)

1,762

Franks, W. R. 1963 A SECOND LOOK AT THE "GRAVEYARD SPIRAL"
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 29-May 2, 1963)

ABSTRACT: In the past, the "graveyard spiral" has been explained on physiological grounds of human disorientation. In this pilot while flying without visual references, i.e. at night or in cloud, inadvertently enters a turn which either is not appreciated or is falsely sensed. This can arise from either subthreshold rates of rotation, "reversal" sensation, or from coreolis disorientation or combination of these. The turn results in an increasing positive acceleration which may be sensed by the disorientated pilot as a climb, and which if acted upon results in a closing spiral descent. Apparently, however, under similar circumstances an error may arise in the attitude gyro which "if not appreciated by the pilot will cause him to put the aircraft into descending turn." The inherent reliance on such instruments by the unconsciously disorientated pilot may thus play a sinister potentiating role in the etiology of this classical accident.

1,763

Franzen, R., & D. R. Brimhall 1948 A STUDY OF SERIOUS AND FATAL ACCIDENT RECORDS DURING 1939 AND 1940 (Civil Aeronautics Administration, Washington, D. C.) Rept. No. 77; May 1948

SUMMARY: The official records indicating the causes of non-carrier accidents, and related elements of information pertaining to such accidents, represent a valuable source of data for analysis as a basis for suggesting steps to be taken in initiating an accident prevention program. However, the value of this source of information is greatly reduced by inadequacies in present non-air-carrier accident recording procedures.

The major purpose of this investigation has been the evaluation of accident record files covering 1163 accidents occurring during 1939 and 1940. The requisite elements of information which are available in the present files, which are available to a limited degree only, and which are not available, are indicated. Suggestions are made for improving accident record procedures in order that a complete description of the background of the accident may be obtained. The major need is for development of procedures which will result in the collection of comparable information on all accidents, particularly in terms of the nature of maneuvers immediately preceding the accident (lead maneuvers), and in terms of other pertinent conditions surrounding the accident (environments). The inadequacy of procedures in which the specific elements of accident data to be collected are left to the discretion of the investigator is noted. This inadequacy often results in restriction of information to those elements which are most immediately available, and, moreover, may lead to uncertainty as to whether certain important background elements did not apply to the accident in question or were merely overlooked by the investigator.

In the course of the analysis, the high incidence of stalls, particularly from turns, immediately preceding the crash, became evident. In the records analyzed, approximately 65 per cent of the private plane accidents resulting in fatalities involved a stall; and more than half of such stalls followed improper execution of a turn at low altitude. The implication of this fact with respect to revisions of the pilot training curriculum is discussed. As another by-product of the principal study, comparisons were made between the sample of pilots in the CAA accident records and a sample of pilots obtained during other research in California. Differences among pilots having accidents, and accident-free pilots, are discussed, in terms of elements of information pertaining to pilot history, such as experience and age. (CAA)

1,764

Fraser, A.M. 1943 A PRELIMINARY STUDY OF THE EFFECT OF MILD ANOXIA UPON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report # C-2644, October 10, 1943

ABSTRACT: Twenty-five of those breathing the low concentration of oxygen developed severe nausea and/or vomiting, while only sixteen of the other group developed these symptoms. This difference is not statistically significant. Nine men in each group had mild symptoms.

1,765

Fraser, A.M. and G.M. Manning 1943 THE EFFECT OF VARIATION IN THE RADIUS (FREQUENCY OF MAXIMAL CHANGE IN G) AND THE ARC (QUANTITY OF MAXIMAL CHANGE IN G) OF THE SWING ON THE INCIDENCE OF SWING SICKNESS. (National Research Council, Canada) Report #C-2622, 9 October 1943

ABSTRACT: A reduction from 58% in the incidence of swing sickness occurred when the frequency (G change constant) was increased from 15 to 22 swings per minute. A reduction from 50% to 22% in the incidence of swing sickness occurred when the change in vertical acceleration (frequency constant) was reduced by decreasing the total angle of swinging from 90° swing is similar to that of a spring elevator used in previous work on which little or no sickness occurred. It would appear that some effective stimulus not present on the spring elevator is operating on the swing.

1,766

Fraser, A.M. and G.W. Manning 1944 EFFECT OF VARIATION IN THE RADIUS (FREQUENCY OF MAXIMAL CHANGE IN G) AND THE ARC (QUANTITY OF MAXIMAL CHANGE IN G) OF THE SWING ON THE INCIDENCE OF SWING SICKNESS. Proc. Assoc. Comm. Aviation Med. Research, Appendix E, 25 Feb. 1944

1,767

Fraser, A.M. & G.W. Manning 1950 EFFECT OF VARIATION IN SWING RADIUS AND ARC ON INCIDENCE OF SWING SICKNESS. J. Appl. Physiol. 2(11):580-584. Apr. 1950.

ABSTRACT: Human subjects were swung on a two-pole swing through angles of 50, 90 and 130 degrees, using radii of 6, 10 or 16 feet, to determine the importance of frequency and of quantity of g change in the occurrence of swing sickness.

The incidence of swing sickness was increased from 4 to 58 per cent when the frequency was decreased from 22 per minute on the 6-foot swing to 15 per minute on the 16-foot swing. Although theoretically the quantity of the forces acting remains constant when the angle remains constant, air resistance results in requiring a greater thrust to operate manually the longer swings; this would result in a greater tangential component of force, and the latter may be responsible for the increase in incidence as stated above. The low incidence of sickness on a vertical elevator, where there is no tangential component, supports this conclusion. The incidence of swing sickness was reduced from 50 to 22 per cent by reducing the oscillation angle from 90 to 50 degrees (or g change from 0.9 to 0.25). Increasing the angle from 90 to 130 degrees did not increase incidence of sickness. The frequency and quantity of g change on the 16-foot, 90-degree swing are similar to those of an elevator used in other work (2) in which sickness was almost absent. This suggests that the tangential component of force on the swing is necessary for production of sickness.

1,768

Fraser, F.T. 1963 ASPECTS OF THE HUMAN RESPONSE TO HIGH SPEED LOW LEVEL FLIGHT.
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28 - May 2, 1963)

ABSTRACT: As a preliminary investigation of the human response to high speed low level flight, a T-33 aircraft was flown at not more than 100-feet AGL and approximately 400 K on a selected course for a duration of about 40 minutes per run. Three pilots of differing anthropomorphic form each made several flights in varying conditions of turbulence. Continuous acceleration tracings were registered on an airborne recorder, from the seat, the "hard hat", and the pilot's hip, along with ECGs and pneumograms. A photographic record of head movement was obtained. Analysis of the tracings showed the dimensions of vertical accelerations and jolts, the predominant frequency response, etc. ECG showed no aberrations, but varied in rate in association with buffeting and flying stress. Pneumograms showed the effects of buffeting on respiratory rate and pattern. A technique was devised for analysing the tracing in terms of jolt function, believed to give a closer representation of the intensity and duration of the buffeting. Subjective reports, borne out by the photographic record, indicated that on some runs the pilot was approaching the limit of his ability to control the aircraft. Pilots varied in their subjective and physiological response.

(Aerospace Medicine 34(3):255, March 1963)

1,769

Frazer, J. W., & E. Reeves 1958 ADAPTATION TO POSITIVE ACCELERATION
(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5818, 23 Dec. 1958 ;
ASTIA AD 216 509.

ABSTRACT: One hundred and fifty male Sprague-Dawley rats, weighing ca 250 grams, were subjected to positive acceleration. Fifty were preconditioned by exposure to 2 g, 50 to 12 g, and 50 to cage stressing 1/2-hour a day for 6 weeks. At the end of the conditioning period all animals were subjected to 20 g and their survival time was measured by means of a transistor EKG. Rats preconditioned to 12 g had significantly longer survival times, rats exposed to 2 g significantly shorter survival times than cage-stressed controls. Statistical correction was made for losses in the group preconditioned at 12 g. Mean survival times at 20 g for cage-stressed controls was 1281 seconds, 2 g preconditioned 969 seconds, 12 g preconditioned 2011 seconds. (Author)

1,770

Fredericks, R.H. 1956 VEHICULAR DECELERATIONS IN CONTROLLED COLLISIONS.
(Society of Automotive Engineers, Annual Technical Convention, 1956)

1,771

Fredericks, R.H. 1958 SAFETY IN AUTOMOTIVE TRANSPORTATION.
(Ford Motor Comp., Dearborn, Michigan)

1,772

Fredericks, R.H., & R.W. Connor 1960 CRASH STUDIES OF MODERN CARS WITH
UNITIZED STRUCTURE. (Ford Motor Comp., Dearborn, Mich.)

1,773

Freeberg, N.E. 1958 ENVIRONMENTAL AND PILOT ASPECTS OF THE VERTIGO ACCIDENT
(U.S. Naval Aviation Safety Center, U.S. Naval Air Station, Norfolk, Va.)
Aeromedical Dept. Rept. No. AM 1-58, Sept. 1958. ASTIA AD 209 349.

1,774

Freedman, T. & V. Blockley 1959 AN INSTRUMENTATION PACKAGE FOR THE
MEASUREMENT OF PHYSIOLOGICAL RESPONSE.
(Paper, Meeting Aero Medical Association, Statler Hilton Hotel,
Los Angeles, April 27-29, 1959)

ABSTRACT: Instrumentation has been developed for recording electrocardio-
grams, skin and deep body temperature, inspiratory mass flow rate, and for
telemetering pressure transducer signals. The development of design
criteria with consideration for compactness, minimum weight, reliability
during physical stress, and comfort of the subject over a prolonged period
of application is discussed. Methods for instrumenting the subject are
reported as are techniques for lead placement and electrode attachment.
Modification of the package for total telemetry, additional parameters and
remote readout is proposed. Sample information obtained from instrumented
subject is presented. (J. Aviation Med. 30(3):183-184, March 1959.)

1,775

Freeman, H.E. 1962 A RESEARCH PROGRAM TO DEVELOP A 60 "G" PERSONNEL
RESTRAINT SYSTEM. In Impact-Acceleration Stress: Proceedings of a
Symposium With a Comprehensive Chronological Bibliography, (National
Academy of Sciences, National Research Council, Washington, D.C.)
Publication No. 977, Pp. 259-264

ABSTRACT: A 60 G personnel restraint system was developed. The central com-
ponents are an individually fitted, fiber glass, torso garment and a similarly
fitted seat pan. These rigid components were selected to provide broad support

and preserve the normal body shape under inertial loading. A flexible, low-rebound liner is used for comfort and intimate fit. The torso shell is retained to the seat structure with steel cables to minimize stretching and the resultant rebound. A dacron strap system, positioned by a leather helmet, was chosen to minimize stretching and the resultant rebound. A dacron strap system, positioned by a leather helmet, was chosen to minimize forward head motion. Lateral head supports are mounted on a carriage that adjusts vertically relative to the seat structure for crew-size variation. Low rebound padding in the helmet cushions the ear area. Arm support is provided by contoured armrests and hand-holds with a strap passed over the crook of the arm holding the arm back and down. The dummy's legs are positioned and restrained by the sides of the seat shell, a central divider, a contoured leg backrest, and a leg cover. Antisubmarine protection for the torso is also provided by the leg cover, which supports the forward inertial loads of the thighs and legs and stabilizes the pelvis by a direct load path through the femur into the pelvic socket. The contoured lower skirt on the torso backshell and the sides of the seat pan reinforce the pelvic socket by limiting lateral shifting of the thighs. The support structure is a tubular steel frame articulated to provide a torso forward position for boost and torso aft position for less stressful flight elements. Full immobilization and restraint are applied in the forward position.

1,776

Freise, H. n.d. INSTRUMENTS FOR MEASURING ACCELERATION IN AIRCRAFT
(Lilienthal Ges., Report 181, pp. 83-102)
R.A.E. Translation No. 152.

1,777

Freitag, W. 1953 UNTERSUCHUNGEN UBER DIE WIRKUNG VON FLIEHKRAFTEN
IN RICHTUNG FUSS-KOPF AUF DEN MENSCHLICHEN ORGANISMUS.
(Investigations On the Effect of Centrifugal Forces in a Foot-To-Head
Direction Upon the Human Organism)
Zeitschrift fur Flugwissenschaft (Braunschweig), 1(2):25-30

ABSTRACT: Experiments were made on 9 subjects flying in a head-downward position (effected by means of a tilting chair) in an airplane diving from altitudes of 2000 or 3000 m. until reaching maximum tolerance acceleration, then spiraling downward in irregular circles. Results show that centrifugal forces acting in the foot-to-head direction increase blood pressure within the vessels of the head and neck region even at accelerations below 2 g, making the blood ooze through the walls of the minor vessels, and causing swelling of the face and pain in the ears and temples. The number of small hemorrhages increased with the rate of acceleration and with exposure time. Under increasing centrifugal force, the heart and blood vessels are no longer able to maintain normal blood circulation. The pressure of the inner organs upon the chest hampers respiration and the pressure in head and neck becomes unbearable. As follows from these experiments, as well as from others made on the centrifuge, man capable of tolerating a centrifugal force up to 2 g for 3 minutes without considerable detriment to his

working capacity. In exposures above 2 g, the time must be rapidly reduced; at 3.5 g it should not exceed 10 seconds to avoid serious troubles. Redding out was not observed in any experiment.

1,778

Free, W. T. & G. M. Jones 1959 A CINE TECHNIQUE FOR MEASUREMENT OF EYE MOVEMENTS IN A DYNAMIC ENVIRONMENT.
(Paper Meeting of the Physiological Society, 11-12 December 1959)

ABSTRACT: The apparatus comprises a standard closely fitting flying helmet, having a forward facing cine camera running at 16, 32 or 64 frames/sec, rigidly mounted on one side, with a 2 in., F/1.9 lens which carries a periscope so arranged that the camera takes a close-up picture of one eye. The motor is connected to the camera by a flex-drive and is mounted on the opposite side for inertial balance. The periscope has front surfaced mirrors, carries a 12 W half-silvered bulb for illumination of the eye and contains an annular photo-cell for exposure control, the current from which is amplified approx. 10 times by a transistorized circuit. A hood is available for covering the periscope and eye, mainly to reduce corneal reflexions to a single spot of light. The whole system can be fixed relative to the skull with a dental bite. The apparatus is controlled from a small box strapped to the knee, by means of which mains voltage, bulb voltage and amplified current from the photo-cell can be measured, and bulb current can be adjusted through a power transistor control circuit. A self-contained Cd-Ni battery pack supplies 28 and 18 V at 1 amp each for 12 min.

Eye movement in the 'horizontal' and 'vertical' planes can be measured to an accuracy of approx. $\pm 1^\circ$ within 25° of a central datum by measuring displacement of the pupil image on the film. Rotational movement about the visual axis can be measured with a similar accuracy by superimposing a projected image of the iris upon a disk, free to rotate about its axis and having characteristic radially disposed marks of the particular iris sketched upon it. The disk is mounted upon a support, graduated in degrees, which is constrained to move in the plane of the image without itself incurring rotation. (J. of Physiol. 150:2-3P, 1960)

1,779

Frenckner, P., & L. Preber 1956 RELATIONSHIP BETWEEN VESTIBULAR REACTIONS AND VEGETATIVE REFLEXES, STUDIED IN MAN BY MEANS OF A REVOLVING CHAIR OF NEW DESIGN. Acta oto-laryngologica (Stockholm) 46(3):207-220, May-June 1956

ABSTRACT: Vegetative reactions were studied in male subjects after rotatory stimulation of the vestibule. A newly designed electrically operated revolving chair with attached apparatus for recording nystagmus, skin resistance, blood pressure and electrocardiogram was used. A distinct and characteristic fall

of the resistance curve was found in neurovegetatively susceptible persons even with the use of weak stimuli (cupulometry). This fall in skin resistance seemed to be caused mainly by vestibular stimulation in the same way as nausea associated with motion sickness. Investigations on approximately 100 persons showed that, on comparison of the changes in skin resistance, the post-rotatory nystagmus, and the aftersensation of cupulometry, the variations in skin resistance were found to be correlated to the intensity and course of the rotatory aftersensation. (AUTHOR)

1,780

Freitag, W. 1958 UBER DIE AERODONTALGIE UND ANDERE AERODONTOPATHIEN.
(About "Aerodontalgie" and Other "Aerodontopathies")
(Deutsche Versuchsanstalt fuer Luftfahrt, Mulheim Ruhr, Germany)
Rept. No. 61, ASTIA AD 204 435

ABSTRACT: According to previous research sound teeth are not injured in any way by environmental changes (such as temperature, atmospheric pressure, radiation, lack of oxygen, acceleration etc.) encountered in flight. However, if the teeth are not sound, some of the above mentioned features can cause pain and further morbid change. Experimental and clinical tests regarding these problems, including some taken from the literature, are reported. (ASTIA)

1,781

Frenkel, O. M. 1940 CHANGES IN EXCITABILITY OF VESTIBULAR APPARATUS FOLLOWING REPEATED STIMULATION.
Bull. Biol. et. Med. Exper. 9:69-72.

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Frenkel, O.M. 1941 CHANGES IN THE EXCITABILITY OF THE VESTIBULAR APPARATUS FOLLOWING REPEATED STIMULATION: SIGNIFICANCE FOR AVIATORS.
Bull. War M. (London) 2:521. Also War Med. (Chicago) 2:536

1,783

Frenzel, H. 1961 A SIMPLE SWIVEL CHAIR MODEL EXPERIMENT ON THE PROBLEM OF CORIOLIS EXCITATION ON THE SEMICIRCULAR CANALS IN HEAD MOVEMENTS DURING ROTATION.
In Arch Ohr Nas Kehlkopfheilk 177:563-578, 1961 (German)

1,784

Freud, S.L. 1962 A STUDY OF PHYSIOLOGICAL MECHANISMS UNDERLYING THE SPIRAL AFTER EFFECT.
(Connecticut University, Doctoral thesis): ASTIA AD 274 366.

ABSTRACT: The physiological mechanisms underlying the spiral after-effect were studied. Some conclusions were: a major central component exists for the SAE; duration of the effect is a simple function of exposure time; duration is longer for non-transfer than for transfer conditions, so it is not possible to rule out retinal contribution; both rods and cones contribute, but cone areas give greater response. The relationship of some of these findings to rod-cone functioning are discussed.

1,785

Friede, R.L. 1958 BIOPHYSICS OF CONCUSSION
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Tech. Rept. 58-193. ASTIA AD 203 385.

ABSTRACT: This investigation was instituted to ascertain the anatomical and/or physiological factors involved when experimental "concussion" was produced. Methods were developed for effecting a reproducible "concussion". The criterion used to determine when "concussion" was produced consisted of the measurement of abrogation of corneal reflex.

Three principal factors thought to cause "concussion" were studied: namely, (1) rapid deceleration (acceleration concussion as defined by D. Denny-Brown), (2) total force imparted to the skull, and (3) stretch of the cervical region. a test drop rig was developed and instrumentation was used to measure the various force vectors. Varying experimental conditions eliminated one or more of the factors thought to cause "concussion," and the following conclusions were drawn: (1) Total force applied to the skull is not a factor in "concussion" under the test conditions. (2) Acceleration concussion is not a factor under the test conditions. (3) Stretch of the cat's neck or some unknown factor, which can be altered by applying a muscle-tetanizing current, accounts for the "concussion" produced.

Neurohistopathological studies were done on serial sections of the brain and cord to establish the site and degree of neural damage under various experimental conditions. These studies are discussed in Part II of this report.

1,786

Friede, R. 1961 DAMAGE OF THE BRAIN
(Paper, Symposium On Impact Acceleration Stress, Brooks Air Force Base, San Antonio, Texas, November 27-29, 1961)

1,787

Friede, R.L. 1961 MECHANICS OF ACCELERATION CONCUSSION
(Paper, Symposium on Impact Acceleration Stress, Brooks AFB, Texas, Nov. 27-29, 1961)

ABSTRACT: A blow accelerating the head produces an abrupt displacement at the cranio-cervical junction. Such a displacement results in a characteristic fiber lesion at the ventral circumference of the first segment of the cervical spinal cord opposite the odontoid process. Thick fibers are more severely affected than thin fibers. The distal parts of the fibers undergo Wallerian degeneration. Axonal reaction is found in the nuclei which send their descending fibers through the damaged region: the reticular formation of the medulla oblongata, particularly its nucleus gigantocellularis, the lateral vestibular nucleus, to a smaller extent the red nucleus, and, inconsistently, other nuclei. This pathology is consistently found in cats which received a blow to the head. It shows a definite relationship to the severity of symptoms so that a reasonable estimate of the duration of reflex abrogation can be made without knowledge of the experimental data. The symptomatology and the mechanical forces recorded are identical to those generally accepted for the definition of concussion.

Because of this pathogenic mechanism, both the typical symptomatology and the pathology of acceleration concussion can be reproduced by other means than by applying a blow to the head: for example, cervical stretch. An experimental analysis of the various mechanical factors involved reveals that stretch and flexion of the craniocervical junction are most important for the mechanics of concussion. Dislocation of the odontoid process, rotation, and herniation of the medulla into the foramen occipitale are not of critical significance.

1,788

Friede, R. L. 1961 EXPERIMENTAL CONCUSSION ACCELERATION. PATHOLOGY AND MECHANICS.
In Arch Neurol (Chicago) 4:449-462, April 1961.

1,739

Friede, R. L. 1961 THE PATHOLOGY AND MECHANICS OF EXPERIMENTAL CEREBRAL CONCUSSION. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio)
WADD TR 61-256; ASTIA AD-266 210

ABSTRACT: A blow to the cat's head produces an abrupt displacement at the cranio-cervical junction. This results in a fiber lesion at the ventral circumference of the spinal cord at C-1, opposite the prominence of the odontoid process. Thick fibers are affected more severely than thin fibers. Axonal reaction is found in the nucleus gigantocellularis of the reticular formation, the nucleus vestibularis lateralis, the red nucleus, and others. All these nuclei send their descending fibers through the damaged region. Changes are consistent. Intensity is related to the severity of concussion so that the duration of concussion can be estimated histologically without knowledge of the experimental data. The mechanical forces used to produce concussion are the same type described by other investigators. An experimental analysis of the mechanical factors involved in the production of damage reveals stretch and flexion to be most important. (AUTHOR)

1,790

Friedman, T. & R.C. Koehler 1958 THE BENEFITS OF SIMULATING PREDICTED ACCELERATION PROFILES THROUGH THE DESIGN OF MANNED FLIGHT SYSTEMS. 3rd European Congress of Aviation Medicine, 1958, Pp. 277-281.

1,791

Frisoli, A. & B. Cassen 1950 A STUDY OF HEMORRHAGIC RIB MARKINGS PRODUCED IN RATS BY AIR BLAST. J. Aviation Med. 21(6):510-512,526.

ABSTRACT: Hemorrhagic rib markings have often been observed during autopsy on the deflated lungs of victims of high explosive blast. Interpretations have been made on one hand by considering that the ribs produce shadows and on the other hand that the ribs produce intensified damage when they are forced against the lungs. To determine definitely between these alternatives, a technique was developed of fixing the lungs of rats in their inflated state after blast injury. These fixed lung preparations clearly demonstrate that the hemorrhagic bands are under the ribs and are most marked under the false ribs. Further, a freely movable disc of metal held loosely to the chest wall will produce intensified damage under it rather than cast a shadow.

1,792

Frommel E., and C. Fleury 1959 PHYSIOPATHOLOGY OF MOTION SICKNESS STUDIED IN THE LIGHT OF ITS THERAPY. Schweiz Med Wschr. 89:590-2, 30 May 1959

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Frucht, A.H. & K. Otto 1959 DRAHTLOSE UBERTRAGUNG DES EKG MIT TRANSISTOR-KLEINSTSENDER VOM MENSCHEN ODER TIER (Wireless Transmission of the EKG of Man or Animal by Means of a Miniature Transistor Transmitter) Pflug. Arch. ges. Physiol. (Berlin) 270(1): 82..

1,794

Fryer, D.I. 1961 THE EFFECTS UPON MAN OF EXPOSURE TO HIGH RAM PRESSURE LOADS. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. No. 1167, July 1961. ASTIA AD 267 789.

ABSTRACT: A study is reported of human tolerance to wind blast, or ram pressure, using a rotating beam channel underwater centrifuge system with specially constructed seat and pylon to simulate the high Q loads of ejection escape

in the air. Descriptions are given of the design and construction of the seat, restraint, communications, breathing gear, and instrumentation used to obtain physiological and mechanical data during the tolerance testing experiments. Results are summarized with regard to tolerance, electrocardiogram, intrathoracic and abdominal pressures, trunk thickness, separation loads on arms and legs, and injuries. (Author)

1,795

Fryer, D. I. 1961
OPERATIONAL EXPERIENCE WITH BRITISH EJECTION SEATS. A SURVEY OF MEDICAL ASPECTS
(Flying Personnel Research Committee, Great Britain)
Rept. no. FPRC-1166 July ASTIA AD 267 788

ABSTRACT: A survey is presented of experience in the emergency use of ejection seats of British design and manufacture. The escapes and attempted escapes included are believed to constitute a complete list of ejections from aircraft flown by the Royal Navy, the Royal Air Force, the ministry of Aviation (formerly Ministry of Supply), and the British aircraft industry up to 1st July, 1960. It does not include test ejections carried out in the development of ejection seats, or the reference to the indications for ejection and the mechanism whereby this is executed is frequently necessary, the primary aim is a medical survey of the difficulties inherent in escape by this means, the nature, causes and contributory causes of injury during and following ejection. (Author)

1,796

Frykholm, A. 1952 REAKTIONSTID OCH REAKTIONSFORMAGA VID FLYGNING MED HOGA HASTIGHETER. (Reaction Time and Reaction Ability in High Speed Flight)
Meddelanden Fran flyg-och navalmedicinska namnden (Stockholm), 1(2):4-8.
In Swedish.

ABSTRACT: The reaction time of a pilot in relation to the speed of the plane is discussed and represented graphically for the hypothetical case of a plane flying at Mach 3. At this speed the process of motor reaction can be divided into the following successive phases: (1) the latent period (0.1 second) during which the plane would progress 100 m.; (2) the time required for eye adjustment or turning of the head, e.g. toward a suddenly discovered plane (0.1 second), during which the plane would progress an additional 100 m.; (3) time required for mental association of the sensory impression (0.05 second), during which the plane would progress 50 m.; and (4) time required for motor-reaction to take effect (0.2 second), which would correspond to a distance of 200 m. The following recommendations are made: a conscious effort should be made on the part of the pilot to avoid movements of the head or eyes as much as possible, and instrument layout should be designed accordingly; aviation cadets should be taught the above facts, and "quick seeing" should be practiced; only individuals with short reaction and visual adjustment times should qualify to pilot high-speed planes (the fact that reaction time increases with increasing age should be borne in mind); the avoid-

ance of alcohol, of vitamin-deficient food, of overtiredness and of lack of oxygen should be mandatory, because of their retarding effects on visual adjustment.

1,797

Fujiwara, H., & G. Saga 1961 ANATOMICAL AND HISTOLOGICAL STUDIES ON DOGS EXPOSED TO ACCELERATION In Abstracts from the 6th Meeting of the Japanese Aviation Medicine and Psychology Society. Nihon Koku Igaku Shinri Gakkai kiroku (Tokyo) No. 11:2-3, May 27, 1961

ABSTRACT: Ten dogs died after being exposed to centrifugal forces of 8 g for 9 minutes and 10 g for 12.5 minutes. The liver was dark red in color, somewhat enlarged, congested and showed signs of marked hemorrhage under mild pressure. The adrenal glands showed hemorrhage and congestion. The kidneys were also congested. Filaria worms were found in 8 of the dogs. The lungs were reduced, congestion was marked, and petechiae and emphysema were present. Histologically, the liver revealed congestion and occasionally showed thickening of the vascular walls. The kidneys showed swelling of the renal tubules, and both the cortex and medulla were markedly congested. The adrenal glands exhibited mild congestion and hemorrhage. The lungs were congested and small hemorrhages were present in the bronchioli. Hemosiderin was also present. (Dr. H. Saiki)

1,798

Fukuda, T., M. Hinoki, & T. Tokita 1958 STATIC AND KINETIC LABYRINTHINE REFLEX (FUNCTIONAL DEVELOPMENT OF LABYRINTHINE FUNCTION WITH ROTATORY TRAINING). Acta Oto-laryng. 49:467-477

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Fukuda, K., T. Tokida, S. Aoki & T. Takeuchi 1959 JURYOKU NO HENKA GA KINKINCHO NI OYOBOSU EIKYO (The Effects of Variations in Gravity on the Muscle Tone) Nihon Koku Igaku Shinri-Gakkai Kiroku (Tokyo) 7: 3, May 1959

ABSTRACT: The effects of gravitational changes on the tonic labyrinthine reflex in animals were studied. Animals subjected to deceleration, free fall, and motion along a Keplerian trajectory were observed. The effects of an increase in the gravitational forces were studied employing linear and rotational acceleration. The results show that labyrinthine control neck muscle tonus is affected by changes in gravitational forces, and that the rotation and flexion reflex of the neck subsequent to unilateral labyrinthectomy is abolished under conditions of weightlessness (during free fall, Keplerian trajectory) to the point of being difficult to observe.

Fulton, J. F. 1941 RECENT DEVELOPMENTS IN AVIATION MEDICINE
New England J. of Medicine 225(7):263-268.

ABSTRACT: The war in the air has come to be in a very real sense a physiologic war, since the limitations of air combat at the present time lie more with the pilot than with the plane.

The more important advances of the last two years relate to the following: the physiologic effects of acceleration; the use of oxygen at high altitudes; air embolism and its prevention; and anoxia of the adrenal glands. The topics are considered in this order; problems of pilot selection and training are not touched on.

1,801

Fulton, J.F. 1941 MEDICINE AND AIR SUPREMACY.
J. Maine M.A., 33:201-210

ABSTRACT: The newer combat planes can fly higher than is compatible with health or life. They can perform maneuvers causing centrifugal forces of such intensity, that blood tends to be drawn away from the brain, resulting in transient blindness (blacking out)

To maintain the body at high altitudes, increased secretion of adrenocortical extract is essential. The problem of anoxia and adrenal cortex is discussed.

One of the means of lessening the physiologic effects of high acceleration is the assumption of a crouched posture, bringing the lower extremities nearer the heart and thus diminishing the length of the hydrostatic column of blood subjected to acceleratory force.

1,802

Fulton, J.F. 1941 PNEUMATIC AND WATER SUITS AND OTHER AGENTS DESIGNED TO
COUNTERACT ACCELERATION IN AIRCRAFT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 15, 22 July 1941

ABSTRACT: This is a brief review of protective devices which was made preliminary to the commencement of OSRD research. The German methods of combating "g" are summarized. It is recommended that the effects of adrenal cortical hormones on "g" tolerance be studied and that the relative merits of abdominal belts and pressurized leggings be determined. It is also suggested that a water suit be pressurized with air and that standards of service testing for acceleration be drawn up.

1,803

Fulton, J.F. & M.W. Thorner 1941 UNSOLVEN NEUROLOGIC PROBLEMS IN MILITARY
AVIATION. Trans. Amer. Neurol. Ass. 67:112-115

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Fulton, J.F. 1942 BLAST AND CONCUSSION IN PRESENT WAR.
New Eng. J. Med. 226:1-8

1,805

Fulton, J.F. 1943 FISILOGIA E VOOS EM GRANDES ALTITUDES: EMBOLIA GASOSA E
EFEITOS DA ACELERACAO (Physiology and High Altitude Flying; With Particular
Reference to Air Embolism and Effects of Acceleration)
Resenha Clinico-Cientifica (Sao Paulo) 12:107-112; 1 March 1943.
English version: Science 95:207-212; 27 Feb. 1942.

1,806

Fulton, J.F. 1948 AVIATION MEDICINE IN ITS PREVENTIVE ASPECTS:
AN HISTORICAL SURVEY. (New York: Oxford University Press, 1948)

CONTENTS:

Altitude sickness and acclimatization: the history of oxygen.
Decompression sickness: the genesis of the tissue bubble.
Pressure cabins and explosive decompression: the spring of the air.
Effects of acceleration: dim-out and black-out; protective measures.
Man and the machine: problems of safety in flight.

These lectures are devoted chiefly to outlining the development of the
current knowledge of the physiological effects of altitude and excessive
gravitational forces upon human beings. Mechanical devices and other
techniques for preventing or ameliorating adverse effects from these causes
are described also. Selected results from research carried on during World
War II are discussed, and there is a rather full account of the development of
the anti-g suit.

1,807

Fulton, J.R. 1942 PHYSIOLOGY AND HIGH ALTITUDE FLYING WITH PARTICULAR
REFERENCE TO AIR EMBOLISM AND EFFECTS OF ACCELERATION.
Science 95:207-212

1,808

Furey, J. A., & R. N. Kraus 1962 A CLINICAL CLASSIFICATION OF VERTIGO
(School of Aerospace Medicine, Brooks AFB, Texas) Review 7-61, Apr. 1962.
ASTIA AD-287 069

ABSTRACT: A survey of the literature on the etiology of vertigo was made to discover slight differences in the described syndrome and present a system for the clinical classification of vertigo. This system is needed to ensure a sound medical judgment for removing an aircrew member from flying if he has a disorder which is incapacitating and likely to recur spontaneously without warning. While aviator's vertigo is not likely to occur except under conditions of reduced visibility, medical vertigo can occur under any conditions and gives the patient a sensation of whirling or a sensation that his environment is whirling. The clinical entities fulfilling these conditions include epidemic vertigo, acute toxic labyrinthitis, atypical Meniere's disease, and pseudo-Meniere's syndrome. As a result of this survey a clinical classification system is suggested based on anatomic location instead of etiology. It classifies vertigo as that produced by: (1) peripheral vestibulopathy, involvement of the peripheral anatomic portion of the vestibular system; (2) central vestibulopathy, an involvement of the retrolabyrinthine central anatomic areas of the vestibular system; and (3) idiopathic vestibulopathy, in which vertigo is produced by an unknown cause. R.C.M.

ACCELERATION

G

1,809

Gabb, J. E. 1961 PROTECTION OF THE HEAD.
Rev. Med. Aero (Paris) 2:210-212, Dec. 1961

1,110

Gable, W. D. & F. M. Townsend 1963 AN ANALYSIS OF CARDIOVASCULAR INJURIES
RESULTING FROM ACCELERATIVE FORCE.
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-
Hilton Hotel, Los Angeles, Calif., April 29 - May 2, 1963).

ABSTRACT: The autopsy protocols of approximately 3,400 victims of fixed wing aircraft, rotary wing aircraft, and parachuting accidents (accessioned at the Armed Forces Institute of Pathology) were surveyed for cardiovascular injuries. In this series, 442 cases showed significant cardiovascular trauma. These cases were analyzed with emphasis being focused on direction and magnitude of accelerative forces, sites of injury and types of injury. A statistical summary of the frequency of injury in a particular anatomic location was prepared from the data obtained. This material serves as the basis for a discussion of the pathogenesis of specific lesions found in the cardiovascular system following accelerative force application and provides information which may be useful in the design of protective devices. (Aerospace Med. 34(3):255, March 1963)

1,811

Gadd, Charles W. 1962 CRITERIA FOR INJURY POTENTIAL
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, (National Academy of Sciences, National Research Council, Publication No. 977), pp. 141-144

ABSTRACT: Appraisal of injury potential of automotive accessories may be attempted through several methods. One method is the laboratory evaluation which establishes a load-deflection curve for the material under observation. Interpretation of the test results is difficult because of the various determinants, both superficial and real, in a test. Furthermore, new criteria must be developed in order to appraise more deep-seated injury. In studying more complex situations rigorous analysis is not possible and an overall empirical function may be the best representation available.

1,812

Gagarin, Yu. 1961 MATERIAL ON FIRST COSMONAUT'S FLIGHT.
FBIS USSR & East Europe, No. 72, 14 April 1961.

ABSTRACT: The world's first cosmonaut, Maj. Yuriy Gagarin, in an interview with TASS told about himself and his flight into outer space on 21 April 1961. The Soviet cosmonaut said that when weightlessness set in, he felt excellent. It became easier to do everything. "While in the state of weightlessness, I ate and drank and everything occurred just as it does here on Earth. I even worked in that condition--wrote, jotting down my observations," Gagarin says. "I was convinced that weightlessness does not at all affect man's fitness for work. The transition from weightlessness to gravitation, to the appearance of the force of gravity, is smooth." (CARI)

1,813

Gagarin, Y., V.V. Parin, & H. Mielke 1962 GAGARIN, PARIN SPEAK ON
GDR TELEVISION. FBIS USSR & East Europe, No. 73, 13 April 1962.

ABSTRACT: Gagarin briefly discusses the problems of cosmic rays, nutrition during flight. He expresses his hope for the cooperation of all scientists in the research on space flights. Professor Parin discusses three main problems of space flights: length of time of space flights is becoming longer and thus requires a very complex closed ecological system; the danger of radiation; and the extended effect of weightlessness on man. (CARI)

1,814

Gagge, A.P. 1945 HUMAN FACTORS IN AIRCRAFT DESIGN.
(U.S. AAF-ATSC, Engineering Division, Aero Medical Laboratory)
TSEAL-3-3-695-53, 29 May 1945.
See also Air Surgeon's Bulletin, 2(9):298-301, 1945

ABSTRACT: This paper deals with all the problems of human factors except the question of design arising in connection with instruments and controls. Such items as g tolerances; visual acuity, depth perception, night vision, sound tolerance; temperature, altitude tolerance, and space requirements.

1,815

Gagge, A. P. & R. S. Shaw 1950 AVIATION MEDICINE
In Medical Physics (Chicago: The Year Book Publishers, Inc., 1950) Vol 2,
pp. 41-65.

1,816

Galambos, R. 1961 PSYCHOLOGICAL TESTING OF SUBJECTS UNDERGOING ACCELERATION STRESS

In: Reports on Human Acceleration (National Academy of Sciences, National Research Council, Washington, D.C.) Publication No. 901, pp. 13-38.
ASTIA AD 266 077

ABSTRACT: The purpose of the tests reported in this paper was to look into the testing of subjects by physiological and psychological methods with a view toward defining objectively the point where a given subject's participation in an experiment must end lest he suffer permanent damage from continued exposure to acceleration. The body system most likely to limit such subject participation was the nervous system. The nervous system is most highly susceptible to the repeated bouts of anoxia and of mechanical trauma experienced by subjects. After completion of the experiments, the author recommended that all centrifuge installations should conduct regular medical examinations of their subjects, with systematic recording of symptoms and careful follow-up of any reported deficiency of vestibular and other functional systems. The peripheral-lights and the auditory emergency signal-response tests should be standardized, and installed and used in all centrifuge installations. Available tests for brain damage, including automated intelligence tests, should be considered for possible inclusion as tests by each centrifuge installation. The Committee conducting and reporting these tests urges immediate research and development looking toward devising a rational practical battery of tests for performance under centrifuge stress. The Committee, or one like it, should continue its work under some appropriate auspices.

1,817

Galambos, Robert 1961 TESTS OF SUBJECTS USED IN ACCELERATION WORK.

(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.)

1,818

Galkin, A. 1958 THE ROAD TO THE STARS (Doroga k Zvezdam)

Trans. from Krasnaya Zvezda (USSR) 25 Nov., 1958.

(Office of Technical Services, Washington, D.C.)

March 9, 1959 59-16327

1,819

Galkin, A. 1959 DOROGA K ZVEZKAM (Road to the Stars)

(Trans. from Krasnaya Zvezda (USSR) Nov. 25, 1958, P. 3)

(SIA Translations Center, Chicago. 111.) 59-16327

1,820

Galkin, A.M., A.R. Kotova, A.V. Petrov, et al. 1958 ISSLEDOVANIYA ZHIZNEDEIATEL' NOSTI ZHIVOTNYKH PRI POLETAKH V GERMETICHESKIKH KABINAKH RAKET DO VYSOTY 212 KM. (STUDIES ON VITAL FUNCTIONS OF ANIMALS DURING FLIGHTS IN HERMETIC CABINS OF ROCKETS UP TO 212 KM)

In: Preliminary Results of Scientific Researches on the First Soviet Artificial Earth Satellites and Rockets, Articles XIth Section of I G Y Program (Rockets and Satellites) No. 1 (Moscow, Academy of Sciences, 1958) Pp. 112-129. JPRS/DC-288: 5-28.

ABSTRACT: Medico-biological investigations during rocket flights into the atmosphere have been conducted systematically in the Soviet Union since 1949, for the purpose of studying shifts in certain physiological functions, behavior of the animals during flights, and any bodily changes as a result of the flights. In 1957, 14 dogs (only 5 dogs are listed, although some were flown 2 or 3 times) were flown in pairs (1 anaesthetized, the other normal) in hermetically sealed biopacks on 7 distinct flights to altitudes of 62 to 130 miles. Pre- and post-flight examinations included blood, chest X-ray, EKG, blood pressure, respiration and pulse, urinalysis, temperature, and body weight. Blood pressure, pulse, and respiration were registered during 3-hr. training periods in the cabin and during centrifuge training. A telemetric control system registered the compartment shell temperature, thermoinsulating lining, and barometric pressure inside the cabin. Physiological functions were measured by means of pickoffs, amplifying units, automatic pressure devices, electric clocks, and automatic optical recording devices. Motion pictures were taken at intervals during flight. The state of the physiological functions was not successfully registered during all parts of the flight projectory, inasmuch as abrupt changes in the direction of action G-stresses interfered with instrument operation and caused sharp animal movements which were reflected in the quality of the recordings. Some data are illustrated, although data are cited for determining the extent of experimental successes. Conclusions were as follows: (1) The vitally necessary conditions were guaranteed by the hermetically sealed cabin. (2) Acute disorder in the physiological functions did not occur, and no postflight changes in behavior were observed. (3) The pulse and respiration rates and the blood pressure of the conscious animals increased during the active part of the flights. During the period of dynamic weightlessness the registered physiological parameters were maintained at a high level for the first two to three minutes, with a tendency to decrease. The physiological indices returned to their original level within 4 to 5 mins. after dynamic weightlessness had begun. In the anaesthetized animals, the pulse rate, respiration, and blood pressure did not differ from their original values during the period of weightlessness. (4) The recovery system guarantees safe landing although additional work is necessary to insure stabilization and more favorable deceleration conditions during the nose sections' fall from altitudes of 200 km and higher.

1,821

Galkin, A. M. et al 1958 MEDICO-BIOLOGICAL RESEARCH IN ROCKETS:
RESEARCH ON THE LIFE ACTIVITY OF ANIMALS DURING FLIGHT IN HERMETICALLY
SEALED CABINS OF ROCKETS UP TO A HEIGHT OF 212 KM: RESEARCH ON THE LIFE-
ACTIVITY OF ANIMALS DURING FLIGHTS IN THE HERMETICALLY SEALED CABINS
OF ROCKETS UP TO AN ALTITUDE OF 110 KM.
Trans. of mono. Preliminary Results of Research by Means of the First
Soviet Artificial Earth Satellites and Rockets, Moscow, 1958. p. 109-149.
(Office of Technical Services, Washington, D.C.)
1959 59-22466

ABSTRACT: A detailed account is given of the cabin arrangements and of the
instruments devised for recording physiological data, together with the results
obtained during the actual flight of dogs.

1,822

Gamble, J. L., and R.S. Shaw 1947 PRELIMINARY OBSERVATIONS ON DOGS
SUBJECTED TO NEGATIVE "G" Federation Proc., 6(1):109, March 1947

ABSTRACT: To gain knowledge of pathology resulting from negative g, anesthe-
tized dogs, harnessed on the human centrifuge in the "head out" position,
were given consecutive two minute runs at 7 g (negative)

1,823

Gamble, J. L., Jr. & R. S. Shaw 1947 PATHOLOGY IN DOGS EXPOSED TO NEGATIVE
ACCELERATION.
(USAF, Aero Med. Lab., Wright Field, Dayton, Ohio) Rept. TSEAA 695-74B.
18 Aug. 1947.

1,824

Gamble, J. L., R. S. Shaw, Otto Gauer, & J. P. Henry July 1948 PHYSIOLOGICAL
CHANGES DURING NEGATIVE ACCELERATION. MCREXD-695-74L, 25 July 1948

ABSTRACT: From the experiments conducted in the Aeromedical Laboratory, it was
concluded that cerebral symptoms occurring at low levels of negative acceleration
lasting only 10 to 15 seconds in the range of 3 to 5 g may be due to changes of
reflex origin and not to intracranial hemorrhage.

1,825

Gamble, J.L., R.S. Shaw, O. Gauer & J.P. Henry 1948 STUDIES OF THE PATHOLOGICAL PHYSIOLOGY OF NEGATIVE "G" IN ANIMALS AND MAN
Fed. Proc. 7: 40.

ABSTRACT: Increased pressure in the veins of the head from negative acceleration causes congestion and eventually petechial hemorrhages in the conjunctivae and in the mucous membranes of the accessory sinuses and middle ear. The vessels of the brain, surrounded by incompressible media in the "closed box" of the skull, do not rupture from short exposures. However, two subdural hematomas were observed in ten animals given four two-minute exposures to accelerations of negative 7 g repeated at short intervals. The increased venous pressure also causes edema in the cephalad portions of the body with a retrobulbar edema which may cause diplopia in humans. If the exposure is prolonged for more than five seconds, evidence of heart and central nervous system disturbance are seen. Electrocardiograms usually show bradycardia in both animals and humans. All degrees of heart block and various types of ectopic rhythms occurred in the dogs and interstitial myocardial hemorrhages were occasionally demonstrated. Blood pressure recordings from animals and humans manifesting these "vagal effects" show a fall in arterial and a rise in venous pressure causing a reduction in the arterio-venous differential pressure.

1,826

Gamble, J. L., Jr., & R. S. Shaw 1948 ANIMAL STUDIES ON IMPACT NEGATIVE ACCELERATION (Air Material Command, Wright-Patterson AFB, Ohio) Rept. No. MCREXD-695-74G; ASTIA ATI-52 685

ABSTRACT: An investigation was made of the effect on dogs of high values of negative accelerations of brief duration such as would be encountered in escape from aircraft by downward seat ejection. Thirteen dogs were exposed to negative acceleration by means of drop tests from a 30 ft. tower, ejection from a horizontal catapult, or up the 100 ft. ejection seat tower. The magnitude of the negative accelerations ranged from 11 g to 50 g, and the durations from 0.04 to 0.3 secs. Minor injuries resulted from these exposures, but no serious irreversible or fatal injuries were observed, and there was no evidence of brain injury. This information cannot be applied to humans until experiments have been performed with animals of anatomical dimensions similar to humans.

1,827

Gamble, J. L., R. S. Shaw, J. P. Henry, & O. H. Gauer 1949 CEREBRAL DYSFUNCTION DURING NEGATIVE ACCELERATION. J. Appl. Physiol. 2:133-140.

ABSTRACT: Six humans were studied in the upright seated posture during exposure to headward centrifugal forces up to 3 g in intensity. Electrocardiograms were taken and arterial and venous blood pressures recorded at

head level. Dogs and rabbits were exposed to accelerations up to 7 g in intensity and 2 minutes in duration. Electrocardiograms and electroencephalograms and arterial and venous pressures were recorded. The electrocardiograms showed vagus block with marked bradycardia and periods of asystole. Electroencephalograms taken immediately after negative acceleration revealed abnormal waves suggestive of brain disturbances.

The arterio-venous pressure differentials in both men and animals pointed to a decreased brain perfusion pressure and it is concluded that cerebral symptoms occurring at levels of headward centrifugal force in the range of 3 to 5 g may be due to changes of reflex origin. These disturbances could result from the marked carotid sinus stimulation that accompanies the increase in blood pressure at head level.

1,828

Gamble, J.L. 1949 CEREBRAL DYSFUNCTION DURING NEGATIVE G.
J. Appl. Physiol. 2:133-140, Sept. 1949.

ABSTRACT: Six humans were studied in the upright seated posture during exposure to headward centrifugal forces up to 3 g. Electrocardiograms were taken and arterial and venous blood pressures recorded at head level. Dogs and rabbits were exposed to accelerations up to 7 g and two minutes in duration. Electrocardiograms and electroencephalograms and arterial and venous pressures were recorded. The electrocardiograms showed vagus block with marked bradycardia and periods of asystole. Electroencephalograms taken immediately after negative acceleration revealed abnormal waves suggestive of brain disturbances.

The arteriovenous pressure differentials in both men and animals pointed to a decreased brain perfusion pressure and it is concluded that cerebral symptoms occurring at levels of headward centrifugal force in the range of 3 to 5 g may be due to changes of reflex origin. These disturbances could result from the marked carotid sinus stimulation that accompanies the increase in blood pressure at head level. (J. Aviation Med. 22:81, 1951)

1,829

Gamow, G. 1962 GRAVITY
(New York: Doubleday & Company, Inc., 1962) (paperback)

SUMMARY: This publication is one of the Science Study Series, intended for the layman or secondary school student, and written by Dr. Gamow, Professor of Physics at the University of Colorado. Ten chapters contain the following topics: 'How Things Fall, The Apple and the Moon, Calculus, Planetary Orbits, The Earth as a Spinning Top, The Tides, Triumphs of Celestial Mechanics, Escaping Gravity, Einstein's Theory of Gravity, and Unsolved Problems of Gravity (Gravity and Quantum Theory, Antigravity). 157 pp.

1,830

Gandelot, H.K. & P.C. Skeels 1962 CONSIDERATIONS IN CRASH ENERGY ABSORPTION IN M.K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, 14-16, Sept. 1961, Pp. 291-224

1,831

Gantz, K. F., ed. 1959 MAN IN SPACE: THE UNITED STATES AIR FORCE PROGRAM FOR DEVELOPING THE SPACECRAFT CREW.
(New York: Duell, Sloan, and Pearce, 1959).

ABSTRACT: Contents include: "The Threshold of Space"; "From Aviation Medicine to Space Medicine"; "Basic Factors in Manned Space Operations"; "Biomedical Aspects of Space Flight"; "Biodynamics of Space Flight"; "The Engineered Environment of the Space Vehicle"; "Human Performance in Space "; "Weightlessness"; "Observation in High-Altitude, Sealed-Cabin Balloon Flight"; "Experimental Studies on the Conditioning of Man for Space Crews"; "Escape and Survival During Space Operations"; "Time Dilation and the Astronaut"; "The Spiral Toward Space"; "Human Factors Support of the X-15 Program"; "The U. S. Air Force Human Factors Program"; "Blueprint for Space"; and "The Military Impact of Manned Space Operations".

1,832

Garbell, M.A. 1960 SOVIET RESEARCH ON GRAVITATION: AN ANALYSIS OF PUBLISHED LITERATURE. (Science and Technology Section, Air Information Division, Library of Congress, Washington, D.C.) Rept. No. AID 60-61, Oct. 1960, ASTIA AD 246 700.

ABSTRACT: A survey is given of Soviet research in the field of gravitation with a comparison of Soviet and Western research. The appendix contains a translation of K.P. Stanyukovich's "The Problem of the Physical Nature of Gravity." A correlation is included of Stanyukovich's public statements on weightlessness with views expressed by other Soviet scientists.

1,833

Garber, T. B. 1958 ON THE ROTATIONAL MOTION OF A BODY RE-ENTERING THE ATMOSPHERE. (Rand Corp., Santa Monica, Calif.) Rept. No. P-1407; 19 June 1958

ABSTRACT: A formulation of the exact equations of motion of a body acted on by aerodynamic and gravitational forces, using inertial axes fixed in a spherical, nonrotating earth. After considering the nature of a typical re-entry path, the equations of motion are linearized. Solutions of the linearized equations are then obtained by the use of a modified WKBJ approximation method.

1,834

Gard, P. W., L. B. Cochran, & M. E. Norsworthy 1955 G x TIME FLIGHT PATTERNS
IN THE MANEUVERS AS FLOWN IN ADVANCED TRAINING UNITS 300 AND 301.
(Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.15-0100.
1.3.. 21 Feb. 1955

1,835

Garrill, R.A. & F.W. Snyder 1957 PRELIMINARY STUDY OF AIRCREW TOLERANCE
TO LOW-FREQUENCY VERTICAL VIBRATION.
(Boeing Airplane Company, Wichita 1, Kansas) Document No. D3-1189,
Issue No. 36, Contract No. AF 34(601)-2975

ABSTRACT: Five aircrewmembers were subjected to vertical harmonic motions of frequencies ranging from 3 to 30 cps with input accelerations ranging to a maximum of over 2.5 g. The subjective judgments of the effect of the vibrations on the aircrewmembers were reported by them in terms of a 5-point scale. The results of the subjective judgment tests indicate that aircrewmembers are able to tolerate unexpectedly high levels of vibratory acceleration for relatively short periods at the frequencies explored. Transmissibility of vibration from supporting structure adjoining the seat to just under the body of the seated airman varied with frequency. Generally, the higher frequencies were transmitted with a greater loss in amplitude of vibration (or g's) than were the lower frequencies.

The same aircrewmembers performed a tracking task while being subjected to vibration of various amplitudes and frequencies. The magnitude and duration of error in tracking was electrically integrated to produce a comparable score for each vibration condition. It was tentatively found that there were statistically significant decrements in performance under vibration conditions which were judged to be nearly "intolerable." In addition, there were some notable individual differences in response to the various vibration conditions.

1,836

Garrote Vega, M. 1942 ENFERMEDAD DE LAS ACELERACIONES DE LOS AVIADORES.
(ACCELERATION DISEASE OF AVIATORS). Medicina (Madrid) 10:330-337
April 1942.

1,837

Garrow, J.S. 1960 POSITIVE ACCELERATION AND THE RELEASE OF ANTI-DIURETIC HORMONE IN MAN. (RAF, Institute of Aviation Medicine, Farnborough) FPRC 1129, Nov. 1960. ASTIA AD 257 043

ABSTRACT: Three normal experienced centrifuge subjects were maintained with a water load of 250 ml. for three hours. At the middle of this period

they were exposed to 2 g positive for ten minutes. One subject always had an antidiuresis, one never, and one sometimes. The reasons for this are discussed. The retention of water was shown to be an effect of the release of about 100 milliunits of antidiuretic hormone; there was also a transient retention of solids, sodium and potassium, but this is not an antidiuretic hormone effect.

1,838

Garsaux, P. 1935 RESULTS OF THE EXPERIMENTS ON THE 12TH AND 17TH OF JULY 1918 FROM "THE ACTION OF CENTRIFUGAL FORCE IN DOGS". (Exper. Serv. Tech. Sect., Milit. Aeronaut., Office of Minist. of War, Paris, 1918). (In Schubert, G., Physiologie des Menschen in Flugzeug) (Berlin: J. Springer, 1935).

1,839

Garsaux, Malassez & Toussaint 1926 SUR LE VERTIGE DE ROTATION (On The Vertigo Of Rotation)
C. r. Acad. Sci. Paris 182:236-238

1,840

Garsaux & Strohe 1932 SES EFFETS SUR L'ORGANISME (Its Effects on the Organism)
Revue aeronautique internationale (Paris) 2(6): 467-475, Dec. 1932.

1,841

Gartmann, H., ed. 1952 RAUMFAHRT-FORSCHUNG (Space Travel Research)
(Munich: R. Oldenbourg, 1952)

ABSTRACT: Five contributions by different authors are introduced by a short preface by H. Gartmann. The contributions are (1) Willy Ley, The History of the Idea of Space Travel; (2) Professor Dr. W. Schaub, The Mathematical basis of Space Flight; the Two-body problem and the Solvable Cases of the Three-body Problem; (3) R. Engel, Dr. U. T. Bodewadt, & K. Hanisch, The Satellite Station; (4) Professor H. Oberth, Stations in Space; (5) Professor Dr. H. von Diringshofen, Medical Problems of Space Travel. The book ends with some notes about the astronomical Societies existing in 1952, and the I. A. F., by H. H. Kollé, and a bibliography of space travel from 1919. (CARI)

1,842

Gartmann, H. 1957 MAN UNLIMITED
(New York: Pantheon Books, 1957)

ABSTRACT: Provides information for the layman on some of the psychophysiological stresses man may expect in space flight.

1,843

Gaspa, P. 1953 PROBLEMES PHYSIOLOGIQUES POSES PAR L'ASTRONAUTIQUE (PHYSIOLOGICAL PROBLEMS POSED BY SPACE FLIGHT)
Rev. path. gen. comp. 53: 1485-1503

1,844

Gatland, K.W. 1952 DESIGN FOR ZERO G: A MAN CARRYING ROCKET FOR
PHYSIOLOGICAL RESEARCH IN NEAR SPACE.
Flight (London), 61:774-775, 779, 27 June 1952.

ABSTRACT: The plans for a man-carrying rocket presented by R.A. Smith and H.E. Ross of Great Britain in 1946 are discussed. The rocket, which would be propelled by compressed air and alcohol, would have no tail fins. Its initial thrust would be 60,000 lb., its initial acceleration 9.8 ft/sec² (after 110 seconds, the effective acceleration would be 2 g). An automatic device would keep the rocket under control in case the pilot would black out. The essential feature of the missile would be its detachable cabin unit, jettisoned by an automatic compressed air device shortly before peak altitude would be reached. The cabin would descend by parachute. While outside the effect of the gravitational pull of the earth, various degrees of "weight" of the pilot may be attained by an axial spin imparted on the cabin by small peroxide-permanganate motors firing tangentially at right angles to its main axis. The range of the rocket has been calculated to be 200 miles, but 180-190 miles is considered the limit of safety. (Literatuuroverzicht (Over Ruimtevaartgeneeskunde) (Space Medicine Bibliography) (Technisch Documentatie en Informatie Centrum voor de Krijgsmacht, den Haag, Netherlands) Rept. No. TDCK-16903; ASTIA AD-227 817; Feb. 1959)

1,845

Gatland, K. W. & A. M. Kunesch 1953 SPACE TRAVEL
(New York: Philosophical Library, 1953)

1,346

Gatland, K.W. 1954 PROGRESS TOWARDS ASTRONAUTICS
Journal of the British Interplanetary Society 13(3): 142-166, May 1954

ABSTRACT: Review of achievements and opinions recorded in 1949 and progress made by 1954; aerodynamic research techniques developed in United States; specific research aircraft described; design of pressure suits; human centrifuge; research in high atmosphere; and guided missiles.

1,847

Gatland, K. W. 1958 ASTRONAUTICS IN 'AMSTERDAM
Flight 74:434-435.

ABSTRACT: Brief summaries of some of the papers read at the Ninth IAF Congress, 25-30 Aug. 1958. For another brief report, see Aeroplane, 95:389, Sept. 1958.

1,848

Gatland, K. 1959 MAN INTO SPACE.
Royal Air Force Flying Rev., 14(9):23-25

ABSTRACT: Reviews United States and Russian achievements in space flight in putting animals into space (monkeys and mice in Aerobee rockets in 1952; white mice in Thor-Able rockets; Gordo, the squirrel-monkey, in a Jupiter nose-cone in 1958; and the dog, Laika, in Sputnik II in 1957). Reviews specifications for the payload of the projected Mercury capsule.

1,849

Gatling, F. P. et al 1959 TRENDS IN NAVAL AVIATION INJURY PATTERNS.
(Aero-Medical Dept. U. S. Naval Aviation Safety Center) Rept. No. AM-3-59.

CONCLUSIONS:

1. Neither techniques nor equipment have been able to eliminate the lethal character of Naval aircraft accidents or prevent them from growing proportionately more lethal with the passing years.

2. If the forces involved in Naval aircraft accidents are sufficient to inflict an injury upon the personnel, the chances are about even that the injury inflicted will be a fatal one.

1,850

Gatling, Frank P., E. M. Wurzel, J. H. Britton 1959
TRENDS IN NAVAL AVIATION INJURY PATTERNS
Rept. no. AM-3-59 June ASTIA AD 227 326
(Naval Aviation Safety Center, Norfolk, Va.)

ABSTRACT: Data from the Naval Aviation Safety Center were accumulated from accident reports from the close of World War II (1946) through 1958. The data were examined and tabulated by specific accident type, phase, and damage classifications in current use at the Safety Center. Corresponding tables were constructed for fatal injuries. In addition, the data were developed for bailouts and ejections and their related injury patterns. Taking the data in their entirety, they indicated that there has been a gradual shift over the years in the aircraft accident pattern. For instance, changes in the type of accidents, the phases in which they begin, the methods of escape and so forth, are occurring. Perhaps because of a universal inability to develop a satisfactory classification system, inadequate reporting procedures, or perhaps because it does not exist, practically no shifting is discernible in the patterns of injury, with one exception. This exception has been the steady increase in the proportion of fatal injuries which has grown steadily over the years in Naval Aircraft accidents.
(AUTHOR)

1,851

Gaty, Jack 1958 HOW TO SURVIVE A FORCED LANDING
U.S. Army Aviation Digest 4: 39-41.

1,852

Gauer, O. 1938 DIE ATEMMECHANIK UNTER BESCHLEUNIGUNG (Mechanism of Respiration During Acceleration)
Luftfahrtmedizin 2: 291-294
See also: (Dept. of the Air Force) German Avia. Med., World War II, Vol. I

1,853

Gauer, O. 1938 KREISLAUF UND FLIEHKRAFTE (Circulation and Centrifugal Forces)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 99-102.

1,854

Gauer, O. 1938 ATMUNG UND BESCHLEUNIGUNG (Breathing and Acceleration)
Luftfahrtmedizinische Abhandlungen (Leipzig) 2: 190-191.

1,855

Gauer, O. 1939 UBER DEN NEUESTEN STAND DER BESCHLEUNIGUNGSFORSCHUNG IN DER LUFTFAHRTMEDIZIN (Concerning the Most Recent Developments in Acceleration Research in Aviation Medicine)
Deutsche Militärarzt. (Berlin) 4:497-503.

1,856

Gauer, O. & S. Ruff 1939 DIE ERTRAGLICHKEITSGRENZEN FUR FLIEHKRAFTE IN RICHTUNG RUCKEN-BRUST. (The Limits of Tolerance for Flying Stress in the Transverse Direction) Luftfahrtmedizin 3:225-230

1,857

Gauer, O. & S. Ruff 1939 DIE ERTRAGLICHKEITSGRENZEN FUR FLIEHKRAFTE IN RICHTUNG RUCKEN-BRUST. (The Limits of Tolerance for Flying Stress in the Transverse Direction).
Luftfahrtmedizin 3:225-230

ABSTRACT: Human subjects can tolerate for longer periods (more than 30 seconds) transverse flying stress from back to chest, corresponding to centrifugal acceleration of 8-10 g. The subjective symptoms are so slight that it appears likely that this limit might be considerable exceeded, especially for short periods. Prolonged centrifugal tests above 8 g, petechial hemorrhages appears in the ocular conjunctiva which disappear after two days. The degree of tolerable transverse stress in the back-chest direction depends largely upon the condition of the substrate upon which the body rests and upon the construction of an apparatus giving reliable support to the head at onset of acceleration and preventing injury by knocking against other structures. (J. Aviation Med. 10(3):156).

1,858

Gauer, O. 1939 LEISTUNGSGRENZEN DES ORGANISMUS IM SCHNELLFLUGZEUG (Performance Limits of the Organism in the Highspeed Aircraft)
Klinische Wochenschrift (Berlin) 18:139-140.

1,859

Gauer, O. & Hubertus Strughold 1943 ROENTGENCINEMATOGRAPHY IN THE SERVICE OF PHYSIOLOGICAL ACCELERATION RESEARCH (ROENTGENKINEMATOGRAPHIE IM DIENST DER PHYSIOLOGISCHEN BESCHLEUNIGUNGSFORSCHUNG)
ASTIA ATI 76 123

1,860

Gauer, O.H. & H. Wieckert 1944 DES ELEKTROKARDIOGRAMM DES MENSCHEN BEI
FLIEHKRAFTWIRKUNG (The Electrocardiogram of Man During the Effect of
Centrifugal Force)
Luftfahrtmedizin 9: 121

1,861

Gauer, O.H. 1944 FLIEHKRAFTERTRAGLICHKEIT BEI SAUERSTOFMANGEL (Centrifugal
Force Endurance During Lack of Oxygen)
Luftfahrtmedizin 9: 104

1,862

Gauer, O.H. 1944 RÖNTGENKINEMATOGRAPHISCHE DARSTELLUNG DER FLIEHKRAFTWIRKUNG
(Roentgencinematography Presentation of the Effects of Centrifugal Force)
Luftfahrtmedizin (Berlin) 9: 109
See also: (Dept. of the Air Force), German Aviation Medicine, World
War II, Vol. I., "X-ray Photographs During Acceleration"

1,863

MOTION PICTURE

Gauer, O. H. 1948 PRINCIPLES OF PROTECTION AGAINST NEGATIVE G.
(U.S.A.F., Wright Field, Ohio) BM-807-4162-AL, March 1948.

1,864

Gauer, O. H. 1950 THE ELECTROCARDIOGRAM DURING EXPOSURES TO CENTRIFUGAL FORCES
German Aviation Medicine World War II (Washington: Dept. of the Air Force,
1950), I, 570-576.

1,865

Gauer, O. H. 1950 THE PHYSIOLOGICAL EFFECTS OF PROLONGED ACCELERATION.
In German Aviation Medicine, World War II. (Washington: Dept. of the
Air Force, 1950), I, 554-583.

1,866

Gauer, O.H. 1950 EVIDENCE IN CIRCULATORY SHOCK OF THE ISOMETRIC PHASE OF VENTRICULAR CONTRACTION FOLLOWING EJECTION
(Paper, The American Physiological Society 59th Annual Meeting, Atlantic City, New Jersey, April 17-21, 1950) Federation Proceedings 9: 47

ABSTRACT: Simultaneous pressure recordings in the outflow region of the left ventricle and the aortic root were taken with 2 miniature manometers mounted on the tips of intracardiac catheters in an anesthetized dog. In the normal animal the summits of the ventricular and aortic pressure curves are congruent and considerable displacement of the ventricular catheter does not affect the pressure contours. If the catheter is kept in this region of the heart and circulatory shock is induced by exsanguination, unusual pressure records may be anticipated when the mean arterial pressure falls below 50 mm. Hg. While the ventricular curve follows an almost sine wave pattern with maximum pressures of 120-200 mm. Hg, the aortic pressure drops abruptly after reaching a peak of 50-60 mm. Hg. This picture is more pronounced in certain stages of adrenalin effect under shock. It can be readily explained by the assumption that the ventricle continues to contract isometrically with considerable force after having expelled its pathologically small blood content. This condition may help to account for the high incidence of subendocardial hemorrhages observed in humans and experimental animals suffering from prolonged circulatory shock.

1,867

Gauer, O., & J. P. Henry 1953 PHYSIOLOGY OF FLIGHT.
Air Force Manual 160-30 (Washington, D. C.: U. S. Government Printing Office, July 1953) pp. 133-134.

1,868

Gauer, O.H. and W.E. Hull 1954 PARADOXIC FALL OF PRESSURES IN THE RIGHT AND LEFT AURICLES AND THE PULMONARY ARTERY WITH A HEAD-DOWN TILT.
Fed. Proc. 13:52

ABSTRACT: Clark, Hooker and Weed (Am. J. Physiol. 109:166, 1934) first described a paradoxical fall of right auricular pressure when an anesthetized dog was tilted head down. This phenomenon was confirmed by Wilkins, Bradley and Friedland to exist also in humans (J. Clin. Investigation 29:940, 1950). By the use of intravascular miniature manometers (Science 112:404, 1950) placed at various locations in the left heart, the right heart and pulmonary artery in anesthetized dogs 2 pressures were recorded simultaneously while tilting the animals. It was found that the pressure fall with the head-down tilt is not confined to the right auricle but extends throughout the intrathoracic circulation. Measurements in humans by Asmussen, Christensen and Nielsen (Surgery 8:604, 1940) and the observation in our dogs that the arterio-venous pressure gradient across the lungs is reduced in the head-down posture suggest that the filling of the intrathoracic circulation is probably increased in spite of decreased intravascular pressures. This observation serves to emphasize the relative independence of volume and pressure as hemostatic parameters.

1,869

Gauer, O. H. 1955 VOLUME CHANGES OF THE LEFT VENTRICLE DURING BLOOD POOLING AND EXERCISE IN THE INTACT ANIMAL. THEIR EFFECTS ON LEFT VENTRICULAR PERFORMANCE. Physiol. Rev. 35:143-155.

1,870

Gauer, O.H. & G.D. Zuidema, eds. 1961 GRAVITATIONAL STRESS IN AEROSPACE MEDICINE
(Boston: Little, Brown, & Co., 1961)

ABSTRACT: Contents include: "The Physiology of Acceleration" by O.H. Gauer; "Historical Aspects of Gravitational Stress" by O.H. Gauer; "Definitions: Magnitude, Direction, and Time Course of Accelerative Forces" by O.H. Gauer; "The Hydrostatic Pressure" by O.H. Gauer; "Arterial Blood Pressure Responses to Positive Acceleration in Animals" by R.W. Lawton; "Blood Volume and Gravitational Stress" by O.H. Gauer; "The Circulation in Man Under Gravitational Stress and in the Giraffe" by O.H. Gauer; "Reflex Responses of the Circulation" by O.H. Gauer and E.W. Salzman; "Effect of Acceleration on the Heart" by H.O. Sieker; "Effect of Acceleration on Respiration" by O.H. Gauer and S. Bondurant; "Visual Performance Under Gravitational Stress" by W.J. White; "The Physiology of Acceleration-Performance" by J.L. Brown; "The Physiology of Positive Acceleration" by O.H. Gauer and G.D. Zuidema; "The Physiology of Negative Acceleration" by O.H. Gauer; "The Physiology of Combined Accelerations" by R. Edelberg; "Transverse G: Prolonged Forward, Backward, and Lateral Acceleration" by S. Bondurant; "Escape from High Performance Aircraft" by R.R. Hessberg; "Human Tolerance to Severe, Abrupt Acceleration" by J.P. Stapp; "Sub-Gravity and Weightlessness" by D.C. Simons; "Some Physiological Considerations of Space Flight" by G.D. Zuidema; "Clinical Evaluation of Low G Tolerance" by S.D. Leverett, R.U. Whitney and G.D. Zuidema; "The Hydrostatic Indifference Level" by O.H. Gauer; "The Hydrostatic Pressure in the Arterial Tree" by R.W. Lawton; and "Standardization of Human Centrifuge Techniques" by S.D. Leverett and G.D. Zuidema.

1,871

Gauer, O. H. 1961 BLOOD VOLUME AND GRAVITATIONAL STRESS.
In Gauer, O.H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961) Pp. 39-42.

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In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 90-114.

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In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 257-259.

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In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 134-139.

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- Gauer, O. H. 1961 THE CIRCULATION IN MAN UNDER GRAVITATIONAL STRESS AND IN THE GIRAFFE.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961) Pp. 43-45.

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Gauer, O. H. & S. Bondurant 1961 EFFECT OF ACCELERATION ON RESPIRATION.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 61-69.

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Gauer, O. H. & G. D. Zuidema 1961 THE PHYSIOLOGY OF POSITIVE ACCELERATION.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 115-133.

1,882

Gauer, O. H. & E. W. Salzman 1961 REFLEX RESPONSES OF THE CIRCULATION.
In Gauer, O. H. & G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine. (Boston: Little, Brown, and Co., 1961). Pp. 46-51.

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DESCENTES EN PARACHUTE (The Organic Injuries and Confusion Attributed to
Parachute Descent)
Bull. Med. 53:258-262.

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Gay, L. N. and P.E. Carliner 1949 PREVENTION AND TREATMENT OF MOTION
SICKNESS. I. SEA SICKNESS. Science, 109: 359

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Gay, L. N. and P.E. Carliner 1950 A SUBSEQUENT REPORT ON DRAMAMINE:
THE PROPHYLACTIC AND THERAPEUTIC CONTROL OF MOTION SICKNESS.
Bull. Johns. Hopkins Hosp., 36:254

1,886

Gazenko, O.G., & V.T. Yazdovsky n.d. SOME RESULTS OF PHYSIOLOGICAL
REACTIONS TO SPACE FLIGHT CONDITIONS. (The Academy of Science of the
U.S.S.R., Moscow)

ABSTRACT: Of special predominant importance for the biologist and physician are all aspects of investigations referring to the traditional problem of flight safety - protection of man and his potential fellow - travelers, the Earth's living organisms, from the detrimental influence of the external factors of space flight.

1,887

Gazenko. O. G. and V. B. Malkin 1958 BIOLOGY OF COSMIC FLIGHTS (Biologiya
Kosmicheskikh Poletov)
Trans. of Nauka i Zhizn' (USSR) 25(11):17-21, 1958. ASTIA AD 257 712.

ABSTRACT: The maintenance of normal living conditions for men during cosmic flights is the main task of cosmic biology. At the present time two groups of experiments are being conducted in the USSR: laboratory experiments and experiments in rockets with telemetric registration of biologic functions. Great difficulties have got to be overcome in solving re-entry at supersonic velocities. The effects of acceleration are being thoroughly studied, whereby it was found that acceleration of 10 G may be endured for several minutes. However, acceleration should be considerably lower than this to maintain operating ability. The authors describe the different operations of re-entry from a cosmic flight: catapulting of pressure cabin from the space ship, slowing down of descent by means of reactive drives and parachute, and finally landing of the cabin with a parachute. (CART)

1,888

Gazenko, O.G., and R.M. Baevskii 1961 PHYSIOLOGICAL METHODS IN SPACE
MEDICINE. (Fiziologicheskie metody v kosmicheskoi meditsine)
Iskusstvennye sputniki zemli (Moskva), 11: 68-77

ABSTRACT: Biotelemetrical methods in space medicine may be grouped along the following lines of application; (1) continuous monitoring of physiological functions in man or animals during space flight, (2) research on the effects of cosmic flight factors on the living organism, and (3) indicators of hazards to human life or the design of transducers and amplifiers, conversion or coding of medical information in a form suitable for input into the telemetry channels, programming of measurements, and the volume of information to be transmitted. A brief review is presented of experience with methods employed on the second and third Soviet space flights, i.e., electrocardiography, seismocardiography (modified ballistocardiography), pneumography, electromyography, actography, thermometry, and investigation of conditioned reflexes.

1,889

Gazenko, O. G. 1961 FUNDAMENTAL MEDICOBIOLOGICAL PROBLEMS OF SPACE FLIGHT
Meditcina i kosmicheskiye polety; sbornik 1961(9):13-27

ABSTRACT: Great achievements have recently been made in the field of space biology and space medicine. Rocket tests using animals were made to investigate the problems of noxious effects of cosmic factors on organisms, life preservation during space flight, and effects of acceleration and weightlessness. After the rocket tests, artificial satellites and space ships were launched. The vehicles carried equipment to record the pulse and respiratory rates, electrocardiogram, and motility of the animals on board. An evaluation of the recorded data showed that weightlessness had no strong effect upon the basic physiological functions. The effect of cosmic radiation after landing was also studied. (CARI)

1,890

Gazenko, O.G. & V.I. Yazdovskiy 1961 SOME RESULTS OF PHYSIOLOGICAL REACTIONS
TO SPACE FLIGHT CONDITIONS
Paper: XIIth International Astronautical Congress in Washington, D.C.,
October 4, 1961

ABSTRACT: In this discussion of the problems of overload and weightlessness, it is noted that a direct dependence of blood oxygenation on the rate of the blood stream testifies to the active participation of hemodynamics of pulmonary circulation in the oxygenation of the blood in the lungs. Thus, active rearrangement of pulmonary circulation can within certain limits insure the preservation of the necessary blood oxygenation level. However, in view of the apparent inequality of the volumes of blood ejected by the right and left ventricles, and taking into account the progressive storage of blood in the lungs, it is difficult to imagine the possibility of enduring increased gravitation for a lengthy period of time. In the study of the mechanisms of the action of overloads on the central nervous system, tests with aminazine as a means of blocking the impulsation at the level of the reticular formation of the middle brain offer promise. The differences in the frequency of pulse and breathing registered by Gagarin and Titov in centrifugal tests and during actual flight are attributed to emotional stress. With regard to weightlessness, the definite instability which has been indicated in the central apparatus which controls vegetative functions probably results from a change in the afferent impulses. Titov noted unpleasant sensations of vestibular character during the entire period of weightlessness. These require a careful analysis. (CARI)

1,891

Gazenko, O. 1962 SPACE BIOLOGY

Joint Publications Research Service, Washington, D.C.) JPRS-16677
Transl. from Nedelya (Moscow), Aug. 5-11, 1962, Pp. 6-7

ABSTRACT: This article discusses the role of biology in the space sciences in terms of the effects of the space environment on living organisms, and of the methods for selecting and training the astronaut. The space environment problems covered are weightlessness, overloading, radiation, and psychological stresses. The importance of considering these psychological factors when selecting astronauts is considered, and methods of training under isolated conditions are described.

1,892

Gazenko, O.G. 1962 SOME PROBLEMS OF SPACE BIOLOGY.

Akademiya nauk SSSR. Vestnik (Moskva) 32(1):30-34, Jan. 1962.
(Office of Technical Services, Washington, D.C.) 62-24338. 22 Mar. 1962.

ABSTRACT: The General Assembly of the Otdeleniye biologicheskikh nauk Akademii nauk SSSR (Department of Biological Sciences of the Academy of Sciences USSR) met in Moscow in 1961 to discuss problems of space biology. Over 30 reports were made and three films shown. N.M. Sisakyan, V.V. Parin, V.N. Chernigovskiy, and V.I. Yazdovskiy reported on "Problems of Space Biology and Physiology." In the report "Some General Results of Medical and Biological Experiments on Cosmic Earth Satellites", O.G. Gazenko, A.M. Genin, and V.I. Yazdovskiy discussed the main results of the biological experiments. The following three main problems exist at present in space biology: (1) clarification of effect of extremum factors of space on living terrestrial organisms; (2) elaboration of the biological fundamentals of safeguarding space flight; and life on other planets; (3) investigation of the conditions and forms of life beyond the earth. The factors of space flight affecting living organism may be divided into three groups: (1) overstrain, vibrations, engine noise, weightlessness; (2) ultraviolet, infrared, and visible ranges of radiation, ionizing radiation, concentration of gas and solid matter, temperature conditions, etc.; (3) insulation, restricted space, peculiarities of the microclimate, rhythm of life, nutrition, etc. The cosmonauts Yu. A. Gagarin and G.S. Titov are mentioned. Under the effect of weightlessness, the two Soviet cosmonauts felt a change of heart beat, dizziness, and sickness. The effect of overstrain and protective measures are serious problems. Perfection of biotelemetry is of great importance for the development of space biology. Lately, methods have been elaborated, permitting study of the coordination of arbitrary movements of man and the blood supply to the brain. (CARI)

1,893

Gazenko, O.G., N.N. Zhukov-Verezhnikov, and V. Ya Kop'yev 1962 TRANSLATIONS FROM NAUKA I ZHIZN' (MOSCOW) (SCIENCE AND LIFE), No. 9. SEPTEMBER 1962.

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"Five Days Which Shook The World" O.G. Gazenko, p. 1-12
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1,894

Gazenko, O. et al 1962 PHYSIOLOGICAL INVESTIGATIONS ON "VOSTOK-2" (AND) AVIATION MEDICINE
Trans. of Aviatsiya i Kosmonavtika (USSR) 44(7):29-34, 90-91, 1962.
(Joint Publications Research Service, San Francisco, Calif.)
Oct. 15, 1962 JPRS: 15706

1,895

Gazley, C., Jr. 1957 DECELERATION AND HEATING OF A BODY ENTERING A PLANETARY ATMOSPHERE FROM SPACE.
(The RAND Corporation, Santa Monica, Calif.) P-955, Feb. 18, 1957.
In Alperin, Morton, Stern, and Wooster, Eds. Vistas in Astronautics, (London: Pergamon Press, 1958)

ABSTRACT: An investigation of the conditions for a safe passage through a planetary atmosphere for instrumented or manned space vehicles, in view of the heating and deceleration to be expected. The dynamics and thermodynamics of several types of entry into the atmospheres of Venus, Earth, and Mars are considered. With the proper planetary approach, successful penetration of these atmospheres appears possible.

1,896

Gazley, C., Jr. 1957 DECLARATION AND HEATING OF A BODY ENTERING A PLANETARY ATMOSPHERE FROM SPACE (Rand Corp, Santa Monica, Calif.) Report no. P-955, 18 Feb 1957, ASTIA AD-221 678

ABSTRACT: The dynamics and thermodynamics of several types of entry into the atmospheres of Venus, Earth, and Mars are considered. Deceleration and heating are most severe for direct entry from a parabolic approach orbit. Appreciable reduction is obtained if the vehicle can be maneuvered into a circular satellite

orbit; entry by decay from a circular orbit is more gradual and both deceleration and heating occur higher in the atmosphere. Further reduction is obtained through the use of a body with gasdynamic lift. In all cases surface heating rates can be reduced by increasing the drag-mass ratio of the body, or the lift mass ratio in the case of a lifting body. Based on current estimates of planetary atmospheres and hypersonic gasdynamics, successful penetration of the atmosphere of Venus, Earth, and Mars appears feasible providing a proper planetary approach can be made. Heating and deceleration during entry into the atmospheres of Venus and Earth are almost identical. Heating and deceleration are appreciably lower for entry into the Martian atmosphere. (Author)

1,897

Gazley, C., Jr. 1958 THE PENETRATION OF PLANETARY ATMOSPHERES.
(Rand Corp., Santa Monica, Calif.) Rept. P-1322, 24 Feb. 1958.

1,898

Gaxley, C. 1960 ATMOSPHERIC ENTRY OF MANNED VEHICLES.
(Paper, IAS-NASA-RAND Manned Space Stations Symposium, April 1960, Los Angeles, Calif.) (Rand Corp., Santa Monica, Calif.) Research Memo No. RM-2579; 20 Jan. 1960. ASTIA AD 244 947.

ABSTRACT: The establishment of manned space stations requires the development of a reliable system for manned return to the earth. The requirements of such a system are reviewed and compared with the characteristics of various atmospheric-penetration techniques. While human deceleration limitations require the relatively low decelerations of gradual atmospheric entry (i.e., shallow path), the aerodynamic shaping of the vehicle and the method of surface-heat-absorption (or rejection) can conceivably cover a wide range of feasibly possibilities. The problems of orbital departure and the establishment of the initial-entry path, the dynamics of deceleration during entry, the aerodynamic heating of the vehicle surface, and the characteristics of various types of surface-protection systems are discussed. It is concluded that there are two types of feasible vehicles for manned entry: (1) a blunt, dense vehicle with little or no aerodynamic lift and a low-temperature ablation-cooling system, and (2) a radiation-cooled vehicle using a very light drag brake or lifting surface to achieve high-altitude deceleration. (Author)

1,899

Geddes, L. A. H. E. Hoff & W.A. Spencer 1961 SHORT DISTANCE BROADCASTING OF PHYSIOLOGICAL DATA
IRE Trans. on Bio-Medical Electronics, BME-8(3):168-172, July 1961.

ABSTRACT: The need for short distance transmission of physiological measurements being made on a hospital patient for diagnostic study, monitoring

of therapeutic techniques, or for teaching is discussed. The development of facilities to telemeter such data is described. A direct wire system is described and its advantages discussed. (Tufts)

1,900

Geer, R. L., & J. F. Rayfield 1959 DEVELOPMENT AND TEST OF A BALLOON BORNE MANNED VEHICLE (Wright Air Development Division, Wright - Patterson AFB, Ohio) WADD TR 59 - 226; ASTIA AD - 227 244

ABSTRACT: Balloon borne vehicles are well suited for use as a means of lighting parachutists to a very high altitude for test jumping. The design, fabrication, and testing of a vehicle, developed at the Wright Air Development Center for this purpose, are discussed in this report. Included are presentations of novel designs for a pressure-retaining hatch and an energy-absorbing parachute landing device.

1,901

Geertz, A. 1944 GRENZEN UND SONDERPROBLEME BEI DER ANWENDUNG VON SITZKATAPULTEN (Limits and Special Problems in the Use of Seat Catapults) Doctorate Thesis, 1944. Tech. Hochschule Stuttgart
ASTIA ATI 56946.

ABSTRACT: The limits of human tolerance to the forces imposed on the body during seat catapult ejection from aircraft were investigated. Methods of measuring short time accelerations are described, and the ejection velocity and flight path required for the seat to clear the tail of the aircraft are determined. Experimentally observed effects of seat ejection on the human body are described. The limitations of present seat catapults are shown, and an equation is derived of less than 0.5 sec duration is discussed, including the results of tests of the strength of the human vertebrae and other experiments.

1,902

Geertz, A., tr., V. J. Wulff 1945 TESTING OF CATAPULT MECHANISM OF THE TA 154 (Ernst Heinkel Flugzeugwerke G. m. b. H., Seestadt Rostock, Research Div.)
Research Rept. 4325, Supplement 4, Pages A-17116-A-17120, July 1944
Translated as Appendix 12 to Lovelace, W. R., E. J. Baldes, & V. J. Wulff,
The Ejection Seat for Emergency Escape from High-Speed Aircraft, ATI No. 7245

SUMMARY: The experimental results of the 5 new cartridge types used with a 700 mm. (27.6 in.) stroke, 75 mm. (2.95 in.) greater than the earlier value, indicated higher terminal velocities and lower peak accelerations with types HL 34/4, HO 33/4 and HO 36/4 than with HL 30/4 and a 625 mm. (24.6 in.) stroke (cp. V.B. 4325,

supplement 3). However, since the scatter also was broader, consideration of the lowest values indicates that a satisfactory solution has not yet been achieved. In other words, the application of a power-driven catapult seat mechanism must still be limited to aircraft types which only require a small amount of energy for safe ejection. The performance of the cartridge types HL 32/4 and HL 35/4 were inferior to that of cartridge type HL 30/4 with a 625 mm. (24.6 in.) stroke, so that increasing the stroke does not seem to be justified. The coefficient of fullness seems very favorable throughout - a fact which, considered together with the low weight, suggests that attempts should be made to improve this exercise.

1,903

Gell, C. F. 1951 COMPARATIVE ANALYSIS OF AN AIRBORNE ACCELERATION LABORATORY VERSUS THE HUMAN CENTRIFUGE.
J. Aviation Med. 22(5):375-381, 390.

SUMMARY: The object of this paper is to demonstrate that centrifuges per se will be useful for some time to come and that even the most rudimentary flying stress laboratory is a long way off in comparative consideration of accomplishment, working space, and cost of operation. Since the Johnsville centrifuge will generate 40 G in less than 7 seconds and indefinitely sustain that stress at a simulated altitude of 60,000 feet, it is considered reasonable to think in terms of an actual flying laboratory that would hold 20 G for 1 minute at 60,000 feet. An investigation into the engineering possibilities for an aircraft of this type was conducted and the results indicated that, as an instrument of physiological investigation, its limitations would negate its usefulness for the following basic reasons: (1) cost of airplane and its operation, (2) extremely limited time of maneuvering, and (3) lack of space for subjects and physiological sensing devices. It appears then that the effort and money in engineering and constructing the human centrifuge is small in comparison with what would be required to even approximate the capabilities in an aircraft.

1,904

Gell, C.F. 1951 MODIFICATION OF F7F, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, INFLIGHT EVALUATION OF THE SEAT
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5104; Sept. 12, 1951
ASTIA AD 133 233

ABSTRACT: An F7F aircraft was modified to include a supine seat and related components in order to evaluate and correlate previous experimental findings concerning the effect of supination on pilot tolerances to G forces. A syllabus consisting of seven hourly periods, six of which were to be in the air, was formulated to instruct test pilots in flying the supine seat. Control of the aircraft was maintained through a PIK autopilot and instruments while the pilot was supinated. The reactions of three subjects tested has been very favorable.

1,905

Gell, C. F. & D. Cranmore 1952 A STUDY OF FLUID SHIFTS IN SMALL RODENTS EXPOSED TO ACCELERATIVE STRESS.
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-5201, 7 Apr. 1952.
ASTIA ATI 150 806

ABSTRACT: A study was instituted to investigate fluid shifts and related physiological phenomena in small animals under acceleration stress by a quick-freezing fixation technique. Following preliminary experimentation an apparatus was designed and constructed that made possible the actual fixation of anatomical and physiological changes of the rat under centrifugation stress.

The results of studies on 60 rats (200 to 300 gms.) with this technique indicate:

1) That freezing to a completely solid state by immersion in liquid nitrogen was accomplished in approximately 150 seconds. Static conditions for circulation and respiration were, however, imposed much faster, in the order of 15 seconds or less.

2) That the quick-freezing technique in itself did not cause any apparent fluid shifts in the tissues of the rat. There was no demonstrable exchange of fluid from completely frozen to partially frozen tissues.

3) That anatomical changes such as organ displacement and edema are fixed under actual centrifugation stress in a striking and incontrovertible frozen picture.

4) The implications of this quick freezing technique in the development of new avenues for the investigation of acceleration stress physiology are discussed. (DACO)

1,906

Gell, C.F. 1952 MODIFICATION OF F7F, INSTALLATION OF SUPINE SEAT AND RELATED COMPONENTS, IN-FLIGHT EVALUATION OF THE SEAT
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-L5208, Dec. 10, 1952
ASTIA AD 133 234

ABSTRACT: A supine seat was installed in an F7F fighter plane and tested. Its relatively small size, and points of constriction, as well as the lack of visibility and difficulty of escape it imposed, were found to be undesirable features. In flight, control of the plane was made possible by means of an autopilot (PIK) device allowing the pilot to change position if desired. Additional tests on the human centrifuge are recommended to investigate the physiological implications of the supine seat under acceleration. It is further recommended that the assembly be modified for stick and rubber installation, improved instrument, visibility, and greater physical comfort.

1,907

Gell, C.F. & D. Cranmore 1953 A STUDY OF FLUID SHIFTS IN SMALL RODENTS EXPOSED TO ACCELERATIVE STRESS
Journal of Aviation Medicine 24(1):48-56, Feb. 1953

ABSTRACT: A study was instituted to investigate fluid shifts and related physiological phenomena in small animals under accelerative stress by a quick-freezing fixation technique. Following preliminary experimentation, an apparatus was designed and constructed that made possible the actual fixation of anatomical and physiological changes of the rat under centrifugation stress. The results of studies on sixty rats (200 to 300 gms.) with this technique indicate: (1) That freezing to a completely solid state by immersion in liquid nitrogen was accomplished in approximately 150 seconds. Static conditions for circulation and respiration were, however, imposed much faster, in the order of 15 seconds or less. (2) That the quick-freezing technique in itself did not cause any apparent fluid shifts in the tissues of the rat. There was no demonstrable exchange of fluid from completely frozen to partially frozen tissues. (3) That anatomical changes such as organ displacement and edema are fixed under actual centrifugation stress in a striking and incontrovertible frozen picture. (4) The implications of this quick-freezing technique in the development of new avenues for the investigation of accelerative stress physiology are discussed.

1,908

Gell, C.F. 1954 EVALUATION OF ANTI-BLACKOUT SUIT WITH PARACHUTE/SAFETY HARNESS AS INTEGRAL PART
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR2, March 9, 1954

ABSTRACT: The subject anti-blackout suit met the requirements of para. 4.2.3 of MIL-S-5085 (Aer) in providing adequate G protection for the subject after being tested and evaluated on the human centrifuge. However, this protection was accompanied by subjective discomfort of excessive pressure from the belly bladder even though the G valve was on the low setting. The same subject had no comparable discomfort when protection of the same magnitude of G was provided by a conventional anti-blackout suit attached to the G valve on the high setting.

1,909

Gell, C.F. & H.N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION
J. Aviat. Med. 25(6): 568-577

ABSTRACT: A healthy male subject can tolerate 15 transverse G while supinated at 85 degrees for five seconds with no indication of impending blackout. At 77 degrees backward tilt, the anti-blackout protection does not exceed that

protection afforded by an inflated anti-G suit with the subject in the upright seated position. To insure full protection against blackout, the subject must be supinated beyond 77 degrees backward tilt. At relatively low G in the 65-77 degrees backward tilt position, a sense of fullness, pressure, or burning sensation often appears in the thorax indicating, again, that the optimum position is beyond 77 degrees backward tilt. The pressure-pain occasionally elicited in the thorax is due to pressure of the rib cage on the thoracic cavity as well as the pressure on the abdomen forcing the abdominal contents against the diaphragm. (Author)

1,910

Gell, C. F. & H. N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION.
(U.S. Naval Air Development Center, Aviation Medical Acceleration Lab., Johnsville, Pennsylvania). NADC-MA-5406, June 30, 1954. ASTIA AD 36856

SUMMARY: Subsequent to the extensive physiological investigations of Stauffer at Pensacola, Florida on the effectiveness of supination in protection against blackout, a supinating pilot's seat was installed in a F7F-2N airplane and flight tested as a prototype.

These test flights indicated the need for further investigation in order to determine the actual positive G protection at varying degrees of supination.

A supine seat, capable of back tilting at 10° increments to 85° backward tilt, was built and installed on one of the swinging platforms of the Aviation Medical Acceleration Laboratory Centrifuge.

In this, as in previous studies, it was demonstrated that when fully supine, exposure to 15 transverse G can be tolerated for 5 seconds with no indication of impending blackout.

It was further demonstrated that at 77° backward tilt the anti-blackout protection did not exceed that protection afforded by an inflated anti-G suit with the subject in the upright seated position.

This study indicates that to receive the full protection against blackout afforded by supination the subject must be back tilted beyond 77°.

A close relationship was observed between the degree of backward tilt of the seat, the vertical angle of the retinal-aortic dimension, and the degree of blackout protection afforded. (DACO)

1,911

Gell, C. F., B. D. polis & O. Bailey 1954 STUDY OF THE EFFECTS OF ACCELERATION STRESS ON FLUID AND ELECTROLYTE DISTRIBUTION IN MAMMALIAN SYSTEMS.
(Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5401, 9 Feb. 1954.
ASTIA AD 36 633.

ABSTRACT: An investigation was made of the Na and K content of Wistar rat brains when the animals were subjected to experimental acceleration stress and tie stress. The concentration of brain K increased over the controls by the application of acceleration and tie stress. No significant changes occurred in the brain Na content of the stressed animals as compared to the controls. There was an increase in the H₂O content of the brain when the tie stress was prolonged; this was not the case with acceleration stress. A marked shift in ratio of K to Na occurred in the brain of the rats exposed to acceleration stress when compared to tie stress and normal control. An electrolyte imbalance occurred in the brain of Wistar rats under acceleration stress.

1,912

Gell, C. F., B. D. Polis, & O. Bailey 1955 EFFECT OF ACCELERATION STRESS ON THE POTASSIUM AND SODIUM CONCENTRATION OF RAT BRAIN. American J. Physiology 183:23-26, Oct.-Dec. 1955
NOTE: Reel 7, Flash 6, Items 9 and 10

ABSTRACT: An investigation was made of the sodium and potassium content of Wistar rat brains after the animals were subjected to experimental acceleration stress and tie stress. The significant findings of this study was the marked shift in ratio of potassium to sodium that occurred in the brain of the rats exposed to acceleration stress when compared to tie stress and normal control. The results indicate that an apparent electrolyte imbalance occurs in the brain of Wistar rats under acceleration stress. This aberration may be of value for further study of the factors contributing to disturbances in brain metabolism and function under acceleration stress. (AUTHOR)

1,913

Gell, C. F. & D. Cranmore 1956 DISLOCATION OF ORGANS AND TISSUES OF RATS EXPOSED TO ACCELERATION STRESS: POSSIBLE PHYSIOLOGIC SIGNIFICANCE.
J. Aviation Med. 27(6):497-504, Dec. 1956.

ABSTRACT: A study was conducted using a quick freeze technique for the anatomic fixation of rats exposed to graduated increments of acceleration stress and time. (1) Visceral displacement reaches a maximum at a relatively low level of acceleration stress in a short period of time in the application of positive, negative or transverse g. (2) Elongation and torsion of the lungs in positive g and compres-

sion of the lungs in negative g supports the postulate of Cranmore that death from acceleration stress is due to anoxic anoxia. (3) Elongation of the heart and great vessels in positive g and compression of these organs in negative g impedes tissue oxygenation by reducing the blood flow. (4) The possibility of tumbling creating pathologic changes due to a piston-like action caused by the alternating displacement of the visceral contents of the cavities above and below the diaphragm appears reasonable, in view of the rapidity of displacement response to applied acceleration stress. (5) The application of transverse g creates little displacement of viscera with no significant physiologic disturbance at much higher g levels than can be applied in positive or negative g. (Author)

1,914

Gell, C. F. 1961 ACCELERATION COMMITTEE --- PANEL OF AEROSPACE MEDICINE ---
AGARD --- NATO COUNTRIES.
(Report to Symposium on Acceleration Stress, San Antonio, Texas)

ABSTRACT: The above titled committee has ten members who represent the NATO countries that are actively engaged in acceleration research. The Panel meets once yearly in one of the NATO countries at which time presentations of mutual work are reviewed and plans for joint effort are discussed and implemented. The Committee itself is appointed by the Executive Council of the Aerospace Medical Panel. Approximately ten collaborators who are well known in the field of acceleration are considered members ex Officio and actively assist in the programs.

In this report, the members point out their areas of investigation, mainly in the field of acceleration. They also review their program of re-defining acceleration and of transcribing bits of related data into meaningful graphs.

1,915

Gell, C. F. 1961 TABLE OF EQUIVALENTS FOR ACCELERATION TERMINOLOGY.
RECOMMENDED FOR GENERAL INTERNATIONAL USE BY THE ACCELERATION COMMITTEE
OF THE AEROSPACE MEDICAL PANEL, AGARD.
Aerospace Medicine 32(12):1109-1111, Dec. 1961.

ABSTRACT: A table of equivalents for the terminologies of acceleration in common usage is presented. The terminologies group themselves into two basic configurations which are set up as Tables A and B. Table A contains the two acceleration terminologies that are commonly used in the field of aeronautics when reference is made to the direction of acceleration of a mass. Table B refers to the inertial reaction of the tissues and fluids of the intact mammalian body in response to the acceleration applied to the whole body. In the first instance the small letter g is used; in the second, the capital letter G is recommended. (Tufts)

1,916

Gelman, R. & J.L. Helfrich 1954 PERFORMANCE OF CATAPULTS IN VARIOUS FORCE FIELDS

(Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) Proj. No. TS1-15-C44; Memo. Rept. No. MR-594; Oct. 1954; ASTIA AD 48517

ABSTRACT: The conclusions reached in this report are not to be considered either final or exact, as experimental firings have not been made under the conditions being considered. These results have been obtained by extrapolating the ballistics equations and comparing the results obtained with those of such experimental firings as seemed to be applicable.

The catapults considered were the models M1, M2, M3, M4, T10, and T14 in force fields of one, three, five, and seven g's. Of particular interest was the performance of the M4 catapult in a 3-g field.

The results indicated that all final velocities would be very little affected by a 3-g field. In addition, final velocities of the M1, M3, and T10 would be little affected by a 5-g field. For all catapults, increasing the force field beyond either three or five g's caused noticeable decreases in final velocities. These conclusions are listed in more detail in tabular form.

1,917

Gemmill, C.L. 1943 THE EFFECTS OF ACCELERATION ON MAN
In Physiology In Aviation (Springfield: Baltimore: Charles C Thomas, 1943) pp. 94-99

ABSTRACT: In this chapter, there is a description of the effects of acceleration on man. These effects are mainly in the circulatory system and produce profound changes in the aviator during dive bombing attacks and fast maneuvers.

1,918

Gemmill, C.L. 1943 PHYSIOLOGY IN AVIATION.
(Springfield, Ill.: Charles C. Thomas, 1943)

NOTE: A study of the physiological reactions which are found to take place in men taking part in plane flights. The material covered is essentially that included in the lectures given at the School of Aviation Medicine, Naval Air Station, Pensacola, Florida, where the author is an instructor.

CONTENTS: Physiology applied to aviation. Historical introduction. Air. Gas laws and their application. Mechanics of respiration. Alveolar air. Carriage of oxygen by the blood. Carrying capacity of the blood for carbon

dioxide. Control of respiration. Acute effects of anoxia. Use of oxygen in aviation. Chronic effects of altitude. Aeroembolism. Circulation. Control of the circulation. Effects of acceleration on man. Temperature control of the body. Physiology of muscular exercise. Instrument flight, by Lieutenant Frederick B. Lee, (T), USNR. Index.

1,919

Gemmill, C.L. 1943 PHYSIOLOGY IN AVIATION
(Springfield; Baltimore: Charles C Thomas, 1943)

CONTENTS:

- Chapter
1. Physiology Applied to Aviation
 2. Historical Introduction
 3. The Air
 4. The Gas Laws and Their Application
 5. Mechanics of Respiration
 6. Alveolar Air
 7. The Carriage of Oxygen By the Blood
 8. The Carrying Capacity of the Blood for Carbon Dioxide
 9. The Control of Respiration
 10. The Acute Effects of Anoxia
 11. The Use of Oxygen in Aviation
 12. The Chronic Effects of Altitude
 13. Aeroembolism
 14. The Circulation
 15. The Control of the Circulation
 16. The Effects of Acceleration on Man
 17. The Temperature Control of the Body
 18. The Physiology of Muscular Exercise
 19. Instrument Flight

1,920

Gemmill, C.L. 1946 AVIATION PHYSIOLOGY
Ann. Rev. Physiol. 8:499-514

ABSTRACT: Some of the experimental work in four fields of aviation physiology is reviewed. Through intensive efforts of Army, Navy, and civilian laboratories several important and useful discoveries have been made in aviation physiology during the war years. Satisfactory oxygen regulators and masks have been developed through the cooperation of physiologists and engineers. Pressure breathing equipment has been perfected which enables some men to reach 50,000 feet. Anti-"g" suits have been devised for protection against the forces of acceleration. Another development has been the teaching of practical physiology to thousands of aviators. Lectures, demonstrations of the effects of altitude on man, and runs in the low pressure chambers have been given to nearly every aviator in our Army and Navy. The teaching of night vision is another example of applying physiology to large numbers of individuals. It is in these fields of instruction that physiologists have made their greatest contribution to aviation medicine in this war.

In contrast to these achievements there have been many disappointments. No test has been devised for "bends" which will predict whether an individual is more or less susceptible to aero-embolism than his partner. No practical substitute for oxygen has been discovered which will raise a man's altitude tolerance. We do know after four years of war much more about how man and animals react to altitude. Most of this knowledge has had no immediate practical value. However, the effort has not been wasted for some of this knowledge may be useful in clinical medicine in studying respiratory and circulatory diseases.

1,921

General Electric Company 1960 FLIGHT CONTROL STUDY OF A MANNED RE-ENTRY VEHICLE.

(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 60-695, Volume II. ASTIA AD 249 400

ABSTRACT: Many of the investigations pertaining to the operation of the energy management concept were performed on an analog computer. The details of the analog simulation and the results obtained are presented in Appendix I. This appendix also contains detailed information concerning the functional capabilities of the energy management system.

Appendix II presents the error analysis which provides justification for statements in Volume I concerning the usefulness of particular systems.

Appendix III is concerned with the aerothermodynamic considerations of glide vehicles. The major contribution of this appendix to the study program is to show that the heat protection systems required for glide vehicles are reasonable from a weight standpoint.

Information concerning the dispersion of ballistic vehicles is presented in Appendix IV. The various sources of dispersion are discussed and the impact errors resulting from error sources are calculated. It is concluded that the ultimate impact point dispersion is about ten nautical miles.

Appendix V shows how a variable drag device can be used to limit the maximum deceleration. The results presented herein should be helpful in evaluating the utility of variable drag devices in terms of human tolerance to deceleration and the thermodynamic and mechanical feasibilities of specific types of devices.

1,922

Generales, C. D. J., Jr. 1960 SPACE MEDICINE AND THE PHYSICIAN.
New York State J. of Medicine 60(11):1741-1761, June 1, 1960

ABSTRACT: Reviews the background of man's desire to travel through interplanetary space from year 1500 A.D. Discusses various aspects of space medicine, including psychological problems of weightlessness, isolation, day-night cycle. Lists human factors in space travel which need further research. The task of space medicine is to adjust man to space environmental conditions which affect him physically and psychologically.

1,923

George, M. B. T. 1959 ATTITUDE CONTROL FOR SPACE VEHICLES.
Astronautics 4:34, March 1959.

1,924

George, T.A. 1961 PRINCIPLES OF ATMOSPHERIC REENTRY (Office of the Director of Defense Research and Engineering, Washington, D.C.) Nov. 1961
ASTIA AD-274 999

ABSTRACT: This paper summarizes the entire field of a space vehicle's reentry into the earth's atmosphere. It is assumed that the vehicle, either lifting or nonlifting, is approaching the earth from outer space and must pass through all densities of the atmosphere as it enters at high altitude until it lands at approximately sea level. During the vehicle's descent through the earth's atmosphere, deceleration must not exceed a maximum value, the total heat taken in by the vehicle must not be excessive, and the vehicle's skin or internal temperature must be limited. Methods of attaining these objectives are explained (Author)

1,925

George Washington University 1960 HUMAN RESOURCES RESEARCH OFFICE BIBLIOGRAPHY OF REPORTS July 1, 1959 to June 30, 1960
(The George Washington University, Human Resources Research Office, operating under contract with The Department of the Army) ASTIA AD 241 451

ABSTRACT: This bibliography lists publications of the Human Resources Research Office, its Training Methods Division, and its Human Research Units, from July 1, 1959, to June 30, 1960. It supplements the Bibliography of Reports as of July 30, 1959, issued in July 1959, and replaces the six-month supplement issued in January 1960.

Part I of this annual supplement presents in chronological order an annotated list of reports in the series issued by the Director's Office during FY 1960. Part II organizes reports by Task and by originating Division or Unit; it lists reports issued by the Units and the Training Methods Division, or approved for distribution during the past fiscal year, as well as listing those published by the Director's Office.

1,926

Georgiyev, O. 1959 GETTING READY FOR OUTER SPACE (Sobirayemaya v Kosmos).
Trans. from Sovetskiy Soyuz (USSR) (10):12-14, 1959.
(Office of Technical Services, Washington, D.C.)
Oct. 30, 1959 60-13191

1,927

Gerathewohl, S. J. 1953 DIE PSYCHOPHYSIOLOGIE DER BESCHLEUNIGUNGS-WIRKUNG
(Psychophysiology of Acceleration)
Weltraumfahrt 4:15-19.

1,928

Gerathewohl, S.J., H. Strughold, and W.F. Taylor 1956 THE OCULOMOTORIC PATTERN
OF CIRCULAR EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION (USAF School of
Aviation Medicine, Randolph AFB, Texas) Report 56-33.

1,929

Gerathewohl, S. F., H. Strughold & W. F. Taylor April 1957 THE OCULOMOTORIC
PATTERN OF CIRCULAR EYE MOVEMENTS DURING INCREASING SPEED OF ROTATION.
J. Exp. Psychol. 53(4), April 1957.
See also (School of Aviation Medicine, USAF, Randolph AFB, Texas) Rept.
No. 56-33, April 1956. ASTIA AD-108 300

ABSTRACT: The basic pattern of guided circular eye movements during increasing rotational target speed was photographed and analyzed with the use of a Master Ophthalmograph. Experiments were made with (1) saccadic eye movements at a constant speed of 15 r.p.m.; (2) during increasing speeds from 20 to 45 r.p.m.; and (3) from 40 to 85 r.p.m. As the rotational speed of the target increases, the movements of the eyes become more frequent, extensive, and irregular. It is concluded that a rotating target can be visually fixated without strain up to a speed of about 30 r.p.m.; that some subjects lose pace in the range between 30 and 60 r.p.m.; and that visual pursuit is extremely difficult at speeds higher than 75 r.p.m. Beyond this limit the oculomotoric pattern disintegrates completely. (AUTHOR)

1,930

Gerathewohl, S.J. & G.R. Steinkamp 1958 HUMAN FACTORS REQUIREMENTS FOR PUTTING
A MAN INTO ORBIT
In: Hecht, F., ed., IXth International Astronautical Congress, Proceedings, 1958.
(Vienna: Springes - Verlag, 1959)

1,931

Gerathewohl, S.J. 1959 EQUIPMENT FOR MANNED SPACE CAPSULE AND LUNAR
BASES. (Army Medical Services, Research and Development Command,
Bioastronautics Research Unit) Special Report. 28 Feb. 1959.
ASTIA AD 227 226

ABSTRACT: The construction of second and third generation boosters developing several million pounds of thrust to manned space flight. This not only requires the advancement of engineering capabilities and space technology, but also demands an acceleration of bioastronautical research and the projection of information already available into the region of outer space. Equipment variables which are thought to be significant for man's exploration and survival in space are discussed, and sets of research task necessary for the accomplishment of manned space missions are proposed.

1,932

Gerathewohl, S.J. 1959 PSYCHOLOGICAL PROBLEMS OF SELECTION, HOLDING,
AND CARE OF SPACE FLIERS. (Army Medical Services, Research and Develop-
ment Command) Reports control symbol CSCRD-16-4, 13 Nov. 1959.

ABSTRACT: The psychological requirements for the selection, holding, and care of space fliers is investigated. The selection methods are scrutinized as to their validity and applicability to the problem. Examples of related activities are presented. The main purpose of the preparations must be to establish a natural pattern of conditioning and familiarization, to develop skill and abilities parallel to the development of the hardware, and to maintain the interest and motivation of the astronaut. (Author)

1,933

Gerathewohl, S.J. 1959 SURVIVAL IN SPACE.
Space Journal, March-May 1959

1,930

Gerathewohl, S.J. & G.R. Steinkamp 1958 HUMAN FACTORS REQUIREMENTS FOR PUTTING A MAN INTO ORBIT
In: Hecht, F., ed., IXth International Astronautical Congress, Proceedings, 1958.
(Vienna: Springes - Verlag, 1959)

1,931

Gerathewohl, S.J. 1959 EQUIPMENT FOR MANNED SPACE CAPSULE AND LUNAR BASES. (Army Medical Services, Research and Development Command, Bioastronautics Research Unit) Special Report. 28 Feb. 1959.
ASTIA AD 227 226

ABSTRACT: The construction of second and third generation boosters developing several million pounds of thrust to manned space flight. This not only requires the advancement of engineering capabilities and space technology, but also demands an acceleration of bioastronautical research and the projection of information already available into the region of outer space. Equipment variables which are thought to be significant for man's exploration and survival in space are discussed, and sets of research task necessary for the accomplishment of manned space missions are proposed.

1,932

Gerathewohl, S.J. 1959 PSYCHOLOGICAL PROBLEMS OF SELECTION, HOLDING, AND CARE OF SPACE FLIERS. (Army Medical Services, Research and Development Command) Reports control symbol CSCRD-16-4, 13 Nov. 1959.

ABSTRACT: The psychological requirements for the selection, holding, and care of space fliers is investigated. The selection methods are scrutinized as to their validity and applicability to the problem. Examples of related activities are presented. The main purpose of the preparations must be to establish a natural pattern of conditioning and familiarization, to develop skill and abilities parallel to the development of the hardware, and to maintain the interest and motivation of the astronaut. (Author)

1,933

Gerathewohl, S.J. 1959 SURVIVAL IN SPACE.
Space Journal, March-May 1959

1,934

Gerathewohl, S.J., & G.R. Steinkamp 1959 HUMAN FACTORS REQUIREMENTS
FOR PUTTING A MAN IN ORBIT. Astro. Acta 5:73-84

ABSTRACT: Man's survival and operational capability in an artificial earth satellite depend primarily on the reliability and accuracy of the launching, guidance and recovery operations on the one hand, and on the perfection of his engineered environment, on the other. Although the human organism is more sensitive and vulnerable than that of man's other creatures, his greater versatility and higher intelligence assure his survival under new and threatening circumstances. If a physiologically habitable environment is created, and if its functions during orbiting are secured, the human passenger can withstand the stresses involved in manned satellite operations of a limited duration.

1,935

Gerathewohl, S.J. 1959 EQUIPMENT FOR MANNED SPACE CAPSULES AND LUNAR
BASES. (Army Medical Research Labs., Bioastronautics Research Unit,
Ft. Knox, Ky.) Special Rept. 28 Feb. 1959.

ABSTRACT: The construction of second and third generation boosters developing several million pounds of thrust leads by necessity to manned space flight. This not only requires the advancement of engineering capabilities and space technology, but also demands an acceleration of bioastronautical research and the projection of information already available into the region of outer space. Equipment variables which are thought to be significant for man's exploration and survival in space are discussed in this first report, and sets of research task necessary for the accomplishment of manned space missions are proposed.

1,936

Gerathewohl, S.J., S.W. Downs, Jr., et al. 1960 BIO-TELEMETRY IN THE NOSE
CONES OF THE U.S. ARMY JUPITER MISSILES. Reprint: IRE Trans.
MIL-4:288-302, April- July 1960.

ABSTRACT: The primary objective of the bio-flights was to demonstrate that animals can survive ballistic flights unharmed, if an adequate life support is provided. The secondary aim was to design, construct and test such a system to develop countdown and launching procedures, and to recover the specimen after flight. Technical and scientific information on the physiologic and behavior status of the animal was to be gained thru telemetry. Although the first animal was lost, valuable data were obtained on the functioning of the bio-package during flight. They served to improve the second experiment, which added substantially to the understanding of the biomedical requirements for space flight. Able and Baker were the first primates recovered unharmed from an operational IREM nose cone after reentering the earth's atmosphere. (Authors)

1,937

Gerathewohl, S. J. & B. E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES
In: National Aeronautics & Space Administration, Washington, D. C.;
Bioastronautics. NASA SP-18, Dec. 1962.

ABSTRACT: The bioastronautical program of the National Aeronautics and Space Administration is based on the classical disciplines of the life sciences as major areas of research. Since man is a terrestrial organism, he has been studied almost entirely under this aspect. However, with his entry into extraterrestrial space, new conditions arise which warrant intensive investigation. Generally, the physiologic research concerns the fundamental bases of human functions, the determination of man's tolerances, and his protection against stressful alterations of his biological homeostasis. The behavioral studies mainly deals with man's performance capabilities and limitations under normal and extreme conditions. In accordance with NASA's mission, the work in these areas is primarily applied and supporting in nature; but there is also a need for basic research. The scope of these investigations reaches from such academic problems as biologic pattern formation and localization at the cellular level to the practical application of cybernetic principles for the monitoring of the organism and the complex systems, communication and information theory, and orientation and navigation processes in animals and man. Also included in this program is the blending of the disciplines of biology and physics in such fields as biotechnology and bionics, which are aimed at the development of improved techniques and instruments as well as of the acquisition of new information. The requirements of man in space necessitate those research efforts, which will result in design criteria for various types of equipment, protective devices, life support systems, communication channels, displays, and controls for space flight and planetary explorations. However, in many ways the life scientist is not yet in a position to inform the engineer which conditions he must produce in order to accommodate the man or what systems must be made available for his protection. This paper will describe some of the NASA's efforts to answer this question. The bioastronautics program of the NASA will cover a much wider range of subjects in which the universities can play a major role. (Author)

1,938

Gerathewohl, S.J. & B.E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES. In Proceedings of the NASA - University Conference on the Science and Technology of Space Exploration, 1:399-413.
(National Aeronautics and Space Administration, Washington, D.C.)
Dec. 1962.

ABSTRACT: Various efforts by the National Aeronautics and Space Administration to obtain data in the life sciences are presented. These data are needed so that the engineer will be able to produce conditions to accommodate man in space or to provide systems for his protection. The following areas of investigation are included: (1) studies of acceleration stress, (2) physiology of men under confined conditions. (3) Project Mercury physiological studies, (4) life support, (5) neurophysiology, (6) behavioral studies, (7) pilot control of aerospace craft, and (8) astronaut performance.

1,939

Gerlough, D. L. 1954 INSTRUMENTATION FOR AUTOMOBILE CRASH INJURY RESEARCH.
Jour. Instr. Soc. Am. 1(12):29-32.

1,940

Gernandt, B.E. 1949 RESPONSE OF MAMMALIAN VESTIBULAR NEURONS TO
HORIZONTAL ROTATION AND CALORIC STIMULATION. J. Neurophysiol. 12:173-184

1,941

Gernandt, B. 1950 EFFECT OF CENTRIFUGAL FORCE UPON NERVE DISCHARGE FROM
HORIZONTAL CANAL.
Acta Physiol. Scandinav. 21:61-72.

1,942

Gerogiyev, O. 1959 SOHIRAYEMAYA V KOSMOS (Getting Ready for Outer Space)
(Trans. from Sovetskiy Soyuz (USSR) (10):12-14, 1959)
(SLA Translations Center, Chicago, Ill.) 60-13191

1,943

Gershuni, G. V. 1958 CHARACTERISTICS OF CONDITIONED GALVANIC SKIN
RESPONSES AND ALPHA RHYTHM SUPPRESSION REACTIONS IN MAN IN RESPONSE
TO SUBTHRESHOLD AND SUPRATHRESHOLD SOUND STIMULATION
Trans. of Zhurnal Vysshey Nervnoy Devatel'nosti (USSR) 5(5):665-676,
1955
(SLA Translations Center, Chicago, Ill.) 59-11016

1,944

Gibbens, M.E. & W.V. Smith 1957 THE DOCTOR AND THE AUTOMOBILE ACCIDENT
JAMA 163(4):255-259, Jan. 26, 1957.

ABSTRACT: Certain well-tested automobile improvements that would lower the mortality and injury rates could be incorporated into the modern car easily and inexpensively. Better roll-over frames are necessary, and safety seat belts should be standard equipment. Safety door latches, padding of the dashboard, elimination of projecting items inside and outside, shock-absorbing steering wheels, a mechanism for restraining all folding seats, provision for holding luggage securely, and certain improvements in lights, mirrors, and signal systems would often save lives. A physician treating accident victims has an opportunity to encourage their relatives and friends to work in favor of the adoption of automobile safety features. A check-list of safety principles is suggested for consideration as a "Good Driver's Code."

1,945

Gibson, J.J. & O.H. Mowrer 1938 DETERMINANTS OF THE PERCEIVED VERTICAL AND HORIZONTAL
Psychol. Rev. 45: 300-323

ABSTRACT: The proposed hypothesis: both the visual and postural vertical are determined by visual factors and gravitational factors acting jointly, with orientation to gravity, however, as the more decisive factor in cases of real conflict between the two types of sensory data, and the primary factor genetically. In the case of vision, the authors summarize the evidence for the anchorage of the perceived vertical to the (visual) factor. Posture is often unstable when vision is eliminated. The perceived vertical, both visual and postural, is often disturbed and even destroyed when the main visual lines move with respect to gravity. The perceived vertical is partially shifted when the main visual lines are tilted by a constant amount (possibly simultaneous contrast). A shift of the perceived vertical into complete congruence with such main lines has not been verified. Evidence for the dependence of the vertical on gravitational determinants consists of conclusions based on experimentation.

1,946

Gibson, J. J. 1952 THE RELATION BETWEEN VISUAL AND POSTURAL DETERMINANTS OF THE PHENOMENAL VERTICAL. Psychol. Rev. 59:370-375

1,947

Gibson, W.C., G.W. Manning and E. Cohen 1943 THE VALUE OF SIMPLE SWINGS IN ACCLIMATIZING TO AIRSICKNESS. (National Research Council, Canada)
Report # C-2638, October 27, 1943

ABSTRACT: Seventy-seven experimental subjects and 75 controls were studied on a total of approximately 4,00 swings and 1250 flights over a period of three months. Swinging for 15 minutes daily on 2-pole, self-propelled simple rope swings (10 foot radius, 90° arc) for 2 weeks prior to and during flying did not reduce the amount of airsickness experienced in Anson aircraft by student navigators.

1,948

Gibson, W.C., G.W. Manning and B. Kirkpatrick 1943 THE EFFECT OF ACTIVE VESTIBULAR TRAINING ON MOTION SICKNESS.
(National Research Council, Canada) Report #C-2512, 8 June 1943

ABSTRACT: The swing reaction of 140 aircrew trainees was determined on 2-pole swings. The men were divided into one group of 92 who were given a special eight week active vestibular physical training programme four times per week,

and another of 48 men (controls) who were given the usual Initial Training School physical training twice a week. Following the eight week period the men were re-swung on the same swing and in the same position. Comparison of the results showed an improvement in both physical fitness and resistance to swing sickness.

1,949

Gil'bert, L. 1960 BEFORE A MANNED FLIGHT
Trans. of Znanie-Sila (USSR) 35(10):6-8, 1960.
(Office of Technical Services, Washington, D.C.)
Aug. 17, 1961 61-28535. ASTIA AD 269 651

ABSTRACT: Some of the equipment is described that is used to simulate the high g forces that will be experienced by astronauts during acceleration and deceleration. The equipment described is mainly U. S. and the document was apparently written shortly after the flight with the two dogs Strelka and Belka.

1,950

Gil'berg, L. 1961 RETURN TO EARTH
Znaniye-sila 34(7):10-13

ABSTRACT: The article reviews the equipment and techniques in standard use for emergency escape from high-speed jet planes, with especial reference to ejection seat design, controlled descent and the physiological effects of ejection and exposure to high altitudes on the pilot. The author explains how high-altitude suits and compensating suits help the pilot to withstand these stresses and survive a bail-out at altitudes as great as 12 km. All the information is based on Western sources. The author mentions prototype capsules which consist in effect of the whole forward portion of the fuselage together with the cabin, the entire unit being detached from the rest of the plane in an emergency to descend by parachute. A development of this method is used for landing astronauts from satellites. Emergency escape cabins for astronauts have also been developed. The pilot's cabin is equipped with a powerful rocket motor which can catapult the cabin to a height from which it can descend by parachute, should any mishap occur during launching. The motor is powerful enough to eject the capsule from the carrier-rocket even when the main rocket engines are functioning during the active

1,951

Gilbert, A.P., H. Boiteau, C. Jacquemin, J. Fabre & A. Adeline 1959 THE PRESENT STATE OF ANIMAL AND HUMAN EXPERIMENTATION IN WEIGHTLESS FLIGHT. Medicine Aeronautique (Paris) 12(2):177-188. In French with English summary.

ABSTRACT: A discussion is presented of current animal and human experiments on weightless flight, and the following conclusions are drawn: Weightlessness in flight does not seem to have any adverse physiological effects, and immediately after return to normal conditions, normal activities are resumed spontaneously. Weightless flights also have demonstrated that behavioral analogies exist between compensatory phenomena following total labyrinthectomy and the effects of conditioning to and training in weightlessness. In both these situations, all clues supplied by the labyrinth, whether abolished or repressed, are compensated by visual ones. However, it is still impossible to predict whether the weightless state, which is well tolerated for one-minute periods, will not, when prolonged, have a deteriorating influence on psychomotor performance. (J. Aviation Med. 30(2):144, Feb. 1959)

1,952

Gillert, E. 1938 IS FLYING DANGEROUS TO PEOPLE WITH FAULTY CIRCULATION? Klin. Med., 1:423-426

ABSTRACT: The increase in the field of aviation and, particularly, the certainty that many cases of death occurring in flight were caused by failure in circulation, led to researches on the effect of flying on health and faulty circulation. Of especial importance here are two factors: (1) altitude of flight, and (2) speed. 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 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, atmospheric 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. (Limited ABSTRACT: Journal of Aviation Med. 9(4): 230-231, December 1938)

1,953

Gilles, E. 1961 PHYSIOLOGIE ET AVIATION (REVUE GENERALE) (Physiology and Aviation (General Revue)
Rev. Intern. services saute armees terre mer et l'air (Paris), 34(9):401-404.

ABSTRACT: Reviews the problems of anoxia, rapid ascent and descent, centrifugal forces, acceleration equal to several times gravity, prolonged flight, high altitudes with low temperatures and low oxygen pressures, and sharp changes in barometric pressure. The physiologist indicates means of avoiding most accidents resulting from them by recommending the use of oxygen masks, cabin pressurization and temperature control systems, protective clothing, and the inhalation of helium or oxygen and exercise to prevent gas embolism during flight.

1,954

Gillings, W.H. 1950 THE EFFECTS OF INTERPLANETARY FLIGHT
Brit. Interplan. Soc. J. 9: 105-107, May 1950

ABSTRACT: A general discussion of various aspects of space flight.

1,955

Gilruth, R. R. & L. N. McMillion 1962 MAN'S ROLE IN APOLLO
(Paper, IAS Man-machine Competition Meeting, Seattle, Washington, Aug. 10-11, 1962.) Paper No. 62-187

ABSTRACT: Manned landing on the moon and return to earth within this decade is a major national objective. Accomplishment of this objective is the purpose of Project Apollo. The Apollo spacecraft is being designed to utilize the capabilities of the crew and various automatic systems. The discussion of selected mission phases illustrates the close interaction between the crew and the spacecraft systems. Man's role in Apollo is, therefore, the efficient use of his own talents and those of the systems at his disposal.

1,956

Gilruth, R.R. & H.K. Strass 1960 MANNED SPACE FLIGHT- PRESENT AND FUTURE STEPS
Aero/Space Engineering 19(5):16-17, 90, May 1960

1,957

Gilson, J. C., W. K. Stewart & Z. Pekarek 1943 PREVENTION OF INJURY IN AIRCRAFT CRASHES.
(R.A.F. Institute of Aviation Medicine, Farnborough) FPRC 556

1,958

Gilson, J. C. & R. L. B. Beare 1945 GERMAN RESEARCHES ON DECELERATION AND EJECTOR SEATS IN AIRCRAFT: INTERROGATION OF DR. S. RUFF, FLUGKAPITAN, HEAD OF THE MEDICAL INSTITUTE OF THE D.V.L. BERLIN, 14.8.45.
(R.A.F. Institute of Aviation Medicine, Farnborough) FPRC Rept. #646, October 1945

1,959

Gilson, J. C. et al 1946 REPORT ON THE HAZARDS OF ESCAPING FROM AIRCRAFT IN COMBAT.
(R.A.F. Institute of Aviation Medicine, Farnborough) FPRC Rept. #658, March 1946

1,960

Gimalouski, E. A. 1952 INVESTIGATION OF IMPACT LOAD ABSORPTION THROUGH SUSPENSION LINE ELONGATION.
(Wright Air Development Center, Wright-Patterson AFB, Ohio) Dec. 1952.

ABSTRACT: The purpose of this investigation was the study of parachute suspension lines under actual operating conditions, having varying degrees of elongation, energy absorption and elasticity. A secondary purpose of the investigation was the study of fabric porosity, shape and type of canopy, and method of parachute deployment.

1,961

Girard, P. F. 1959 MEDICAL AND HUMAN ENGINEERING ASPECTS OF FLIGHT IN RYAN VTOL AND STOL AIRCRAFT
(Paper Fourteenth Meeting of the Flight Test Techniques and Instrumentation Panel, 11-15 May 1959, Athens, Greece)
(Advisory Group for Aeronautical Research and Development, Paris, France) Rept. no. 239 May 1959 ASTIA AD 237 625

ABSTRACT: A short historical outline including brief descriptions of the VTOL aircraft constructed by the Ryan Aeronautical Company is given. The major aspects of the principal medical and human factors in hovering and transitional flight are discussed, principal attention being given to the human engineering aspect. It is concluded that the medical and human factors must be given serious consideration in the early design stages of a VTOL aircraft if satisfactory handling qualities are to be obtained. (Author)

1,961

Girden, E., J. E. Barmack & J. D. Coakley 1948 A BIBLIOGRAPHIC EVALUATION OF THE EFFECTS OF ACCELERATION ON THE CONTROL AND SAFETY OF HIGH SPEED AIRCRAFT. (USN Special Devices Center, Port Washington, L.I., N.Y.) Rept. SDC 151-1-9, Feb. 1948. ASTIA AD 45 884.

ABSTRACT: Literature pertinent to the effects of acceleration on pilots and aircraft is evaluated to derive implications for the safe operation of supersonic aircraft. Available data indicate that human g tolerance varies with the individual, the direction in which the force is applied, and the criteria employed to measure its effect. Using visual symptoms and continuation of consciousness as criteria, higher values of g may be tolerated if directed transversely than if directed from head to seat (+g) or from seat to head (-g). Methods are now available for increasing -g tolerance such that, although consciousness can be retained in the presence of large g forces, the manipulation of controls is impaired by muscular inadequacy. Various aids for minimizing the effects of g and the effect of the duration of exposure to g forces are discussed.

1,962

Githens, T. S., et al. 1919 PHENOMENA FOLLOWING INDIRECT CONCUSSION OF THE SKULL.
Paper, Thirty-First Annual Meeting of the American Physiological Society, Johns Hopkins University, Baltimore, April 24, 25, and 26.

ABSTRACT: Concussion was produced in completely etherized dogs by a weight falling on a board 4 cm. thick laid on the head in front of the occiput. Complete unconsciousness continued till the end of the experiment. The lid and corneal reflexes were never lost. The eyes showed nystagmus for an hour or so after the concussion and afterward were moved in an apparently normal manner. Stimulation of exposed sensory nerves (e.g., supra-orbital) caused no sign of pain and no influence on respiration or other reflex effect even after four hours. A new nose-licking reflex was noted. The medullary centers were surprisingly little affected. The blood pressure was usually very high soon after the concussion, and the respiration was noisy and irregular, soon becoming normal. For the first hour or so there was complete paralysis with loss of all reflexes and responses. Later, circulatory, respiratory and spinal reflexes returned and often became exaggerated. Only gross study of hemorrhage was made. The only characteristic lesion was a hemorrhage into the upper part of the cord extending from the calamus to the second or third cervical nerves. This was associated with laceration of the gray matter extending from the central canal into the dorsal horns. There was almost no hemorrhage within the skull. (American J. Physiol. 49:120.

1,963

Giurdzhian, A.A., N.N. Demin, N.V. Korneeva, R.S. L'vova, L.T. Tumochkina, M.S. Uspenskaia, and T.A. Fedorova. SOME ASPECTS OF THE METABOLISM OF ANIMALS AFTER A SPACE FLIGHT. (Nekotorye storony metabolizma u zhivotnykh sovershivshikh polet v kosmos) Iskusstvennye sputniki zemli (Moskva) 11: 78-86

ABSTRACT: Shifts in biochemical indices (protein fractions and the total protein content of blood serum, serum mucoid content, non-specific cholinesterase activity, free and bound 21-hydroxy-20-ketosteroids in the urine, presence of deoxycytidine in the urine) were investigated in a number of dogs, rats, and mice after single or repeated exposures to vibration, accelerations of 6-9 g, and a prolonged stay in a sealed cabin. For some of the animals data from space and rocket flights were available. Single exposures to different stresses resulted in shifts indicative of compensatory reactions, while repeated exposures were followed by a dystrophic state. The dogs Belka and Strelka exhibited a reversible stress reaction after space flight which differed considerably from the picture observed after radiation injury. The extent of biochemical changes seems to be more dependent upon the dose of stress rather than its nature.

1,964

Glaister, D. H. 1961 DIAPHRAGM MOVEMENT UNDER POSITIVE ACCELERATION. (Paper, 32nd Annual Meeting of the Aerospace Medical Association, 24-27 Apr., 1961, Chicago, Ill.)

ABSTRACT: Movement of the diaphragm has been studied in man on the human centrifuge. A technique has been developed which allows direct recording of diaphragm movement at the oesophageal hiatus. Descent of the diaphragm has been demonstrated under positive acceleration and correlated with the degree of acceleration applied, and with simultaneous changes in lung volume and intra-abdominal pressure. The inflation of an anti-g suit raises the diaphragm; the net result of inflating the suit under positive acceleration is a reduced fall in diaphragm level. It is concluded that movement of the diaphragm at the oesophageal hiatus is similar to that at the dome, but that the excursion is about half that at the dome.

(Aerospace Medicine 32(3):231, March 1961)

1,965

Glaister, D. H. 1961 THE EFFECT OF POSITIVE ACCELERATION ON DIAPHRAGM MOVEMENT AS DEMONSTRATED BY A DIRECT RECORDING TECHNIQUE. Rev. Med. Aero (Paris) 2:28-29, Dec. 1961 (Fr)

1,966

Glaister, D.H. 1961 BREATHING. Nature (London) 192(4798):106-108,
14 October 1961

ABSTRACT: Reviews two papers presented at a symposium on "Breathing." The first paper studies the problems of air temperature and pressure at 40,000 feet, and includes effects of explosive decompression from 8,000 to 38,000 feet. Describes design for oxygen masks which allows proper breathing under decompression. The second paper discusses the effects of posture on breathing under positive acceleration. The mechanical effects on the lungs, viscera and diaphragm under accelerations of 3 g are described, and it is shown that the total efficiency of the respiratory process decreases during positive acceleration.

1,967

Glaister, D.H. 1963 PULMONARY GAS EXCHANGE DURING POSITIVE ACCELERATION
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler
Hilton Hotel, Los Angeles, Calif., April 29- May 2, 1963)

ABSTRACT: Quantitative measurements of pulmonary gas exchange, and qualitative measurements of pulmonary gas distribution have been made during positive acceleration on the human centrifuge.

Use has been made of expired air collection, as well as breath to breath analysis of expired air with a rapid response carbon dioxide meter. Findings demonstrate changes in metabolism and gas distribution in man at low levels of positive acceleration.

1,968

Glantz, William M. and Vernie A. Stembridge 1959
CORONARY ARTERY ATHEROSCLEROSIS AS A FACTOR IN AIRCRAFT ACCIDENT
FATALITIES
(Armed Forces Inst. Of Pathology, Army Medical Center, Washington, D.C.)
Journal of Aviation Medicine, 30:75-89, Feb., 1959
ASTIA AD 219 780

ABSTRACT: Recent reports have shown that significant degrees of coronary sclerosis occur in young age groups. To evaluate this finding, a microscopic study was undertaken, utilizing autopsy material from 222 aircraft accident fatalities. Seventy percent of 222 cases, ranging in age from 19 to 43 years, showed some degree of coronary sclerosis. Twenty-one percent showed varying degrees of definite restriction of the coronary lumen. A marked increase in the incidence of restrictive coronary sclerosis is demonstrated in the age group of 30 to 40. A definite occurrence of myocardial infarction in flight was found in 3 cases, and in 1 case myocardial infarction caused the accident. The electrocardiogram still seems to be the best tool to detect coronary sclerosis.

(AUTHOR)

1,969

Glanvill, A.D., et al. 1937 THE MAXIMUM AMPLITUDE AND VELOCITY OF JOINT MOVEMENTS IN NORMAL MALE HUMAN ADULTS
(Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 55-159
See also: Human Biology 9: 197-211

1,970

Glascock, H.W., Jr. 1961 JOINT US- CANADIAN CONFERENCE ON ENVIRONMENTAL PHYSIOLOGY HELD ON 9-10 NOVEMBER 1960. (Army Medical Research Lab., Ft. Knox, Ky.) Report no. 474, ASTIA AD-264 971,

1,971

Glaser, E. M. and G. R. Hervey 1952 FURTHER EXPERIMENTS ON THE PREVENTION OF MOTION SICKNESS
Lancet (London) 1:490-492, March 1952

1,972

Glaser, E.M. 1959 PREVENTION AND TREATMENT OF MOTION SICKNESS Proc Roy Soc Med 52:965-72, Nov. 1959

1,973

Glenn, J.H., Jr. 1962 PILOT'S FLIGHT REPORT
In: Results of the First U.S. Manned Orbital Space Flight, February 20, 1962.
(NASA Manned Spacecraft Ctr.) Pp. 119-136

1,974

Godby, R. O., S. B. Browning, D. S. Belski & E. R. Taylor 1963 ANTHROPOMETRIC MEASUREMENTS OF HUMAN SLED SUBJECTS.
(6571st Aeromedical Research Laboratory, Aerospace Medical Division, Holloman AFB, New Mexico) ARL-TDR-63-13, April 1963. ASTIA AD 407 668

ABSTRACT: Fifty-seven human volunteers are used at present in the study of abrupt acceleration at the Biodynamics Branch of the 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico. Various standard anthropometric measurements have been made on these subjects. These data and their analyses are presented. Somatotyping of the subjects, performed elsewhere, is presented. (ASTIA)

1,975

Goddard, James L. 1962 FEDERAL AVIATION AGENCY IMPACT RESEARCH
In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive
Chronological Bibliography, (National Academy of Sciences, National Research
Council) Publication No. 977, pp. 21-23

ABSTRACT: The research activities of the Federal Aviation Agency in the field of impact acceleration stress are discussed. These research activities can be listed in three major categories: (1) the further determination of human tolerance to impact forces; (2) the further determination of forces transmitted to the occupants of current civil aircraft during crash impacts; and (3) the further development of crash safety designs which can contain the crash forces transmitted to aircraft occupants at levels below the maximum tolerance level.

1,976

Godshall, W.D. 1962 THE FPL LINEAR DEADWEIGHT ACCELEROMETER
CALIBRATOR. (Forest products Laboratory, Madison, Wisconsin)
ASTIA AD-280 236

ABSTRACT: An accelerometer calibrator that provides a convenient and satisfactory method of checking the response characteristics of accelerometers on an operational basis was constructed at the Forest Products Laboratory. The calibration can be made under normal operating conditions of the accelerometer.

1,977

Goethe, H. 1956 GEDANKEN ZUR EXPERIMENTELLEN UND PRAKTISCHEN PRUFUNG VON SEE-
KRANKHEITSMITTELN (CONSIDERATIONS ON THE EXPERIMENTAL AND FIELD TESTING OF
SEA-SICKNESS MEDICAMENTS) Ärztliche Praxis (München-Gräfelfing) 8(3):8-
Jan. 21, 1956

ABSTRACT: Several types of apparatus and methods in use for testing of motion sickness remedies are described. The Canadian-built motion sickness simulator was recommended as producing accelerations and decelerations most analogous to natural conditions on the ship. Other testing methods include combination of below-threshold doses of apomorphine (central nervous system stimulant) and Barany rotating-chair stimulation. This method has certain drawbacks since there are individual differences in the reaction to the drug. The above methods are suitable primarily for exploration of the therapeutic properties of the drug. Field tests are invaluable for determining the therapeutic properties since long-term simulation of sea conditions is almost impossible. Certain suggestions are offered for better control of field-test conditions.

1,978

Goethert, B.H., ed., W.C. Nelson 1961 TRANSONIC WIND TUNNEL TESTING.
AGARDograph no. 49, (New York: Pergamon Press) ASTIA AD-271 130

ABSTRACT: This AGARDograph presents a review of the extensive efforts made during the last 15 years to develop practical transonic wind tunnels and discusses their performance and limitations. Emphasis is placed on the design and operational characteristics of both types of modern transonic wind tunnels, that is, on wind tunnels with either longitudinally slotted or perforated test sections. Each chapter of the AGARDograph has been made as complete as possible, with its own series of figures and a separate list of references and bibliographical material. (Author)

1,979

Gold, A.J., H.E. Hance, M. Kornhauser & R.W. Lawton 1961 TOLERANCE OF
MICE TO IMPACT FOLLOWING FREE FALL. (Biosciences Operation, General
Electric Missile and Space Vehicle Dept., Philadelphia, Pa.)
Reprinted from Federation Proceedings, 20(1):208, March 1961.

ABSTRACT: A study was made to establish impact tolerance of mice as a function of impact velocity and average acceleration. Restrained mice were placed in a carriage dropped freely from controlled heights and were subjected to controlled inertial loads of relatively short duration. Occurrence of death was selected as the index of irreversible damage, or failure. With only several exceptions, all of approximately 300 mice responded to impact forces in an all-or none manner, either dying within 30 seconds or surviving indefinitely without permanent injury. By plotting impact velocities against average accelerations for mouse groups having mortality rates of 5% or 95%, two hyperbola-shaped curves were obtained. Assuming that the 5% mortality curve represented minimum damage below which no permanent injury occurred, limits of tolerance were found to approximate 20 fps (velocity) and 650 g (acceleration). For the 95% curve, limits were 35 fps and 1950 g, respectively. Post mortem examinations indicated that death resulted directly from sudden displacement of the c.n.s., particularly of the brain, on impact and that frequently-observed pulmonary hemorrhage was of secondary importance.

1,980

Gold, A.J., H.E. Hance, M. Kornhauser & R.W. Lawton 1962 IMPACT TOLERANCE OF
RESTRAINED MICE AS A FUNCTION OF VELOCITY CHANGE AND AVERAGE DECELERATION.
Aerospace Med., 33(2):204-208, Feb. 1962.

ABSTRACT: A study was made to establish impact tolerance limits for restrained mice as a function of velocity change and average deceleration. Mice placed in a carriage dropped freely from measured heights were subjected to controlled inertial loads of short duration. Mice were observed to respond in all-or none

manner, either dying within 30-40 seconds or surviving indefinitely without permanent injury. Ability to survive impact was therefore selected as the index of tolerance. Two tolerance curves, constructed from plots of groups having (a) a high incidence (91-100 percent) and (b) a low incidence of survival (0-8 percent), were asymptotic at approximately 27 fps and 650 G and 45 fps and 1970 G, respectively. Limits of high and low probability of survival zones were thus defined. Therefore, this experimental approach to establishing design criteria for protective equipment was found feasible. Evidence indicated that death resulted primarily from sudden displacement of the central nervous system that frequently observed pulmonary hemorrhage was of secondary importance. (Authors)

1,981

Goldberg, A. and S. Merjan 1955 USE OF THE HAN-S-44 SHOCK TEST MACHINE AS A MEANS OF TRANSIENT CALIBRATION FOR BARIUM-TITANATE ACCELEROMETERS FOR AN ACCELERATION RANGE UP TO 1000 G's.
(Pitman-Dunn Labs., Frankford Arsenal, Philadelphia, Pa.) Rept. no. S-4336, March 16, 1955. ASTIA AD 68 711.

ABSTRACT: Comparisons were made between transient accelerometer calibrations, steady-state and transient calibrations, and accelerometer sensitivities as determined by the Frankford Arsenal with those indicated by the manufacturer. Two independent and parallel approaches to the transient calibration of accelerometers were studied by using the JAN-S-44 shock-test machine: the theoretical -G and the integrated-output methods. Studies indicated that the test machine could be used for accurate transient calibration of BaTiO₃ accelerometers. The theoretical -G method permitted accelerometer calibration at shock-pulse frequencies as low as 60 c and as high as 700 c, and for a 35- to 1000-g shock-acceleration range. The integrated-output method of calibration produced satisfactory results when (1) the integrator time constant was 6 or more times larger than the period of the shock pulse being integrated and (2) the integrator constant was of sufficient magnitude to facilitate accurate measurement of output voltages.

1,982

Goldberg, M.N., R.A. Mills and W.V. Blockley 1960 INSTRUMENTATION PACKAGE FOR INFLIGHT PHYSIOLOGICAL STUDIES. (North American Aviation, Inc., Los Angeles, Calif.) WADD TR 60-83, ASTIA AD-236 039

ABSTRACT: An instrumentation package was developed for the monitoring of pilot physiological status during flights in the X-15. Data recorded include electrocardiograph signals, respiratory flow rates, skin and deep body temperatures, and helmet-suit and suit-cockpit pressure differentials. Environmental and flight tests were performed to determine the characteristics of the package and to survey subject response during stress. The package is capable of driving a pulse duration modulation (PDM) system for telemetering pressure data. Descriptions of the components and methods of use are included.

1,983

Goldbloom, A. A., M. L. Kramer, & A. Lieberman 1940 CLINICAL STUDIES IN CIRCULATORY ADJUSTMENTS. VI. PHYSIOLOGIC RELATION BETWEEN POSTURE AND CARDIAC OUTPUT. Arch. Intern. Med. 65:178-184

1,984

Goldman, D.E. 1946 MECHANICAL FORCES ACTING ON AVIATION PERSONNEL
J. Aviation Med., 17(5): 426-430, October 1946
See also: WADC TR 58-107, Feb. 1946

ABSTRACT: A description of ambient pressure, acceleration, wind blast and vibration and how these mechanical forces affect Aviation Personnel.

1,985

Goldmann, Jack B. 1962 HUMAN CAPABILITIES IN THE PRONE AND SUPINE POSITIONS:
AN ANNOTATED BIBLIOGRAPHY
(Lockheed Aircraft Corporation, Sunnyvale, Calif.) SP-62-14, May 1962
ASTIA AD 282 780

ABSTRACT: This literature search covers the decade, 1951-1961. It is concerned with the ability of man to perform basic operations in aircraft while relegated to a prone or supine position, and the possible application of man's performance in spacecraft under similar conditions. References to the design requirements for man are included.

1,986

Goldstein, A.G. 1959 LINEAR ACCELERATION AND APPARENT DISTANCE.
Percept. Mot. Skills, 9(3):267-269, September 1959

ABSTRACT: This is a preliminary study of the effects of linear saggital acceleration upon distance perception. Thirty-three subjects were accelerated from zero to 60 mph in 10 to 11 seconds in a fluid drive transmission automobile while observing an illuminated ring. Subjects reported changes in appearance of the ring - size, distance, etc., during forward and backward acceleration and deceleration. McNemars test of the significance of changes was used to compare the effects of direction of acceleration.

1,987

Golikov, A. and I. Smirnov 1961 OVER THE ROUTES OF THE COSMOS
Trans. of Ogonek (USSR) 39(14):2-3, 1961
(Office of Technical Services, Washington, D.C.)
March 29, 1962 62-24268

ABSTRACT: Information is given on the flights of the dogs Zvezdochka (fifth space ship), and Belka and Strelka.

1,988

Golikov, A. & I. Kas'yan 1962 BEFORE THE LEAP TO THE STARS
(Translation Services Branch, Foreign Technology Div., Wright-Patterson AFB, Ohio)
FTD-TT-62-1767/1 21 December 1962 ASTIA AD 295 768

ABSTRACT: This article describes the weightlessness training on Russian astronauts A. Nikolayev and P. Popovich. The action of a galvanic current on the vestibular apparatus during a weightless condition was studied. These experiments, in particular, indicated that in the state of weightlessness the illusion of anti-rotation becomes briefer. The excitability of the vestibular apparatus towards angular accelerations is reduced. It is established also, that weightlessness does not lead to the functional turning-off of the otolithic apparatus, and is only an extreme irritant for it.

1,989

Gollub, Fred 1960 AN ANALYSIS OF THE MAGNAFLUX INSPECTION RECORD OF
WELDED JOINTS ON THE 50-FT CENTRIFUGE. (U.S. Naval Air Dev. Center,
Johnsville, Pa.) NADC-MA-6027. ASTIA AD 248 216.

ABSTRACT: The 50-foot radius arm of the human centrifuge at the Aviation Med. Acc. Lab. was inspected on 7 occasions. The data from these inspections has been analyzed by the Eng. Div. in order to try to determine the cause of damage to the arm. All cracks found in the welded joints were bound to the parent metal, preheated by torch, welded, stress-relieved by torch and finally, magnafluxed.

1,990

Gomez Gomez, L. A. 1945 ACCELERATION AND DECELERATION: INFLUENCE ON HUMAN
ORGANISM.
Med y cir., Bogota, 10:1-19.

1,991

Goldstone, N.J. 1961 LANDING SHOCK ABSORPTION

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. 215-224

ABSTRACT: This paper provides design data obtained in a development test program for an aluminum honeycomb shock-absorption system for planetary soft landings. Test procedures are described. Data are presented from static and dynamic crushing tests of selected aluminum honeycomb specimens, and from drop tests of a full-scale model of a lunar landing craft.

A method using laterally unrestrained honeycomb blocks is unsatisfactory because of inability to react shear forces incurred during impacts on an inclined plane. Supporting the honeycomb within a piston system is a feasible method. The magnitude and duration of impact decelerations, while higher than calculated on the basis of Reference 1, approximate the levels of design capability of mechanical and electrical systems for planetary vehicles.

Impact decelerations measured during the most critical drop, 29.3 feet per second onto a 15 degrees inclined plane, were as follows:

41.5 G extending for 0.003 second

38.2 G extending for 0.007 second

20 G minimum for 0.036 second

The predictability of test vehicle rebound behavior was demonstrated for all four of the drops. Stable behavior occurred for drops 1, 2, and 3, and a low-level unbalanced overturning moment was observed in Drop 4, as predicted in the dynamic analysis of Reference 2.

1,992

Golikov, A., I. Smirnov and A. Nikolayev 1960 SOVIET SPACE FLIGHTS:
SPACE TRAVELERS (AND) FROM THE EARTH TO AN ORBIT OF MARS.
Trans. of Ogonek (USSR) 38(35):2, 4-5, 1960.
Dec. 19, 1960 JPRS: 6402

ABSTRACT: The first paper discusses the manner in which the dogs (Strelka and Belka) were selected, trained, instrumented, clothed, and fed during their space flight. The second paper discusses, in a popular (nontechnical) way, the well known physiological problems connected with space flight (effect of weightlessness, how to breath, effect of cosmic rays, etc).

1,993

Golikov, A. & N. Smirnov 1960 FOUR-LEGGED ASTRONAUTS
(Air Information Division, Wright-Patterson AFB, Ohio) AID Rept. No. 61-72
ASTIA AD 260 501
See also: Ogonek 49: 2

1,994

Goncharskii, L.A. 1952 ELECTRONIC ACCELERATION INDICATORS
Elektrichestvo (Russian) n. 12, pp. 54-57

ABSTRACT: The design principles of electronic acceleration indicators with moving anode are pointed out with reference to a simple theory of these instruments. Points discussed in more detail are: the relations between voltage and sensitivity; advantages of the use of a collector for the anode current in a diode unit; a determination of the sensitivity of a triode indicator with a moving anode. Formulae are given for determining the current and voltage sensitivity of an indicator with directly heated filament displaced in a homogenous field. (B.F. Kraus)

1,995

Goodall, McC., and J.P. Meehan 1956 CORRELATION OF "G" TOLERANCE TO URINARY
ADRENALINE AND NORADRENALINE.
(Paper, American Physiological Society Fall Meeting, Sept. 4-7, 1956)

ABSTRACT: Subjects with either a high, low or intermediate "g" tolerance was centrifuged. Urine samples were collected in accordance with a 3 hr. pre-run, 1 hr. run, 1 hr. post-run and a 3 hr post-post-run schedule and bioassayed for adrenaline and noradrenaline by the von Euler method (*acta physiol. scandinav.* 22:161, 1951). All subjects showed a marked elevation in the urinary output of both adrenaline and noradrenaline. The adrenaline output was increased predominantly during the pre-run and the run periods. This appeared related to the anxiety of anticipating the centrifuge ride and the anxiety associated with the ride rather than the physiological changes produced by the ride itself. The noradrenaline output was increased during the run period and to a somewhat lesser degree during the post-run period. High 'g' tolerance subjects in general showed a higher noradrenaline output during centrifugation and a higher pre-run (control) noradrenaline output than those subjects with a low 'g' tolerance.

High 'g' tolerance subjects, when exposed to various 'g's, showed variation in the noradrenaline output commensurate with the 'g' exposure; the greater the 'g' exposure, the greater the noradrenaline output. No significant changes in the adrenaline output were noted in these subjects.
(Amer. J. Physiol. 187:601. 1956)

1,996

Goodall, M. 1962 SYMPATHOADRENAL RESPONSE TO GRAVITATIONAL STRESS.
In J. Clin. Invest. 41:197-202, Feb. 1962.

1,997

Goodall, M., & M. L. Berman 1960 URINARY OUTPUT OF ADRENALINE NORADRENALINE, AND 3-METHOXY-4-HYDROXYMANDELIC ACID FOLLOWING CENTRIFUGATION AND ANTICIPATION OF CENTRIFUGATION. J. Clin. Invest. 39(10)1533-1538, Oct. 1960

ABSTRACT: Nine normal males were centrifuged at a rate of 1 g per 5 seconds to 12 g, or were given a mock centrifuge ride at 2 r.p.m. (equivalent to 0.02 g forward acceleration) for 3 minutes, respectively. Each subject was unaware as to whether he would receive a real ride or a mock ride, and it was therefore possible to measure the sympatho-adrenal response to both centrifugation and anticipation of centrifugation. Under high gravitational stress, increased urinary adrenaline release seems to be largely related to the emotions, while noradrenaline release seems more closely related to the physical changes (hemodynamics) produced by centrifugation. Following the increase release of either or both adrenaline and noradrenaline, there is a commensurate rise in the urinary output of their common metabolic product, 3-methoxy-4-hydroxymandelic acid. (AUTHOR)

1,998

Goody, W. & M. Reinhold 1952 SOME ASPECTS OF HUMAN ORIENTATION IN SPACE.
I. SENSATION AND MOVEMENT.
J. Neurology (London) 75:472-509.

1,999

Goody, W. & M. Reinhold 1953 SOME ASPECTS OF HUMAN ORIENTATION IN SPACE.
(ii) THE DYNAMIC NATURE OF NERVOUS ACTIVITY (a) "MOTION SENSE," (b) SENSE OF DIRECTION.
Brain 76(3):337-363, Sept. 1953.

SUMMARY: In this paper we have attempted to present a dynamic concept of the nervous system. We have suggested that afferent stimuli are streams of successive motion complexes (occurring perpetually in the living man) which become highly integrated and organized both on their way to the cortex, and as a result of cortical activity. The cortex functions in terms of quantity and rate. The final motion patterns are the basis for perception. Perception itself involves the active appreciation of change, here called motion sense.

Sensations are actively endowed with spatial properties by the man who perceives them. They are also perceived as possessing temporal properties on account of their serial nature. Because they are endowed with spatial qualities and because they are in motion, stimuli are perceived as possessing attributes of direction. The sense of direction is necessary for spatial orientation, and for such performances as reading, writing, calculation, and drawing. Certain patients demonstrating varieties of spatial disorientation are described.

2,000

Goodman, B.D. 1961 THE PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE: A LITERATURE SURVEY
(System Development Corporation, 2500 Colorado Ave., Santa Monica, Calif.)
Field Note 5220, March 2, 1961. ASTIA AD 252 434

ABSTRACT: What type of man will be able to endure the silence and loneliness of space, with no human voice to speak to him, no human ear to listen? What type of man can remain alert and maintain his performance, removed from ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves the earth and all that is familiar?

A review of space literature shows that the primary emphasis in research has been on engineering -- designing the space vehicle to get man into space, and providing the proper closed ecological system, the necessary controls, displays, and equipment to make it possible for him to survive there. This phase of research has involved studying man and his physiological needs, and analyzing human tolerances to environmental variances. An accompanying, but less emphasized phase has been concerned with the study of the psychological and social problems of man in space.

It is the purpose of this bibliography to bring together the reports, books, and periodical articles published through January 1961 in the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes social and sensory isolation, psychological assessment and training, fatigue, confinement, performance under stress, work schedules, motivation, weightlessness, idorientation, emotional stability, and the day-night cycle.

Citations listed are unclassified unless otherwise noted. All titles are unclassified. To facilitate ordering items listed in the Technical Abstract Bulletin (TAB) and the Armed Services Technical Information Agency, ASTIA documents (AD) numbers have been given when available.

2,001

Goodman, B. D. 1961 PSYCHOLOGICAL AND SOCIAL PROBLEMS OF MAN IN SPACE - A LITERATURE SURVEY. American Rocket Society Journal 31(7):863-872, July 1961

ABSTRACT: What type of man will be able to endure for months or even years the vast silence and loneliness of space, far removed from the sounds and sights of his natural environments? What type of man can remain alert and maintain his performance, deprived of ordinary sensory stimuli, enclosed in the cramped quarters of a space capsule as it leaves Earth and all that is familiar? It is the purpose of this bibliography to bring together the reports, books, and periodical articles published thru the early part of 1961 dealing with the specific area of behavioral science related to space flight, or as it is sometimes called "space psychology." This area includes problems of confinement, isolation, sensory deprivation, weightlessness, psychological assessment and training, motivation and morale, emotional stability, boredom and fatigue, performance under stress, and work load. (AUTHOR)

2,002

Goodrich, J. W. 1956 ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 56-7; ASTIA AD-81 562

ABSTRACT: The information presented by this study may be summarized as follows for the conventional ejection seat system. The maximum linear deceleration is essentially constant for a given calibrated airspeed regardless of altitude. At constant calibrated airspeed the rate of tumbling increases with altitude and approaches a value proportional to the inverse of the square root of the density ratio. At constant calibrated airspeed the duration of g forces is approximately proportional to the inverse of the square root of the density ratio. The maximum linear deceleration forces increase as the 2.47 power of the velocity. The maximum linear deceleration rapidly approaches the limit of human tolerance as the speed of the aircraft at time of ejection is increased above 550 knots calibrated airspeed. The aerodynamic and physical characteristics defined by the parameter ($C_D A/W$) are such as to limit the usefulness of the conventional ejection seat system to the lower part of the speed range of the 'Century Series' fighter. Only by optimization of these parameters, such as may be obtained by the use of a low drag capsule, can successful escape be expected in the extreme speed range capability of the 'Century Series' aircraft and beyond." (WADC)

2,003

Goodson, J. E. & J. W. Miller 1959 DYNAMIC VISUAL ACUITY IN AN APPLIED SETTING.
Aerospace Med. 30(10):755-763.

SUMMARY: 1. Visual acuity deteriorates in the air with increased target speeds in much the same manner as it does in the laboratory when similar targets are used.

2. The rate of deterioration in acuity, when using two targets, seems to take a linear form over the range of speeds used as opposed to the curvilinear form taken when one target is used.

3. Deceleration of target speeds has a marked effect on performance of a visual tracking task because of both the change in speeds and the resulting change in configuration of the target. The effect appears to be beneficial.

4. Physiological factors peculiar to the flight conditions either did not effect performance, or else acted in a consistent manner.

5. Anxiety toward flight, as measured by proneness to become air sick, did not have an effect on performance of the task.

6. All three methods used for testing dynamic acuity discriminated between subject significantly at all speeds.

7. While there was considerable learning in the one-target method, no learning took place when the more complex target was used.

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