265

Douglas, W.S. 1942 FRANKS SUIT.
(National Research Council, Canada) Report #C-2848, November 23, 1942

ABSTRACT: This is a report of a conference held at Headquarters, Fighter Command, R.A.F., November 16, 1942, to discuss the adoption of the Franks Flying Suit.

266

Downey, V.M., F.V. Lorentzen & E.H. Lambert 1949 EFFECT OF THE CROUCH POSITION ON THE INCREASE IN TOLERANCE TO POSITIVE ACCELERATION AFFORDED BY AN ANTI-BLACKOUT SUIT
J. Aviat. 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.

267

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.

268

Dressel, J. H. 1958 LOW LEVEL ESCAPE IN NAVAL AIRCRAFT.
SAE Reprint S 86., May 1958.

ABSTRACT: This report concerns the different types of ejection seats with parachute combinations, which are in use or being developed by the U. S. Marines. It pertains to systems which can be used in low altitude. For the future, one will use the Martin Baker MKA5 ejection seat and the rocket ejection which is being developed. Meanwhile one tries to improve the prestige of the present apparatus of ejection.

59

Dressel, J. H. 1958 SAFE PILOT EJECTION LEVEL DROPS TO 500 FT. S. A. E. Journal 66(7):119, Part. 2.

BSTRACT: Low-speed ejection fatalities have affected the design of airplane eats and controls. Now the pilot moves one control and the ejection seat utomatically throws him into the proper parachute descent at low or high alti- ude.

ailing out under 2000 ft resulted in death 50% of the time when the pilot first ad to release the canopy, then fire the seat, release himself from the seat, nd pull the rip cord. The death rate climbed to 75% for jumps under 1000 ft.

he Martin-Baker seat adapted by the Navy now provides safe bail-out from ltitudes of 500-700 ft. straight and level.

his rapid low-level ejection system has a barometric and speed limiter to revent parachute failure. The barometric control prevents pilot-seat sep- ration above 10,000 ft. The speed limiter is actually a "g" meter, which elays the pilot's chute from opening until his deceleration rate drops below he safe value for the chute. These provisions make the system safe for normal light bail-out.

0

illis, Rudolfs June 1961 ON BIOMECHANICS OF UPPER EXTREMITY. (Paper Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961).

STRACT: The human arm is a superior many-sided tool which enables the n to perform skillfully an immense variety of activities. Since the eye not able to catch and preserve the fast-changing patterns of arm and hand vements, objective methods of recording are needed. The most frequently ed methods for recording movements are optical and electrical. They rmit simple reduction of data and enable quantitative measurements of splacement, velocity and acceleration. Normally each movement can be bmitted to a biomechanical analysis in terms of temporal, kinematic and netic factors. The analysis discovers the acting forces and indicates e possibilities for work simplification and increase of movement and tool fficiency.

ury, D.R. 1947 PHYSIOLOGICAL, BIOCHEMICAL, AND ANATOMICAL EFFECTS OF CCELERATION ON THE BODY RELATIVE TO PILOT POSITION IN HIGH SPEED AIRCRAFT. University of Southern Calif., Depart. of Aviat. Med., Los Angeles) ontract no. N6ori77, Task 1, January 1947

272

DuBois, E. F. 1944 ANATOMY AND PHYSIOLOGY OF THE AIRPLANE COCKPIT. (National Research Council, Washington, D. C.) CAM Report #375, 16 Nov. 1944.

273

DuBois, E.F. 1945 THE ANATOMY AND PHYSIOLOGY OF THE AIRPLANE COCKPIT. Aeronaut. Engng. Rev., 4(4):15, 17, 21.

ABSTRACT: Suggests a reconsideration of cockpit design with reconstruction planned according to principles of human anatomy, physiology, and psychology. Proposes relocation of and standardization of position and actions of instruments and controls. Urges jettisonable canopies and "radically new methods" for escape in spins or at very high speeds.

Cites DeHaven's studies as evidence that the human body could stand enormously high decelerations (30 g and probably 40 g) if the resulting pressures were reasonably supported and distributed. Cockpits should be stressed, therefore, so that they will not collapse under forces that develop less than 30 g. (CARI)

274

DuBois, E.F. 1945 THE SAFER COCKPIT. Skyways, 4:41, 90

ABSTRACT: The survey and analysis of crashes has developed several points of fundamental importance. The first is the fact that the human body when supported by the proper belt and shoulder harness can withstand decelerations of great magnitude for short intervals, probably 40 g's or more. This means that if the cockpit does not collapse and if the seat, harness and their attachments do not break, a pilot can crash at high speed and still escape serious injury. If a belt without a shoulder harness is worn, the pilot or passenger jacknifes forward and survives only if his head does not swing into a structural member or rigid instrument panel. Some pilots are killed by steering wheels; others sustain fractures of the legs by "ankie traps" in the form of poorly designed rudder pedals. A large number of head and face injuries caused by sharp edges and spiked switches on the instrument panel could be prevented. In general, the farther the pilot or passenger is placed from the engine and instrument panel, the greater arc his chances of survival.

275

DuBois, Eugene F. Sept. 1952 SAFETY BELTS ARE NOT DANGEROUS
Brit. Med. Journal, Sept. 27, 1952, pp. 685-686.

ABSTRACT: The once wide-spread belief that 1,000 lb. safety belts cause internal injuries in the case of crash, has been refuted by the efforts of the Crash Injury Research unit of the Cornell University Medical College (New York City). An analysis of the crash of a Viking aircraft, on October 31, 1950, at London Airport, and a tabulation of autopsy findings, showed complete absence of abdominal injuries. Almost all safety belts and seat anchorages had broken at the very first impact. In other accidents, where even stronger belts than in the Viking had been used, hardly any evidence of belt injuries was found, as the 858 crash analyses show.

276

Duddy, J. H., & C. A. Dempsey 1958 LIGHT-WEIGHT SEATING: DESIGN RESEARCH AND DEVELOPMENT OF A NET SEAT FOR PROJECT MANHIGH. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 58-307; ASTIA AD-206 922; Dec. 1958

ABSTRACT: This report describes the design research and development of a light-weight nylon net seat for project MANHIGH. Experiments were conducted to determine the ways in which the complex contours of a continuous body supporting surface could be generated with nylon net. Three independent factors, found to affect the curvature of the surface, were varied empirically to develop an experimental seat design for submission to the Project MANHIGH contractor. Contractor forces developed an aluminum and nylon net facsimile of the proposed seat for installation in the balloon gondola. An evaluation of the seat was conducted by the pilot during OPERATION MANHIGH II.

277

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

278

Dye, E.R. 1942 PILOT'S SEAT (PLASTIC) - MODEL SBD-3
(Douglas Aircraft Co., Inc., El Segundo Plant, Calif.) Report No. 6042, Test No. 343, ASTIA ATI- 104 982, August 1942

ABSTRACT: The purpose of the tests on the pilot's seat was to determine the strength of a pilot's seat made of plywood. It was found that the main main structure of the seat was rigid and satisfactory under the ultimate load of these tests.

During the tests, it was observed that the lap belt attachment fitting should be attached to the seat in a more secure manner either by increasing the size and gauge of the bolt head bearing plate or by using a three bolt connection. The attachment fitting screws used in this seat should be replaced by clevis or A.N. bolts to exposed unthreaded surface to bearing on the wood.

279

Dye, E. R. Dec. 1951 RESEARCH ON PADDING MATERIAL (Cornell Aero. Lab.,Inc.) Rept. No. OG-674-D-2, Dec. 27, 1951.

.280

Dye, E.R. 1957 DESIGNED FOR LIVING (Cornell Aeronautical Laboratory, Inc.) Research Trends 5(3): Fall 1957.

ABSTRACT: Over 60 safety concepts have been incorporated in the Cornell Liberty Safety Car, designed to afford maximum protection to passengers during a crash. "Accordion" doors for easy entrance and exit, bucket seats for better lateral support to the hips, body-restraining panels and seat belts, are among the safety features illustrated here.

.281

Dye, E.R., and M.D. Smith 1958 IMPACT PROTECTION WITH FOAM PLASTICS. Mech. Eng., 80(12):65-67, Dec. 1958

ABSTRACT: Paper discusses the methods of selection of a low-density cellular plastic of the right dimensions and mechanical properties to protect the head during impact.

282

Dyme, H. C. 1950 REPORT ON USAF RESCUE AND SURVIVAL CONFERENCE (Air Materiel Command, Wright Patterson AFB, Dayton, Ohio) 4-6 April 1950.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

E

283

Earle, K. 1959 MARTIN-BAKER SYSTEM PARACHUTE AND HARNESS DESIGN IMPROVEMENT AND EVALUATION (Joint Parachute Test Facility, U. S. Naval Auxiliary Air Station, El Centro, Calif.) Naval Parachute Unit Technical Rept. #3-59; TED ELC AE-5242.5; ASTIA AD-266 378; 2 Apr. 1959

SUMMARY: As a result of conference considering Fleet and contractor reported and Bureau of Aeronautics Inspection Team discovered discrepancies existing in Martin-Baker escape system installations and other considerations, the Bureau of Aeronautics initiated concurrent coordinating "A" priority projects at the Naval Parachute Unit and the Air Crew Equipment Laboratory to sponsor expedited development and evaluation of a universal improved system for retrofit into all Martin-Baker seats. Mutual support and coordination between these laboratories was directed.

The Naval Parachute Unit fabricated approximately eighteen special modifications and assemblies of the MBA horseshoe pack, including ripcord, various kinds of lap belt and kit suspension assemblies, and integrated torso suits and harnesses to support evaluation tests at the Naval Parachute Unit, Air Crew Equipment Laboratory, and the SMART Hurricane Mesa facility. The Naval Parachute Unit received various ACEL versions of certain of the foregoing components both for testing and for fabrication into assemblies which were returned to ACEL in support of that activity's evaluation program.

The Naval Parachute Unit evaluation program included four in-flight dummy ejections, thirty live jumps, dummy drop tests, and numerous ditching drills, components tests in the seat and in the inverting fixture for seat restraint. In addition, arrangements were consummated whereby the Naval Parachute Unit modified parachute and lap belt were utilized in two F8U-3 cockpit rocket sled tests at the SMART facility in conjunction with Chance Vought MK G5 ejection seat evaluation.

Ultimate coordination of the laboratories' project developments will be affected. It is considered that utilization of several of the Naval Parachute Unit modifications will significantly improve the present interim Martin Baker parachute from the standpoints of comfort, adjustability, ease of ditching with survival gear, manual bailout, and overall system compatibility. (AUTHOR)

284

Early, J. C. 1945 ANTI-BLACKOUT SUITS, EFFECT OF WEARING ON V AND G DURING SYLLABUS TRAINING. (Tactical Test, U. S. Naval Air Test Center, Patuxent River, Md.) Project No. TED NO. PTR - 2404, 16 July 1945

285

Early, J. C. 1951 THE NAVY EJECTABLE COCKPIT. J. Aviation Med. 22(1):46-49.

SUMMARY: The ejection seat has proved effective and safe as a means of emergency escape from aircraft at current operational speeds and altitudes. However, prospective improvement in aircraft performance will render this device obsolete because of the hazards of windblast, anoxia, and extreme cold.

The Navy Ejectable Cockpit is designed to provide positive, safe, emergency separation from high performance aircraft, and a safe, even comfortable, descent and landing. The pilot is ejected in an enclosed, pressurized, and relatively warm cockpit. After landing, the cockpit becomes a usable lifeboat at sea, and an effective shelter on land.

This survival feature is of great importance in cold weather operations.

286

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

287

Edelman, W. E. 1957 THE DYNAMICS OF SEAT BELT DESIGN. (Master's Thesis for MS in ME, University of Minnesota) Dec. 1957

288

Educational Research Corporation 1959 A BIBLIOGRAPHY ON HUMAN FACTORS RELATED TO MANNED SPACE VEHICLES (Educational Research Corporation, Cambridge, Mass.) Contr. N 61339 294, ERC proj. 496, Oct. 1959.

ABSTRACT: This bibliography on human factors related to manned space vehicles is intended to supplement other listings in the same area by adding to rather than by displacing them. A list of such sources is presented alphabetically by author and with annotations that are intended to give the reader some idea whether the citation refers to something he might be interested in. A subject index is included.

289

Edwards, George A. 1944 FINAL REPORT ON TEST OF CUSHION, BACK AND SEAT, NEOPRENE FOAM (Army Air Forces Proving Ground Command, Eglin Field, Florida) AAF Bd. Proj. No. (M-4) 546 Serial No. 7-44-13 June 12, 1944 ASTIA ATI 73 196

ABSTRACT: Tests were conducted using two types of pad assemblies-parachute back, and 3 types of cushion assemblies-parachute seat, filled with neoprene. The tests were conducted to determine whether or not the equipment possessed the following necessary military charactersitics: (1) The cushions should be of a suitable size and weight to fit the parachute harness. (2) The filler should not have any tendency to pack, break up, or shift. (3) After prolonged use, the degree of fatigue of the user should be less than with the present standard parachute back pad and seat cushion. After completion of the tests, it was concluded that the subject equipment was of light weight and of a size suitable to fit the seat-type parachute harness. Furthermore, the neoprene filler did not pack, break up or shift as does the hair filler now in use in many parachutes. The fatigue of the user was less, after prolonged use, than with the hair filled pads and cushions, and similar or slightly less than with the old-type combination rubber-air cushion. Finally, the seat chshion weighing 2.63 pounds is the most comfortable of the 3 types furnished.

290

Edwards, H.H. 1962 EMERGENCY DETECTION AND ESCAPE INITIATION SYSTEM, PART I. LIQUID PROPELLANT BOOSTERS (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD Technical Documentary Report 62-276, Part I; 4 May 1962

291

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 33 g. 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)

292

Eisen, L., & R. S. Zeigen 1959 A SUPINE SEAT FOR HIGH-STRESS TESTING OF PRIMATES. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TR 59-165; ASTIA AD-219 894; April 1959

ABSTRACT: This study summarizes the design rationale of a supine seat and restrain harness, with surrounding inclosure, for high stress bioscience experiments with a Macaca cynomolgus monkey (Macaca iris). This configuration is intended for test under various abnormal stresses including high g centrifuge runs. Testing and feed ing of the subject in the inclosure will be accomplished to determine his reaction to these stresses. With minimum modification, The Macaque supine seat and restrain harness could accept any primate for ground tests or bioexperiments in space flight A brief description of an earlier supine test seat and restraint harness for low-stress experiments using a squirrel monkey is included. (Author)

293

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. 22;-246.

ABSTRACT: The scope and implications of aviation and space medicine are summarily discussed. 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.

294

Ellis, B.C. E.A. Ripperger and J. N. Thompson 1961 DESIGN OF CUSHIONING SYSTEMS FOR AIR DELIVERY OF EQUIPMENT. (Structural Mechanics Research Lab., U. of Texas, Austin) ASTIA AD-270 241L, August 1961

ABSTRACT: A description of effective systems is given by which the impact on ground contact may be reduced within permissible limits through the use of cushioning materials. In addition to theory of cushioning, the properties of cushioning materials, and the fragility of vehicles, the procedure for designing a cushioning system for a vehicle is given. (Author)

295

Ellis, J. D. 1940 THE INJURED BACK AND ITS TREATMENT. (Springfield, Illinois: C.C. Thomas and Co., 1940.)

296

Ellis, J. D. 1944 COMPRESSION FRACTURES OF THE VERTEBRAL BODIES AND OTHER CHANGES MISTAKEN FOR THEM. The Journal of Bone and Joint Surgery 26(1):139-145.

297

Ellis, M. M. 1921 PULSE-RATE AND BLOOD PRESSURE RESPONSES OF MEN TO PASSIVE POSTURAL CHANGES. Amer. J. Med. Science 161:568-578

298

Ellis, M. M. 1922 PULSE RATE AND BLOOD PRESSURE RESPONSES OF MEN TO PASSIVE POSTURAL CHANGES. ii. UNDER LOW OXYGEN. Air Serv. Inform. Cir. (Wash. D. C.) IV, No. 359-75.

299

Elzufon, E. E. and P. Goldberg 1956 ANALYSIS OF COMPONENTS INVOLVED IN AN EJECTION SEAT MALFUNCTION
(Naval Ordnance Lab, White Oak, Md.) 6 June 1956
NAVORD rept. no. 4319 ASTIA AD 113 862

ABSTRACT: "Studies were conducted at the Laboratory to determine: (1) the sensitivity of the PECC Mk 1 Mod. 0; (2) the output characteristics of the firing mechanism; and (3) the adequacy of design of the firing mechanism and cartridge assembly. Approximately 900 primers were fired under varying conditions. Conclusions drawn for these firing tests can be summarized as follows: (1) penetrations of .-12 inches are marginal and, therefore, unsatisfactory; (2) primer penetrations of .017 inches or better will reliably fire the primers; (3) spring strength as low as 25.5 lbs/inch compression gives reliable results providing a minimum penetration of .017 inches is obtained; (4) primers can be fired with varying firing pin eccentricities up to .055 inches with .017-inch primer penetration and a 31-pound spring; (5) the weight of the piston has little effect on the sensitivity of the primer itself; (6) when firing pins are forced into primers slowly, misfires are possible with penetrations of up to .070 inches; and (7) primer penetrations of .061 ± .017 inches and spring strengths of 36 ± 5 pounds gave reliable firing. Based on available information, the conditions under which the accident occurred were such that reliable functioning should have been expected. Undeterminable parameters which may have contributed to the accident were discussed. Analysis of the firing mechanism showed poor design of several components. Examination of sample firing mechanisms revealed components out of tolerance in critical dimensions." (NOL abstract)

300

Emanuel, I. and J. Barter 1957 LINEAR DISTANCE CHANGES OVER BODY JOINTS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) TR 56-364, ASTIA AD-118 003, February 1957

ABSTRACT: Measurements of joints and joint complexes on 30 men. Summary statistics and design values are presented for 48 linear distant changes.

301

Emanuel, I., & M. Alexander 1957 HEIGHT-WEIGHT SIZING AND FIT-TEST OF A CUTAWAY G-SUIT, TYPE CSU-3/P. (Aero Med. Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 57-432; ASTIA AD 130 912, July 1957.

ABSTRACT: Body size data from the 1950 air force anthropometric survey have been reanalyzed to yield a statistical sizing program based on height and weight

This six-size program was incorporated into the Type CSU-3/P Cutaway Anti-g Garment, which was tested from the standpoint of fit and comfort. Suit selection was accomplished simply by asking each subject his height and weight. Of seventy three subjects fitted, seventy-two were comfortably accommodated by the size indicated by height and weight values. It is concluded that this sizing procedure will result in the saving of time and money because of the ease of fitting, reduction of individualized tailoring and simplification of procurement. (DACO

302

Emrick, W.H. 1954-55 DEVELOPMENT OF CATAPULT, AIRCRAFT PERSONNEL CAPSULE T16 AND T16E1, FOR THE MX 15548 (F103) AIRCRAFT CAPSULE ESCAPE SYSTEM. (Reaction Motors, Inc., Rockaway, N.Y.) Rept. no. RMI-024-F; Contract DA 30-069-ord-1240: ASTIA AD-113381; 4 Jan. - Dec. 1954. May 1955

303

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

304

Ernsting, J., H.L. Roxburgh & P.R. Wagner 1960 RAPID DECOMPRESSION IN THE HELMET, JERKIN, ANTI-G SUIT SYSTEM--A PRELIMINARY REPORT (Flying Personnel Research Committee, Farnborough) FPRC/1150 April 1960 ASTIA AD 261 160

ABSTRACT: Experiments were conducted by the R.A.F. to establish the effects of rapid decompression on aircrew wearing the R.A.F. partial pressure suit system incorporating the anti-g suit, the partial pressure jerkin and the partial pressure helmet. During the tests it was found that the expiratory valve in the partial pressure helmet has a marked resistance to flow even when there is no compensating pressure. This resistance to flow is increased by virtue of the compensation of this valve to a pressure in the helmet inlet tube which is maintained by the Mark 3 jerkin connector. The pressure jerkin is not inflated sufficiently quickly to prevent full and rapid distension of the lungs. In the present investigation no damage to the personal equipment was noted even in the simulated lung experiments where peak pressures of the order of 80 mm Hg were applied very rapidly to the pressure helmet.

305

Ervin, R. G. 1960 HUMAN FACTOR CONSIDERATIONS IN THE DESIGN OF THE B-58 ESCAPE CAPSULE. (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

306

Esgar, J.B. & W.C. Morgan 1960 ANALYTICAL STUDY OF SOFT LANDINGS ON GAS-FILLED BAGS
(National Aeronautics and Space Administration) NASA TR 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.

307

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, the effectivenesses are compared, and conclusions are drawn as to the more promising types of systems.

308

Estes, E. H., Jr., H. D. McIntosh, A. M. Weissler, and J. V. Warren 1956 VASODEPRESSOR SYNCOPE. EFFECT OF G SUIT INFLATION ON CARDIAC OUTPUT. Circulation 14:933.

09

Evans, R. Nov. 1954 THE RELATIVE CRASH PROTECTIVE QUALITIES AND DEFICIENCIES OF PASSENGER SEAT MIL-S-7877 (AER) IN FORWARD AND AFT FACING POSITIONS. (Aero Medical Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) Rept. TED No. NAM AE 6303, 15 Nov. 1954.

10

Evrard, E. 1957 LE SAUVETAGE DES AVIATEURS PAR SIEGE EJECTABLE (RESCUE OF AVIATORS BY MEANS OF EJECTION SEATS (Air Technical Intelligence Center, Wright-Patterson Air Force Base, Ohio) Rept. no. ATIC-305111-A; 1957, ASTIA AD-140 536

ABSTRACT: During a period of five years (1952-1956) fifteen cases, wherein ejecti seats were used in the pursuit plane squadron of the Air Force, were recorded. Nove ejections ended in the death of the users. Ten cases of ejection saved the pilot's lives. An analysis of the medical aspects of the ejection conditions and their consequences for the aviator may be taken as precious, practical lessons. Effort is made: (1) to describe the circumstances surrounding the ejection where the consequences were fatal, and those where the conditions under which the ejection took place were abnormal. (2) to contemplate the consequences from the study of these cases as far as practical purposes are concerned. (Author)

11

Everling, O. 1942 WIND TUNNEL EXPERIMENTS WITH A CATAPULT SEAT - PART 2 OF 5 PARTS (WINDKANALVERSUCHE AN EINERN SCHLEUDERSITZ) Zentrale fuer Wissenschaftliches Berichtswesen , Berlin-Adlershof (Not translated ASTIA ATI 67 725

ABSTRACT: Wind-tunnel experiments were conducted with a catapult seat to insure safe escape of the pilot from aircraft flying at high speeds. The seat turns about any axis regardless of the aerodynamic forces. Accelerations are brief, and therefore have no detrimental physiological effect. Various model tunnel tests were made for purposes of comparison with measured and calculated accelerations.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

F

312

Fabre, J. 1959 PROBLEMES MEDICAUX LIES A L'UTILISATION DU SIEGE EJECTABLE (Medical Problems of Ejection Seat Utilization) Report CERMA 1896

313

Fabre, J. and B. Graber 1959 RÔLE DU COUSSIN DE SIÈGE DANS LA GENÈSE DES ACCELÉRATIONS LORS DU CATAPULTAGE DU SIEGE EJECTABLE (SEAT CUSHION ROLE IN ACCELERATION PRODUCTION ON EJECTION SEAT CATAPULTING) Report CERMA 904.

314

Fabre, J. 1961 ASPECT MÉDICAL DES ÉJECTIONS PRATIQUÉES EN FRANCE SUR DIFFERENTS TYPES DE SIÉGES ÉJECTABLES. In Bergeret, ed., Escape and Survival: Clinical & Biological Problems in Aero Space Medicine. (London, New York, Paris: Pergamon Press, 1961) AGARDograph 52. Pp. 18-29. ASTIA AD 261 861.

ABSTRACT: Over a period of 7 years, a wide diversity of ejection seats have been used in France. This study, reviewing 100 ejections, deals with a survey on the influence of altitude and speed, the percentage of fatalities, major and minor injuries, and of cases in which pilots come out unhurt, in relation with the type of seats used and the improvements which have been added. The second part deals with the specific traumatology of the ejection phenomenon, i.e. injuries of the spine. The author emphasizes the drawback of seats using non-telescopic guns, which involve, within too short a time, values of g which are too high and often exceed the tolerance threshold of the spine.

315

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)

316

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 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) deceleratinn, and (3) rotation of the seat and pilot.

317

Faget, M. A., R. O. Piland 1960 MERCURY CAPSULE AND ITS FLIGHT SYSTEMS. Aerospace Engineering, 19(4):48-53, 58 April 1960

CONTENTS:

1. Detailed description of measures against too high temperature inside cabins.
2. The system of regulating the outer as well as inner circumstances of cabin and space suite.
3. The systems of regulating the stand of the cabins in space. (hand service).
4. Radio-communication systems.
5. Energy provisions.
6. Measurement of scientific instruments carried within flight.
7. The air cushion that "catches" the landing shock.
8. The instrument panel.

318

Fairbanks, D. H., & B. Moore 1956 DOUGLAS A4D SEAT-EJECTION TESTS. (Naval Ordnance Test Station, Supersonic Track Division Test Department, China Lake, Calif.) Rept. No. NOTS 1068; ASTIA AD-105 846; 3 Feb. 1956

ABSTRACT: A series of aircraft seat ejection tests were conducted on a rail track to investigate the operational characteristics of the A4D ejection system at speeds approaching 600 knots. Data were obtained concerning the time-motion relationship

of the sled; the ejection characteristics of the canopy, seat, and dummy, including ejection velocity; and the trajectory of the canopy, dummy, and seat relative to the airplane. The tests gave no indication of collision of the canopy with the dummy, and revealed a minimum safe clearance by the dummy of the tail. Dismemberment of the dummy, loss of personal equipment, and blowing of parachute panels was observed, indicating the high air loads encountered at these velocities. As a result of the tests, the A4D was released for further flight tests with the standard Navy seat gun and cartridge.

319

Fairbanks, D.J. 1953 STATIC " D " RING GRIP TESTS.
(Stanley Aviation Corp., Buffalo, N.Y.) Document no. 214
ASTIA AD-129 143, November 1953

ABSTRACT: A standard downward ejection seat was equipped with arm slings which would pull both arms simultaneously, horizontally backwards and outwards at a 45 degree angle. The slings were lever loaded and equipped with cable tension instruments capable of recording maximum tension. An instrument was also attached to the "D" ring cable.

The three instruments were calibrated in the Stanley Aviation Corporation Dillon Tensile Tester and a report is included.

It was realized that the airman being tested might use his shoulders and upper arms to load the arm slings in addition to his grip on the "D" ring. Several tests were run with hands off the "D" ring and it was found that the shoulders and upper arms could load the slings to approximately 125 pounds.

320

Fairbanks, D. J. 1954 "D" RING SHOCK ABSORBER TOWER TESTS
(Stanley Aviation Corp., Buffalo, N.Y.)
Contract AF 33(600)22530 March 1954 ASTIA AD 129 144

ABSTRACT: Five tower tests were conducted at WADC at Wright Field, Ohio, to evaluate the adequacy of the 2D102100 "D" ring shock absorber for downward ejection seats. It was established by this testing program that although the "D" ring extended as far as 4-3/4 inches (2 inches for initiator firing) from its stowed position there was no tendency for the elbows to move outwards and hang up on the hatch. In each case it was observed that the elbows moved inwards rather than outwards. Occupants for the tests were selected so as to cover as far as possible the sizes of personnel who use the downward ejection seats. It was further established that the "d" ring cable tension loads using the 2D102100 "D" ring shock absorber were on the average 211 pounds. A 16mm slow motion picture was taken of each test and should be used in conjunction with this report. (Author)

321

Fales, E.D., Jr. 1958 SEAT BELTS: SAFE OR HAZARDOUS? AMA Reprint from Today's Health, Oct. 1958.

ABSTRACT: This publication contains the answers to questions commonly asked about seat belts. It also reviews the opinions of several safety experts concerning the actual need for seat belts in case of accident.

322

Falk, D. M. 1949 OPERATIONAL SUITABILITY TEST OF PULSATING SEAT AND BACK CUSHIONS. (Air Proving Ground, Eglin Air Force Base, Fla.) Project No. 34864 - 5; 31 March 1949; ATI-64 411

ABSTRACT: A pulsating seat and back cushion assembly was tested to determine its operational suitability. The item tested was the Aeromat Products' type M-4 pulsating seat and back cushion assembly, which is composed of dual rubber connecting hose and six parts: a control valve, a pneumatic valve, a jack insert box, quick releases, pulsating seat cushion, and a pulsating back cushion. It was developed to increase pilot efficiency through the reduction of compression fatigue. It was recommended that the item be tested on missions of at least ten hours in duration and that further development work be carried out by the USAF in order to increase the comfort of aircrew members participating in long-range missions. (ASTIA)

323

Farley, N. E. 1959 THE SAFETY THE MOTORIST GETS (Society of Automotive Engineers, Inc., New York, N. Y.) Rep. SP 165, June 1959.

ABSTRACT: Four papers dealing with the question of what automotive engineers are doing to assure safety in the modern American automobile are included in this report. The specific aspects of the automobile that are treated are: 1) the chassis, 2) the body, 3) electrical-accessory, and 4) over-all car appraisal. Various phases of product development to meet the changing requirements of traffic conditions and the human factor in the vehicle-driver complex are discussed. Quality control methods that are used to assure that the safety designed in is actually built into the car are discussed thoroughly. (Tufts)

324

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.

325

Ferguson, Clarence N. Risto P. Lappala, & F. Bruce Trenk. 1959 DEVELOPMENT OF IMPROVED FLIGHT HELMET LINEAR (Bjorksten Research Laboratories, Inc., Madison, Wisconsin) WADC Tech. Rep. No. 59-435 October ASTIA AD 231 284.

ABSTRACT: Various low-density plastic foam systems were evaluated for suitability for a padding helmet liner providing maximum comfort with greatest protection against shock and impact. Means of fabricating uniform and reproducible liners by injection of fluid foam into molds were studied.

A linear was developed which appears to meet specification requirement for comfort, protection, ease of application, and durability. It consists of a complete inner layer of a maximum comfort, open-celled, hydrophobic, polyurenthane foam, integrally bonded to an outer layer of high-energy, absorbent, polyurethane foam which is thickest over the pariental, upper occipital, and temporal areas and also provides chin area protection.

Polyurethane foam systems are shown to be capable of providing the desired combination of properties for this application, utilizing techniques adaptable to production processing.

326

Feldinger 1945 TESTING OF EJECTION SEAT. (Versuche mit dem Schleudersitz) ASTIA ATI 51836, February 1945

ABSTRACT: A number of ejection tests were conducted on an ejection seat with dummy to test its functioning. From these tests the characteristics of the

seat were determined for the early part of acceleration immediately following the detonation of the charge. It was concluded that with proper installation and normal functioning of components a smooth ejection can be attained. The maximum acceleration under prescribed conditions was 130 m/s^2; pressure required to release the seat by hand was determined at 25 kg.

327

Ferguson, H. 1953 INVESTIGATION OF THE ACCELERATION AND JOLT HISTORIES DURING ESCAPE FROM HIGH SPEED AIRCRAFT
(Wright Air Development Center, Johnsville, Pa.) 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 curves are valid. In this report, the algebraic sign of the acceleration is not suppressed at the end; it refers to lower bounds of negative accelerations rather than upper bounds of acceleration magnitudes. (ASTIA)

328

Ferwerda, T. 1941 TEST OF EXPERIMENTAL PNEUMATIC STOCKINGS AND BELTS FOR AVIATORS. (Anacostia Naval Airport) CAM No. 28; 24 Sept. 1941

ABSTRACT: Spencer acceleration belt and stockings tested in plane. When inflated to 1.5 psi pressure, they relieved aching in legs following pull out. Use of belt did not affect initial blackout at 5 "g", but after blackout vision cleared and remained clear for as long as 5 "g" could be held on plane. When inflated to 1.5 psi, apparatus had no effect on "g"-tolerance at forces greater than 5.5 "g". When belt alone was used, very painful pressure was felt in legs.

329

Ferwerda, T. 1942 ANTI-BLACKOUT EQUIPMENT -TEST OF -REPORT ON.
(Navy Dept., Naval Air Station, Anacostia, D.C.) 27 April 1942

330

Ferwerda, T. 1956 ANTI-BLACKOUT DEVICE
U. S. Patent 2,760,484; 28 Aug. 1956

ABSTRACT: An anti-blackout device is described and illustrated for use by aviators in combat or other aircraft. The objects of this device are to: (1) permit the aviator to withstand more g without graying or blacking out; (2) provide an automatic gradient pressure means for subjecting the body to increased g resulting from acceleration forces, and provide a pressure suit with a gradient pressure controlling device fixedly mounted on the aircraft with a quickly detachable connection between them permitting the aviator to detach his suit from the equipment fixed to the aircraft instantaneously should it become necessary for bailout.

331

Field, H., & A. V. Bock 1925 ORTHOPNEA AND THE EFFECT OF POSTURE UPON THE RATE OF BLOOD FLOW. J. Clin. Invest. 2:67-76

332

Finch, D. M., & J. D. Palmer 1957 DYNAMIC TESTING OF SEAT BELTS
Trans. Soc. Automot. Engrs. 64:541-51.

333

Fischer, A. & Pavel Kantorek 1958 URYCHLENIE METABOLICKEHO ZOTAVENIA A ZNIZENIE O_2 DLHI PO TELESNEJ PRACI CHLADOVYM PODNETOM APPLIKOVANYM V POPRACOVNOM OBDOBI (Acceleration of the Metabolic Recovery and Decreasing of O_2 Deficit Following Physical Labor by Means of a Stimulus of Cold Applied in the Period after Finished Work)
Cesk. Fysiol (Praha), 7(6):513-514

334

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 discussed 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)

335

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

336

Fisher, J.R. and M. Theodore 1957 JET AGE CRASH HELMET.
Modern Plastics, 34(12):88-91 Aug. 1957

ABSTRACT: Key to the dramatic success of the new APH-5 aviators' crash helmet, now being used by the U.S. Navy is found in a number of plastics applications. The exacting requirements of high-speed flight necessitated a revolutionary design employing a new concept in head protection.
This concept, which involves the absorption of impact energy by the crushing of a rigid cellular material, is implemented by the use of an expanded polystyrene. The complete helmet is an integrated assembly of shell, visor communications equipment, and attachment for an oxygen mask. It is an intricate structure that contains a surprising total of 105 parts, the most important of which are plastics.

337

Fitzsimons, J. T. & M. K. Browne 1956 PHYSIOLOGICAL ASPECTS OF A MULTIGRADIENT ANTI-G VALVE. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 991. Nov. 1956.

338

Flagg, J. E., J. A. Ruseckas, & D. M. Clark 1956 INFLATABLE GARMENT FOR AVIATORS AND THE LIKE. U. S. Patent 2,762,047, 11 Sept. 1956

ABSTRACT: An improved and simplified inflatable garment of flexible gas-tight material for aviators is described and illustrated. Pressures in the garment are adapted to counteract the disturbing physiological effects of violent accelerative forces which can be exerted on vulnerable portions of the wearer's body. The whole or any portion of the wearer's body, with no loss of mobility, can be uniformly pressurized to the desired degree without discomfort and possible harmful effects caused by the pressure medium seeking to enter a body opening, due to the pressure differential existing between the pressurized interior of the garment and prevailing respiratory pressure.

339

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

340

Flechtner, J.A. 1959 LOW SPEED WIND TUNNEL TEST OF A .15 SIZE PILOT CAPSULE MODEL TO OBTAIN AERODYNAMIC CHARACTERISTICS DURING SEPARATION FROM THE AFTERBODY
(Chance Vought Aircraft) Report No. E9R-12497 ASTIA AD 263 504

ABSTRACT: A .15 Size Pilot-Capsule Model was tested in the CVA Low Speed Wind Tunnel during the period September 8 through September 16, 1959. The Long Capsule (C_2) and the Short Capsule (C_3) were tested in the presence of the Afterbody during separation. A typical "Separation Position" of the Capsule is shown as photographed in the Test Section. The Afterbody was moved in increments body longitudinally and vertically as designated. Data was obtained on the Capsule alone during runs 3 through 10 and in the presence of the Afterbody in runs 11 through 52. The purpose of the test was to obtain the Aerodynamic Deltas due to the presence of the Afterbody. These Delta Coefficients are presented for both the pitch and yaw runs.

341

Fleishman, E.A. 1953 THE PERCEPTION OF BODY POSITION. EFFECT OF SPEED, MAGNITUDE, AND DIRECTION OF DISPLACEMENT ON ACCURACY OF ADJUSTMENT TO AN UPRIGHT POSITION. (Perceptual and Motor Skills Research Lab., Air Training Command, San Antonio, Tex.) HRRC Research bull. no. 53-1; ASTIA AD-14 729; 30 Jan 1953
See also J. Exper. Psychol. 46:261-270, 1953.

ABSTRACT: A tilting-chair apparatus was used to investigate the influence of certain factors on the accuracy of adjustment to an upright position in the absence of a visual frame of reference. Relationships were found between degree and speed of tilt and the accuracy with which the subject adjusted the chair to an upright position. The experiment demonstrated that the greater the degree of tilt and the slower the speed of tilt, the greater the average error in returning the chair to an upright position. Significantly greater average error in returning to the upright position was observed when the original tilt was to the right rather than to the left. The constant error of adjustment was generally in the direction of initial displacement; constant error increased as the magnitude of displacement increased. The amount of average error and constant error was influenced by slight changes in magnitude of initial displacement as well as in speed of displacement.

342

Fleishman, E.A. 1953 THE INFLUENCE OF FIXED VERSUS FREE HEAD POSITION ON THE PERCEPTION OF BODY POSITION. (Perceptual and Motor Skills Research Lab., Lackland Air Force Base, Tex.) HRRC Research Bull. 53-371
ASTIA AD-24 654

ABSTRACT: Further study of the perception of body position in the absence of a visual frame of reference was conducted employing 90 subjects whose heads were held in fixed position. Adjustment to an upright position was attempted by subjects displaced to various degrees of tilt and subjected to various speeds of displacement in a tilting chair apparatus. Greater precision of adjustment to the upright position resulted with free head positions. A smaller constant error of adjustment resulted with the fixed head position, although the constant error was in the direction of initial displacement under both conditions. Greater precision of adjustment resulted in both tests when speed and magnitude of displacement under both conditions. Greater precision of adjustment resulted in both tests when speed and magnitude of displacement decreased and when the direction of displacement was to the left rather than to the right. The difference between free and fixed positions were greater at earlier stages of practice. The consistency of individual performance was high under both conditions.

343

Fletcher, K.E., & S.E. Neely 1960 USAF EMERGENCY ESCAPE EXPERIENCE 1949-1959. (Paper, Aerospace Med. Congress, 1960)

344

Florentino, M. Ralph 1949 STRENGTH TESTS OF TURNBULL MODEL 131 NAVIGATOR AND RADIO OPERATOR'S SEAT (ENGINEERING TEST REPORT) (Glenn L. Martin Co., Baltimore, Md. Turnbull Enterprises, Inc., Baltimore, Md.) Engineering Test Report No. 1013 ASTIA ATI 67 810

ABSTRACT: Tests were conducted on three Model 131 Navigator and Radio operator seats for use in C-119 cargo airplanes to determine the strength of the seats in compliance with AAF Spec. 25276A. Two seats were made of 24ST aluminum alloy tubing frame with a pressed aluminum bucket-type seat pan, while the third was of the same design, except for two pieces of 4130 normalized steel tube replacing a section of the lower back frame tubes. The first seat supported the 1700 lb. ultimate down load satisfactorily without yield or apparent set. In subsequent safety belt tests failure of the right hand seat support tube at the pedestal attachment occurred. The aluminum tubing was replaced with 4130 normalized steel tubing, which then supported 103% of the specification ultimate load.

345

Floyd, W. F. and A.T. Welford 1954 SYMPOSIUM ON HUMAN FACTORS IN EQUIPMENT. (Symposium on human factors in equipment design held at the University of Birmingham, 18th - 20th April 1951) (London: H.K. Lewis, 1954)

346

Flynn, John 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.

347

Follis, R.H. Jr. 1943 SHOULDER SAFETY HARNESS. (War Dept., Air Force, Materiel Div.) ENG-M-49-698-10, 23 March 1943

348

Forbes, A.R. 1959 PREFERRED LOADS FOR THE AUXILIARY FIRING HANDLE OF THE MARK 3 EJECTION SEAT. (Flying Personnel Research Committee, Gt. Brit.) Report no. FPRC-999, ASTIA AD-229 169, April 1959

ABSTRACT: Six male subjects were tested under static conditions and three male subjects exposed to positive acceleration of 5 g to determine the optimum load on an ejection seat auxiliary firing handle. The range of loads investigated was from 65 lb to 95 lb, using the techniques of absolute judgments and paired comparisons. The maximum load on this handle should not exceed 75 lb for a two-handed pull. It is recommended that aircrew should be given training in its use to acquaint themselves with the amount of force required to pull it. (Author)

349

Forrest, J., E. A. Wade, W. K. Carter, & R. F. Slechta 1958 LIGHT-WEIGHT SEATING: DESIGN RESEARCH ON A NYLON NET SEAT; ONE OF A SERIES OF STUDIES PERTAINING TO CREW COMPARTMENT HABITABILITY FOR EXTENDED MISSIONS. (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC TR 58-309; ASTIA AD-209 380, Dec. 1958

ABSTRACT: This report describes a design research program for a light-weight aircraft seat made from nylon netting. An empirical approach was used to evaluate a series of exploratory designs and to modify solutions on the basis of subjective reports by individuals occupying the seats. A number of specific design problems were investigated with the results indicating that human factors requirements of a seat for long term occupancy can be met by a nylon net seat. (Author)

350

Forrest, J., et al. 1959 COMFORT EVALUATION OF THE C-124 CREW SEAT (WEBER) (Aerospace Medical Lab., Wright-Patterson AFB, Ohio) Oct. 1959

351

Forrest, J. & R.F. Slechta 1959 COMFORT EVALUATION OF THE C-97A/KC-97E PILOT SEAT (WEBER). (Tufts University, Dept. of Sociology, Bio-Mechanics Lab, Mass.) November 1959.

352

Foster, D. L. 1961 STRATO LAB HIGH #2 POST FLIGHT REPORT. (Winzen Res. Inc. Minneapolis, Minn.) Rept. 1266-R 19 Jan. 1961.

353

Fouch, H. W. 1946 HUMAN SUBJECT EJECTION TESTS FROM P-61B AIRPLANE (Air Material Command, Wright Field, Dayton, Ohio) Rept. No. TSEAC 11-45341-2-1, 26 Aug. 1946, ASTIA ATI- 9212

ABSTRACT:

1. Interviews with the human subject immediately after ejection and again on 21 August 1946 disclosed that no unusual sensations were experienced, except for the slight forward rotation of the seat upon entering the air stream.

2. The human subject stated that the shock received upon the opening of the parachute seemed less severe than those imposed by average routine troop jumps using a static line at speeds of approximately 122 knots. This would indicate that the human subject had reached terminal velocity before his parachute opened.

3. The test indicates that a 12 "G" catapult charge is adequate to propel the occupant and the seat clear of the empennage of most conventional fighter planes without causing physical injury to the human subject or damage to the airplane, at speeds up to 263 knots.

354

Fouch, H. W. 1947 PILOT EJECTION SEAT TESTS ON THE P-61B AIRPLANE AT MUROC ARMY AIR BASE, - AND APPENDIXES 1-11 - MEMORANDUM REPORT (AMC, Wright-Patterson AFB, Dayton, Ohio) TSEAC 11-45341-2-6, 25 July 1947, ATI 119 664.

ABSTRACT: The purpose of this publication is to report on a series of twenty pilot ejection seat flight tests from a P-61B airplane at Muroc Army Air Base from 8 October to 4 November 1946 and from 14 February to 7 March 1947, inclusive. Test "M", considered the most critical condition

in the flight plan, used a low charge of 57.4 gms; an ejection angle of 33°; an indicated airspeed of 260 knots; with a pressure altitude of 10,000 feet. The pilot ejection seat with dummy and parachute equipment, having a total weight of approximately 300 pounds, ejected out of the forward gunners compartment, cleared the upper surface of the vertical stabilizer by approximately 24 feet. Extrapolation of curves for the trajectory of the seat and dummy leaving the test airplane vs. airspeed; tail clearances vs airspeed, shows that safe escape using ejection force, can be made using 0°, 23°, and 33° angles of ejection, flying at speeds up to 260 knots. The automatic opening devices for releasing the safety belt and dummy's parachute are not entirely satisfactory in their present stage of development. Due to the number of opening device failures, it was necessary to double check each unit at the time of rigging and just before take-off time. The maintenance of this type of equipment is very involved. The P-61B airplane is not fast enough to be used for future pilot escape flight tests within the compressibility range of airspeeds. Tests requiring this speed range will be conducted with the P-82 and P-80B airplanes.

355

Fouch, H. W. 1948 PILOT EJECTION SEAT TESTS FROM REMOTE CONTROLLED P-80B ROBOT AIRPLANE (U. S. AF, AMC, Wright-Patterson AFB, Ohio) MCREXA7-45341-3-7 15 July 1948 ASTIA ATI 34691

ABSTRACT: A series of flight tests were conducted on the pilot ejection seat from a F-80B remote controlled airplane. The tests were not completed due to a crash, however it is recommended that, a two place airplane, capable of airspeeds approaching and exceeding Mach number .82, such as the TF80C airplane, be used to complete the original flight plan.

356

Fouch, H. W., & T. E. Sierer 1949 TESTS OF NAMC TYPE CATAPULT PERSONNEL EJECTION ON THE AERO MEDICAL LAB. 100 FOOT VERTICAL TRACK. (Air Material Command, Wright-Patterson AFB, Ohio) Rept. MCREXA 45341-3-10, Jan. 1949

357

Frankford Arsenal 1954 CARTRIDGE ACTUATED DEVICES FOR AIRCRAFT USE (Engineering Manual, Frankford Arsenal, Philadelphia, Pa.) Jan. 1954.

358

Franks, W. R. 1940 ADDENDUM TO WING COMMANDER GREIG'S REPORT ON TESTS WITH "SPECIAL FLYING SUIT" CARRIED OUT BETWEEN JUNE 1st AND JUNE 5th, 1940, USING SPITFIRE L. 1090. (National Research Council, Canada) Report #C-2831.

ABSTRACT: Notes are made on certain technical difficulties of the fitting and adjusting of the flying suits. It is concluded that no difficulties have presented themselves which could not be overcome by suitable manufacturing means.

359

Franks, W.R. 1940 MEMORANDUM - FLIGHT TEST OF EXPERIMENTAL SUIT. (National Research Council, Canada) Report #C-2829, May 14, 1940

ABSTRACT: In over twenty test dives developing accelerations of over 5 G it was shown that the experimental suit designed to counteract "blackout" was effective in conferring such protection.

360

Franks, W.R. 1940 PROGRESS REPORT ON FLYING SUIT TO PROTECT AGAINST PRESSURE EFFECTS OF ACCELERATION. (National Research Council, Canada) Report #C-2832, October 2, 1940

ABSTRACT: Progress in the design of the anti-G suit is reviewed, and recent developments of manufacturing procedures are outlined. It is also noted that construction of the accelerator and that of the human centrifuge has begun.

361

Franks, W. R. 1941 ANTI-BLACKOUT SUIT (National Research Council, Canada) C-2062.

ABSTRACT: On the basis of flight tests made by S/L Briggs and F/L Franks, some tests in the Harvard Aircraft, others in a Curtis P-40 Aircraft with accelerations up to plus 7'G' showed that the Franks suit Type E had been effective in eliminating or delaying the onset of blackout symptoms beyond the normal limit of acceleration obtainable in fighter aircraft. Also that the continued wear of the suit has no serious effect on the well being of the wearer, that the suit does not hinder the pilot in control of movements and there is a feeling of complete normality during heavy accelerations when the suit is worn. The report concerns liaison with British and American authorities in the development of this suit.

362

Franks, W.R. 1941 THE FRANKS SUIT.
(National Research Council, Canada) Report #C-2840, October 1941

ABSTRACT: This memorandum reports the service trials of the Franks Flying Suit in England and suggests simplifications in the design of the suit be conducted in Canada where tests can be made on the human centrifuge.

363

Franks, W.R. 1941 HYDROSTATIC SUIT IN GUNNER'S POSITION OF DEFIANT.
(National Research Council, Canada) Report #C-2834, July 1941

ABSTRACT: In tests at R.A.E. Farnborough, the hydrostatic suit was found to protect the passenger seated up right in gun turret against 6 G lasting for 6 seconds. Tests in the decompression chamber at simulated altitudes up to 38,000 feet showed that the suit caused no symptoms of discomfort.

364

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 applicance 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.

365

Franks, W.R. 1941 TEST FLIGHTS WITH HYDROSTATIC SUIT.
(National Research Council, Canada) Report C-2849
F.P.R.C. 301, 27 May 1941 ASTIA ATI 206 421

ABSTRACT: Progress reports on the flight trials with the Franks Flying Suit concluded that the blackout threshold of the passengers was raised from 4.5 to 6 G.

366

Franks, W.R. 1942 REPORT ON TRIAL NO. 23 - FRANKS FLYING SUIT. (National Research Council, Canada) Report #C-2843, 16 July 1942

ABSTRACT: This report summarizes briefly the security aspect of the Franks Flying Suit, accelerative forces in flying, a description of the Franks Flying Suit and its fitting and servicing. Arrangements of the Service trial are described. The dangers of the use of the Franks Flying Suit and its advantages are pointed out. It was found that it enables the wearer to withstand 1 1/2 to 2 G more than he normally can.

367

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.

368

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 FFS (AB-BG SYSTEM) (National Research Council, Canada) Report C-2722, Sept. 28, 1944.

369

Franks, W.R. and W.R. Martin 1944 LIAISON REPORT ON MEETING OF SUB-COMMITTEE 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

370

Franks, W. R., E. A. Ryan, and W. A. Kennedy 1944 THE COOLING OF PILOTS AT READINESS UNDER SIMULATED TROPICAL CONDITIONS BY BUBBLING AMBIENT AIR THROUGH A MARK III FFS PARTIALLY FILLED WITH WATER. (In Proc. Assoc. Committee Aviat. Med. Res., N.R.C., Canada) Rept. No. C-2721, 4 Sept. 1944.

371

Fraser, A.M. 1943 THE EFFECT OF THE FRANKS FLYING SUIT ON THE INCIDENCE OF DECOMPRESSION SICKNESS.
(National Research Council, Canada) Report # C2561, 30 June 1963

ABSTRACT: In 24 (57%) of the control flights severe pains (requiring descent) occurred in the lower extremities, wheras, in only 2 (6%) of the flights in which the Franks Flying Suit was worn did such pains occur, and both of these were present in the same subject. Severe pains in the upper extremities occurred in 9 (21%) of the control flights and in 8 (26%) of those in which the Franks Flying Suit was worn. The hydrostatic column applied in wearing the Franks Flying suit, and which is found here to prevent pains in the lower extremities is much shorter than that previously found necessary to relieve such pains. It is pointed out that this is in agreement with the general experience that greater decrease in altitude is necessary to relieve decompression sickness, than is required to prevent it. This effect of hydrostatic pressure in preventing pains of decompression sickness is regarded as additional support for the view that the origin of limb pain is peripheral.'

372

Fredericks, R. H. 1960 PROGRESS IN SAFE VEHICLE DESIGN
(Ford Motor Comp., Dearborn, U. S. A.)

373

Fredericks, R. H. 1962 PROGRESS IN SAFE VEHICLE DESIGN. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 225-240

374

Freeman, H. E. 1960 PERSONNEL RESTRAINT SYSTEM PROGRESS REPORT FOR JUNE--JULY 1960. (Chance Vought Aircraft) AF 33(600)-41418, CVA-AST/EOR-13079, August 1960.

375

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) Pp. 259-264 Publication No. 977.

ABSTRACT: A 60 G personnel restraint system was developed. The central components 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 shell, a central divider, a contoured leg backrest, and a leg cover. Anti-submarine 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 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.

376

Freeman, H. E., W. C. Boyce, & C. F. Gell 1962 INVESTIGATION OF A PERSONNEL RESTRAINT SYSTEM FOR ADVANCED MANNED FLIGHT VEHICLES. (6570th Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio) AMRL-TDR-62-128, Dec. 1962

ABSTRACT: To develop new concepts for personnel restraint, the following studies were conducted. Characteristic accelerations were defined for advanced manned flight systems. Ballistic reentry, generating 8 to 12 G associated with ballistic reentry, produce the most severe physiological stress. Landing impact, generating low-total-energy accelerations of 60 to 100 G's peak on the capsule, produced the most severe structural loading. Human tolerance to acceleration was studied by a survey of the available test data and a structural analysis of the human body. Case histories of accidental falls and suicides were studied to gain insight into human tolerance to high-peak-magnitude low-total-energy acceleration exposures. Several basic crew restraint concepts were evolved and evaluated. One employing rigid contoured support was selected to limit body-element displacement and distortion and to minimize rebound. A test system was designed and fabricated. Mechanisms were designed to proposition and pretension the crewman mechanically before impact. The system should be thoroughly tested to determine the protection achieved by rigid contoured restraint. (AUTHOR)

377

Frenier, C.E. 1947 BELT ASSEMBLY - SHOULDER HARNESS, PILOT EJECTION SEAT - DRAWING NO. X4766061 (Army Air Forces, Materiel Command) TSEAP-7B-1-826, 16 Jan 1947, ASTIA ATI-179 498

ABSTRACT: The purpose of this report is to present the results of the comparative strength tests between subjects belt assembly and the standard Type B-18, Belt Aircraft Safety Shoulder, Specification 94-3262. The type B-18 Shoulder Harness, Exhibit A, was modified by removing the metal attachments fittings, Part Nos. 42B6034-L-1 and 42 6034-R-1 and installing webbing loops and rolling edges in to form an oval cross-section, stitching being used to secure loop and oval cross-section. As a result of the tests, it was found that webbing formed loops are superior to weak steel fittings. That webbing formed loops protected to prevent wear would be suitable for service use.

378

Freudenthal, A. M. 1957 SAFETY AND SAFETY FACTORS FOR AIRFRAMES (AGARD, Paris, France) Rept. 153, Nov. 1957

379

Frost Engineering Dev. Corp. 1961 INVESTIGATION OF THE DYNAMICS OF HUMAN RESTRAINT SYSTEMS. (Frost Engineering Dev. Corp., Denver, Colo.) 30 July 1961.

ABSTRACT: Excluding effects due to improper restraint system configuration, which may cause the imposition of intolerably high localized loads on the body structure or organs, the effective stiffness and damping characteristics of a restraint system has a very great influence upon the physiological tolerability of short period accelerations. This report describes the dynamic fundamentals of restraint and makes recommendations concerning a research program of restraint dynamics.

380

Frost, Richard H. 1952 INTEGRATION OF EQUIPMENT IN THE CAPSULE (Paper, Conference on Problems of Emergency Escape in High Speed Flight)

381

Frost, R.H. 1955 ESCAPE FROM HIGH SPEED AIRCRAFT.
I.A.S. Preprint 532, (Stanley Av. Corp., presented at the 23rd Annual Meeting, January 24-27, 1955)

ABSTRACT: A view is given of the development of the emergency escapes for planes with high speed. In the second World War the Germans did research in this field. Before the end of the war, the Germans made use of ejection seats. After the War England as well as U.S. busied themselves with bail-out problems. The author summarizes the expectations for the near future. from researchers in Germany, Sweden, Great Britain and America.

382

Frost, R.H. 1955 ESCAPE CAPSULE.
J. Aviation Med. 26(6):452.

ABSTRACT: We believe at present that the ejection seat will be just about at its upward limit of use at speeds corresponding to little more than sonic flight at sea level, because angular and translational accelerations encountered will approach human limitations and because of the problems of retaining protective equipment and body extremities in the airblast. Some alleviation can be expected by increasing the weight of the seats and incorporating special stabilization and retaining devices. However, when this point is reached, it is our belief that we might as well go on to the complete capsule, because it will probably cost little if any more in weight, space, and complexity. Moreover, the capsule has many advantages over ejection seats; better protection of the occupant from environmental conditions, opportunity for considerable integration of personal equipment, and protection for the user after he has reached the surface...

Whichever capsule configuration is chosen, it will unquestionably be capable of retaining pressure, withstanding landing impact, and floating for long periods after water landing. The recovery system can be expected to be completely automatic in operation, probably consisting of a drogue stabilizer chute deployed immediately after ejection and subsequently released by some sort of altitude- and force-sensing device. At release, the drogue will deploy a single or multistage recovery parachute that will lower the capsule all the way to the ground or water. The intention will be that the occupant stay in the capsule through the entire descent and, if desired, until rescue is accomplished. However, I strongly suspect that all capsules will have to provide for manual bail out at any time desired, at least until a great deal of experience has been gained to prove their reliability, and this requirement will diminish full realization of the capsule potentialities. In any event, I am convinced that airplanes capable of supersonic flight at low altitude should and will be equipped with capsules, and I expect the result will then continue the trend already apparent from ejection seat statistics- an increasing percentage of successful escapes from combat airplanes. (Author)

383

Frost, R.H. 1957 ENGINEERING PROBLEMS IN ESCAPE FROM HIGH PERFORMANCE AIRCRAFT J. Aviation Med. 28(1):74-77, Feb. 1957.

ABSTRACT: A discussion of the elements of over-all problem of ejection: (1) Decision to abandon the aircraft; (2) operation of emergency controls; (3) removal of obstructions to egress; (4) egress from the crew station; (5) avoidance of airplane structure after egress; (6) prevention of injury caused by impact pressure, temperature, deceleration and/or tumbling; (7) prevention of injury caused by ambient pressure and/or temperature; (8) retention, and protection until use, of life-saving and survival equipment; (9) operation of life-saving equipment; (10) prevention of injury during landing, considering both vertical and horizontal velocities, and type of surface encountered; (11) counteracting effects of surface environment, including hunger and thirst; (12) Facilitating search and recovery operations by friends; avoiding these operations by enemy; (13) training in operation and maintenance of the system.

384

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

385

Fryer, D. I. 1958 AIRCRAFT PASSENGER SEAT DESIGN AND CRASH SURVIVAL. (RAF, Institute of Aviation Medicine, Farnborough) FPRC No. 1055 August 1958

ABSTRACT: In this review, an attempt is made to describe the forces likely to be encountered in an accident and the best means by which to minimize their various effect on passengers.

386

Fryer, D. I. 1959 PASSENGER SURVIVAL IN AIRCRAFT CRASHES Aeronautics (London) 40(2):31-37

ABSTRACT: Medical and physiologic data concerning factors affecting human survival in aircraft crashes are reviewed and discussed. Recommendations are made for protecting passengers against crash forces in the direction most commonly involved: forward and downward. This includes appropriate aircraft design and positioning of passenger accommodations.

387

Fryer, D. I. 1961 OPERATIONAL EXPERIENCE WITH BRITISH EJECTION SEATS. A SURVEY OF MEDICAL ASPECTS.
(Flying Personnel Research Committee, Gt. Brit.)
Rept. no. FPRC-1166 July 1961 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 R.A.F. experience with American seats. Although reference to the indications for ejection and the mechanism whereby this is executed if frequently necessary, the primary aim is a medical survey of the difficulties inherent in escape by this means, and the nature, causes and contributory causes of injury during and following ejection. (Author)

388

Fryer, D. I. 1962 RAF EXPERIENCE WITH SAFETY HARNESSES
Am. Occup. Hyg. 5:113-127

ABSTRACT: In the development of safety harness from its earliest stages to the present complex systems in current aircraft, a number of important strides have been made and these are briefly reviewed. The main advances have been in the provision of shoulder harness, the recognition of the need for attachment to the airframe rather than the seat, the design of harness such that the centre of gravity of the body is not lower than the junction point of the straps, and the construction of harness such that it will withstand the forces encountered in very severe impacts. The three principal aims of harness in aircraft are to provide restraint during various in-flight manoeuvres, to provide retention during crash decelerations and to maintain optimum body positioning during operation of the ejection seat. The relevance of the features of current harness to the requirements for safety belts for motor vehicles is briefly discussed.

389

Fuchs, L. A., & B. S. Hutchins 1960 UNDERWATER RESEARCH TO SAVE PILOTS
(Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

390

Fulton, C.L. 1958 EFFECT OF ENVIRONMENTAL CONDITIONING ON AN AIRCRAFT EMERGENCY ESCAPE SYSTEM. (Pitman-Dunn Laboratories Group, Frankford Arsenal, Philadelphia, Pa.) Memo Rept. MR-667, Feb. 1958. ASTIA AD 204 692.

SUMMARY (a): Three "mock ups" of an emergency escape system were each subjected to nearly 100 cycles of environmental conditioning. This conditioning simulated an aircraft traveling from sea level, 70° F, to 50,000 feet, -65°F, and return.

Two of the "mock ups" were disassembled and found to contain various amounts of moisture; the third was successfully functioned while at -65°F.

While the results show that there was moisture accumulation within the "mock ups" successful functioning of one at -65°F indicates that the accumulated moisture is not sufficient to adversely affect the functioning of the system. (Author).

391

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.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

G

392

Gaer, R. L. 1957 OPERATIONAL REGIONS AND BIO-AERODYNAMIC LIMITATIONS OF FUTURE AIRCRAFT ESCAPE SYSTEMS. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 57-590; Oct. 1957

393

Gagge, A.P. PRINCIPLES OF SEATING IN FIGHTER TYPE AIRCRAFT AAF Memo Report TSEAL-3-695-58

394

Gagge, A.P. 1943 PERSONNEL EQUIPMENT PROBLEMS IN ETOUSA AND NATOUSA Appendix 12: AN IMMEDIATE APPLICATION FOR THE ANTI-G-SUIT. (War Dept., Air Forces) ENG-49-695-34, 20 September 1943

395

Gagge, A.P. 1945 HUMAN FACTORS IN AIRCRAFT DESIGN. Air Surgeon's Bulletin, 2(9):298-301
See also U.S. AAF-ATSC, Engineering Division, Aero Medical Laboratory Memo. Rept. TSEAL-3-695-53, 29 May 1945.

396

Galban, P. and J. Fabre 1961 ETUDE DES EFFECTS DE L'ÉJECTION SUR LA TAILLE DES PILOTES (STUDIES ON EJECTION EFFECT ON THE PILOTS HEIGHT) Report CERMA 1025

397

Galiana, T. de 1952 TECHNIQUES NOUVELLES DE PARACHUTAGE (NEW TECHNIQUES OF PARACHUTING) Atomes (Paris) 7(79):333-337

ABSTRACT: This is an illustrated summary of the functioning of the ejection seat and the physiological effects of high-altitude bailout. The outlooks of recently developed techniques, such as the ejection capsule, are briefly discussed

398

Galkin, A. M. et al 1959 MEDICO-BIOLOGICAL RESEARCH IN ROCKETS: RESEARCH ON THE LIFE ACTIVITY OF ANIMALS DURING FLIGHTS IN HERMETICALLY SEALED CABINS OF ROCKETS UP 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) PP. 109-149, LC or SLA 59-22466.

399

Gandelot, H. K. and P. C. Skeels 1962 CONSIDERATIONS IN CRASH ENERGY ABSORPTION. (In M. K. Cragun, ed., The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961) Pp. 219-224.

400

Gantz, K.F., Ed. 1959 MAN IN SPACE: THE UNITED STATES AIR FORCE PROGRAM FOR DEVELOPING THE SPACECRAFT CREW (Duell, Sloan and Pearce, New York)

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"; "Observations 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"; "The Military Impact of Manned Space Operations"

401

Gard, P. W., & L. B. Cochran 1956 INSTALLATION AND EVALUATION OF TV-2 TYPE ARM RESTS ON SPECIAL DEVICE, 6-EQ-2a, EJECTION SEAT TRAINER. (Naval School of Aviation Medicine, Pensacola, Fla.) Special Rept. No. 56-16; 24 Apr. 1956

ABSTRACT: The modification of the 6-EQ-2a ejection seat trainer to incorporate a direct TV-2 type trigger arm rest firing mechanism is described and illustrated. The modified seat trainer proved to work successfully, utilizing either face curtain or arm rest firing technique. This training device is used to indoctrinate student and naval aviators in escape procedures from high speed aircraft.

402

Gardner, W. J. and D. F. Dohn 1956 THE ANTIGRAVITY SUIT (G-SUIT) IN SURGERY
J. of American Medical Association, 162:274-276, Sept. 22, 1956

ABSTRACT: The principle of the antigravity suit (G-suit) used in aviation is effective in combating postural hypotension during operations with the patient in the sitting position. It is also helpful in the management of induced hypotension during operations with the patient in the supine position A simplified G-suit, consisting of a plastic bladder, may be wrapped about the lower part of the body and inflated from a tank of gas. Crile applied this principle to the control of blood pressure during surgery more than fifty years ago. (J. of Aviation Medicine 29(5):365, 1958)

403

Garn, Stanley M. 1960 THE INNER MAN
(Paper, American Rocket Society Anatomy of Manned-Space Operations Conference, Dayton Biltmore Hotel, Dayton, Ohio, October 10-12, 1960)

ABSTRACT: A man is not just his outline, measured and traced on OSCAR, but the sum of his inner components, of which, the fat-free compartment and the fat compartment are the two of greatest current interest

404

Garrett, J. W. 1962 AN EVALUATION OF DOOR LOCK EFFECTIVENESS: Pre-1956 vs Post-1955 Automobiles. In M. K. Cragun ed. The Fifth Stapp Automotive Crash and Field Demonstration Conference, Sept. 14-16, 1961. PP. 20-31.

405

Garrett, J.W., & P.W. Braunstein 1962 THE SEAT BELT SYNDROME
The Journal of Trauma, 2(3):220-237, May 1962.

ABSTRACT: The data examined in this study were based on accident and medical records drawn from a total of 2,778 automobiles in each of which at least one occupant was wearing a seat belt when an accident occurred. These cars contained 3.673 occupants; 3,325 occupants wore seat belts and of these, 944 were injured.

A total of 150 occupants received some injury to the lower torso; 26 of these except in one case, but the injury was not related to seat belt use; both car and occupant were completely crashed in a collision with a bus. The frequency of lower torso injuries among injured seat belt users was essentially similar to that observed among occupants in injury-producing accidents without belts (about 15 per cent for both).

In the majority of the 26 cases where serious lower torso injuries occurred, accident circumstances were rather severe. Only 7 of these patients showed any evidence of severe seat belt application--bruises, contusions, etc.

406

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.

407

Gatling, F. P. 1959 EJECTION SEAT STUDY (USN Safety Ctr., Norfolk)
Rept. No. AM 2-59, ASTIA AD 220 667.

ABSTRACT: The ejection rate for calendar 1958 was the highest in the history of Naval aviation, but there is an indication that the rate of increase is slowing. Lack of altitude is still the greatest factor in unsuccessful ejections. There was a large increase in on-the dock ejections in 1958, and the main altitude at which ejections were made in 1958 was the lowest yet recorded, 7474 feet. There was a substantial increase in fatal ejections that began above 3000 feet. The mean speed at which ejections are made continued to decrease to 217 knots. Attitude data again failed to reveal any connection between attitude and fatal injury. Among aircraft had the smallest percentage of fatal injuries.

408

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"

409

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

410

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.

411

Geer, R. L. 1957 OPERATIONAL REGIONS AND BIOAERODYNAMIC LIMITATIONS OF FUTURE AIRCRAFT ESCAPE SYSTEMS. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 57 590, Oct. 1957. ASTIA AD 131 089.

ABSTRACT: The boundaries and conditions for practical flight within the atmosphere are delineated. The region where flight is practical is divided into areas of different escape requirements. Three figures are included to illustrate the various flight regions as a function of altitude and Mach Number. (Author)

412

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; June 1959

ABSTRACT: Balloon borne vehicles are well suited for use as a means of lifting 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.

413

Geiger, R. C. 1948 PROOF TEST OF PILOT'S, CO-PILOT'S, AND NAVIGATOR'S SEAT INSTALLATIONS MODEL XB-48-2(Glenn L. Martin, Co., Baltimore, Md. USAF Contract No. W33-ac-13492, 26 Aug. 1948.

ABSTRACT: Proof tests were made on the pilot's, co-pilot's and navigator's seat installations in the XB-48-2 bomber. Deflection readings were taken and the results plotted. The pilot's, co-pilot's, and navigator's seat installations were satisfactorily proof loaded with no indication if imminent failure little deformation, and no appreciable permanent set. The various test results indicate that the installations are satisfactory from a strength standpoint.

414

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.

415

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, 10 Dec. 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.

ll, C.F. 1954 EVALUATION OF ANTI-BLACKOUT SUIT WITH PARACHUTE/SAFETY HARNESS AS INTEGRAL PART
S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR2 March 9,1954

STRACT: The subject anti-blackout suit met the requirements of para. 4.2.3 MIL-S-5085 (Aer) in providing adequate G protection for the subject after ing tested and evaluated on the human centrifuge. However, this protection s accompanied by subjective discomfort of excessive pressure from the belly adder even though the G valve was on the low setting. The same subject had comparable discomfort when protection of the same magnitude of G was provided a conventional anti-blackout suit attached to the G valve on the high setting.

7

ell, C.F. & H.N. Hunter 1954 PHYSIOLOGICAL INVESTIGATION OF INCREASING RESISTANCE TO BLACKOUT BY PROGRESSIVE BACKWARD TILTING TO THE SUPINE POSITION
Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-5406; 30 June 1954 ASTIA AD 36 856
ee also: J. Aviat. Med. 25(6): 568-577, Dec. 1954.

BSTRACT: Physiological instrumentation for the tests on the supine seat ncluded the measurements of ear opacity, ear pulse, ECG, systolic blood pressure ulse, and respiration. The subjects were monitored by peripheral and central ifht responses. The runs consisted of 5-sec exposures from 1 g to the g level here grayout occurred for each position. At the grayout level, the g tolerance as evaluated after the seat was tilted backwards and fixed into position. Excessive discomfort in any position due to abdominal or thoracid pressure was also considered an end point. The angular relationship of the back of the seat with the retinal-aortic dimension was determined by x-ray when the seat was positioned at 20 degrees, 65 degrees, and 85 degrees. No change was indicated in the blackout tolerance between 0 degrees to 35 degrees backward tilt. The first increases in tolerance were noted at the 45 degree position. At 77 degrees, the anti-blackout protection did not exceed the protection afforded by an inflated anti-g suit with the subject in the upright position. The study indicated that to receive the full protection against blackout afforded by supination the subject must be tilted back beyond 77 degrees. (ASTIA)

418

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 fulness, 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)

419

Gell, C. F. Capt., E. L. Hays and J. V. Correale, Jr. 1957 CHRONOLOGICAL DEVELOPMENT HISTORY OF THE NAVY'S FULL PRESSURE HIGH ALTITUDE SUIT (Air Crew Equipment Laboratory) NAMC-ACEL-334

420

Gell, C.F., E.L. Hays, and J.V. Correale 1958 THE NAVY FULL-PRESSURE, HIGH ALTITUDE SUIT J. Aviation Med. 29(3): 324, March 1958

ABSTRACT: The development and design features of a Navy full-pressure suit for the protection of aviators at extreme altitudes are described.

421

Gell, C. F., E. P. Hays, & J. V. Correale 1959 DEVELOPMENTAL HISTORY OF THE AVIATOR'S FULL PRESSURE SUIT IN THE U.S. NAVY. J. Aviation Med. 30(4):241-250.

ABSTRACT: This article gives a complete history of research conducted on various full pressure suits since the one made for Wiley Post. It also surveys the research in certain related fields such as decompression, cold water

exposure, anti-G protection and other physiologic studies. At the present time, the U.S. Navy's full pressure high altitude suit provides protection for potential disabilities at high altitude. Above 35,000 feet, whether the altitude is reached by design or due to aircraft cabin decompression, the suit system will maintain a 35,000 foot atmospheric pressure level with 100 per cent oxygen to the respiratory apparatus. In this manner it provides full protection against anoxic anoxia, aeroembolism or the damaging effect of explosive decompression.

422

Gell, C. F. 1960 BIO-ENGINEERING OF PROTECTIVE SYSTEMS
(Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

423

Gell, M.E. 1946 NOTES ON THE OPENING SHOCK OF A PARACHUTE
(War Dept., Air Forces, Wright-Patterson) TS 328, 29 April 1946

424

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 48 517

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.

425

Gemmill, C. L. 1943 TESTS ON ABILITY OF ANTI-G SUITS AS A PROTECTION AGAINST AEROEMBOLISM. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-147, 22 Feb. 1943

426

Gemmill, C. L. 1944 COMPARISON OF DIFFERENT TYPES OF PARACHUTE HARNESS WITH PARTICULAR REFERENCE TO EASE OF RELEASE. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Rept. X-292.1., 7 March 1944

ABSTRACT: Extensive studies on the U.S. Navy Type and the British "quick release type of parachute release, with advantages and disadvantages of each.

427

Gerathewohl, S.J. & B.E. Gernandt 1962 PHYSIOLOGICAL AND BEHAVIORAL SCIENCES In: National Aeronautics & Space Administration, Wash, 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 reached 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 animal 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 is the life scientist 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)

428

Gero, D. R. 1956 EJECTABLE AIRCRAFT SEAT CAPSULE
U. S. Patent 2,733,027; 31 Jan. 1956

ABSTRACT: An ejection seat for occupants of high-speed airplanes consisting of a capsule or enclosure for such seats and providing an airtight means of protecting the occupant to safely escape from the airplane in flight is described and illustrated. Capsule operation is automatic and can be initiated from a single lever or switch. This is to insure safe escape of an occupant who is wounded and who could not perform the normal escape functions in an open ejection seat. The capsule includes as standard equipment an armor plate, an adjustable seat parachute for the occupant, a recovery drogue chute, oxygen supply, and ejection guns, track, and support structures. The capsule is capable of floating when landing on water.

429

Gex, R.C. 1961 PERSONNEL SUBSYSTEM TESTING AND EVALUATION FOR MISSILES AND SPACE SYSTEMS (AN ANNOTATED BIBLIOGRAPHY)
(Lockheed Missiles and Space Division, Lockheed Aircraft Corp., Sunnyvale, Calif.)
Special Bibliography SB-61-21 April 1961. ASTIA AD 257870

ABSTRACT: 259 references are included, most of which contain abstracts. The emphasis is on evaluation of performance of teams of personnel engaged in operating and maintaining complex man-machine systems. Training and training equipment, personnel requirements and human engineering studies were included if they contained information relevant to personnel evaluation.
Sources checked: ASTIA, LMSD reports catalog, AFBMD reports catalog, STL reports catalog, Air University Periodical Index, Psychological Abstracts. Classified reports are included. The titles were taken from unclassified sources.

430

Gibbens, Murray E. & W. V. Smith 1957 THE DOCTOR AND THE AUTOMOBILE ACCIDENT
The Journal of the American Medical Association, 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."

431

Gibson, J. C., W. K. Stewart, & Z. Pekarek 1943 PREVENTION OF INJURY IN AIRCRAFT CRASHES
(RAF, Institute of Aviation Medicine, Farnborough) FPRC 556, Dec. 1943.

432

Glaister, D. H. 1959 A TECHNIQUE FOR THE EVALUATION OF SEAT PACK EJECTION CHARACTERISTICS. (Royal Air Force, Inst. of Aviation Med., Farnborough) FPRC Memo. No. 139, Nov. 1959.

ABSTRACT: A technique for the evaluation of seat pack ejection characteristics before actual trial on an ejection rig is of value both in reducing testing time and in increasing safety, as only potentially safe packs need be tested with human subjects on the rig. A technique for static testing of seat packs was developed by Guignard 1958 (unpublished), in which oscillations following a blow on the pack were recorded by means of accelerometers. This suffered from undue sensitivity to high frequency vibrations which are of no physiological importance as they are damped out by the human body. These vibrations made evaluation of the primary oscillations difficult. The test blow was given to the whole upper surface of the pack and was therefore unsuited to testing packs where the contents were distributed in relation to the bearing area of a sitting subject - i.e. the shaped water cushion in the Q pack.

With these considerations in mind the rig was modified so that actual displacement induced by a blow on the pack was recorded rather than acceleration. The pack is loaded statically, the distribution of the load corresponding to that of a seated person. A second weight is dropped a fixed distance on the static load and the resulting oscillations are recorded

433

Glaister, D.H. 1961 PROPERTIES OF POLYURETHANE FOAMS IN RELATION TO THEIR USE AS EJECTION SEAT CUSHION MATERIAL. (Flying Personnel Research Committee, RAF Institute of Aviation Medicine, Farnborough, Hants) FPRC Report No. 1184, Memo Report no. 158, Aug. 1961. ASTIA AD 279 574.

ABSTRACT: Polyester and polyether grades of polyurethane foams have been subjected to a number of tests to determine their physical properties in relation to their suitability for use as cushions on ejection seats. Properties measured were density, compressibility, permanent deformation following prolonged compression, rates of recovery following brief compression, and measures of damping under lightly and heavily loaded conditions.

434

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

435

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.

436

Glushkov, I. 1961 PARACHUTES WITH ROTATING CANOPIES (Kryl'ya Rodiny, Nr. 12, 1961, pp. 24-26) Prepared by: Translation Services Branch, Foreign Technology Division, WP-AFB, Ohio FTD-TT-62-983/1+2 August 7, 1962 ASTIA AD 284 113

ABSTRACT: This article reports on several types of parachutes: parachutes with canopies with flat, axially-symmetrical forms having shroud lines of varying lengths; parachutes with flat surfaces having an unbroken canopy; parachutes of feathered construction; parachutes with special construction and form of the canopy; and rotating parachutes.

437

Goddard, J.L. & W. Haddon, Jr. 1961 AN INTRODUCTION TO THE DISCUSSION OF THE VEHICLE IN RELATION TO HIGHWAY SAFETY. (Presented at the Joint Conference on Automotive Safety, Evaluation of Automotive Design and Res., West Point N.Y., 17-19 May 1961.)

438

Godshall, J. C. 1959 UNDERWATER ESCAPE PROGRAM: F4D-1 CANOPY LOAD AND HUMAN EGRESS TESTS ABOARD A SUBMARINE. (Naval Air Development Center, Johnsville, Pa.)

SUMMARY (a): Preliminary tests for underwater egress from an F4D-1 cockpit section installed on a fleet type submarine at New London, Conn., during July 1958 are described in this report. Pilot egress problems are discussed, including the waterflow effect which tends to close the canopy. It is recommended that certain further tests be conducted at higher sink rates to obtain additional information using both the single-place fighter cockpit, F4D-1, and a two-place trainer cockpit.

438

Godshall, John C. 1959 UNDERWATER ESCAPE PROGRAM: HUMAN EGRESS AND CANOPY FORCE TESTS F4D-1 AND T2V-1 COCKPIT SECTIONS ABOARD A SUBMERGED SUBMARINE
(US Naval Air Development Center, Johnsville) ASTIA 231438

ABSTRACT: Tests were conducted to determine the waterflow effect tending to close the canopy of a sinking aircraft. A single-place fighter cockpit (F4D-1) and a 2-place trainer cockpit (T2V-1) were secured alternately to the aft deck of a submarine. No water forces were experienced during the complete series of tests that would tend to hold the pilot in his cockpit. It is possible for an uninjured pilot to escape from a fighter or trainer aircraft that is sinking in either a nose down or a tail-down attitude as specifiec in this report, provided the canopy is held open or removed. The F4D-1 canopy tests show that a force of approximately 50 lb at the canopy leading edge will maintain the canopy open 25° and a force of approximately 85 lb will maintain the canopy open 35° in the tail-down sinking attitude at a sink rate of approximately 10 fps. Reclosure of the canopy in an underwater situation would seriously jeopardize pilot escape. An M3A1 cartridge initiator was employed in the F4D-1 aircraft to initiate the action of the canopy-removal system at depths of 18 ft or less. The buoyant free-ascent method, known as the blow-and-go method, is considered the safest and most desirable method of ascent to the surface from a sinking aircraft after breathing oxygen or air under pressure. The aircraft cockpit provides a shield against the onrush of water incident to either the nose-down or tail-down sinking conditions until the pilot leaves the cockpit.

439

Goldman, D. E. 1946 MECHANICAL FORCES - TABLE I. ESTIMATED TOLERANCES OF UNPROTECTED HUMAN BODY TO VARIOUS MECHANICAL FORCES.
J. Aviation Med. 17(5):426-430, Oct. 1946.

ABSTRACT: Aviation personnel, especially those in military service, are subjected to a wide variety of mechanical forces including changes in ambient pressure, acceleration, wind blast and vibration as well as the forces associated with parachute escape, crashes, explosions and missile casualties. Little is known of the actions of these forces or of means of protection against them.

Eventually it should be possible to accumulate a background of information sufficient to permit generalizations and to allow specific predictions to be made as to tolerances and requirements for protection.

A listing of complexities must be made to enable an intelligent choice to be made of methods for handling problems which must be solved.

A first step, the performance of a structural analysis of the human body, involves a study of the geometrical and physical layout and the determination of the elastic properties of the various parts and connections.

Secondly, a vibration analysis should yield considerable information of value.

Resonance measurements can be used to find natural frequencies, damping coefficients, effective masses and spring constants.

From such orderly investigations, it should be possible to learn a great deal about basic physiology and some of its practical consequences. A table of human tolerance limits of various grades and for various forces is essential for engineers concerned with the design of aircraft and of other machinery involving close human association.

440

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.

441

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.

SUMMARY: 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.
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

442

Gonsalves, J., and J. Mollick 1959 SUMMARY OF INTEGRATED FLIGHT CAPSULE: PARACHUTE RECOVERY SYSTEM PROGRAM. (Vought Aeronautics, Chance Vought Aircraft Inc., Dallas, Texas) ASTIA AD-263498, September 1, 1959

SUMMARY: This report contains a review of the work accomplished to date on the recovery system for the Integrated Flight Capsule and outlines a program that would permit concurrent development of the recovery system and the capsule. The preliminary design parameters established in previously completed feasibility studies are included for information.

443

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; ASTIA AD-252 434; 2 March 1961

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, disorientation, 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) of the Armed Services Technical Information Agency, ASTIA document (AD) numbers have been given when available. (AUTHOR)

444

Goodrich, J.W. 1956 ESCAPE FROM HIGH PERFROMANCE AIRCRAFT (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 56-7; Jan.9, 1956; 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 tha 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 aximum linear deceleration rapidly approaches the li it of human tolerance s the speed of the aircraft at time of ejection is increased above 550 knots alibrated airspeed. The aerodynamic and physical characteristics defined by he parameter (C_DA/W) are such as to limit the usefulness of the conventional jection seat system to the lower part of the speed range of the 'Century eries' fighter. Only by optimization of these parameters, such as may be btained by the use of a low drag capsule, can successful escape be expected peed range capability of the 'Century Series' aircraft and beyond." (WADC)

445

oodyear Aircraft Corp. 1960 PERSONNEL RESTRAINT DEVICES FOR ADVANCED FLIGHT VEHICLES, PART I. (Goodyear Aircraft Corp., Akron, Ohio,) June 1960.

446

ord, Biermann 1931 WELTRAUMSCHIFFAHRT? EINE KURZE STUDIE DES PROBLEMS (SPACE TRAVEL? A BRIEF STUDY OF THE PROBLEMS) (Bremen: F. Leuwer, 1931).

ABSTRACT: Early history of the physical and technical problems of rocketry with a discussion of space travel.

447

Gordon, E. S. and S. Hori 1961 VIABILITY DATA ACQUISITION SYSTEM FOR TESTING BIOSATELLITE CAPSULES.
Aerospace Medicine 32(3):231, March 1961.

ABSTRACT: Under contract with the Air Force Missile Test Center, Holloman Air Force Base, a feasibility study and preliminary design have been completed for portions of a Viability Data Acquisition, Handling, Storage, Reduction, Display and Recall System (VIDAT System). The purpose of VIDAT is to test and evaluate biosatellite capsules and components, utilizing chimpanzees (and eventually humans) as test subjects. The variables initially considered were systolic and diastolic blood pressure, respiration rate and waveform, electrocardiogram, heart rate, rectal and skin temperatures, O_2 and CO_2 partial pressures withing the capsule, total pressure, dry bulb temperature, and relative humidity. Among the unique requirements and restrictions were: two week continuous test period during which access to instrumentation within capsule is prohibited; chimpanzee only partially restrained, precluding instrumentation techniques and equipment subject to chimpanzee disruption; ease, simplicity and rapidity of transducer attachment to a struggling chimpanzee; applicability of the same transducers and attachment methods to humans; tranduction by external means only (no subcutaneous electrodes or

other implantations); analog outputs for all variables; reliability of 95 per cent over two week continuous operation. Instrumentation was devised or studied for physiological data acquisition: An experimental method for chimpanzee thigh blood pressure measurement was found despite failure of the Korotkow method at this location; the feasibility of a closed-hydraulic servo controlled pressure cuff featuring small size, simplicity, and ease of automatically programming pressure was determined; a new type of EKG electrode for long term continuous use was constructed and partially tested; a highly sensitive, simple respiration waveform transducer was tested and means for its utilization determined; concepts for a chimpanzee bioelectronic harness and transducer attachment methods were formulated. Fundamental problems of physiological reaction to physical instrumentation are discussed.

448

Gottlieb, S. 1948 STATIC AND DYNAMIC TESTS OF A TYPICAL FIGHTER PILOT'S SEAT INSTALLATION FOR A 40 G CRASH CONDITION
(Naval Air Material Ctr., Aero Struc Lab.) NAM 24102, Part I, Jan. 12, 1948
ASTIA ATI 37398

ABSTRACT: Tests were conducted on a standard R4D pilot seat and reinforcements made after each failure until seat demonstrated its ability to withstand a 40 g deceleration load at the c.g. of a 200 lb. dummy in head-on-crash condition. Dynamic tests were made in the NAES drop test machine and static tests were made by applying loads to a steel plate behind the dummy acting through its d.g. Several reinforcements consisted of replacing dural parts with 4130 steel of same gage were required to enable seat to withstand 40 g when shoulder harness passed over fuselage bar. Reinforcements added 3-1/2 lbs. to original seat installation weight. Harness was found to transmit all applied load to seat in a 1:2 ratio of shoulder harness to lap harness load. Reinforced seat withstood 20 g when shoulder harness was passed over seat back to floor attachment. Recommended static loads for transport type seat under 40 g loadings are 3000 lbs. shoulder harness load and 6000 lbs. total lap harness load at 40° upward.

449

Gottlieb, S. 1948 STATIC AND DYNAMIC TEST OF A TYPICAL PILOT'S SEAT INSTALLATION FOR A 40 G CRASH CONDITION. (Naval Air Material Ctr.)
NAM 24102, Part 2, 2Sept. 1948 ASTIA AD- 51489

ABSTRACT: The A N Standard 7505 seat used in F6F single-engine fighters was tested to determine what ultimate static carry through structural strength is required to withstand the loads resulting from a 40 g deceleration of about 0.1 sec. duration at the cg of a 200 lb dummy in a head-on crash condition. The harness loads were measured and the Bureau of Standards ring dynamometer used to measure the harness loads was evaluated. It is concluded that the F6F seat

th reinforcements is structurally capable of supporting 40g dynamic loads of 00 lbs. The general distribution of load between shoulder harness and lap rness at 40° upward is a 1 to 2 ratio. The loads determined with the BuSTds ngs are consistently low. These results indicate that dynamic calibration y materially improve the accuracy of the dynamometer.

50

ugh, M. N. and A. P. Beard 1937 LIMITATIONS OF THE PILOT IN APPLYING FORCES TO AIRPLANE CONTROLS. (National Advisory Committee for Aeronautics, Washington, D. C.) NACA TN 623. Nov. 1937.

51

ozulov, S. A. 1959 MEDICAL CONTROL OF TRAINING CATAPULTING (vrachetnyy kontrol pri trenirovochnykh katapul 'tirovaniyalth) Voyennomeditsinskiy zhurnal 5:23-29

52

Gracie, S.F. 1941 HYDROSTATIC SUITS.
(National Research Council, Canada) Report # C-2838, 30 August 1941

ABSTRACT: This report on the service trial of the Franks Flying Suit at 601 Squadron, R.A.F., Duxford, recommends its use for the protection against the effects of G.

453

Graham, H.B. 1951 QUALIFICATION TESTS OF F-89A PILOT'S AND RADAR OPERATOR'S EJECTION SEATS (Northrop Aircraft, Inc., Hawthorne, California) Rept. No. T-375, 8 February 1951. ASTIA ATI 109473

ABSTRACT: The pilot's seat was ejected twice and the radar operator's seat one The tests showed that, with the seats installed and rigged in accordance with the latest drawings, the seats and related components will function satisfactorily. The theoretical clearance between the seats and tail of the airplane is given below. In making the calculations, the seat velocities determined by the ground tests were used. Flight conditions assumed were 650 mph true airspeed in level flight at an altitude of 2000 feet.

454

Gramer, J. Jr., 1946 REQUIREMENTS FOR PILOT EJECTION IN FIGHTER AIRPLANES. (Army Air Forces, Air Material Command) M.R. TSEAC11-4534-7-2, 1 May 1946. ASTIA ATI 119 794

ABSTRACT: This report presents the desing requirements for pilot ejection seat installation and summarizes the installation of the pilot ejection seat in fighter airplanes. It was found that the pilot ejection seat is the immediate answer to provide a means of escape from high-speed aircraft. Whether or not this device will be superseded by other methods, such as the use of ellipsiods, capsules, etc., will be determined by investigations involving physiological, aerodynamic, and structural considerations. The design requirements for the pilot ejection seat and installation contained in the Appendices of this report are suitable for use as a guide in the preparation of designs. These requirements are tentative and may be used until such a time as AAF Specifications are available. The reasons necessitating Army Air Forces Specifications for the pilot ejection seat are given.

455

Grandpierre, R., F. Biolette, R. Loubiere & G. Chatelier 1960 PHYSIOLOGIE DU VOL SPATIAL (PHYSIOLOGY OF SPACE FLIGHT)
Forces aeriennes francaise 14(159): 789-823, May 1960 and 14(160): 969-986, June 1960.
See also: Aerospace Med., 31(10): 873, October 1960

ABSTRACT: The following subjects are reviewed: Acceleration and deceleration tolerances, weightlessness, radiation, prolonged life in a space ca bin, oxygen regeneration, utilization of urine and collection of water vapor, and the nutritional requirements of astronauts.

456

Grant, David, N.W. 1945 *CLOTHES MAKE THE SUPERMAN*
Flying, Sept 1945

ABSTRACT: Blackout was encountered even by the pilots of the planes of World War I. Far more today it has been one of the major obstacles to full utilization of the speed and strength of modern aircraft. The flying services have answered this problem with the development of a simple G-suit which now enables pilots to withstand forces of eight or nine G without blacking out. The primary cause of blackout is abrupt anemic anoxia of the brain resulting from a sudden stopping of blood through the brain. The great accomplishment of the G-suit has been to prevent this circulation stoppage and thus prevent blackout in abrupt combat maneuvers. A brief history of the G-suit is presented in this paper.

457

Gratz, C.M. 1944 BIOMECHANICS, A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engng., 66:313-314

ABSTRACT: Loss of life in crash landings can be, and is being, reduced. With the recognition that the pilot is the most vulnerable portion of the cockpit, advances have been made in the application of biomechanical safety engineering to cockpit design. This is the use of data on the amount of stress that shear human tissues can tolerate. Such data have been collected by the Biomechanics committee of the Aviation division of ASME, partially in combat zones in the Pacific. The British and Russians have also been working along these lines, and much information has been obtained from Army and Navy boards investigating crashes.

458

Grave, Caswell 1960 ENVIRONMENTAL PROTECTION EQUIPMENT FOR AIR AND GROUND CREWS AND HUMAN ENGINEERING ASPECTS OF PILOT'S COCKPIT (AN EVALUATION OF F-101B AIRCRAFT)
(Air Proving Ground Center, Eglin Air Force Base, Florida) APGC-TN-60-34 APGC Project 217AY5, July 1960 ASTIA AD 240085

ABSTRACT: This report on the human factors aspects of the F-101B weapon system is concerned primarily with the personal equipment used during the Category III test. Other considerations in the report are problems encountered by a tactical squadron in environmental protection of ground crews and human engineering deficiencies noted in the pilot's cockpit.

It is concluded that the most significant deficiency in air crew protection is lack of a safe ejection capability throughout the performance envelope of the aircraft. Problem areas were found in ground crew protection and in survival kit utilization and maintenance. The standard equipment required for air crew protection was found to be available at the test site in sufficient quantity for operational use.

Recommendations include improving the ejection capability from the aircraft, revising technical publications, and correcting certain design deficiencies in the pilot's cockpit

459

Gravendyk, J. 1949 WEBER PILOT AND CO-PILOT SEAT FOR C-124 (TEST REPORT) (Douglas Aircraft Co., Inc., Long Beach Plant, Calif.) (USAF Technical Report No. TR-010AF) ASTIA ATI 74 968

ABSTRACT: Load tests were conducted with the Weber pilot and co-pilot seat used on the C-124 cargo airplane. The features of the seat include vertical adjustment, horizontal fore and aft adjustment, horizontal side adjustment, and recline adjustment. During the tests, loads were applied to the seat with hydraulic jacks and a calibrated tension ring. All ultimate loads were applied for a minimum time of one minute. No structural failures occurred during the tests.

460

Gray, F. R. & M. G. Webb, 1959 HIGH G PROTECTION.
(Paper, 1959 Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29.)

ABSTRACT: Teh principal distortions of the body of a person exposed to increased acceleration include displacement of blood within the body with undesirable secondary effects such as: (1) loss of vision, (2) loss of consciousness, (3) petechia, (4) pain, (5) heart failure. Other distortions in various parts of the body may also lead to pain. Advantages, problems and limits of older types of G protective systems are discussed. Theories are presented for methods of using liquid or form-fitting external supports for the body along with respiratory pressurization to counteract the distorting forces. Actual devices worked out to apply these theories are shown. These devices include: (1) the "Mayo tank" first used by Wood, Code, and Baldes in 1942 to test G protection by submersion in water. This has been slightly modified to bring about substantial increase in G protection in 1958; (2) the "G-capsule" and associated equipment which most thoroughly of all devices so far built, is an application of these new theories of body support; and (3) the "NASA-AMAL moulded couch" built by the National Aeronautics and Space Administration according to some of these ideas and incorporatingseveral other devices or procedures such as partial supination to avoid chest pain as indicated by Wright AFB studies. Through the use of these various devices during the past year, several new records of tolerance to centrifugal acceleration have been established, indications have been gained for improvements on these devices, and it is expected that higher levels of G tolerance will be attained. (J. Aviation Med. 50(3):185-186, March 1959.)

461

Gray, R.F. 1957 MECHANICAL SYSTEMS SUGGESTED FOR G PROTECTION
(Naval Air Development Center, Johnsville, Pa.) NADC-MA-5708; 15 July 1957
ASTIA AD 144 106

ABSTRACT: A mechanical system is proposed as a means of increasing tolerance to acceleration. The subject is assumed to be completely underwater in a suit and helmet, both capable of resisting a high pressure atmosphere transmitted through the water from the subject's chest. Analysis of the system indicates that it could protect against loss of blood from the head and consequent blackout at levels of acceleration considerably higher than 100 G units. However, distortions of organs and blood vessels within air-containing spaces of the body would tend to establish much lower tolerance levels since blood vessels within the top part of the chest would tend to collapse and cut off circulation. It is possible that circulation through the collapsed blood vessels could be restored by pumps acting to change the volume of the suit. Respiration could be provided by cycling the pressure of the air supplied to the subject. This could be under voluntary control. The suit could serve as a pressure suit for high altitude flying since pressures within the body would be exactly counterbalanced by pressures outside the body. (Author)

462

Gray, R.F., M.G. Webb, & W.H.B. Ellis 1957 TEST AND DEVELOPMENT OF ANTI-BLACKOUT EQUIPMENT; LETTER REPORT CONCERNING DEVELOPMENT OF A G-CAPSULE (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR19 March 5, 1957

ABSTRACT: A water-filled capsule is proposed as a method of increasing protection for individuals undergoing acceleration stress of high levels for relatively long durations. The capsule is essentially a method of controlling blood and gas distribution in the body and of controlling external and internal body shape. The capsule is a rigid container for the subject, including his head. All space between the subject and the suit is filled with water including the space in the helmet. A rigid cuirass is molded to the subject's chest to reduce distortion of the chest due to hydrostatic pressures. A mockup of a capsule is now being manufactured and will be tested upon completion.

463

Gray, R.F. & M.G. Webb 1958 PRELIMINARY STUDY OF G TOLERANCE OF A SUBJECT IN THE G-CAPSULE, PRONE POSITION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR59; July 8, 1958

ABSTRACT: The G-Capsule is a deivce for testimg some theories of protection of subject against acceleration by use of complete immersion of the subject and by pressurization of his respiratory system through the water against the rigid walls of the capsule to hold his respiratory system at a constant volume. This device was tested at AMAL on the 50-foot centrifuge. The subject was seated in an upright position within the capsule facing away from the center of rotation and was exposed to constantly increasing levels of acceleration from 1 to 9 G. The subject held his breath during each period of centrifuge rotation.

464

Gray, R.F. & M.G. Webb 1959 TEST OF WATER-FILLED CAPSULE IN THE PRONE POSITION (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR82 April 13, 1959

ABSTRACT: The G-Capsule is a device to protect humans against the body distortion effects of high acceleration forces. It is a nonexpandable container designed to resist the outward expansion of the subject's body and positive pressure is used in his respiratory system to keep the body expanded against these external supports. Water is used to closely couple the outside of the person's body to the rigid container while allowing some motion. The principle new feature of this protective system is the use of pressure in the respiratory system to oppose distortion. It was tested on the centrifuge by three subjects. One subject went to 28 G, another to 26 G and a third has gone to 31 G. The pattern used brought the subjects up to peak G in 12.5 seconds where they remained for 5 seconds and then brought them down again in 12.5 seconds. This established a record for sustained high acceleration tolerance. No trouble was reported with petechiae, eye pain, or leg cramps.

465

Gray, R.F. & M.G. Webb 1960 HIGH G PROTECTION
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-5910; 12 Feb. 1960
ASTIA AD 235 338
See also: Aerospace Med. 32(5): 425-430, May 1961

ABSTRACT: Investigation of mechanical principles important in solving some problems of protection against high acceleration. Also discussed is a study of the effects of acceleration on humans in the positive g($+g_z$) position when submerged to eye level in a tank of water. Subjects are also studied in the prone position ($-g_x$) while completely submerged with respiratory pressurization.

466

Gray, R. F. 1961 FULL BODY SUPPORT SYSTEMS.
(Paper, Symposium of Acceleration Stress, San Antonio, Texas)

ABSTRACT: External support systems which are used as protection against accelera tion levels that cannot be tolerated by the action of physical mechanisms only, are discussed. Results indicate that while a foam system has weight and safety advantages compared to water, it does not fit the body as well, cannot be used to support regions such as eyes, and a person within it is severely immobilized. Foam castings can give much more complete support than strap systems and can be rapidly formed around or rapidly removed from subjects. Foams seem best applied to one-shot short-term (15 minute) support applications, but some reversible foam casting support systems have been hypothesized.

467

Gray, R.F. & M.G. Webb 1961 HIGH G PROTECTION
Aerospace Medicine 32(5): 425-430, May 1961
See also: NADC-MA-5910; 12 Feb. 1960; ASTIA AD 235 338

ABSTRACT: The advantages, problems, and limits of older types of G protection systems are discussed in this report. Theories are presented for methods of using liquid or form-fitting external supports for the body along with respiratory pressurization to counteract the distorting forces. Actual devices which were worked out to apply these theories are shown. These devices include: (a) the "Mayo Tank" first used by Wood, Code, and Baldes in 1942 to test G protection by submersion in water. This tank was slightly modified to bring about a substantial increase in G protection in 1958; (b) the "G-Capsule" and associated equipment which, most thoroughly of all devices so far built, is an application of these new theories of body support; and (c) the "NASA-AMAL Moulded Couch" built by the National Aeronautics and Space Administration according to some of these ideas and incorporating several other devices or procedures such as partial supination to avoid chest pain as indicated by Wright Field studies. Through the use of these various devices during the past year, several new records of tolerance to centrifugal acceleration have been established, indications have been gained for improvements on these devices, and it is expected that higher levels of G tolerance will be attained.

468

Gray, R.F. 1962 FULL BODY SUPPORT SYSTEMS
(In: Impact Acceleration Stress: Proceedings of a Symposium With a Comprehensive Chronological Bibliography, National Academy of Sciences, National Research Council, Publication No. 977, pp. 265-270)

ABSTRACT: Subjects have been exposed to centrifugation when completely submerged in water and when completely cast into polyurethane foams. Both methods provide maximal support areas on the outside of the body. Some support for the interior of the gas filled spaces of the body is obtained by internal pressurization. Advantages and disadvantages of the two methods of full body support are compared.

469

Graybiel, A., R.H. Holmes, D.E. Beischer et al. 1959 AN ACCOUNT OF EXPERIMENTS IN WHICH TWO MONKEYS WERE RECOVERED UNHARMED AFTER BALLISTIC SPACE FLIGHT
Aerospace Medicine 30(12): 871-931, Dec. 1959

ABSTRACT: An account has been given of two experiments in which three monkeys were carried in Jupiter missiles 300 miles into space. In the first, a squirrel monkey survived in good condition till a mishap occurred to the vehicle re-entry. In the second, an American-born rhesus and a squirrel monkey were recovered uninjured. Details have been furnished covering the construction of the bio-capsules, the provisions for a closed life support environment, the equipment and arrangements for monitoring the responses of the monkeys, and the experimental findings.

470

Grayfer, G.R. & A.I. Bykhovskiy 1936 PROPHYLAXIS OF ANKLE INJURIES IN PARACHUTE JUMPERS
Sovetskaya khirurigiya (Moscow) 7: 115-118

471

Green, C.D., B.E. Welch et al. 1961 STUDIES OF ESCAPE FROM BALLISTIC SPACE VEHICLES. I. BIOMEDICAL EVALUATION. II. INSTRUMENTATION. (School of Aviation Medicine, Brooks Air Force Base, Tex.) Report No. 61-29, April 1961. ASTIA AD 254 065

ABSTRACT: Biomedical information on primates successfully flown through programed escape profiles was obtained in conjunction with the NASA project Little Joe. Animal response during acceleration, deceleration, re-entry,

and water impact demonstrated survivability. Also recorded and evaluated were: (a) environmental data (i.e., relative humidity, total gas pressure, 02 partial pressure, and gas temperature); (b) physiologic data (i.e., respiratory rate, pulse rate, and cardiac rhythm from ECG tracings); (c) psychomotor performance data; and (d) oculomotor movement. These experiments substantiate, under actual flight conditions, physical and biologic design criteria for biopacks, physiologic sensor response, and performance criteria during all phases of the ballistic trajectory and recovery operations from an impact area. (Author)

472

Green, M. R. & F. A. Muckler 1959 SPEED OF REACHING TO CRITICAL CONTROL AREAS IN A FIGHTER-TYPE COCKPIT (Wright Air Development Division, Wright-Patterson AFB, Ohio) WADC-TR-58-687, June 1959

473

Greenberg, S.H. 1958 UNDERWATER ESCAPE PROGRAM. DESCRIPTION OF F86D-11 AIRPLANE 50-FOOT DROP TEST KEY WEST, FLORIDA - 25 MARCH 1958. (Naval Air Development Ctr., Johnsville, Pa.) NADC-ED-5816; Interim Rept. No. 3; 25 Aug. 1958; ASTIA AD 231 439

ABSTRACT: Tests were performed to determine (1) the effect of high-velocity vertical entry on the sinking time of aircraft in water; (2) the structural damage sustained by the aircraft on impact; and (3) the physiological shock the pilot suffers when subjected to water collisions of this nature. Damage resulting from implosion of the canopy due to depth pressure and the accompanying physiological implications are also discussed. Shock loadings sustained by the anthropometric dummy in the F86D-11 aircraft reached a peak acceleration value of 62 g, with values well above 25 g for 30 msec. This shock loading was greater than that sustained by any other part of the airframe when the complete system was subjected to the 50-ft. fall. The acceleration has a rate of onset of approximately 6000 g/sec which, at the g loading and duration of sustained shock, represents values well above the threshold of vertebral damage, signifying a high expectancy for extensive spinal injury. The opening in the canopy resulting from the implosion appeared to be large enough to permit egress of the pilot and his equipment from the cockpit. Only 19 sec were required from entry to submersion. The increase in the rate of submergence in the latter test must have been contributed by the higher entry velocity, accompanied by greater water penetration of aircraft, and by extensive impact damage which destroyed watertightness and buoyancy of the airframe. (ASTIA)

474

Greig, D. D. A. 1940 REPORT ON PRACTICAL FLYING TESTS CARRIED OUT WITH "SPECIAL FLYING SUIT" (DESIGNED BY DR. FRANKS) BETWEEN JUNE 1ST AND JUNE 5TH, 1940. (Spitfire L 1090). (Assoc. Com. Aviat. Medical Res., NRC, Canada) Rept. C-2830, 8 June 1940.

ABSTRACT: Flight tests were carried out with the special flying suits designed by Dr. Franks in a Spitfire. A pilot who normally "blackened-out" between 3 to 5 G's was able to make maneuvers going to 8 G without feeling any effect of the 'blackout'. It is felt that the principle involving the design of the suit is sound but in its present form it is not sound but its present form it is not a practical proposition. The results obtained were of such a convincing nature however, that further development is strongly recommended.

475

Grime, G., et al. 1961 CAR SEAT-BELTS AND HARNESSES (Road Research Lab., Harmondsworth, Great Britain) Research Note RN/3958/GG.RDL

476

Griswald, G.M. 1957 PARACHUTE JUMPING FROM ARMY AIRCRAFT (U-1A AIRPLANE) (Army Airborne and Electronics Board, Fort Bragg, N.C.) Proj. no. AB 2354 27 June 1957, ASTIA AD-140 955

ABSTRACT: An investigation was conducted to determine optimum exit methods, safe procedures, special equipment required, and the suitability of the Army U-1A aircraft for the parachute delivery of personnel and equipment. The equipment used in these tests included (1) a U-1A airplane, (2)T-10 personnel parachute assembly, (3) G-13 cargo parachute assembly, (4) M-1950 cotton duck case for the parachutist's individual weapons, and (6) A-7A and A-21 aerial delivery containers. Test results indicated that the U-1A aircraft is suitable for aerial delivery from the port door of a maximum of 5 parachutists wearing combat equipment. The U-1A airplane was also found suitable for consecutive aerial delivery of standard type aerial delivery containers from the door followed by parachutists with combat equipment. Procedures are outlined for making safe parachute jumps from the U-1A airplane. (Author) (See also AD-113 658)

477

Griswold, George M. 1957 FIFTH PARTIAL REPORT OF PROJECT NR AB 2354 "PARACHUTE JUMPING FROM ARMY AIRCRAFT" (U-1A AIRPLANE)
Airborne and Electronics Board, U.S. Army DA Proj. 87-03-002; RDB Tech. Obj. AL-12 ASTIA AD 140 955

ABSTRACT: The purpose of this publication is to report on a series of test to determine safe procedures for making parachute jumps from Army aircraft, except command type airplanes and reconnaissance helicopters (H-13 and H-23). It was found that the U-1A Airplane was adaptable for parachute delivery of personnel. Safe conditions for parachute delivery of personnel existed at indicated air speeds of 60 to 70 knots. Safe conditions existed for parachute delivery from the port door of a maximum of five parachutists with combat equipment utilizing procedures outlined in Appendix E. Safe conditions existed, within the weight and space limitations of the airplane, for consecutive aerial delivery of standard type aerial delivery containers dropped from the door followed by parachutists with combat equipment.

478

Gronow, D. G. C. 1954 BACKWARD FACING SEATS IN AIRCRAFT FOR INCREASED PASSENGER SAFETY. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept. 870a

479

Gronow, D. G. C. 1954 A STUDY OF THE SAFETY OF BACKWARD-FACING AND FORWARD-FACING 1 PASSENGER SEATS IN ACCIDENTS INVOLVING RAF TRANSPORT COMMAND AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) Rept. No. 870, TIP U72437, Mar. 1954

480

Grunzke, Marvin E. 1961 A RESTRAINT DEVICE FOR BEHAVIORAL RESEARCH WITH THE CHIMPANZEE
(Hq, 6571st Aeromedical Research Laboratory, Holloman Air Force Base, New Mexico) Technical Documentary Report No. MDC-TDR-61-37 Dec. 1961, Project No. 6893, Task No. 689301, ASTIA AD 271845

ABSTRACT: This report describes a restraint chair that can be employed in operant conditioning research with the chimpanzee. The chair is designed for easy adjustment to various sizes and when used with a suit or vest will also facilitate attachment of sensors for collection of physiological data.

481

Guilbert, E.A. 1952 BACKWARD SEATING
S.A.E. Journal 60(6): 56 June 1952

ABSTRACT: Most passenger fatalities in aircraft accidents result from impact in crash landings and not from burning, according to current medical opinion. Injuries prevent the passenger from escaping a crash fire. Also, the present safety belt is inadequate because it only restrains the lower part of the body, letting the torso act as a weighted lever driving the ten-pound human head forward and subjecting it to an impact force greater than that acting on the aircraft structure at that point. Therefore it became logical for investigators to experiment with a rear-facing seat. The general reaction to this proposal was that "people do not like to ride backwards." However, this was not borne out by investigation. The Military Air Transport Service provided for rearward facing seats in part of its Boeing C-97 fleet, using a seat designed to take a 16 g forward load based on a passenger weight of 225 pounds. With a normal passenger weight of 175 pounds, the permissible forward g load increases to approximately twenty-four. The seat can be folded against the side of the fuselage to make room for cargo. (J. of Aviation Medicine 23(5): 533. October, 1952)

482

Guilbert, E. A. 1952 MILITARY AIR TRANSPORT SERVICE - PASSENGER HANDLING TECHNIQUES (Society of Automotive Engineers, New York, N.Y.) Jan. 1952

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

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483

Haack, M. 1955 **TRACTOR SEAT SUSPENSION FOR EASY RIDING.** S.A.E. Transactions, 63: 452-470

ABSTRACT: This paper describes an investigation into the best design of seat suspension for tractors having pneumatic tires with a rigid rear axle.

Test results show that some of the factors entering into a good tractor suspension include:

1. a ratio between the natural frequency of the seat and tires of 0.4 to 1.5.
2. A supplementary seat deflection 1.5 times the static seat deflection to avoid bottoming.
3. Use of suspensions having non-linear characteristics in order to hold seat deflection within practical limits.
4. Adjustable seat-spring action to compensate for varying weights of drivers.

484

Haber, F. 1952 **BAILOUT AT VERY HIGH ALTITUDES**
In (School of Aviation Medicine, Randolph AFB, Texas) Epitome of Space Medicine
See also J. Aviation Med. 23(4):322-329, Aug. 1952.

ABSTRACT: Flight in the border zone of space (in the "aeropause") will pose special problems with regard to bailout. At an altitude of 300,000 feet, the air is rarified to about one-millionth its density at sea level. Flight will be at very high speeds (10-20 Mach). The speeds and trajectories of bodies bailing out from moving aircraft or falling free from an altitude of 300,000 feet are discussed and presented graphically. The speed of a falling body first increases until the denser layers of the atmosphere are reached; the air resistance (wind blast) then decelerates the falling body. This deceleration, which may reach several g, is proportional to the velocity of the body. Capsules for escape from very high altitudes should, therefore, be equipped with air brakes or small parachutes. Another problem encountered in very high altitude escape is the aerodynamic heating at high speeds (e.g., at Mach 10, 5,000 to 8,000 degrees F.). After deceleration on the other hand, the body lose heat to the surrounding air.

485

Haber, F. 1952 BAILOUT AT VERY HIGH ALTITUDES
J. Aviation Med. 23(4):322-329, Aug. 1952.

ABSTRACT: This paper emphasizes the problems of bailout at speeds and altitudes unattainable by today's aircraft, but which will be a reality in the near future In the future, planes will travel in the aeropause at speeds in the range of Mach number 10 to 20 and with altitudes in the range of 200,000 to 400,000 feet. The author discusses the various problems encountered in the problem of bailout at these extreme speeds and altitudes.

486

Haber, F. 1952 ESCAPE AND SURVIVAL IN SPACE TRAVEL
American Rocket Society Paper No. 68-52

487

Haber, F. 1953 ESCAPE AND SURVIVAL AT HIGH ALTITUDE
(School of Aviation Medicine, Randolph Field, Texas) Sept. 1953
Proj. 21-1207-006 ASTIA AD 19613.

ABSTRACT: The speed of future aircraft will be limited by the temperatures caused by aerodynamic heating. Thermal considerations call for high altitudes if flying speed is increased. At the high altitudes required, windblast and dangers of escape proper will be reduced. The phase of free fall should last much longer after bailouts. High speeds attained in such falls create decelerations which could be dangerous. (Author)

488

Haber, H. 1952 GRAVITY, INERTIA, AND WEIGHT
In White, C. S., & O. O. Benson, Jr., eds., Physics and Medicine of the Upper Atmosphere (Albuquerque, N. Mex.: University of New Mexico Press, 1952) pp. 123-136.

ABSTRACT: To evaluate properly the physiological processes in flight, a new formulation of the concept of weight is required. In reversing and implementing the classical definition of weight (or the force of attraction which the earth exerts on a body, with its direction toward the center of the earth) the following definition is proposed: weight is the resultant external force exerted upon a body by a restraining agent in response to forces of gravitation and inertia. This definition makes it evident that weight of a body is not a constant nor a property of the body but depends upon the dynamic conditions to which the body is subjected (e.g. inertia, drag, or propulsion

in an aircraft). On the basis of this definition a formula is developed to determine the weight of a pilot under all conditions of propelled and unpropelled flight. The posibility of prolonged weightlessness is a factor to be counted on in future flight and is going to become an outstanding aviation medical problem. While no major disturbances in the normal physiological functions (such as digestion, breathing, etc.) are foreseen, normal orientation might be impaired.

489

Haber, H. 1955 CAN MAN SURVIVE IN SPACE
Flying Review 10: 15-16

ABSTRACT: Phenomena man will experience in space flight and his physiological reactions to them; hazards to space flight; use of space suits. Article is condensed from the author's. Man in Space (New York: Bobbs-Merrill, 1953), 629. 1388/H1141M.

490

Haber, H., & S. Hulbert, eds. 1955 ESCAPE FROM HIGH PERFORMANCE AIRCRAFT: A SYMPOSIUM (Institute of Transportation, University of California, Los Angeles, Calif., Oct. 7, 1955)

491

Hainline, B. C. 1942 PLYWOOD SEAT DESCRIPTIONS AND TESTS-MODEL PT-17. (Boeing Airplane Co., Wichita Div., Kansas) Report No. 75-6318, ASTIA ATI-115 299, 10 August 1942.

ABSTRACT: This test was conducted to determine the different strengths of an assortment of plywood pilot seats as submitted to the company by various manufacturers and to get a description of these seats. This information of these seats will be used as a reference for plywood seat information.

Four different specimens were submitted. The seats from Fletcher and Morrow Aircraft Companies and the Baldwin Piano Company were drop tested to destruction and a description taken of them. Due to the lack of proper fittings, the seat from Starr Piano Company was impossible to test. Only a description was taken of this seat.

492

Hainline, B. C. 1947 MODEL X-15 - TEST OF PILOT'S AND OBSERVER'S SEATS (Boeing Airplane Co., Wichita, Kansas) Rept. WD-10503, Feb. 14, 1947

493

Hakanson, H. G. 1947 PILOT EJECTION SEAT TESTS AT MUROC ARMY AIR FIELD - AND APPENDIXES 1-3 - MEMORANDUM REPORT (AMC, Wright-Patterson AFB, Dayton, Ohio) Serial No. TSEAC11-45341-2-3 13 Feb. 1947, ATI-119 800.

ABSTRACT: This is a report on the pilot ejection seat flight tests from an A-26C airplane at the Muroc Army Air Field from 8 October 1946 to 4 November 1946. A series of nine flight tests was conducted. An ejection seat in the invested vertical position facing to the rear, was installed in the rear bomb bay of A-26C airplane, Serial No. 44-35678. The seat was supported by an 1100-pound bomb shackle which was actuated by a switch mounted on the forward bulkhead of the rear gunner's compartment. The operator rode in the rear gunner's compartment. There was no means of ejection other than gravity. It was found that the pilot ejection seat with dummy and parachute equipment having a total weight of approximately 270 pounds, dropping out the bomb bay, will clear the lower surface of the tail by approximately 13 feet up to velocities of approximately 283 knots indicated airspeed at 10,000 feet altitude. Extrapolation of the curves for angle of seat leaving airplane versus airspeed; and tail clearance versus airspeed, shows that safe ejections using no ejection force other than gravity can be made in straight and level flight up to velocities of 320 knots.

The automatic opening devices for releasing the safety belt and dummy's parachute are not entirely satisfactory in their present stage of development.

494

Hakanson, H.G. 1948 DOWNWARD PILOT EJECTION SEAT TESTS FROM THE XA-26F AIRPLANE AT MUROC ARMY AIR FIELD
(Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio) Eng. Div. Memo Rpt. No. MCREXA 72-45341-3-6 ASTIA ATI 119 798

ABSTRACT: The purpose of this report is to present the results of downward pilot ejection seat flight tests from an XA-26F airplane at the Muroc Army Air Field from 28 July 1947 to 20 September 1947. The results from the tests brought about the following conclusions: (a) The catapult cartridges used in these tests have too great an acceleration and velocity for safe downward ejection. (b) The antoropomorphic dummies require a lap to make it possible to securely fasten them in the seat for downward ejection. (c) An insufficient number of trajectories were recorded to justify a suitable angle for downward ejection. However, ejection angles of 20° and 30° aft of vertical proved very satisfactory.

495

Hale, R. 1961 GENERAL HUMAN FACTORS CONSIDERATIONS - MTSS FINAL REPORT - VOLUME III
(Aeronautical Systems Division, Wright-Patterson AFB, Ohio) Contract No. AF33(600)-42456 ASD-CR-61-14(111) ASD-TR-61-211(111) ASTIA AD 273005L

ABSTRACT: The final summary report of the military test space station study is divided into three volumes. Volume I discusses the Phase II (Gamma) vehicle design. The MTSS missions are described in Volume II. General human factors considerations are given in Volume III.

496

Haley, J.A. 1954 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS (Naval Air Development Center, Johnsville, Pa.) TED ADC AE 6303.1, BUAER LTR AER AE 631/56 of 19 Apr. 1954, NADC LTR MA 4 Serial 10467 of 3 Nov 1953, Ref. MA 4 9393, Sept. 1954. ASTIA AD 70757

ABSTRACT: To determine the time a pilot requires to actuate the ejection seat controls of an F9F-6 under emergency conditions, the ejection system was installed in the gondola of a centrifuge. Navy pilots were tested while being subjected to fluctuating accelerations (from 1.5 to 7.0 positive g at rate of 8.0 g per sec.) for the time required to eject when dressed in full flight gear and in minimal flight clothing. In addition, motion picture coverage of subjects was made. The data were analyzed and recommendations for ways to decrease time requirements are made.

497

Haley, J.L., and J.P. Avery 1962 PERSONNEL RESTRAINT SYSTEMS - BASIC CONCEPTS. (Aviation Crash Injury Research, Phoenix, Ariz.) TREC Tech. Rept. 62-94. AVCIR 62-12

498

Hall, A. L., & L. A. Alford 1950 MEASUREMENTS OF STRESS ON MARTIN-BAKER EJECTION SEAT FACE CURTAIN. (Naval School of Aviation Medicine, Pensacola, Fla.) Proj. MR005.13-4002.2.1., 23 Oct. 1950

499

Hall, A.L. et.al. 1950 SERVICE TEST OF NEW AND IMPROVED METHODS AND TECHNIQUES FOR THE PHYSIOLOGICAL ADAPTATION OF FLIGHT PERSONNEL IN THE OPERATION OF AND ESCAPE FROM AIRCRAFT. STUDY NO. 1. (NM 001 061.01) TO DETERMINE THE VARIOUS PROFILE AREAS OF A "LIGHT", "MEDIUM", AND "HEAVY" AIRMAN CLOTHED IN VARIOUS TYPES OF NAVAL FLIGHT EQUIPMENT. Final Rept. Oct. 12, 1948- Jan. 17, 1950. (Proj. TED No. PTR MED-7144; Series No. ST34-12) 8 February, 1950 ASTIA TIP U10 746 ASTIA ATI 208159

ABSTRACT: Profile areas were determined as an aid in solving the free-fall velocity problem encountered in abandoning an aircraft. Planimetric measurements were obtained from photographed shadows of airmen; profile area contour maps were made from anthropometric measurements of nude subjects. A statistical analysis was made of these areas to select combinations which would give reliable maximums and minimums and to determine which factors had little or no effect. The airmen wore summer, winter, and electrically heated equipment. Studies were also made of subjects wearing an A-13-A oxygen mask; the maximum increase in the size of the profile area was 6.08% with heavy winter-flight gear and a side view of 0° tilt.

500

Hall, L. A. 1945 REPORT OF PARACHUTE JUMP FROM THE B-29. Air Surgeon's Bull. 2:242-243.

501

Hallenbeck, G.A., C.A. Maaske & E.E. Martin 1943 EVALUATION OF ANTI-G SUITS
(Wright-Patterson AFB, Ohio) Rept. No. 2; Eng-49-696-51B; 12 Dec. 1943
See also: National Research Council, Com. on Aviat. Med. Rept. No. 254

ABSTRACT: Centrifuge tests on 32 subjects at Wright Field and the Mayo Clinic show that the Berger Bros. GPS raises the "g" threshold between 1 and 2 "g". To simulate the condition found at high altitudes where the output of the vacuum pump is limited, maximum suit pressures were kept to 4 to 4.5 psi. Protection offered by the suit remained good. Protection offered by suit summates with that afforded by muscle straining maneuvers. Individuals wearing the suit have a very high threshold for unconsciousness, a valuable feature. Graphs of the performance of the Berger valve when supplied by the B-12 pump are included

502

Hallenbeck, G. A., R. MacCardle & K. E. Penrod 1944 MAGNITUDE AND DURATION OF PARACHUTE OPENING SHOCKS AT VARIOUS ALTITUDES AND AIR SPEEDS. (U.S.A.AF, Wright-Patterson AFB, Ohio) Eng. 49-696-66. 8 July 1944.

503

Hallenbeck, G. A., K. E. Penrod, & R. MacCardle 1945 MAGNITUDE AND DURATION OF OPENING PARACHUTE SHOCK. Air Surgeon's Bull. 2:35-37

504

Hallenbeck, George A. 1946 DESIGN AND USE OF ANTI-G SUITS AND THEIR ACTIVATING VALVES IN WORLD WAR II
(Air Materiel Command, Wright-Patterson AFB, Dayton, Ohio) AF TR 5433
ASTIA ATI 25139

ABSTRACT: Several types of anti-G suits and several air-metering valves are described. The factors involved in the protection afforded by G units are discussed. The pressure source for anti-G suits in conventional airplanes is the vacuum instrument pump; in torbojet airplanes, the compressor discharge of the jet engine. These and other possible sources are discussed. Evidence is adduced to show that the protection afforded by present day anti-G suits does not of itself lead to overstressing of aircraft. Finally, recommendations are made for future research work which can profitably be carried out in the field of G protection.

505

Hammil, J.P., & F.C. Miskam 1948 STRENGTH ANALYSIS OF REVISED PILOT AND CO-PILOT SEAT INSTALLATION-MODEL C-74.
(Douglas Aircraft Co., Inc., Long Beach Plant, Calif.) Report 10310, Jan. 1948. ASTIA ATI 55431

ABSTRACT: An analysis has been prepared to substantiate the strength of the support structure of the revised pilot and co-pilot seat installation in the C-74 transport. Each seat is mounted on longitudinal and transverse rails to permit adjustment in either direction. Added platforms are used to transfer loads, which are introduced into the longitudinal rails by the seat support members, into transverse rails. Reinforced channel sections are used to carry the vertical loads to primary frame structure. Fore and aft loads are taken by the floor.

6

nff, G. E. 1959 INTEGRATION OF MAXIMUM COMFORT INTO THE ELECTRA PASSENGER SEATS. (American Society of Automotive Engineers) Jan. 1959

07

Hanna, T. D. and L. M. Libber 1957 DEVELOPMENT AND TEST OF PNEUMATIC SEAT CUSHIONS: EVALUATION OF PROTOTYPE SEAT CUSHIONS. (Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.) Proj. TED no. NAM-AE-5225.1; Rept. no. NAMC-ACEL-321 8 Feb. 1957 ASTIA AD 221 885

ABSTRACT: To relieve fatigue encountered in prolonged flight, a project was initiated to improve seat cushions used in combat aircraft. Eight types of seat cushions were evaluated in an exploratory laboratory study and in operational squadrons. By means of a quantifiable questionnaire the operational evaluation indicated that the most beneficial seat cushion assembly was the pulsating type covered with Tri-lok. This tri-dimensional fabric was found to be most helpful in relieving thermal discomfort and in minimizing perspiration under the buttocks and thighs. Due to certain inherent disadvantages in the motor driven compressor unit used with the pulsating seat cushion it is recommended that : (1) further effort be expended to develop an improved miniaturized motor driven compressor, (2) a further attempt be made to utilize the existing air sources within the aircraft; and (3) that a redesigned static air cushion be operationally evaluated to determine its suitability as an interim seat cushion. (Author)

508

Hanna, T.D. & L.M. Libber 1958 THE PRESENT STATUS OF THE NAVY FATIGUE-RELIEVING PNEUMATIC SEAT CUSHION Jour. Aviation Med., 29(3):237., March 1958

ABSTRACT: A static air cushion and two types of pulsating air cushion covered with trilok were submitted to an operational squadron for evaluation. Results obtained from a structure questionnaire revealed the static air cushion to be the most acceptable design. considered.

509

Hannegan, E.A. 1959 TEST AND EVALUATION OF PARTIAL PRESSURE SUIT SEAT PAN REGULATOR ASSEMBLY (Naval Air Test Center, Patuxent River, Md) proj. TED no. PTR AE 5139; Serial no. ST 33-13; 29 Jan. 1959; ASTIA AD-214 716L

ABSTRACT: The partial pressure suit seat pan regulator assembly was installed in F8U-1 seat pan and flown in that airplane for evaluation. The seat pan assembly improved the suitability of the partial pressure suit by simplifying the accessories and attachments. The A12-A mask adapter, the inadequate length of the oxygen hose and the excessive height of the seat pan proved to be unacceptable features. (Author)

510

Hanselman, N. K., C. A. Metzger, & E. A. Horns 1958 OPERATION, INSPECTION AND MAINTENANCE PROCEDURES FOR CUSHION, SEAT, OXYGEN AND SURVIVAL EQUIPMENT. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TN 58 26, Feb. 1958; ASTIA AD 142 304.

ABSTRACT: This report was prepared to assist users in the operation, maintenance and inspection of the cushion, seat, oxygen and survival equipment which has become known as the rigid survival kit. The information applies mainly to kits designed for aircraft equipped with upward ejection seats.

SECOND ABSTRACT: The major components of the contractor furnished cushion, seat, oxygen and survival equipment are described; and the function of each component is outlined. Inspection procedures and necessary equipment are defined to serve as a guide for squadron and depot maintenance.

511

Hansen, O. K., P. E. Franks, & J. A. Modrick 1959 NATURE AND USE OF THE MAC-2(MALFUNCTION AND CIRCUITRY) TRAINER, (Wright Air Development Dividion, Wright-Patterson AFB, Ohio) WADC-TN-59-140, May 1959, ASTIA

512

Hansen, R. and D. Y. Cornog 1958 ANNOTATED BIBLIOGRAPHY OF APPLIED PHYSICAL ANTHROPOLOGY IN HUMAN ENGINEERING
(Yoh, H. L., Co., Philadelphia, Pa.)
Contract AF 33(616)2353 WADC Tech. rept. no. 56-30
May 1958 ASTIA AD 155 622

ABSTRACT: This volume contains condensations of 121 reports in the field of Applied Physical Anthropology. A majority of the annotations are grouped

nder three headings, Anthropometry, Biomechanics, and Comfort; a few are ncluded in a General Group. Working data and important illustrations are quoted directly from the original papers in most cases. A complete index is arranged by author as well as by subject. An additional list of reports (not annotated) is included as background material. Two appendices containing relevant commentary on Seating Comfort and Anthropomorphic Dummies, are also included. (Author)

513

Hardman Tool & Engineering Co. 1950 STATIC TEST REPORT - MODEL 605 ADJUSTABLE CREW SEAT. (Hardman Tool & Engineering Co., South Gate, Calif.) Report No. 605, ASTIA ATI 70193, JAN. 1950

ABSTRACT: Model 605 Crew Seat having been tested in accordance with this report with no failures nor excessive permanent distortion, it is assumed that Model 605 Crew Seat Meets the structural requirements of specifications as set forth by Douglas Aircraft and Specification An-S-1a. Amend. 3.

514

Harper, E. D. . . . 1956 . . . AIRCREW RECOVERY FROM AIRBORNE MISHAPS. Canad. Aeronaut. J. (Ottawa) 2(5):151-153, May 1956

ABSTRACT: The aircrew ejection devices presently in use in Canadian aircraft are considered largely inadequate for the special conditions of high altitude, low altitude, high speed, and low speed flight. The CF-100 possesses the most advanced escape equipment, including an automatic parachute operating system timed for ejections at any altitude above 200-300 feet, a barostatic operating device which opens the parachute at a predetermined altitude, maximum available support and protective device and a stabilization parachute to prevent tumbling. The problem of air blast, violent contortion, and high acceleration during ejection at high speeds has not been solved, and may require the development of an escape capsule.

515

Harris, J.F. and W.R. Martin 1942 REPORT ON THE FRANKS SUIT. (National Research Council, Canada) Report #C-2903, 26 September 1942

ABSTRACT: This is a progress report on the service trials on operational trials of the Franks Flying Suit in the Fleet Air Arm, commenting upon certain failures of the suit and suggested modifications in design.

516

Harris, R.J. 1942 STATIC TESTS OF PILOT'S SEAT OF PLYWOOD CONSTRUCTION (Morrow Aircraft Corporation, California) Report No. 102, 29 April 1942, ASTIA ATI-98615

ABSTRACT: A pilot's seat of laminated wood and plywood construction, made by the Morrmw Aircraft Corporation, was tested in accordance with specification AN-RR-S-176 and found to be satisfactory for all conditions inasmuch as there was no permanent set after proof loads, and no failure at 100% of design load.

517

Harris, R.J. 1942 STATIC TESTS OF PILOT'S SEAT OF PLYWOOD CONSTRUCTION (Rialto Corp., Morrow Aircraft Div., Calif.) Report No. 116, 4 July 1942, ASTIA ATI-98 614

ABSTRACT: These tests were conducted to test a pilot's seat Model 12, Morrow Aircraft Corporation in accordance with requirement 3, mentioned in letter to Morrow Aircraft Corporation, dated June 19, 1942, from A.A.F. Materiel Center Commanding General. The loads specified in paragraphs E-3c and E-3d should be applied to the 0.257 diameter hole used for attaching the safety belt as well as the bracket.

These tests were considered satisfactory. The seat supported load E-3c 1600# and load E-3d 1500# as specified without damage to material or finish.

518

Harris, R.J. 1942 STATIC TEST OF PILOT'S SEAT OF PLYWOOD CONSTRUCTION - SEAT MODEL 10.(Morrow Aircraft Corporation, California) Report No. 148, 12 Oct. 1942, ASTIA ATI 98 613

ABSTRACT: A pilot's seat of laminated wood and plywood construction made by Morrow Aircraft Corporation, was tested in accordance with specification AN-RR-S-176 and found to be satisfactory for all conditions inasmuch as there was no permanenet set or failure at 100% of design load.

519

Hasbrook, A. H. & R. M. Petry 1951 HANDBOOK FOR AIRCRAFT ACCIDENT INVESTIGATORS (Aviation Crash Injury Research of Cornell University, New York) CIR H-2, Jan. 1951.

520

Hasbrook, A. H. 1955 AvCIR EVALUATION REPORT ON THE BELL XH-40 MOCK-UP (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-4-PV-60; Dec. 1955

521

Hasbrook, A. H. 1955 DESIGNING FOR SURVIVAL OF CREW AND PASSENGERS IN SURVIVABLE AIRCRAFT ACCIDENTS. (Aviation Crash Injury Research, Cornell Univ., New York) March 1955.

522

Hasbrook, A. H. 1955 SAFETY BELT (BUCKLE) SLIPPAGE, AND/OR INADVERTENT RELEASE (Aviation Crash Injury Research of Cornell University, New York) Rept. 40-0-52, May 1955.

523

Hasbrook, A. H. 1956 AvCIR AERO-COMMANDER REPORT (ARMY) (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-48-0-78; Dec. 1956

524

Hasbrook, A.H. 1956 DESIGN OF PASSENGER "TIE-DOWN". SOME FACTORS FOR CONSIDERATION IN THE CRASH-SURVIVAL DESIGN OF PASSENGER SEATS IN TRANSPORT AIRCRAFT. (Presented at the Third Air Navigation Conference of the International Civil Aviation Organization Montreal, Canada, Sept. 18 - Oct. 23, 1956 and presented before the Scientific Society of Aeronautics and the German Research Institute for Aeronautics at their Joint Meeting Essen, Germany, April 9-12, 1957) ASTIA AD-217 660, September 1956

525

Hasbrook, A. H. 1956 GENERAL DESIGN REQUIREMENTS FOR CRASHWORTHINESS AND DELETHALIZATION OF PASSENGER TRANSPORT AIRCRAFT. (Aviation Crash Injury Research) AvCIR-0-45(67), Aug. 1956

526

Hasbrook, A. H. 1956 THE HISTORICAL DEVELOPMENT OF THE CRASH-IMPACT ENGINEERING POINT OF VIEW. In A. F. De Palma, Ed., Clinical Arthopaedics, No. 8 (Philadelphia: J. B. Lippincott & Co., 1956), pp. 268-274.

527

Hasbrook, A. H. 1956 PHOTO AND CAPTION RELEASE OF H-13 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-2-PCR-74; July 1956

528

Hasbrook, A. H. 1956 PHOTO AND CAPTION RELEASE OF HV HARNESS MOCK-UP (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-4-PCR-76; Nov. 1956

529

Hasbrook, A. H., & J. T. Pairn 1956 AvCIR PHOTOGRAPHIC REPORT ON L-19 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-3-PR-62; Feb. 1956

530

Hasbrook, A. H., & J. T. Pairn 1956 PHOTO AND CAPTION RELEASE OF F-11F-1 (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-1-PCR-73; Oct. 1956

531

Hasbrook, A. H., & J. T. Pairn 1956 PHOTO AND CAPTION RELEASE OF T-34B (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-3-PCR-75; Nov. 1956

532

Hasbrook, A. H., & J. T. Pairn 1956 PHOTO AND CAPTION RELEASE OF TWA MARTIN 404 (Aviation Crash Injury Research, A Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-5-PCR-77; Dec. 1956

533

Hasbrook, A. H. 1957 THE BIO-MECHANICAL ANALYSES OF SURVIVABLE-TYPE AIRCRAFT ACCIDENTS AS A FACTOR IN IMPROVING SAFETY. (Paper, 25th Annual Meeting, Aviation Crash Injury Research, 28-31 January 1957)

534

Hasbrook, A. H. 1957 DESIGNING FOR SURVIVAL IN VTOL AIRCRAFT. (Paper, American Helicopter Society 13th Annual National Forum, Washington, D. C., 9 May 1957)

535

Hasbrook, A. H. 1957 GENERAL DESIGN REQUIREMENTS FOR CRASHWORTHINESS AND DELETHALIZATION OF PASSENGER TRANSPORT AIRCRAFT. Inst. Aero Sci. Preprint No. 697 1957.

ABSTRACT: Presentation of data on the major factors contributing to injuries in survivable-type accidents involving transport aircraft and of the design precepts which can be used to eliminate these injury causatives.

536

Hasbrook, A. H. 1957 GREATER SAFETY THROUGH CRASH INJURY ANALYSIS. Aero. Eng. Rev. 16(6):67-69, June 1957.

537

Hasbrook, A.H. 1957 THE NEED FOR CRASH SAFETY DESIGN IN CREW MEMBER STATIONS IN TRANSPORT AIRCRAFT. (Cornell-Guggenheim Aviation Safety Center) AVCir 52-0-85.

538

Hasbrook, A. H. 1957 PHOTO AND CAPTION RELEASE OF MARTIN 404 EASTERN AIRLINES, LOUISVILLE, KENTUCKY. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-7-PCR-84; Mar. 1957

539

Hasbrook, A. H., & J. T. Pairn 1957 PHOTO AND CAPTION RELEASE OF CV 240, AMERICAN AIRLINES, TULSA, OKLAHOMA (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-6-PCR-80, Jan. 1957

540

Hasbrook, A. H. 1958 CRASH SURVIVAL BY DESIGN
Arizona Engineer & Scientist, March 1958.

541

Hasbrook, A. H. 1958 DESIGN OF PASSENGER TIE DOWN. Some Factors for Consideration in the Crash-Survival Design of Passenger Seats in Transport Aircraft. In Jahrbuch 1957 der Wissenschaft Lichen Gesellschaft für Luftfahrt, E. V. (Braunschweig: F. Viewig & Sohn, 1958) pp. 326-338.

542

Hasbrook, A. H. 1958 MAGNITUDE, DURATION, AND RATE OF ONSET OF MEAN DECELERATIONS USTAINED BY NINE SURVIVORS OF FREE FALLS FROM HEIGHTS OF 55 TO 185 FEET. (Aviation Crash Injury Research, Phoenix, Ariz.) AvCIR Human Factors Design Data Sheet CSDM-DDS (HF)-1.

543

Hasbrook, A. H. 1959 CRASH INJURY RESEARCH, A MEANS FOR GREATER SAFETY IN ACCIDENTS. In. E. Evrard, P. Bergeret & P. M. Palthe, eds., Medical Aspects of Flight Safety AGARD ograph 30. (New York: Pergamon Press, 1959), PP. 241-252.

544

Hasbrook, A. H. 1959 CRASH SAFETY DESIGN CAN AFFECT YOU Insurance Counsel J. 26(4):529-541, Oct. 1959.

545

Hasbrook, A. H. 1959 GREATER AIR SAFETY THROUGH CRASH SAFETY DESIGN. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-59-0-102, April 1959

546

Hasbrook, A. H. 1959 HUMAN FACTORS, THE BASIS FOR CRASH SAFETY DESIGN (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-63-0-108, Sept. 1959

547

Hasbrook, A. H. 1960 CRASH-SAFE DESIGN CAN MAKE MANY ACCIDENTS SURVIVABLE Aerospace Engineering, Sept. 1960, PP 79-81, 87.

548

Hasbrook, A. H. 1962 CRASH SURVIVAL BY DESIGN Arizona Engineer & Scientist, March 1962

549

Hasbrook, A. H. & J. C. Earley 1962 FAILURE OF REARWARD FACING SEAT-BACKS AND RESULTING INJURIES IN A SURVIVABLE TRANSPORT ACCIDENT. (U. S. Civil Aeromed. Res. Inst., Oklahoma City, Oklahoma) 62-7 April, 1962.

ABSTRACT: Photographs with captions showing seat-back failures and their causes and a description of the injuries sustained in a relatively low force transport accident are presented.

538

Hasbrook, A. H. 1957 PHOTO AND CAPTION RELEASE OF MARTIN 404 EASTERN AIRLINES, LOUISVILLE, KENTUCKY. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-7-PCR-84; Mar. 1957

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Hasbrook, A. H., & J. T. Pairn 1957 PHOTO AND CAPTION RELEASE OF CV 240, AMERICAN AIRLINES, TULSA, OKLAHOMA (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc., Phoenix, Arizona) Report AvCIR-6-PCR-80, Jan. 1957

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Hasbrook, A. H. 1958 CRASH SURVIVAL BY DESIGN
Arizona Engineer & Scientist, March 1958.

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Hasbrook, A. H. 1958 DESIGN OF PASSENGER TIE DOWN. Some Factors for Consideration in the Crash-Survival Design of Passenger Seats in Transport Aircraft. In Jahrbuch 1957 der Wissenschaft Lichen Gesellschaft für Luftfahrt, E. V. (Braunschweig: F. Viewig & Sohn, 1958) pp. 326-338.

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Hasbrook, A. H. 1958 MAGNITUDE, DURATION, AND RATE OF ONSET OF MEAN DECELERATIONS USTAINED BY NINE SURVIVORS OF FREE FALLS FROM HEIGHTS OF 55 TO 185 FEET. (Aviation Crash Injury Research, Phoenix, Ariz.) AvCIR Human Factors Design Data Sheet CSDM-DDS (HF)-1.

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Hasbrook, A. H. 1959 CRASH INJURY RESEARCH, A MEANS FOR GREATER SAFETY IN ACCIDENTS. In. E. Evrard, P. Bergeret & P. M. Palthe, eds., Medical Aspects of Flight Safety AGARD ograph 30. (New York: Pergamon Press, 1959), PP. 241-252.

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Hasbrook, A. H. 1959 CRASH SAFETY DESIGN CAN AFFECT YOU Insurance Counsel J. 26(4):529-541, Oct. 1959.

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Hasbrook, A. H. 1959 GREATER AIR SAFETY THROUGH CRASH SAFETY DESIGN. (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-59-0-102, April 1959

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Hasbrook, A. H. 1959 HUMAN FACTORS, THE BASIS FOR CRASH SAFETY DESIGN (Aviation Crash Injury Research, A Division of Flight Safety Foundation, Inc. Phoenix, Arizona) Report AvCIR-63-0-108, Sept. 1959

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Hasbrook, A. H. 1960 CRASH-SAFE DESIGN CAN MAKE MANY ACCIDENTS SURVIVABLE Aerospace Engineering, Sept. 1960, PP 79-81, 87.

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Hasbrook, A. H. 1962 CRASH SURVIVAL BY DESIGN Arizona Engineer & Scientist, March 1962

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Hasbrook, A. H. & J. C. Earley 1962 FAILURE OF REARWARD FACING SEAT-BACKS AND RESULTING INJURIES IN A SURVIVABLE TRANSPORT ACCIDENT. (U. S. Civil Aeromed. Res. Inst., Oklahoma City, Oklahoma) 62-7 April, 1962.

ABSTRACT: Photographs with captions showing seat-back failures and their causes and a description of the injuries sustained in a relatively low force transport accident are presented.

550

Hasbrook, A. H., J. D. Garner & C. C. Snow 1962 EVACUATION PATTERN ANALYSIS OF A SURVIVABLE COMMERCIAL AIRCRAFT CRASH. (U.S. Civil Aeromed. Res. Inst., Oklahoma City, Okla.) 62-9, May 1962.

ABSTRACT: The evacuation pattern of 99 to 106 survivors of a jet transport crash involving a post crash fire is described, factors possibly effecting the suffocation and ultimate death of 16 passengers are listed and photographs and diagrams are presented.

551

Hass, G. 1943 AN ANALYSIS OF RELATIONS BETWEEN FORCE, AIRCRAFT STRUCTURE AND INJURIES TO PERSONNEL INVOLVED IN AIRCRAFT ACCIDENTS WITH RECOMMENDATIONS FOR SAFER PRINCIPLES IN DESIGN OF CERTAIN TYPES AIRCRAFT. (School of Aviation Medicine, Randolph Field, Texas) November 1943 ASTIA AD 131 867

552

Hass, G. M. 1944 RELATIONS BETWEEN FORCE, MAJOR INJURIES AND AIRCRAFT STRUCTURE WITH SUGGESTIONS FOR SAFETY IN DESIGN OF AIRCRAFT. J. Aviation Medicine 15 (6):395-400. Dec. 1944.

SUMMARY: Personnel who have been subjected in aircraft accidents to large forces for brief times may be divided into four groups. The distribution of cases in these groups indicates that just below the range of impact which causes sudden death, there is a narrow range of impact which produces multiple internal injuries and permits survival. This is the range of over-all maximum tolerance of the body to force.

The differential diagnosis and treatment of internal injuries are major problems, but prevention of injuries is still a more important problem. The first step is the definition of parts of the aircraft which by contact with the body are unduly responsible for injuries. The second step is to determine the extent to which collapse of aircraft structure causes injuries that might have been prevented if structure had not collapsed. The third step is to analyze the problem of emergency escape from aircraft.

, G.M. 1944 A STUDY OF FACTORS WHICH OPERATE AGAINST THE SUCCESSFUL ESCAPE OF OCCUPANTS FROM AIRCRAFT. (School of Aviation Medicine, Randolph Field, Texas) Proj. no. 249, Rept. no. 1. 5 May 1944.
Abridged in Air Surgeon's Bull. 1:6-7, Oct. 1944.

TRACT: Twelve reasons why occupants of falling aircraft often do not use the achute are given. Three case reports which illustrate one reason for failure use the parachute, namely, immobilization of occupants in the aircraft by force erated by spinning of the airplane during its fall to the ground, are given. force generated in each case was directed from "head-to-seat" and was of fficient magnitude not only to physically transfix each occupant but also to oduce "blackout" or "near blackout" in two cases in which the long axis of the dy was oriented in the direction of the force. In the third case a prone position was assumed and there was no "blackout." (Author)

54

ass, G.M. 1944 UNSUCCESSFUL USE OF PARACHUTES AND CASES RESULTING FROM FORCES GENERATED BY AIRCRAFT SPINS. Air Surgeon's Bulletin 1(10):6-7, Oct. 1944. (Abridgement of School of Av. Med., Res. Proj. No. 249, Rept no.1, 5 May, 1944)

ABSTRACT: Fliers should be informed that if they are immobilized by a force of sufficient magnitude to cause blackout on standing they should crawl to the nearest exit keeping the trunk and head parallel to the long axis of the fuselage.

Among the causes of nonuse of parachutes may be (1) limitations of speed and accuracy of physiologic reactions, such as slow perception or reaction to stimulus of a stall abnormal attitude or direction of spin; acute disorientation or vertigo; (2) improper spatial relations between occupants and avenues or facilities of escape; (3) inadequate spatial relations between the aircraft and the occupant or his opening parachute after the occupant has jumped from the aircraft.

555

Hass, G.M. 1945 THE PROBLEM OF ESCAPE BY PARACHUTE IN ACUTE AERIAL EMERGENCIES IN FLYING TRAINING. (U.S. AAF, School of Aviation Medicine, Randolph Field, Texas) Project No. 417, Rept. No. 1, Sept. 1945.

ABSTRACT: Acute aerial emergencies lead to accidents which cause most fatalities in flying training. An analysis of the problem of escape in 250 escape in 250 acute aerial emergencies resulting in aircraft accidents which involved 468 personnel in flying training is reported. Attempts to escape by parachute and the success of these attempts increased in direct proportion to the altitude at which control was lost. When control was lost at altitudes below 500 feet only one (0.8%) of 126 personnel successfully escaped by parachute. When control lost at altitudes between 500 and 2000 feet, 7(8.3%) out of 84 personnel successfully escaped by parachute. When control was lost at altitudes above 2000 feet principally 2000 to 7000 feet in this series) 48(18.6%) of 238 personnel escaped successfully by parachute.

556

Hass, G.M. 1945 RESULTS OF DUAL ATTEMPTS AT CONSECUTIVE ESCAPE BY PARACHUTE FROM UNCONTROLLED TWO-SEATED AIRCRAFT. (U.S. AAF, School of Aviation Medicine, Randolph Field, Texas) Project 328, Report No. 1, 12 February 1945.

ABSTRACT: Twenty-two cases in which at least one of two occupants was able to escape by parachute from uncontrolled spinning or diving aircraft are reported.

Forty-four personnel were involved, two in each aircraft. Twenty-six escaped successfully by parachute. The remainder wore fatally injured.

Among the twenty-six who escaped, twenty-two were first in the one-two sequence in jumping.

It is apparent that momentary delay caused by following a one-two sequence in escape by parachute was an important factor in the high fatality rate among those who are seated in the sequence.

One basic attack upon this and similar problems involving human reactions in critical emergencies created by sudden loss of control of aircraft could be made by development of efficient mechanical devices for ejection of personnel.

557

Havron, M. Dean & Leslie F. Butler 1957 EVALUATION OF TRAINING EFFECTIVENESS OF THE 2FH-2 HELICOPTER FLIGHT TRAINER RESEARCH TOOL (Naval Training Device Center, Port Washington, L.I., N.Y.) Technical Report -- NAVTRADEVCEN 1915-00-1 Contract Nonr 1915(00) ASTIA AD 125 465

ABSTRACT: This is the report of an evaluation of Device 2-FH-2, Helicopter hovering research tool. Device 2-FH-2 was constructed by the Bell Aircraft Corporation, Buffalo, New York under contract to the U.S. Naval Training Device Center. The device was developed as an engineering prototype to determine the feasibility of a non-programmed visual display for training in hovering and other maneuvers performed near the ground. Later, its capabilities were extended to permit simulation of high altitude maneuvers without extensive modification of the flight computer system. All instructors recommended further investigation of the operational capabilities of the device. This is a report of the methods used and the results obtained on the recommended investigation. The evaluation was conducted by the steps summarized below and described in detail: (1) Collection and integration of content (2) Development of a training syllabus (3) Development of a flight criterion (4) Administration of training syllabus and flight criterion (5) Analysis of data (6) Report of results. Results from the tests indicate that: (1) Training in the 2-HF-2

led to no apparent improvement in flight performance in the aircraft. (2) Training in the 2-HF-2 produced sickness somewhat similar to motion sickness among most participating instructors and students. (3) Flight characteristics of the device that specify display-control relationships lack fidelity in a number of important respects. It is probable that these faults contribute to sickness. There is some evidence of negative transfer because of them.

558

Hawkes, J.E. 1948 GROUND SEAT EJECTION TESTS ON TF-80C AIRPLANE. (Lockheed Aircraft Corp., Burbank, California) ASTIA ATI-46462, October 13, 1948

ABSTRACT: Ground seat ejection tests were conducted on the rear seat of a modified TF-80C turbojet airplane. A total of three ground ejection tests were completed. During the ground ejection tests the airplane was in the configuration specified in the contract. In addition Mitchell 35 mm and Western Electric (ultra high speed) motion picture cameras were used to take photographs of the ejection. It was concluded from these ground ejection tests that provided the head rest is firmly bolted to the seat the test configuration was satisfactory for additional air ejection tests.

559

Hawkes, R. 1956 AEROMEDICINE REINFORCES FRAIL MAN
Aviation Week 65(6): 360-361, 363-365, 6 Aug. 1956

ABSTRACT: An overall view is presented of the basic and applied research carried out by branches of the Aero Medical Laboratory. The current ideas in research and design of oxygen systems, pressure breathing devices, and pressure suits are noted. Studies of the effects of acceleration and deceleration have culminated in the requirement of an escape capsule in all designs capable of supersonic speeds or high-altitude flight. Further, studies in aviation psychology, bioacoustics, vision in an empty visual field, and flight feeding are mentioned.

560

Hawkes, R. 1956 AIR CRASH DEATH OR INJURY MAY BE PREVENTED BY SOUND DETAIL DESIGN. Aviation Week 65(19):61-64, 67-70, 73, 77, 79, Nov. 5, 1956

ABSTRACT: The concepts of crash survival design are based on the fact that the human body is capable of withstanding impacts greater than those which can be transmitted through the structure of a current airplane. The basic principles are centered around designing the tiedown of passengers and loose equipment up to the ultimate load factor of the aircraft frame. The study of forward-facing seats versus backward facing seats is used to illustrate the fallacy of drawing conclusions from incomplete evidence.

561

Hawkes, R. 1956 NAVY INTEGRATING FLIGHT SYSTEM IN PILOT CAPSULE Aviation Week 64(18):54-59, Apr. 30, 1956

ABSTRACT: The overall design concept is outlined for an interchangeable nose section ejection capsule which would contain the pilot and the sensing, interpreting, and communicating organs of a new integrated flight-control system. Some of the background work that culminated in the man-machine bearing capsule is related.

562

Hawkes, R. Feb. 1957 HUMAN FACTORS APPROACHING MATURITY Aviation Week 66(8):201-202

563

Hawthorne, R. 1953 ARE AFT FACING SEATS SAFER? Aviation Age, Oct. 1953

564

Hawthorne, R. 1959 "ENERGY ABSORPTION" APPLIED TO SEAT DESIGN. Space Aeronautics (Oct. 1959): 70-74, 76, 77.

ABSTRACT: How can the seat anchorage be kept from failing in survivable aircraft crashes? By designing to the energy absorption principle, answers Aerotherm, which has done just that with the seats for Pan Am's 707s.

565

Hays, E.L. 1948 EVALUATION OF THE MARINE CORPS SEAT RELEASE COMPOSITE QUICK DISCONNECT ASSEMBLY (Aeronautical Medical Equipment Laboratory, Naval Air Experimental Station, Naval Air Material Center, Philadelphia, Penn.) TED NO NAM AE 519059.1, 27 July 1948, ATI 76256

ABSTRACT: The Marine Corps Seat Release Composite Quick Disconnect Assembly has been subjected to leakage, pressure drop, general operational and ejection seat tests at this station. In general, the performance of the Seat Release is good but it is considered unsatisfactory for use in Naval Aircraft because of failure of the springs in the electrically heated suit circuit and minor mechanical difficulties. This type disconnect can be installed in Naval Aircraft for use with Ejection Seats if the seat is equipped with a member that maintains the same relative position to the aircraft throughout all seat adjestments to which the "seat side" of the disconnect can be fastened. This type Seat Release Disconnect can be installed with the NAMC Ejection Seat because the above requirements are fulfilled in the design of the seat. In order to use this disconnect with other type ejection seats, it would be necessary to equip the "airplane side" with a linkage which would allow this side to retain the same relative position to the seat throughout all seat adjustments.

566

Hecht, K. F. 1953 GROUND TESTS OF A PILOT EJECTION SEAT EJECTED THROUGH MONOLITHIC-, REINFORCED-MONOLITHIC-, AND LAMINATED-TYPE CANOPIES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 53-361, Oct. 1953

ABSTRACT: Five tests were conducted by the Aircraft Laboratory, Wright Air Development Center, Wright-Patterson Air Force Base during the latter half of 1951 to determine the feasibility of ejecting pilots through canopies in the event of a canopy release failure. For 3 of the tests the ejection seat and dummy were fired through a monolithic-type canopy used on the F-86A aircraft; the remaining 2 tests were through an F-84 reinforced monolithic-type canopy and a B-47 laminated-type canopy. Ejections were accomplished by duplicating the mechanisms involved in actual flight. Motion picture cameras and metering devices record the data.

The results of the tests indicate that the trajectory of the seat and pilot after ejection through the canopy is not seriously affected, and adequate tail clearance will still be attained. (DACO)

567

Hecht, K.F. 1953 GROUND AND FLIGHT TESTS OF AN AUTOMATIC-OPENING LAP BELT FOR EJECTION SEATS (Aircraft Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical rept. no. 53-365; Dec. 1953; ASTIA AD-76-428

ABSTRACT: These tests were performed in order to develop a system which would permit automatic separation between a man and his seat after ejection from an

aircraft. Test results are presented, and the conclusion is drawn that automatic separation, immediate or time-delay, is feasible from an engineering viewpoint. Test results further indicated that a time-delay system is more desirable than an immediate separation system. (WADC abstract)

568

Hecht, K. F. 1953 UPWARD EJECTION SEAT FLIGHT TESTS UTILIZING THE M4 CATAPULT (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TN 53-364; Dec. 1953

569

Hecht, K. F., E. G. Sperry, and F. J. Beaupre 1953 DOWNWARD CREW EJECTION SEAT TESTS FROM THE B-47B AIRPLANE. (USAF, Wright-Pat. AFB, Ohio). WADC TR 53-433. Nov. 1953; ASTIA AD-63 501

ABSTRACT: Flight test ejections of the downward ejection seat from a B-47B airplane are described. A total of twenty-three ejections were accomplished; sixteen dummy subject tests were conducted at Wright-Patterson AFB from 17 July 1953 to 29 September 1953, and seven human subject tests were conducted at Eglin Air Force Base from 7 October 1953 to 21 October 1953.

Test results obtained by analysis of motion picture records and subjective reactions of the human subjects are presented. It is concluded that the downward ejection seat is acceptable as an escape device for use in the B-47 airplane if provisions for automatic separation and parachute deployment are included for the crewman.
It is recommended that further studies be made of the firing control method utilized for downward ejection seats to improve the ability of the crewman to retain his grip. It is further recommended that design consideration be given to the mechanical retention of the limbs during very high airspeed ejections

570

Hecht, K. F. and E. G. Sperry 1957 DOWNWARD EJECTION FLIGHT TESTS OF A SHOCK-ABSORBING SEAT FIRING CONTROL SYSTEM
(Aircraft Lab., Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TEch. note no. 55-239
Feb. 1957 ASTIA AD 118 053

ABSTRACT: The report covers the 28 flight test ejections of a downward ejection seat conducted from a B-47B airplane between the dates of 1 April

1954 and 3 August 1954. Eighteen of these tests were accomplished at Wright-Patterson Air Force Base, Ohio, utilizing dummy subjects; the remaining ten tests were performed with human subject at Eglin Air Force Base, Florida. Measurements of the forces encountered in the wrists when utilizing a D-ring type of firing control during downward ejection are presented. Other test results, including those from two high altitude human subject ejections, obtained from motion picture records and subjective reactions of the human subjects, are reported. It is concluded that the downward ejection seat as modified for the human subject phase is a satisfactory escape device throughout the speed and altitude range tested. (Author)

571

Hegenwald, J.F., Jr. 1956 HIGH PERFORMANCE EJECTION SEAT. PHASE I. PRELIMINARY INVESTIGATION. (North American Aviation, Inc.) Rept no. NA 56-3770 , Sept. 1956.

572

Hegenwald, J.F. & W.V. Blockley 1956 SURVIVABLE SUPERSONIC EJECTION. A CASE STUDY TO CORRELATE ANALYTICAL, EXPERIMENTAL, AND MEDICAL DATA BY RECONSTRUCTION OF AN INCIDENT. AN INTERIM REPORT PRESENTED ON APRIL 17, 1956, AT THE 27th ANNUAL MEETING OF THE AERO MEDICAL ASSOCIATION, CHICAGO, ILLINOIS. (North American Aviation, Inc., Los Angeles, Calif.) Rept. NA 56 452, April 1956 ASTIA AD 138 762

ABSTRACT: An anthropomorphic dummy was ejected 4 times from a simulated F-100 airplane cockpit at 533 to 677 kn. The objective was to obtain information which could be used to prevent the recurrence of injuries which were sustained by a pilot who was ejected from an F-100A airplane over the Pacific Ocean. The M-5 catapult with an ejected weight of about 350 lb. was used. The standard F-100 ejection seat configuration was employed, except for the incorporation of the drag parachute in later runs. In addition to the photographic coverage, continuous acceleration data were provided by means of a telemetering transmitter mounted within the dummy's torso. The pilot was believed to experience, at the head (1) a maximal period of 290 msec with an acceleration greater than 20 g, (2) a period of 120 msec at an acceleration above 35 g, (3) a peak acceleration of 64 g, and (4) a rate of onset of the peak of 700 g/sec.; the direction of application was predominantly negative. At the lower torso, the pilot was

believed to experience (1) a maximal period of 140 msec with the acceleration greater than 20 g, (2) a period of 45 msec at an acceleration above 35 g, (3) a peak acceleration of 50 g, (4) and a rate of onset of 1300 g/sec.; the direction of application was chest to back. The imposition of a single properly directed force vector upon the seat-man unit would benefit ejection seat escape in 3 main aspects: (1) orientation of the seat attitude to produce accelerative forces in physiologically favorable directions; (2) attentuation of acceleration magnitude at the seat occupant's extremities and (3) improvement of aerodynamic lift characteristics.

573

Hegenwald, J. F. and E. A. Murphy 1957 SLED TESTING THE EMERGENCY ESCAPE SYSTEM: THE HUMAN FACTOR (Presented at the ARS Spring Meeting, Washington, D.C.).

ABSTRACT: During escape from high-performance airplanes, the aircrew may be subjected to hazards of bodily accelerations, windblast, noise, pressure gradients, and equipment disintegration. Rocket-propelled sleds on the experimental track provide a ready medium for determination of the physiological, mechanical, and structural effects of escape unit ejection at all airspeeds. A primary design objective is aerodynamic control of the escape unit's actions after separation from the airplane; pitch-retarding and stabilization devices are investigated in the current program of North American Aviation to attenuate aircrew accelerations during ejection. The reactions of helmets, oxygen masks, parachutes and ejection seats are studied. Methods of securing and recording data are reviewed.

574

Hegenwald, J.F., Jr. & E.A. Murphy, Jr. 1957 SLED TESTING THE EMERGENCY ESCAPE SYSTEM: THE HUMAN FACTOR.
Jet Propulsion 27(9): 1025-1028, Sept. 1957

ABSTRACT: Tests were made to assess single items of ejection equipment and also, using instrumented dummies, to determine the forces on the human frame. The test vehicle was designed for 16 standard 2.2 ks solid propellant rocket motors and was run on the Edwards Air Force Base high-speed track.

575

Hegenwald, J.F., Jr., J.F. Madden & P.R. Penrod 1959 X-15 RESEARCH AIRCRAFT EMERGENCY ESCAPE SYSTEM
Paper, Joint Meeting of the Flight Test Panel and the Aeromedical Panel of the Advisory Group for Aeronautical Research and Development, Athens, Greece. 11-15 May 1959 (AGARD Rept. No. 243) ASTIA AD 256 386

ABSTRACT: An extensive survey of alternate escape system types was made. The results indicate conclusively that an open ejection seat in conjunction with a full pressure protective garment best satisfy X-15 emergency escape requirements. An evaluation of available ejection seats which had demonstrated a supersonic capability revealed that modifications required to meet the specific requirements of cockpit compatibility, acceptance of the pressure suit, and use at very high Mach numbers, would be equivalent to complete redesign. A seat tailored to the X-15 offered the most acceptable solution. The completed test program has demonstrated that the aerodynamic, mechanical, structural, propulsive, and survival aspects of X-15 emergency escape system similar in concept to that incorporated in the X-15 will best satisfy escape requirements for currently projected manned orbital vehicles. (Author)

576

Hegenwald, J. F., Jr. & D. W. Brown 1960 EMERGENCY AND ESCAPE PROCEDURES. (Paper, Physiological Training Officer Symposium School of Aviation Medicine, Brooks AFB, Texas, 13-17 June 1960) (North American Aviation, Inc., Los Angeles, Calif.) Report No. NA 60-814. ASTIA Doc. No. AD-268510

ABSTRACT: Methods are discussed by which escape devices designed fifteen or more years ago, may be considerably improved. Then, the ejection seat-pressure suit combination of a research aircraft is described, followed by a report concerning the encapsulated seat of a Mach 3 air vehicle and brief examination of the aspects of escape from space vehicles. (Author)

577

Hegenwald, J.F., Jr., & P.R. Penrod 1960 AEROSPACE EMERGENCY AND ESCAPE PROCEDURES. In Lectures in Aerospace Medicine, 11-15 January 1960, (School of Aviation Medicine, Brooks AFB, Texas)

ABSTRACT: Successful penetration of this new frontier will depend on space ship duplication of the natural habitat of man. The use of a mechanical substitute for natural provision of requirements for sustaining life will inevitably generate the necessity for minimal standby equipment to assure a safe emergency environment.

578

Hegenwald, J.F. and P.R. Penrod 1960 AEROSPACE EMERGENCY AND ESCAPE PROCEDURES. (North American Aviation, Inc., Los Angeles) Rept. no. NA-59-1867, ASTIA AD-256 387, January 6, 1960

ABSTRACT: Successful penetration of the space frontier will depend on space ship duplication, or at least approximation, of the natural habitat of man. For early probing missions of relatively short duration and in the immediate vicinity of the earth, extension of current techniques will best satisfy the requirements of emergency and escape procedures.

Intra-atmospheric emergencies occurring during launch, boost, re-entry, and recovery will essentially parallel those attendant to super-performance aircraft such as the X-15 and B-70, whose development is already solving space age problems and producing much technology of direct applicability to putting man safely in space. The exact escape procedure and system configuration will be dependent on vehicle type, varying from total vehicle separation and recovery for a wingless craft to a fly-down or minimum-mass ejection for the winged craft

Inter-planetary operations with extended mission duration should be planned on a parallel vehicle approach. The ultimate conclusion is that from a standpoint of ethics, the philosophy of democracy and ordinary realism, a man or crew on an exploration will not be sent into space by our nation without a high probability of a safe journey and safe recovery.

579

Hegenwald, J. F. 1961 ENVIRONMENTAL ASPECTS OF THE B-70 MACH 3 ESCAPE CAPSULE.
Aerospace Medicine 32(3):234, March 1961.

ABSTRACT: The aircrew emergency escape system of the B-70 air vehicle provides safe egress at performance levels as high as Mach 3.0 above 70,000 feet and as low as 90 knots at zero altitude. The capsule's influence upon normal and emergency flight operations is discussed. Oxygen and pressurization provisions, as well as crew positioning and restraint devices are described. The acceleration environment through all escape phases is presented in conjunction with unique communications and survival features.

580

Hegenwald, J.F., Jr. 1962 ENVIRONMENTAL ASPECTS OF THE B-70 MACH 3 ESCAPE CAPSULE
Aerospace Medicine 33(8): 951-957, Aug. 1962.

ABSTRACT: The first encapsulated seat to demonstrate safe ejection throughout the speed spectrum from 90 knots to supersonic, including ground-level escape

at these speeds, the B-70 capsule is entering the qualification phase of the test program. Suitable aerodynamically for very high Mach numbers, the capsule is capable of providing emergency pressure protection for space vehicle crews as well as furnishing intra-atmospheric escape for winged reentry spacecraft.

The aircrew emergency escape system of the B-70 air vehicle provides safe egress at performance levels as high as Mach 3.0 above 70,000 feet and as low as 90 knots at zero altitude. The capsule's influence upon normal and emergency flight operations is discussed. Oxygen and pressurization provisions, as well as crew positioning and restraint devices, are described. The acceleration environment through all escape phases is presented in conjunction with unique communications and survival features.

581

Heidner, R. L. 1962 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS
(B. F. Goodrich Aerospace and Defense Products, Akron, Ohio)
13th Monthly Engineering Report, 18 May 1962 - 17 June 1962 ASTIA AD-293 057.

ABSTRACT: A physical testing program has been initiated to evaluate the tensile, elongation and seam strengths of the glass-rayon fabrics. Design work and parts procurement is underway for the XH-38 headpiece. The basic hardshell for the intermediate size headpiece required reinforcement to control distortion. The XGD-37 full pressure suit has demonstrated walking, waist bending, and knee bending capabilities. Mobilities studies are progressing utilizing one-way stretch fabric in the knee and elbow joint areas.

582

Heidner, R.L. 1962 DEVELOPMENT OF PERSONNEL PROTECTIVE SYSTEMS FOR SPACE FLIGHT AND EXPLORATION MISSIONS
(B.F. Goodrich Aerospace and Defense Products, Akron, Ohio) Contract NOw 61--554-c Covering Period June 18 thru July 17, 1962 Fourteenth Monthly Engineering Report ASTIA AD 284 169

ABSTRACT: An instrument is being designed to reliably measure absolute reflectance. HR-1 yarn is undergoing evaluation as a possible base for producing fabric of improved thermal radiation resistance and reflectance capabilities. Efforts are continuing towards creating a satisfactory glass-rayon type fabric. The XH-32, XH-40, XH-41 headpieces and XGD-37 full pressure suit have been delivered to A.C.E.L. for testing and evaluation. The design features have been established for the XGD-38 full pressure suit. Design work has been completed and components ordered for the XH-38 headpiece. A method has been devised for providing the stretch fabric convoluted knee section with circumferential sizing without any sacrifice in mobility

583

Heinecke 1943 CATAPULT SEAT WITH GUNPOWDER PROPULSION
(Messerschmitt AG., Projektbuero, Augsburg) April 1943; ASTIA ATI 32382

ABSTRACT: An incestigation is conducted to see if the weight of a jettisonable seat with compressed air propulsion could be decreased by using gunpowder for propulsion. Calculations were made to determine the powder loading, force, speed and acceleration. Results of these computations are shown in a pressure diagram and schematic drawings. Tests were made with the Heinkel air-pressure-propulsed catapult seat weighing 19 kg. It was possible, using gun powder for propulsion, to reduce this weight to 5 kg.

584

Heinrich, H.G.; & Berndt, Rudi 1948 PARACHUTE, GUIDE SURFACE 40" DIA., EJECTION SEAT STABILIZATION, TESTS OF" (Eng. Div., USAF, Wright-Patterson AFB, Ohio) No. 143, MCREXE-672-22K, 3 Sept. 1948 ASTIA ATI 179 497

ABSTRACT: The tests reported in this publication were conducted for the following purposes: (1) To determine the maximum force applied to the ejection seat during opening of the 40" Guide Surface Stabilization Parachute at various airspeeds. (2) To check the stability of the ejection seat with 40" Guide Surface Parachute. (3) To determine velocity, trajectory inclination angle and vertical fall of the parachute stabilized ejection seat for the first fifteen seconds of free flight at various altitudes.

When the tests were completed, it was found that the trajectory calculations show that with an ejection speed of 650 MPH at sea level, the seat will have decelerated to 340 MPH at the time of opening of the stabilization parachute. It was also found that the maximum force of the 40" Guide Surface Stabilization Parachute for the ejection seat does not exceed the limits calculated in Memorandum Report No. MCREXE-672-22H at sea level and at speeds up to 350 MPH. These limits seem to be within the tolerance of the human body as established by Aero Medical Laboratory. The stability of the ejection seat with the subject parachute is adequate.

585

Heinrich, Helmut G. and Shukry Ibrahim 1959 A TRANSDUCER FOR THE MEASUREMENT OF SMALL PRESSURE DIFFERENTIALS ON PARACHUTE CANOPIES
(Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC TR 59-115, Contract No. AF 33(616)-6372, Project 6065-60252, November 1959, ASTIA AD 232 039

ABSTRACT: A Pressure Transducer for the measurement of pressure distribution on parachute canopies in subsonic flow has been developed and tested in wind tunnel experiments. The transducer which has a pressure range of 0.5 psi differential is to be fastened to the canopy structure. It employs SR-4

Strain gages manufactured by Baldwin-Lima-Hamilton Corporation, which are bonded to light steel beams. The beams are deflected by the differential pressure by means of a diaphragm. The strain gages are electrically connected in a 4-arm bridge arrangement providing means of compensation for temperature and inertia effects. A suitable method to lead the local pressure to the transducer is proposed.

The transducers originally developed to be used in connection with parachutes may advantageously be applied for other purposes where high sensitivity, high natural frequency, low temperature drift and low dynamic response are required.

586

Heinrich, Helmut G. and L. Albert Scipio 1959 PERFORMANCE CHARACTERISTICS OF EXTENDED SKIRT PARACHUTES
(Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) Contract No. AF 33(616)-6372, Project 6065-60252, WADC TR 59-562, October 1959 ASTIA AD 232 149

ABSTRACT: Extended skirt parachutes represent a particularly shaped, very efficient and widely used type of parachute. In the aerodynamic sense, extended skirt parachutes are statically unstable over a certain range of angle of attack and, therefore, they descend either in a gliding or oscillating or combined motion.

A consequence of this range of uncertainty is a considerable variation of the average rate of vertical descent and a corresponding spread of effective drag per unit of surface area, and unit of parachute weight or volume.

The prime objective of this project is to collect and analyze all available performance data and to reduce them to average values by the methods of statistical analysis. The establishment of characteristic values for the various types of extended skirt parachutes and the establishment of trends in the relationship between effective drag and size as well as canopy loading and the registration of reported opening forces and opening times, also under consideration of the types, were secondary objectives

587

Heinrich, H.G. 1961 SOME RESEARCH EFFORTS RELATED TO PROBLEMS OF AERODYNAMIC DECELERATION
(Wright Air Development Division, Wright-Patterson AFB, Ohio) WADD TN 60-276; November 1961; ASTIA AD 272 404

ABSTRACT: The status of research efforts designed to explain physical phenomena associated with the operation of aerodynamic decelerators, in particular textile type parachutes, is presented. A theoretical approach to calculate the velocity

and pressure distribution in the turbulent wake of basic bodies or revolution is outlined and compared to actual test results. The concept of the effective porosity of textile materials is developed, and its influence upon the aerodynamic and opening characteristics of conventional textile parachute canopies is discussed. The results of research efforts to reduce parachute inflation time with a minor increase of opening force are presented. (Author)

588

Hendler, E. and Poppen, J. R. 1948 PROTECTIVE HELMET FOR PILOTS OF HIGH-SPEED AIRCRAFT. J. Aviation Med. 19(6):420-425, 455.

SUMMARY: A protective helmet has been described which was designed to afford protection to aviators from the buffeting action encountered in high-speed aircraft. This helmet has been designated the H-1 Protective. The smaller size, lighter weight, greater stability and protective features incorporated in this helmet have been discussed. Problems of increased ventilation and sizing have been presented. Comments of jet pilots who have worn this protective helmet during flight have been shown to be generally favorable.

589

Hendler, E. and R. G. Evans 1954 EVALUATION OF COLLAPSIBLE TYPE DITCHING SEAT
(Aeronautical Medical Equipment Lab., Naval Air Experimental Station, Philadelphia, Pa.)
Rept. TED no. NAM AE-6316 15 Nov. 1954 ASTIA AD 50 046

ABSTRACT: "Three types of aft-facing collapsible ditching seats, differing mainly in materials used in their construction, were statically and dynamically tested to determine their ditching and crash protective properties. Dynamic tests were made using the HG-1 catapult and an anthropomorphic dummy. Average accelerations applied to the catapult car, upon which the test load was mounted, ranged from about 10 to 38G, lasted from about 0.22 to 0.12 seconds and were approximately square wave in shape. Over shoot of acceleration measured in the dummy reached values more than twice that applied to the catapult car. Tensions measured in each lower seat suspension strap were as high as 1.5 times the total load computed as the product of mass and applied acceleration, while in each upper seat suspension strap, tensions as high as the total load, computed as above, were measured. With certain modifications to the basic structure, it is concluded that a nylon mesh and strap collapsible ditching seat would provide adequate protection for personnel against forces engendered during aircraft ditching and crashes. It is therefore recommended that this type of modified seat be accepted for use in multi-place long range type aircraft." (AMEL abstract)

590

Hendler, E., et al. 1954 TEST AND EVALUATION OF MODEL R 3Y DITCHING SEAT (Naval Air Material Ctr., Philadelphia, Pa.) Rept. TED No. NAM EA AE-6302 27 May 1954

591

Hendler, E. 1955 EVALUATION OF AIR ASSOCIATES, INCORPORATED SINGLE STRAP SHOULDER HARNESS AND LAP BELT. (Naval Air Material Ctr., Philadelphia, Pa.) Rept. NAM EA 6314, 17 March 1955

592

Hendler, E., and E. M. Wurzel, 1956. THE DESIGN AND EVALUATION OF AVIATION PROTECTIVE HELMETS. J. Aviation Med. 27(1):64-70.

ABSTRACT: Most present-day crash helmets are based not upon scientific theory but upon established lines which have resulted from misinterpretation of the mechanism of head injury. When the physics of head injury are studied, it is immediately clear that a theoretically sound helmet is neither difficult to design nor necessarily expensive to manufacture. Although the shape and details of a properly designed crash helmet may vary with the purpose for which it is intended, its basic properties will always be the same-resistance to penetration, resistance to deformation, reduction of accelerations, and absorption of kinetic energy.

593

Hendler, E. 1961 COMPENDIUM OF ABSTRACTS OF PAPERS PRESENTED AT THE SYMPOSIUM ON BIOMECHANICS OF BODY RESTRAINT AND HEAD PROTECTION, June 14-15, 1961. (Office of Naval Research, Bureau of Naval Weapons, and Aircrew Equipment Lab., Naval Air Material Ctr., Philadelphia, Pa.)

ABSTRACT: The objectives of the Symposium were to (1) review and bring up-to-date the theoretical biological knowledge on acceleration injuries, (2) review and bring up-to-date engineering progress in the design of protective devices, and (3) foster the interchange of ideas between the two disciplines with the hope of eventually developing better protection against linear acceleration.

This Compendium contains a copy of the program, those abstracts of papers which were submitted for inclusion herein, and a complete list of attendees.

594

Hendler, Edwin 1961 PROBLEMS RELATED TO HEAD PROTECTION.
(Paper, Symposium on Biomechanics of Body Restraint and Head Protection, Naval Air Material Center, Philadelphia, Penn. June 14-15, 1961)

ABSTRACT: In spite of some excellent work elucidating the mechanism of head injury, a great deal more must be known before adequate criteria are available for those who design and evaluate protective helmets. A beginning is being made in establishing educational curricula which are designed to produce scientists trained in biomedical engineering. A review is given of the various devices utilized by the Air Crew Equipment Laboratory over the past 15 years for the evaluation of protective helmets. The importance of incorporating velocity changes equivalent to those occurring in survivable aircraft crashes in helmet test procedures is pointed out. A rebound test tower is described which allows velocity changes up to 80 feet per second to be produced. Other features of this tower also make it more suitable for evaluating protective helmets than more conventional devices.

595

Henley, F. S. 1947 SEAT FAILURE IN AIRCRAFT.
(Letter, from Field Office of The Air Inspector, Hq AAF, Langley Field, Va., to The Air Inspector, The Air Surgeon, AC/AS-1(in turn) 11 July 1947)

596

Henry, J.P., W.G. Clark et al 1944 DETERMINATION OF THE EFFECT OF TIME OF INFLATION ON THE "G" PROTECTION GAINED FROM THE CLARK G-4 SUIT
(National Research Council, Committee on Aviation Medicine, Washington, D.C.)
CAM Rept. No. 398; 1 Dec. 1944

ABSTRACT: A quantitative measure in terms of "g" units has been made in the course of over 700 centrifuge runs of the protection afforded by a Clark G-4 coverall when rapidly inflated (in less than 0.1 sec) by 5 psi at various times relative to the onset of an acceleration cycle of constant pattern. The pressure could be applied any time less than two minutes before the attainment of maximum "g" without involving the loss of more than 20 percent of maximum protection. With the acceleration pattern used, the optimum time of rapid inflation lay between the start of acceleration and the attainment of 3 "g".

597

Henry, J.P. 1945 A METHOD FOR THE ASSESSMENT OF SEAT COMFORT WITH A DESCRIPTION OF SOME RESULTS OBTAINED WITH THE PILOT'S SEAT OF THE DOUGLAS BT2D BOMBER. (Com. Aviat. M. U.S. Res. Counc., Wash.)

598

Henry, J. P., W. G. Clark, P. O. Greeley, and D. R. Drury 1946 NOTES ON OBTAINING COMFORT IN THE PRONE POSITION WHEN FORWARD VISION IS MAINTAINED FOR LONG PERIODS. (National Research Council acting for Committee on Medical Research) CAM Rept. No. 498, 23 Jan. 1946.

599

Henry, J.P., P.J. Maher et al. 1948 PROTECTION AGAINST THE EFFECTS OF NEGATIVE ACCELERATION BY USE OF A PRESSURIZED HELMET (Wright-Patterson AFB, Ohio) MCREXD-689-3

600

Henry, J. P. 1954 FLIGHT ABOVE 50,000 FEET - A PROBLEM IN CONTROL OF THE ENVIRONMENT. Astronautics 1:12

601

Henry, J. P. 1952 PROBLEMS OF ESCAPE DURING FLIGHTS ABOVE 50,000 FEET. In White, S., & O. O. Benson, eds., Physics and Medicine of the Upper Atmosphere. (Albuquerque, N. Mex.: University of N. Mex. Press, 1952) p. 516.

ABSTRACT: Physiological problems arising from cabin pressure failure at high altitudes are discussed. On the basis of present findings, no deleterious effect from cosmic radiation may be expected evenat prolonged flying (25 hours a week) up to altitudes of 60,000 feet. Below this altitude, normal oxygenation can be sustained with the aid of a special helmet and an elastic vest protecting the trunk. Elastic resitance of the vest may be overcome by the use of an intermittent breathing valve. However, even with this device, pressure breathing can only be maintained for a few minutes before unconsciousness sets in because of the pooling of blood in the extended limb veins. The adoption for a full pressure suit would overcome most of the difficulties encountered in the helmet and vast protection method. Unfortunately, however, such suits, at the present stage of development, are extremely cumbersome to wear, and the problem of internal ventilation has not yet been entirely solved.

602

Herbert, D. C. 1960 INJURY REDUCTION BY THE USE OF SAFETY BELTS IN MOTOR CARS. (Snowy Mountains Hydro-Electric Authority, Scientific Service Div. New South Wales, Australia) Aug. 1960, Rept. No. S.M. 1252

603

Hermann, F. von 1952 PRONE FLYING Sailplane and Glider (London), 20(6): 5-6 1952.

ABSTRACT: Reports of various German pilots regarding their personal experience while piloting a plane in the prone position, reveal that in no case major discomfort was encountered. A position between kneeling and lying prone, with the upper part of the body inclined at 30 degrees to the horizontal proved to be the best posture. No fatigue was experienced even after flights lasting 6 to 10 hours. The range of vision was found to be considerably wider than in the sitting position. Only one pilot stated that the location of the head far in front of the center of gravity of the aircraft, involved angular accelerations which were felt unpleasantly in acrobatic flying.

604

Herrick, R.M. 1959 ANIMAL BEHAVIOR EQUIPMENT FOR BIOSATELLITE (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR76 Feb. 17, 1959

ABSTRACT: This report describes equipment that was developed under the AMAL biosatellite project. The equipment, which was designed for use with rats, consists of the following: a prototype rat performance capsule, a restraining vest, electrodes for skin implanation, an instrument that will both deliver an electrical shock to a rat and transmit the rat's electrocardiogram to suitable recording devices.

605

Herrington, L. P., H. Lamport, & E. C. Hoff 1942 ANALYTIC STUDIES OF PRESSURE TRANSMISSION FACTORS IN ANTI-"G" SUITS. (Yale) CAM No. 129; 10 Dec. 1942

ABSTRACT: (a) Directly underneath pressurizing air bladders, the pressure is the same as in the bladder, irrespective of the surface curvature and friction.
(b) At points removed from the air bladder, skin pressure is proportional to the curvature of the surface.
(c) When the air bladder is pressurized through a range of pressures to a peak (acceleration) and returned to the starting point, ascending and descending

pressure curves at skin not beneath bladder are different.
(d) This difference is greater as distance from bladder increases.
(e) The difference is greater in proportion to the curvature of the skin.
(f) The greater the friction between cloth and skin, the greater these discrepancies should become.

This is "Capstan" type of pressure. Analysis of these factors should permit design of suits which would depend less on bladder and more on cloth pressure. Limiting factors would be inequalities of pressure permissable to give proper physiological effect.

606

Herron, R.D. and T.W. Binion, Jr. 1961 TEST OF THE KAMAN KRC-6M ROTOCHUTE AT TRANSONIC SPEEDS. (Arnold Engineering Development Center, Arnold Air Force Station, Tenn.) AEDC TN 61-60, ASTIA AD-256 779, May 1961

ABSTRACT: Force and moment data, govenrning loads, and deployment characteristics were obtained on the Kaman KRC-6M Rotochute. Limited data were obtained to determine the effect of rotor geometry. Data were taken at Mach numbers of 0.5 to 1.5 and altitudes of 39,000 ft for rotor tip velocities to 530 feet per second. The Rotochute was satisfactorily deployed within three seconds under simulated flight conditions. Governing action was positive both during deployment and at steady-state test conditions. (Author)

607

Hersey, I. 1959 SOVIET BIOLOGICAL EXPERIMENTS Astonautics, 4(2):31, 80-81 Feb., 1959.
See also J. Aviation Med., 29:781-84, 1958.

ABSTRACT: A discussion is presented of Russian biological experimentation in space flight since 1949, reported at the Third European Congress of Aviation Medicine, Louvain, Belguim, in September 1958. In the initial phase, animals encapsulated in hermetically sealed cabins were rocket-flown to heights of 100-210 km. and then ejected for return to earth by parachute. In the second phase, the capsule was eliminated, and the animal (in a special high-altitude suit) was separated by catapult from the descending rocket (at heights of 75-85 km. and of 39-46 km.) and parachuted to earth. The third phase of the experiments culminated in animal-rocket launchings to a height of 473 km. No major physiologic changes that could be regarded as resulting from acceleration, catapult launching, or parachute descent from any of the altitudes studied were observed in the animals. A biological experiment which met all the conditions of space flight was realized with the launching of Sputnik II carrying the dog, Laika. During the crucial period between launching and the time the satellite was placed in orbit, the animal was in such a position as to sustain transverse acceleration. Data about the condition and behavior of the animal were successfully transmitted and

received. Included was information on the effects of acceleration upon the frequency of heart contractions; the effects of zero-G conditions and weightlessness; the position of the dog's body in space; changes in the functional state of the nervous system; and changes in blood circulation and breathing. No physiologic manifestations of the effects of cosmic radiation on the animal were discovered.

608

Hertzberg, H. T. E., & J. W. Colgan 1948 A PRONE POSITION BED FOR PILOTS. (USAF AMC Engineering Div., Wright-Patterson AFB, Ohio) Memo Rept. No. MCREXD-695-71D, 25 June 1948. ASTIA ATI 34088.

ABSTRACT: A prone position bed has been described which in the opinion of the pilots testing it provides greater comfort for longer periods of time than present conventional airplane seats. (DACO)

609

Hertzberg, H.T.E. 1949 COMFORT TESTS OF THE PULSATING SEAT CUSHION AND LUMBAR PAD - AND APPENDIXES I-III (Engineering Division, Air Materiel Command, AMC, Wright-Patterson AFB, Dayton, Ohio) April 1949, ATI 70599

ABSTRACT: Twenty-one persons were employed in comfort tests made on the pulsating seat cushion and lumbar pad. The assembly was adjusted for individual comfort. Group I sat on the cushion assembly until fatigue was experienced, at which time cushion was made to pulsate. Pulsations were maintained throughout the test for Group II. The subject was asked periodically during the test the degree of discomfort which he experienced, and, at the conclusion of the test, his evaluation of the cushion. All subjects suffered some discomfort during the test. The cushion was considered by 14 persons to be an improvement over existing accomoda tions. Four thought it was fairly good, but not sufficiently helpful to install in an airplane. The remaining three believed it had no value. It is concluded that the cushion assembly does help to relieve discomfort, but does not eliminate it.

610

Hertzberg, H.T.E. & Gilbert S. Daniels 1949 HAMMOCK FOR THE B-36 AIRPLANE (Aero Medical Laboratory, Headquarters Air Materiel Command, Wright-Patterson Air Force Base, Ohio) Serial No. MCREXD-720-143 October 27, 1949

ABSTRACT: This is a report on a sleeping hammock for intermittent use of the stand-by crew in the forward compartment of the B-36 airplane. Experiments using the hammock were conducted and it was found that it is possible to construct and install two hammocks for the B-36 airplane which will provide comfort while retaining rapid demountability and small bulk when stowed

611

Hertzberg, H.T.E., Daniels, G.S., and Churchill, E. 1954 ANTHROPOMETRY OF FLYING PERSONNEL. (Wright-Patterson AFB, Ohio) WADC- TN Rept. 52-321, September 1954

ABSTRACT: Body size data for 132 measurements of over 4,000 AF flying personnel are presented. Organization of the survey is briefly discussed and the techniques of measurement are illustrated by photographs for the benefit of other anthropologists. Both diametral and surface measurements are included. Dimensions are given in both centimeters and inches. A Glossary and Bibliography are included.

612

Hertzberg, H. T. E., Emanuel, I. and M. Alexander 1956 THE ANTHROPOMETRY OF WORKING POSITIONS. I. A PRELIMINARY STUDY. (Wright Air Development Division, Wright-Patterson AFB, Ohio) Rept. No. WADC TR 54-520, ASTIA AD 39 439, August 1956.

ABSTRACT: Measurements taken on forty adult males to ascertain new body-size data for various representative working positions. The positions include standing, kneeling, crawling, and prone positions.

613

Hertzberg, H.T.E., C.W. Dupertuis and I. Emanuel 1958 STEREOPHOTOGRAMMETRY AS AN ANTHROPOMETRIC TOOL. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC Technical Report 68-67, ASTIA AD-150964, February 1958

ABSTRACT: This paper briefly reviews previous biological applications of sterophotogrammetry, and outlines with illustrations the present procedures used to draw human body contours at 1/2 inch intervals. It compares the dimensions derived from plotted profiles with those taken by hand on the subjects themselves. It discusses the utility of stero data for special anthropometric purposes, and mentions further applications for other biological sciences

614

Hertzberg, H.T. 1959 THE ANTHROPOMETRIC SURVEY: ITS MILITARY AND COMMERCIAL POTENTIALS. (Committee on Anthropometry, AGARD, NATO.) November 1959

ABSTRACT: The design range of a population cannot be adequately known without sound anthropometric data on that population. Design from anything less becomes guesswork. This is the major reason for taking a large number of body dimensions in an anthropometric survey; the resulting knowledge of overall ' body proportions, both standing and sitting, makes it possible to design general items for either type of endproduct, thus greatly increasing the value of the survey.

615

Hertzberg, H. T. E. 1960 DYNAMIC ANTHROPOMETRY OF WORKING POSITIONS. (Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio) Proj. 7222; ASD TR 61-90; ASTIA AD-263 715
See also Reprint Human Factors Pp. 147-155, Aug. 1960

ABSTRACT: This paper provides a review of the principles and procedures of workspace design for engineers. It emphasizes that human body size, anthropometry, and muscle force capability, biomechanics, are both essential for the efficient sizing of equipment. The proper method of workspace design, the 'design limits concept', is described and the fallacy of the 'average man' concept is demonstrated General methods of gathering body size, strength data are outlined, and major information sources noted. The author's ideas on human muscle strength in the weightless state are included. (AUTHOR)

616

Hertzberg, H. T. E. 1961 NYLON NET SEAT FOR A MODIFIED RB-57 AIRCRAFT. (USAF Behavioral Sciences Lab., Wright-Patterson AFB, Ohio) Proj. 7222, Task 71749, ASD TR 61 206, Dec. 1961.

ABSTRACT: "A light-weight, adjustable, easily demountable net seat for persons who must operate in cramped quarters is described. Tests lasting for more than a year in a modified RB-57 have shown the seat to be fully satisfactory. Design drawings and photographs of the method of installation are included." (Tufts)

617

Hess, J. L. 1956 THE APPROXIMATION OF THE RESPONSE OF THE HUMAN TORSO TO LARGE RAPIDLY APPLIED UPWARD ACCELERATIONS BY THAT OF AN ELASTIC ROD AND COMPARISON WITH EJECTION SEAT DATA. (Douglas Aircraft Co., Inc., El Segundo, Calif.) Rept. No. ES 26472; ASTIA AD-125 558; 26 Nov. 1956

ABSTRACT: It has been noticed that when the human body is subjected to very rapidly applied accelerations, the accelerations at points of the body can be considerably larger than the maximum value of the applied acceleration. This paper considers the case when the acceleration is applied along the line of the spine from seat to head as in ejection from aircraft and attempts to approximate the motion of the human torso under these conditions by that of an idealized, one-dimensional, visco-elastic structure. The simple case of a homogeneous elastic rod is discussed in detail and its predictions compared with ejection seat data. The extensions to more complicated visco-elastic structures are discussed. It is concluded that the elastic rod is a fairly good first approximation, but that it is not sufficiently exact to be used in making quantitative predictions. It is also concluded that more complicate structures will require more and better data for their evaluation. (AUTHOR)

618

Hessberg, R. R., Jr. 1961 ESCAPE FROM HIGH PERFORMANCE AIRCRAFT. (In Gauer, O. H. and G. D. Zuidema, eds., Gravitational Stress in Aerospace Medicine) (Boston: Little, Brown, and Co., 1961). Pp. 160-164.

619

Hetharington, A.W. RECENT STUDIES OF HUMAN REQUIREMENTS IN HYPERSONIC ESCAPE. (Directorate of Life Sciences Hdq., Air Research and Development Command, Andrews AFB, Washington, D.C.)

620

Hetzar, W. 1939 DIE TRAUMATISCHEN SCHÄDIGUNGEN DER BANDSCHEIBENNAHEN WIRBELKÖRPERABSCHNITTE (The Traumatic Injuries of the Intervertebral Discs of the Vertebra Body Section)
Deutsche Zeitschrift für Chirurgie (Berlin) 252-396

621

Heymans, R.J. & R.M. Stanley 1956 CREW SURVIVAL IN THE JET AGE.
S.A.E. Preprint no. 750 9-12-April 1956

ABSTRACT: Mere escape from a disabled aircraft does not necessarily quarantee survival. Of the many factors influencing crew survival in military aircraft, this discussion will limit itself to the problem of survival during the following abandonment of distressed jet aircraft. The assumption is made, in keeping with this nation*s tradition, that the life of the crew is worth saving, irrespective of cost.
The problem of survival following abandonment of the aircraft is two-fold. First, there is the problem of physical escape; secondly, there is the problem of prolonging life until complete rescue can be effected. The problems of modern war are global in nature, and in many instances our problem of survival following successful escape is as great or greater than the escape itself. To look at the problem of crew escape without concerning ourselves with the chances of ultimate survival would manifestly be a narrow viewpoint.
In each of the following fields the designer of the escape device can materially influence the crewman's chances of survival and restoration to useful duty.
A. Incapacitation
B. Separation from aircraft
C. Air Blast effects: 1) physical injury, 2) loss of equipment
D. Linear and angular accelerations
E. Avoidance of the Aircraft. (Tail, Landing Gear, etc.)
F. Oxygen and pressure supply
G. Avoidance of enemy action
H. Parachute opening
I. Impact with earth's surface
J. Drowning
K. Exposure, Hunger, Thirst
L. Communications

622

Hicks, W. E. 1951 SAFER SEATING
Aeronautics 24(4):36-37, May 1951
also, J. Aviation Med. 23(1):94.

ABSTRACT: In a typical severe plane crash, complete crumpling of the fuselage extends roughly halfway back along the inhabited portion. The only occupants who can escape without more than minor injuries are those in the intact part of the fuselage. If they are stowed immovably, the only question is if they can endure the shock of deceleration. Properly supported, they can stand brief deceleration up to 40 g, the force achieved by a moderate-sized airliner moving 205 mph at time of impact. The fore part of the fuselage cushions the shock to the rear part, so that occupants (if adequately supported) have a good chance of survival.

In a crash a person held by a lap strap simply folds up like a jack-knife--if nothing is in the way. From a sample of men and women passengers it was computed that for complete haed clearance of the seat in front of the passenger, 40" separation between seats is necessary. The path of the head in swinging forward and down is not a circular arc about the hip joints but a spiral curling inwards, due to flexure of the spine. At the same time, as the trunk swings forward there is a powerful force tending to straighten it. It would be wise to allow another inch for this and for any forward sliding of the body in spite of the lap strap. No allowance has been made for the upward swing of the legs (about 12" allowance needed). At least, there should be no sharp bottom edge of the seat-back.

With a backward-facing seat, the lap strap is not essential but would help prevent side-slipping in a "cartwheel" crash. The headrest should be adequately padded. In a 40 g crash, the headrest must yield at least as great a distance as the initial separation between it and the head (60 cm. if the passenger is leaning well forward). A carefully designed seat could be made to give this much but would weigh much more than any present-day seat. To realize its full worth, the backward-facing seat requires some simple shoulder or body harness; with it, there need be only a few inches of give in the headrest. Nothing elaborate or of great strength is necessary.

Air line operators have fought shy of backward-facing seats because they fear public disapproval. Al evidence points, however, to public indifference on the subject. And they are hardly likely to be frightened by anything that will increase the probability of survival in case of an accident. (Journal of Aviation Medicine 23(1):94, Feb. 1952)

623

Hill, G. T. R. 1952 ADVANCES IN AIRCRAFT STRUCTURAL DESIGN. (Presented at The Third Anglo-American Aeronautical Conf., Sept. 1951) (London: The Royal Aeronautical Society, 1952)

624

Hill, J.H. 1957 EVALUATION OF THE TORSO-HEAD RESTRAINT SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION (U.S. Naval Air Dev. Ctr., Johnsville, Pa.) Letter Rept. TED-ADC-AE-5209; Serial 2621; 2 April 1959

625

Hill, J. H. and J. L. Brown 1958 COMPARATIVE EVALUATION OF A STANDARD FACE CURTAIN AND AN EXPERIMENTAL D-RING LOCATED ON THE SEAT FRONT AS MODES OF ACTUATING EJECTION DURING EXPOSURE TO ACCELERATION: LETTER REPORT CONCERNING
(Aviation Medical Acceleration Lab., Naval Air Development Center, Johnsville, Pa.)
Proj. TED ADC AE-5205 Rept. no. MA-3-3585 5 May 1958 ASTIA AD 257 519

ABSTRACT: A comparative evaluation is presented of a standard face curtain and an experimental D-ring located on the seat front as modes of actuating ejection during exposure to acceleration. The results are presented graphically in two forms. The time measures for both the successful and the unsuccessful attempts to eject are considered together in one distribution. The harmonic mean reaction time (the time required to initiate the ejection procedure) and the harmonic mean action time (the time required to perform the ejection procedure) are presented for the two ejection controls under each orientation as a function of the G level. The action times, however, are consistently shorter for the D-ring for all the orientations of acceleration. It may be concluded that for ease of access during exposure to sustained accelerations in the orientations which were investigated, an ejection control located on the front of the ejection seat is superior to the standard face curtain. (ASTIA)

626

Hill, J.H. and J.L. Brown 1958 A COMPARATIVE EVALUATION OF TWO EJECTION CONTROLS: THE STANDARD FACE CURTAIN VS. A "D-RING" LOCATED ON THE FRONT OF THE EJECTION SEAT Jour. Aviation Med., 29(3):238, March 1958

ABSTRACT: The ability of 5 subjects to perform the ejection procedure with either the face curtain or an experimental D-ring ejection control was tested in a cockpit mockup mounted on a human centrifuge. The ejection procedure was performed during positive accelerations of up to 6 g, transverse back-to-chest accelerations to 5 g, and transverse chest-to-back accelerations to 6 g. The results showed that an ejection control located on the front of the ejection seat is superior to the standard face curtain.

627

Hill, J.H. & M.G. Webb 1959 PILOT'S ABILITY TO ACTUATE EJECTION CONTROLS; FINAL REPORT CONCERNING
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR 75 Feb. 5, 1959 ASTIA AD 257 520

ABSTRACT: The purpose of this study was first to determine the effect of acceleration on a pilot's ability to actuate the ejection controls of two makes of

ejection seats, the McDonnell-Stanley seat equipped with an experimental torso-head restraint system and the Martin-Baker G-5 seat with the integrated harness restraint system. It was also an objective of the study to determine the degree to which the Mark V exposure flight suit and Mark IV (Goodrich) and the AX-83 (Arrowhead) lightweight full pressure flight suit impeded a pilot in the actuation of the ejection controls whem compared to his performance while wearing the summer flight suit. The results indicate that a pilot, under conditions of acceleration, may not be able to reach either the face curtain or the D-ring. Any encumberances such as an exposure suit or a full pressure suit will decrease the probability of his successful ejection. Failure of the canopy to jettison upon operation of ejection control and the subsequent requirement for use of the emergency actuation control will further decrease this probability if he is wearing an inflated full pressure suit.

628

Hill, J.H. 1959 EVALUATION OF THE TORSO-HEAD RESTRAINT SYSTEM AND THE INTEGRATED HARNESS RESTRAINT SYSTEM UNDER CONDITIONS OF ACCELERATION; final letter report concerning (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR80, April 2, 1959. ASTIA AD 257 375.

ABSTRACT: A model F4H-1 aircraft ejection seat equipped with the torso-head restraint system was installed on the 50-foot centrifuge and an investigation was carried out to determine its ability to restrain the pilot under conditions of sustained and fluctuating patterns of acceleration to simulate emergency conditions. For sustained acceleration, the play in the head restraint system would be excessive in in-flight emergency with a lateral acceleration of 4 G. For the fluctuating acceleration runs made, the restraint was adequate but the acceleration levels were below in-flight emergency levels. The Martin-Baker G-5 seat integrated harness restraint system was tested in a similar manner except that no fluctuating patterns were used. It proved to be adequate for the positive and transverse chest-to-back runs made but totally inadequate for transverse back-to-chest and lateral runs made.

629

Hill, J.H. & M.G. Webb 1959 TORSO-HEAD RESTRAINT SYSTEM FOR THE MODEL F4H-1 AIRPLANE; final report concerning (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR77 Feb. 20, 1959 ASTIA AD 257 374

ABSTRACT: A study was conducted to evaluate an experimental torso-head restraint system to be used in the flight tests of the Model F4H-1 airplane. This study was concerned with the adequacy of the restraint offered by the system with

respect to protection of the pilot during exposure to acceleration. Three specific acceleration patterns representing extreme conditions which might occur during the course of the flight tests were investigated. Also determined in the course of the study was the ability of subjects to operate the stick and rudder pedals, the aircraft drogue chute, and both ejection controls under these conditions of acceleration while using the torso-head restraint. Results indicated that, to the degree that the conditions of flight of the F4H-1 were simulated in this study, the pilot will be adequately restrained by this seat and restraint system and will be able to operate the stick control, rudder pedals, drogue chute control, and the ejection controls under actual flight conditions.

630

Hitchcock, F. A. 1947 PHYSIOLOGY OF SAFETY BELTS AND HARNESSES (Ohio State University) 9 Oct. 1947

631

Hodell, C.K. & A.H. Rosner 1957 EJECTION SEAT TESTS CONDUCTED ON THE 10,000 FOOT AERODYNAMIC RESEARCH TRACK AT EDWARDS AIR FORCE BASE (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 52 63; Nov. 1957. ASTIA AD 142 103

ABSTRACT: Eight ejection seat tests were conducted on the 10,000 ft. track from Dec. 1949 to July 1950 to analyze the resultant trajectories of the ejection seat and the acceleration forces imposed upon a dummy subject. The cockpit mockup was designed to simulate the forward cockpit opening of the XF-89 airplane with canopy removed. Instrumentation in the test carriage consisted of a complete telemetering recording system which transmitted intelligence via a mobile transmitter to receiving and recording equipment at a fixed station and a carriage motion recording system from which carriage velocity was obtained. Results indicate that ejection accelerations were not accurately determined because acceleration rocket burnout occurred at or near station of seat ejection, and the test vehicle porpoised because of clearance between vehicle skippers and railhead. The elastic structure of ejection seat and test vehicle, and stretching of harness assembly which held dummy in ejection seat also prevented accurate measurements. The deceleration forces imposed on the vehicle and seat were of such high magnitudes that in-flight seat trajectories could not be simulated. The seat should be ejected in a state of zero acceleration.

632

Hodgson, V.R., L.M. Patrick, and H.R. Lissner 1963 EXPERIMENTAL RESPONSE OF THE SEATED HUMAN CADAVER TO ACCELERATION AND JERK WITH AND WITHOUT SEAT CUSHIONS. (Biomechanics Research Center, Wayne State University) June 1963

ABSTRACT: This paper describes tests conducted on three cadavers in the seated position and accelerated in the caudocephalid direction, with 18 G jerk acceleration and jerk amplitudes to 2600 G's per second. Spring seats were used to observe effect of cushions. Experiments were conducted on a 120' vertical accelerator mounted in an elevator shaft. Strain gages were mounted on various vertebrae and accelerometers attached to the seat, and on crest of ilium, sternum and head. Each cadaver was restrained with head, arm, leg, shoulder and seat belts. The objective was to determine the effect of a jerk and cushion noticed on the response of a cadaver at various levels of acceleration, on the response of the human cadaver as a spring mass system, and on strain in the vertebral column. A number of conclusions were made; among these that no cushion is better than any cushion; jerk causes overshoot of strain or acceleration of increase almost linearly up to a maximum value dependent upon the mean acceleration, the degree of overshoot of acceleration on the body increases in seventy with distance from the seat, and this overshoot is most severe and critical in some locations in the posterior parts of the vertebrae due to process interference during caudocephalid loading of the vertebral column. (CARI)

633

Hoerner, S.F., H.L. Anderson, O.J. Ritland 1949 TRAJECTORY OF EJECTION SEAT- and APPENDIXES I-III (MEMORANDUM REPORT) (Air Materiel Command, Engineering Div., Dayton, Ohio) Oct. 1949, ATI 72212

ABSTRACT: A study was made to determine the causes for the discrepancy between the seat trajectories observed in flight tests and those predicted by published methods. An examination of two published methods indicate that the results agree essentially, but that neither takes into account the aerodynamic lift of the seat. The theory is extended to include the effect of this lift. Using the TF-83 fighter, a number of secondary factors were investigated as to their effect on the clearance between the seat and the airplane. The variation of clearance against speed, angle of flight path, altitude, angle of the ejection rails, weight of the seat, catapult speed, drag coefficient, lift coefficient and size of the airplane were considered. The discrepancy between the TF-80 flight tests and simple theory can be attributed in a large part to the neglect of the lift force acting on the seat.

634

Hoffman, D.H. 1961 TRI-AXIAL AIRLINE SEAT LIMITS ACCELERATION Aviation Week July 24, 1961. Pp. 95-100.

ABSTRACT: New airline transport seat that responds like a shock absorber to ground impacts has been designed to protect passengers from injury or death in survivable accidents. The "tri-axial acceleration seat" uses controlled

movement to dampen the peak g forces imposed on a passenger during sudden stops. The rearward facing seat, contoured to furnish protection on three sides, also would distribute impact g forces over a passenger's entire body, sparing skeletal joints and vital organs from unendurable pressures.

To obtain such resistance, the new seat would: (1) Automatically place reclining passengers in a more upright position to boost their acceleration tolerance. (2) Move with respect to the fuselage so as to absorb peak accelerations. (3) Consist of a metal shell foundation suspended from the cabin ceiling and attached to the cabin floor.

635

Hoffman, E. 1948 TRIGGER MECHANISM - PILOT'S JETTISON SEAT - P-84 - LOAD TEST (Republic Aviation Corporation Farmingdale, New York, Engineering Research Section)ERMR-775, 20 July 1948, ASTIA ATI No. 45176

ABSTRACT: A series of load tests were conducted to determine the handle force required to operate the jettison seat catapult trigger in a F-84 fighter. The mechanisms tests were mostly installed on a production seat modified in the Engineering Research Laboratory. It was found that the cable installation in one of the installations was unsatisfactory because of the excessive handle loads required in operation. On the other hand, the installations SK-30-8434 and 8431 were satisfactory in operation. All linkage mechanisms tests yielded satisfactory results. A curve of handle force vs trigger load for the seat trigger mechanism is plotted, and a photo shows an alternate cable routing, which proved unsatisfactory

636

Hoffmann, E. 1948 SEAT-PILOT'S JETTISON F-84 EJECTION TESTS (Republic Aviation Corp., Farmingdale, N. Y.) July 1948, ATI 45303.

ABSTRACT: Operational tests were made on a modified pilot's jettison seat assembly ejected from an F-84 fighter by means of a T4E1 catapult. Upon ejection, the seat was propelled upward and, when clear of its tracks and the extended catapult, began to rotate forward about its center of gravity. While rotating rapidly, the seat rose approximately 35-ft in the air and passed over the tail. The seat landed approximately 10-ft behind, and in line with the tail. Rotation of the seat was caused by the moment arm between the CG of the loaded seat and the point of attachment of the catapult to the seat. No apparent structual damage was incurred by either the seat or the cockpit. Motion pictures show that the seat suffered no interference as it left the airplane. It is recommended that action be taken to reduce the excessive load required to operate the pilot's release handle.

637

Holcomb, G.A. 1959 THE APPLICATION OF BASIC HUMAN ENGINEERING PRINCIPLES TO A COCKPIT DESIGN. (Paper, Meeting of Aero Medical Association, Statler Hilton Hotel, Los Angeles, April 27-29, 1959)

ABSTRACT: Basic human engineering data have been available many years which would have enabled the designer-engineer to achieve marked improvement in cockpit layout and composition. A fundamental requirement is the placement of a cockpit design control in the hands of one authority, trained in basic human engineering practices. Engineering personnel are required of this authority in order to maintain these standards in terms of practical mechanical consideration. A second requirement is relaxation of dated specification which may lag from 3 to 5 years behind the needs of that particular weapon system. The third requirement is the ability to establish cockpit design under the Weapons System concept. Engineering and product design personnel, with no formal training in experimental or engineering psychology, made radical departures from existing cockpit design practices, in the design of the A3J cockpit. This was accomplished essentially using previously qualified components and making full use of existing data compiled by recognized experimentalists. Design was then given to the engineering psychologist for refinement. Final alterations in control placement resulted from the continuing application of task and link analysis techniques. Design was proven for full pressure suit operation by live evaluation. Slides and motion pictures of the new cockpit will be shown. (J. Aviation Med. 30(3):188, March 1959)

638

Holcomb, G. A. 1960 THE DEVELOPMENT OF AN AUTO-ADJUSTING AND POSITIONING SINGLE DISCONNECT UPPER TORSO RESTRAINT HARNESS FOR THE B-58 ESCAPE CAPSULE (Paper, 31st Annual Meeting of the Aerospace Medical Association, Americana Hotel, Bal Harbour, Miami Beach, Fla., May 9-11, 1960)

ABSTRACT: The requirements for harnessing air crewmen in long range bomber aircraft utilizing escape capsules differ greatly from the requirements of shorter range aircraft using open ejection seats. In long range aircraft, the harness must not introduce excessive fatigue and must not require excessive time to adjust and don. Escape capsules must have superior restraint capabilities since there is no wind blast to assist in distributing the deceleration load on the torso. All of the upper torso deceleration must be restrained by the harness. The harness is engaged by a single connect point. All sizes airmen between 5 percentile and 95 percentile may use the same harness without adjustment. This prevents misadjustment of the harness, which might cause localized loading on torso areas incapable of withstanding these loads. When used in conjunction with the inertia reel, to protect the airman from sudden deceleration of the aircraft, it automatically positions itself on the upper torso. When used as a torso positioning device for escape in conjunction with the powered portion of the inertia

reel it also automatically positions itself on the upper torso. The harness provides superior lateral restraint and together with the lap belt provides approximately 35 per cent more bearing area on the torso than present operational harnesses. Approximately seventy-five operational Air Force crewmen have been classified as to anthropometric types and have demonstrated emergency procedures wearing the harness.

639

Hooton, E.A. 1945 A SURVEY IN SEATING.
(Boston: Heywood-Wakefield Co., Harvard Univ., 1945)
See also USAF Tech. Report 5501.

ABSTRACT: Includes three sections: Survey of body measurements relative to dimensions of seats; notes on variations of the curves of the spine in standing and sitting; and a survey on the curves of the spine in the sitting position. Eight measurements were taken on each of 3,867 (1908 females, 1959 males) between ages 17 and 89, stated to be representative of the U.S. population. A description of the measuring chair, the contour sand mold chair, and recommended seating dimensions are given.

640

Holcomb, Galen A. 1961 B-58 CAPSULE DROP TESTS TO DETERMINE LOAD FACTORS PRODUCED ON VARIOUS SOILS
(Stanley Aviat.Corp., Denver, Colorado) Rept. No. 1318; June 1961.

641

Holcomb, G.A. 1961 INVESTIGATIONS TO DETERMINE HUMAN TOLERANCE TO ABRUPT ACCELERATION IN CAPSULE SYSTEMS
Paper, 32nd Annual Meeting, Aerospace Medical Association, 24-27 April 1961, Chicago, Ill.

ABSTRACT: Landing impact effects are one of the major physiological problems of capsule systems in general, whether they by atmospheric or space vehicles. Published human tolerance allowables are basically unuseable when evaluating the accelerations produced by impact with the earth's surface, since the accelerations measured on a human subject, in most cases, are of shorter duration and higher rates-of-onset than the allowables describe. Approximately 150 human experiments were undertaken to determine tolerability. Subjects were dropped on concrete, dirt and sand from heights ranging from 9'9" to 12'0" at drift velocities up to 23 mph, while strapped in a production type escape capsule Accelerations up to 83 G's were recorded on the subject's sternum.
Aerospace Medicine 32(3): 234-235, March 1961)

642

Holcomb, G.A. 1962 B-58 CAPSULE DROP TESTS FROM STANLEY MONORAIL (Stanley Aviation Corp., Denver, Colo.) No. 1376; 10 May 1962.

643

Holcomb, G., et al. 1962 CAPSULE ESCAPE AND SURVIVAL SYSTEMS. (Paper, NATO Hqs., AGARD 12 General Assembly, Paris, France, 11-12 July 1962)

644

Holmoqvist, N.B. 1959 CONSTRUCTION PRINCIPLES FOR EJECTION SEATS. Medd. Flyg Navalmed Namnd 8(2):7-12

645

Homans, J. 1954 THROMBOSIS OF DEEP LEG VEINS DUE TO PROLONGED SITTING. New Eng. J. Med. 250:148

646

Hopkins, Charles O., Donald K. Bauerschmidt, M.J. Anderson 1960 DISPLAY AND CONTROL REQUIREMENTS FOR MANNED SPACE FLIGHT
WADD TR 60-197 Contract No. AF 33(616)-6033 ASTIA AD 242 572

ABSTRACT: A study was made of the display and control requirements for a manned orbital vehicle of the "space-ferry" type. The mission included ground launch, rendezvous with a satellite station already in orbit, re-entry into the earth's atmosphere, and landing at a selected base on earth. Display and control requirements were determined for vehicle attitude control while in orbit, orbital plane change, minimum energy transfer between circular orbits at different altitudes, and de-orbit for re-entry into the earth's atmosphere. Displays, controls, and control panels were designed to meet these requirements. Representations of these displays and controls were constructed and incorporated into full-scale mockups of cockpits for two alternate display and control systems

647

Horowitz, M. W., and C. F. Wells 1958 ANALYSIS OF COCKPIT MOTIONS NEEDED FOR OPERATIONAL FLIGHT TRAINERS (Educational Research Corporation, Port Washington, New York, 1958) Report No. 20-OS-51.

648

Hovgard, P.E. 1944 COMMENT ON BIOMECHANICS - A NEW APPROACH TO AIRPLANE SAFETY. Mech. Engng. 66:613-614.

ABSTRACT: It would be a fallacy not to recognize the importance of this subject. Flying requires absolute coordination of mind and body, and aircraft must be designed to protect this coordination. The airplanes are built to withstand stresses and strains; the human body is not so designed and must be protected in every possible way.

The author suggests changing passenger seating so that the person faces the tail of the plane. This would protect him in case of sudden jolts. Moreover, it may be that the trouble with the poorly designed instrument panels now in use is that the engineer has failed to recognize the normal sight paths. In everything it is necessary to recognize the limitations of the human figure and to compensate for them.

649

Howard, J.R. 1949 ANALYSIS OF THE FREE-FLIGHT CHARACTERISTICS OF THE F-86A (Fighter) Pilot and Pilot's Seat Combination (North American Aviation, Inc., Los Angeles, Calif.) NA-49-1158, Dec. 1949, ATI 73 631

ABSTRACT: The stability of the pilot and pilot's seat combination after ejection from the F-86A fighter was studied. The data used were obtained from low-speed wind tunnel force tests of a 1/2-Scale model of the pilot and pilot's seat combination. Results indicate that with a headrest drag-flap installation the pilot-seat combination oscillates about a position with the pilot's back parallel to the relative wind at all speeds. Without the headrest flaps, the seat and the pilot tumbled forward at about 2 revolutions per sec at all speeds up to approx Mach No. 0.08, after which the seat oscillates in a similar manner to that of the flapped seat configuration. Adequate clearance of the vertical tail was obtained for all conditions calculated.

650

Hsight, E.C. 1949 STRUCTURAL PROOF TEST OF SEAT, GAS TANK AND BATTERY INSTALLATIONS. (Bell Aircraft Corp., Buffalo, N.Y.) Rept. no. 47-929-167 ASTIA ATI 100 359, 17 February 1949

ABSTRACT: This test was conducted to aid in the C.A.A. certification of the Model 47D-1 helicopter. The helicopter was lifted clear of the floor and leveled for base deflection readings. An increment of load was applied and the helicopter releveled for deflection readings. Balancing was obtained by adding sand bags

at the extreme end of the tail boom. Deflection readings were taken after each increment of loading. Limit load was removed to obtain set readings. Ultimate load was then applied. After the test, it was concluded that the Model 47D-1 seat, gas tank and battery rack installations carried the ultimate design loads satisfactorily. The fuselage carried the loads imposed on it by the seat, gas tank, and battery satisfactorily. The seat installation and fuselage was also structurally satisfactory for passenger weights of 200 pounds each.

651

Hubach, J.C. 1932 GEVAREN VAN HET VLIEGEN MET SNELLE VLIEGTUIGEN (Dangers of Flying in Fast Airplanes from Medical Viewpoint) Geneesk. Tijdschr. Ned. -Ind. (Jakarta) 72: 98-105

652

Huettl, G. 1961 COCKPIT RETENTION AND PARACHUTE SUSPENSION GARMENT (Dept. of Navy, Bureau of Naval Weapons, Airborne Equipment Div.) Contract NOw 60-0053, Final Engr. Rept., Oct 27, 1961 ASTIA AD 269 824

ABSTRACT: Cockpit retnetion and parachute suspension flight clothing which can distribute high acceleration forces over large areas of the body was studied to reduce injuries occurring in present day high performance aircraft. It was found that a flexible, inelastic nylon-netting garment could be utilized in distributing acceleration loads over the body torso. By crossing the fibers of a material over each other and biasing them at 45 degrees to the external load, a Chinese finger grip containment action can be developed. This containment action (axial compression load) is applied when acceleration forces are applied to the cockpit seat or the risers. Several restraint garments were constructed for evaluation. Hip and shoulder restraint straps were integrated into the netting pattern for attachment to the risers and cockpit seat. The final garment had a cover and liner for additional comfort and ease of donning and doffing. (Author)

653

Hull, W.E. and G.C. Knowlton 1945 INDOCTRINATION OF 14TH AIR FORCE PERSONNEL IN G-TYPE EQUIPMENT. (War Dept., Air Forces) TSELA-3-696-511, 12 April 1945

654

Hull, Wayland E. & Vistor Buillemin, Jr. 1946 EJECTION SEAT DISPLACEMENT TIMER (Air Materiel Command, Engineering Div., Dayton, Ohio) Serial No. TSEAA-695-66B ASTIA ATI 119 945

ABSTRACT: A device has been designed and constructed by the Aero Medical Laboratory of the Engineering Division which is used to record photographically the data necessary to calculate velocity of ejection of the experimental ejection seat. This device has the following characteristics: (a) A photographic record is made of the linear travel of the seat by the method described in Appendix I. (b) A time scale is recorded alongside the displacement record. (c) Velocity of seat travel is determined from these records, i.e., distance of seat travel per unit time. (d) The system is capable of determining velocities with an accuracy of ± two per cent to 100 feet per second. The device was found to be simple, rugged, and adequate for the purpose.

655

Hunsicker, Paul A. 1955 ARM STRENGTH AT SELECTED DEGREES OF ELBOW FLEXION (Aero Medical Laboratory) Contract No. AF 18(600)-43 Project No. 7214 WADC TR 54-548 ASTIA AD 81792

ABSTRACT: A selected summary of the strength testing literature forms the first part of this study. This is followed by a listing of the modifications that had to be made on the Kinematic Muscle Study machine as a result of exploratory testing. The major portion of the investigation is concerned with the results of testing 55 young men on 60 arm strength tests in the sitting position and 60 in the prone position. Percentile tables and figures depicting arm strength in relation to degrees of elbow flexion are included. Recommendations for further use of the Kinematic Muscle Study machine are offered.

656

Hunsicker, Paul A. 1957 A STUDY OF MUSCLE FORCES AND FATIGUE (Wright Air Development Center, Wright-Patterson Air Force Base, Ohio) WADC Technical Report 57-586 Contract No. AF 33(616)-3461 Project 7214; Task 71727 December 1957 ASTIA AD 131 087

ABSTRACT: The first phase of the research deals with the strength test results taken on 30 subjects covering 120 strength tests. The subjects were seated in a simulated pilot-seat and six movements were tested. The results are presented in percentile tables and graphic form. The next part of the study involves data on 25 subjects who were tested to determine the amount of strength possible in wrist pronation and wrist supination. The final phase of the research gives information on the strength-decrement over a 42-hour period in which the subjects were tested hourly. Several recommendations are offered.

657

Hunter, H. N. 1947 EVALUATION OF MARTIN-BAKER AND AAF T-2 PERSONNEL CATAPULTS (U. S. Naval Air Development Center, Johnsville, Pa.) Rept. TED NAM 256005, pt. 2.

658

Hunter, H.N. & D.T. Watts 1947 THE EFFECT OF TEMPERATURE ON THE PERFORMANCE OF THE MARTIN-BAKER MULTIPLE CHARGE EJECTOR SEAT CATAPULT. (Naval Air Exp. Station) Rept. No. TED NAM 256005, pt. 3, 14 March 1947. ASTIA ATI 43077.

ABSTRACT: The effect of temperature on the performance of the Martin-Baker multiple charge ejection seat catapult was investigated. The Martin-Baker aircraft charges were fired on the ground on a test rig at temperatures of -60 to +40°C. Decreasing ejection velocity must be considered in selecting a catapult for a given airplane. Performance of the charges at -60 to +40 C is considered satisfactory from a physiological standpoint.

659

Hunter, H.N. & M. Weiss 1953 PILOT'S ABILITY TO SIMULATE AN EMERGENCY ESCAPE WITH VARIOUS TYPES OF EJECTION SEATS WHILE SUBJECTED TO A FLUCTUATING ACCELERATION (U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR1, Nov. 3, 1953 Proj. No. TED ADC AE 6303. ASTIA AD 54 281

ABSTRACT: To determine some of the difficulties a pilot experiences in operating an ejection seat under emergency conditions, three types of ejection seats, i.e., Air Force "arm rest" upward, Air Force "D-Ring" downward, and Navy "face curtain" upward were installed, respectively, in the AMAL centrifuge and tests were conducted wherein pilots were requested to execute ejection procedures under fluctuating G conditions. To simulate an aircraft in an uncontrolled condition, positive G was varied from 1.5 to 6.5 G at a rate of 8 G per second while the subject pitched and/or rolled through a maximum angle of 36°. One of the major faults found in all seats was the difficulty subjects had in retracting their feet into the stirrups. Other problems encountered were the failure to properly operate the face curtain, fouling of the arm rest, and the straining to reach the "D-Ring." Factors affecting the efficient use of the equipment were the clothing worn and training and practice effects.

660

Hunter, H. 1954 EVALUATION OF ANTI-BLACKOUT SUIT WITH PARACHUTE/SAFETY HARNESS AS INTEGRAL PART; REPORT OF (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. NADC-MA ser. 2262 of 9 Mar. 1954; TED ADC AE 5202

661

Hunter, H.N. & H.S. Weiss 1954 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR3 Sept. 16, 1954 ASTIA AD 70 757

ABSTRACT: The pilots were requested to execute the maneuvers required in an F9F-6 ejection sequence upon receipt of a signal during an acceleration stress pattern. All parts of the seat that were involved with the ejection sequence and the pre-ejection lever were fitted with microswitches and wired to recoders so that the time required to complete all maneuvers could be determined. The acceleration pattern fluctuated the positive G from 1.5 to 7.0 at 5 G/sec while the subject pitched or rolled to a maximum of 70^{o}. The maximum acceleration rate of change of roll was 5.8 rad/sec^2 and the maximum acceleration rate of change of pitch was 4.5 rad/sec^2. The average time for each maneuver under conditions which included all test conditions of an emergency escape were: 3.22 sec-feet retraction; 1.77 sec pre-ejection movement, and 1.71 sec face curtain actuation.

662

Hunter, H.N. 1955 ANTI-BLACKOUT EQUIPMENT VALVES AND FILTERS; EVALUATION OF ARO EQUIPMENT CO. USAF TYPE M-8 ANTI-G VALVE
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR7 Feb. 23, 1955 CONFIDENTIAL

663

Hunter, H. 1955 ANTI-BLACKOUT EQUIPMENT, COMPARATIVE TEST AND EVALUATION. (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5201.1; 31 Dec. 1955

ABSTRACT: Both types of suits give the same G protection. However, the Air Force suit is made of two ply cotton and one ply nylon while the Navy suit is made only of nylon. Even though the Air Force uses a fire retardent to treat the cotton, the cotton nylon combination is more flammable than nylon alone. Due to the additional fire hazards associated with carrier operations, it was recommended by this laboratory that the Navy continue the use of nylon and not change to a cotton nylon combination.

667

Hunter, H. 1955 ESTABLISHMENT OF A QUALIFIED PRODUCTS LIST FOR TYPE Z3 (CUTAWAY) ANTI-BLACKOUT SUIT, CONFORMING TO SPECIFICATION MIL-S-5085 (AER) (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-5203; 31 Dec. 1955

ABSTRACT: The companies listed have been contacted as possible suppliers for Z-3 (cutaway) anti-blackout suits. However, they cannot submit samples until AMEL standardizes the patterns for the four different sizes of suits.
David Clark Co., Worchester, Mass.
Berger Brothers, New Haven, Conn.
Switlik Co., Trenton, N. J.
Seymour Wallace Co., St. Louis, Mo.

668

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS (Naval Air Development Ctr., Johnsville, Pa.) Letter Rept. TED ADC AE-6303.1; Serial 9341; 24 Aug. 1955

669

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE COCKPIT CONTROLS UNDER G CONDITIONS (U.S. Naval Air Development Ctr., Johnsville, Pa.) NADC-MA-LR11 Aug. 24, 1955

ABSTRACT: Tests were conducted at AMAL to ascertain the relative accessability of controls in a fighter plane's cockpit when the pilot is under acceleration stress. As a result of these tests, the ejection seat controls of the F9F-6 were found to be easily accessable to the pilot wearing full flight gear and under fluctuating acceleration stress (1.5 to 7 G). Flight clothing required for operation over cold water increases the time of actuation of controls from 10 to 99 percent, depending on the type of maneuver executed.

670

Hunter, H. 1955 PILOT'S ABILITY TO ACTUATE F9F-6 EJECTION SEAT CONTROLS UNDER FLUCTUATING G CONDITIONS. (Naval Air Development Ctr., Johnsville, Pa.) Project TED ADC AE-6303.1; 31 Dec. 1955

ABSTRACT: All available ejection systems (Navy, face curtain, upward; Air Force, arm rest, upward; and Air Force, "D" ring, downward) were evaluated by exposing Air Force and Navy pilots in full flight gear to fluctuating G. For upward ejections both the arm rests and face curtains were accessible to the pilot and

the time required to actuate each under simulated uncontrolled flight conditions was approximately the same. In each system the most time-consuming maneuver was placing the feet on the stirrups. For down ward ejections the "D" ring was easily accessible. However, the supports to hold the feet down during ejection never operated properly.

.671

Hunter, H. & C.F. Gell 1955 INFLIGHT PHYSIOLOGICAL AND PSYCHOLOGICAL REACTIONS TO THE SUPINE POSITION. PHASE II.
(Naval Air Development Ctr., Johnsville, Pa.) Project NM 001 100 300; TED ADC AE-6300; 31 December 1955

ABSTRACT: It was determined that 65 degrees supination is the maximum angle which can be provided in a fighter cockpit without sacrificing the single control system, pilot vision and escape possibility. At this angle, all subjects tested requiring protection withstood 7 G for 30 seconds with the aid of a Z-2 anti-blackout suit plus straining. This acceleration stress was withstood without peripheral light loss and with little or no discomfort.

672

Hunter, H.N. 1956 ANTI-BLACKOUT EQUIPMENT, DETERMINATION OF LIMITATIONS OF EQUIPMENT AND PERSONNEL
(U.S. Naval Air Development Center, Johnsville, Pa.) NADC-MA-LR14 Feb. 3, 1956

ABSTRACT: Investigations were carried out using the AMAL centrifuge to determine the maximum anti-blackout protection provided by the Z-2, Z-3, and AF-N anti-blackout suits, the full pressure half suit, and the supine positions with the upper limit of acceleration stress being 6 G for 30 seconds. The results indicated that the Z-2 and Z-3 suits and proposed AF-N suits are approximately equal in efficiency. The full pressure half suit caused such discomfort in the range of 5 to 7 psi that the subjects ended the runs even though peripheral lights were still visible. The supine position alone does not offer any more protection than that of either the Z-2 suit plus straining or the full pressure half suit until the angle of supination is at least 77^{o}.

673

Hunter, S. 1958 CORRELATION OF HEART-BRAIN DISTANCE AND OF SITTING HEIGHT AGAINST POSITIVE ACCELERATION THRESHOLDS. (Institute of Aviation Medicine, RAF, Farnborough) FPRC No. 1048; ASTIA AD-201 165; April 1958

ABSTRACT: It is generally accepted that the hydrostatic pressure exerted by the arterial column of blood between the heart and the brain is proportional to its length measured in the direction of the applied force. For brevity, this length has been called the heart-brain distance. The purpose of this pilot experiment was to find out if any simple relationship existed under positive acceleration (g) between (1) the heart-brain distance and the black-out threshold, and (2) the sitting height and the black-out threshold. Accordingly, 10 unprotected experienced subjects from the Institute of Aviation Medicine carried out a total of 674 runs on the human centrifuge at Farnborough. The correlation coefficient for the heart-brain distance against the positive g threshold value was found to be -0.77. This leads to the deduction that, with a 99 percentage of certainty, the heart-brain distance is inversely related to the threshold. When the sitting height was correlated against positive threshold, the coefficient was +0.01. No simple functional relationship seems to exist between these two variables. (AUTHOR)

674

Huntington, J.M. 1959 SELECTED BIBLIOGRAPHY OF HUMAN FACTORS REPORTS. (Minneapolis-Honeywell Regulator Company, Aeronautical Div., Minneapolis, Minnesota) MH Aero Document U-ED 6147, Nov. 25, 1959.

675

Hyde, A. S. 1961 THE PHYSIOLOGICAL EFFECTS OF ACCELERATION ON RESPIRATION AND PROTECTIVE MEASURES. 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. 101-106.

ABSTRACT: Recent, current, and near future experiments defining respiratory physiology during forward ($+a_x$) acceleration are presented and reviewed. Areas where more work is needed have been noted.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

I

676

Idomir, K. 1960 TM-76 MACE LANDING MAT DESIGN
J. Aero/Space Engineering pp. 28-33, Feb. 1960

ABSTRACT: A parachute recovery kit with landing mats for shock absorbers is described for the TM-76 Mace missile.
Two landing mats (pneumatic shock absorbers), one installed forward and the other aft, reduce the descent velocity of the missile from parachute rate of descent to zero, without exceeding the design limitations of the missile. During final descent, the landing mat fairings are released by explosive bolts and the landings mats are exposed and automatically inflated to a predetermined pressure by air stowed in high-pressure pneumatic cylinders. Shear pin-type orifices are installed in the landing mats to control impact loading. The reliability of the recovery kit has been demonstrated and it is now in production by the Air Force.

677

Ignasiak, B. J. 1947 STRESS ANALYSIS AND CRITERIA FOR REAR SEAT OF BELL MODEL 48. (Bell Aircraft Corp., Buffalo, N. Y.) Rept. No. 48-050-001, 20 Feb. 1947
ASTIA ATI 111 037

ABSTRACT: Bell Model 48 (XR-12) helicopter has provisions for three passengers Individual seats are provided for each passenger and are located behind the pilot and co-pilot. The seats are designed by Bell and Consist of two parts seat bottom and seat back, which are permanently attached to the adjacent structure.
The seat pan is of conventional design and the seat back is an .032 reinforced, stiffened sheet which is attached to the forward firewall bulkhead (48-312-001) with Dzus fasteners.
The design criteria for the seats and supporting structure is given in this report.

678

Ingham, John S. 1947 SEAT EJECTION TEST IN THE MASSIS MEMORIAL WIND TUNNEL, TEST NO. 55
(Air Technical Service Command, Army Air Forces) Memo. Report Serial No. TSEAC14-45341-3-3 Dec. 1, 1947 ASTIA ATI 186 677

ABSTRACT: The purpose of these tests was to investigate the reactions and effects on the human body during ejection in a free stream of air. Due to the large time

element involved in raising and lowering the subject into the free stream, it was agreed that the apparatus did not duplicate accurately actual ejection during flight. However, the test did give indications that a blast of air at higher speeds would be great enough to separate the legs.

679

MOTION PICTURE

Institute of Transportation and Traffic Engineering 1960 SAFETY THROUGH SEAT BELTS. (16 mm documentary film, Department of Visual Communication, Univ. Extension, Univ. of California, Los Angeles 24, California)

680

Ioan, C.S. 1963 PARACHUTING AT SUPERSONIC SPEEDS
(Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio)
Trans. No. FTD-TT-6201307; 20 February 1963; ASTIA AD 298 777
Original Source: Stiinta Si Technica (Rumania) 1: 14-16, 1962

ABSTRACT: Under conditions encountered while traveling at supersonic speeds, the need to ensure that the pilot and the entire crew will be rescued if an accident should occur during a flight at supersonic speed, i.e., the development of new methods and devices for ejection and parachuting at high speeds and altitudes, has become one of the most important problems to be solved by the builders of new supersonic airplanes. The main obstacles which had to be surmounted in designing ejection devices were acceleration, shock waves, and aerodynamic heating. The newest ejection methods and devices used at supersonic speeds are the "encapsulated seats" or ejectable "hermetically-sealed cabins." Another new type of ejection method is the sectional plane.

681

Isreeli, J., & G. T. Allen 1956 PRESSURE-CONTROL APPARATUS FOR ANTI-G SUITS.
U. S. Patent 2,748,786, 5 June 1956

ABSTRACT: A pressure-control apparatus is described and illustrated for anti-g protective suits to be used in aircraft by personnel subjected to high values of g. This suit consists essentially of a double-walled bag formed of rubber or the like which surrounds the passenger closely. If air pressure is introduced into the bag the passenger is subjected to a compressive force which assists him to overcome the ill effects of high g values

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

J

682

Jackson, K.F. 1957 PREFERRED LOADS FOR A FIRING HANDLE (RAF, Institute of Aviation Medicine, Farnborough) FPRC Memo 87, July 1957. ASTIA AD 209 984.

ABSTRACT: Six male subjects were tested in order to find suitable loads for restraining a firing handle. Such loads must conform to requirements common to a certain class of safety device. A range of usable loads has been found.

683

Jackson, K.F. 1958 PERFORMANCE IN A SIMULATED HIGH ALTITUDE EMERGENCY. FPRC 1058. Dec. 1958.

684

Jager, M. 1956 BEI 2400 KM/ST: AUSSTEIGEN...? (AT 2400 KM./HR.: EXIT....?) Flug-Revue (Stuttgart) (12):18-20, Dec. 22, 1956.

ABSTRACT: American research and experiences with ejection at high altitudes and supersonic speeds are briefly described. It is recognized that the progressively increasing speeds and higher altitudes exceed the protection offered by further development of the ejection seat. Instead, the new safety design concept consists of a completely enclosed ejection capsule encompassing the pilot and the cockpit.

685

Jailer, Robert W., Gerald Freilich and Monroe L. Norden 1960 ANALYSIS OF HEAVY-DUTY PARACHUTE RELIABILITY
(Wright Air Development Division, Wright-Patterson Air Force Base, Ohio) WADD TR 60-200, Contract No. AF33(616)-6544, Project No. 8151, Task No. 61052, June 1960 ASTIA AD 246 490

ABSTRACT: This report presents a model for the computation of heavy-duty parachute system reliability based on the reliability of the individual components and sub-components of the system and the operational reliability

of the system as a whole. The model is applicable to the estimation of system reliability in field use; it can be applied at any desired phase in the development of the system.

Methods of selecting the applicable terms for the model for a specific parachute system, and the details of computation of component reliability values from various types of field use, laboratory test, and engineering data to a preselected confidence coefficient are presented. A worked example of a reliability analysis of a hypothetical parachute system is used to illustrate the application of the method.

Numerical results of reliability analyses of parachute packing, reefing line cutter performance, and some solid fabric canopies, and data on parachute materials strength tests usable in the analysis are included. The mathematical derivation of the reliability methodology is presented in an appendix.

686

Jean, J. V. 1955 CREW COMFORT TEST OF THE STANLEY PROTOTYPE TILTABLE UPWARD EJECTION SEAT. (Human Factors Oper. Eng., Hq. 6th Air Div., MacDill AFB, Fla.) Rept. No. 13. Jan. 1955.

687

Jennings, D. L., & R. G. Peterson 1959 STUDY AND DEVELOPMENT OF PARACHUTES AND SYSTEMS FOR IN-FLIGHT AND LANDING DECELERATION OF AIRCRAFT. PART I. THE APPLICATION OF PARACHUTES. (Wright Air Development Ctr., Wright-Patterson AFB, Ohio) WADC TR 57-566, Pt. 1; ASTIA AD-234 008; Jan. 1959

ABSTRACT: The text of the aerodynamics study and analysis shows the theoretical development of performance equations for airplanes trailing drag parachutes. Insofar as is possible, the development is made general. Where generality is best presented by study of specific airplanes, four aircraft are used to typify all current classes of aircraft. The installation proposals show the general application of various size parachutes to each class of aircraft as pertaining to basic flight maneuvers. The simplest parachute installations and operating systems are exemplified which would provide maximum utilization of the airplanes. It is concluded that it is possible and practical to install and operate the correct size parachute for aircraft deceleration both for in-flight maneuvers and ground roll deceleration. Additional study, development, design and in-flight testing are indicated. (AUTHOR)

688

Jewell, J. 1959 ESCAPE FROM MILITARY JET AIRCRAFT. J. Roy. Aeronaut. Soc 63:320.

689

Jez, J. 1960 PRZYCZYNY I MECHANISM URAZÓW W CZASIE SKOKÓW ZE SPADOCHRONEM (CAUSES AND MECHANISM OF INJURIES DURING PARACHUTE JUMPING) Lekarz Wojskowy (Warszawa) 36(10): 992-999. (In Polish, with French summary)

690

Johnson, C. T. 1960 INVESTIGATION OF THE CHARACTERISTICS OF 6-FOOT DROGUE-STABILIZATION RIBBON PARACHUTES AT HIGH ALTITUDES AND LOW SUPERSONIC SPEEDS. NASA TM X-448, 1960.

691

Johnson, L. F., Jr. 1961 AUTOMATIC ESCAPE SYSTEMS OF CURRENT USAF FIGHTER AIRCRAFT
(USAF School of Aerospace Medicine, Brooks AFB, Tex.)
Rep. 9-61 Aug. 1961

ABSTRACT: An automatic escape system is one that, once activated, will eject a pilot from his aircraft, separate him from his seat, and activate his parachute. Characteristics of the different sections of systems of current USAF fighter aircraft are described: ejection seats, catapults, lapbelt initiators, parachute timers, and parachutes. A time comparison of two escape systems is presented. (Tufts)

692

Johnson, L. F., Jr. 1961 AUTOMATIC ESCAPE SYSTEMS OF CURRENT USAF FIGHTER AIRCRAFT (School of Aerospace Medicine, Brooks AFB, Texas) Report 9-61; Aug. 1961; ASTIA AD-268 797

ABSTRACT: Characteristics of the different sections of automatic escape systems are compared. It is seen that in using a fast system (i.e., the M-12 lapbelt initiator, zero lanyard, and the B-4, C-9 parachute) there is a considerable time advantage over using a slower system. This time advantage can be meaningfully transposed into altitude and shows that a fast system will allow successful escape at a lower altitude than will a slower system. (AUTHOR)

693

Johnson, L. F. 1961 ESCAPE SYSTEMS OF CURRENT USAF FIGHTER AIRCRAFT (Paper, 32nd Annual Meeting of the Aerospace Medical Association, Palmer House, Chicago, Illinois, April 24-27, 1961)

ABSTRACT: The escape systems of current USAF fighter aircraft are considered in their component sections if initiators, catapults, seatbelt initiators, parachute

timers and parachute types. These component sections are analyzed as to their sequential operation, operating characteristics and operating times. Time and altitude comparisons are made between two combinations of functional components to demonstrate how shorter time characteristics can be meaningfully transposed into altitude. (Aerospace Med. 32(3):236, March 1961)

694

Johnston, Richard S. 1960 MERCURY LIFE SUPPORT SYSTEMS
In: Life Support Systems for Space Vehicles (Inst. Aero. Sci.)
S.M.F. Fund Paper No. FF-25, Jan. 1960

695

Jones, C.E., Kobrick, J.L., Gaydos, H.F. 1958 ANTHROPOMETRIC AND BIOMECHANICAL CHARACTERISTICS OF THE HAND. (US Army Quartermaster Research and Engineering Center, Natick, Mass.) AD-204867, Sept., 1958

ABSTRACT: Descriptive data are presented on the structural and functional characteristics of the human hand which are of interest to engineers concerned with the design of handwear and manually-operated equipment.

The 1st section deals with the anthropometric dimensions of the hand, and shows the centile distribution of component hand sizes and in several military population samples. The 2nd section reviews data on the biomechanics of the hand involved in typical functional movements. (Author)

696

Jones, W. L. 1951 STUDY OF BAILOUTS FOR A FIVE-YEAR PERIOD IN THE U. S. NAVY. J. Aviation Med. 22:123

ABSTRACT: Factors involved in 850 emergency bailouts in the U. S. Navy have been presented. Most of these bailouts were made from fighter and attack type aircraft. Roughly, 85 per cent of the bailouts were successful—lives were saved; and almost 50 per cent were not injured at all. It is noteworthy that most of this population had little choice but to abandon their aircraft. The difficulties encountered have been enumerated. The attitude, speed, and altitude of the plane at time of exit, reasons for bailout, and the extent and cause of injuries have been discussed. The need for bailout training is emphasized.

697

Jones, W. L. 1952 THE VALUE OF PROTECTIVE HELMETS IN AIRCRAFT CRASHES
J. of Aviation Medicine 23(3):263-270, June 1952

ABSTRACT: This paper consists of a brief history of the development of the protective helmet worn by pilots. Many examples are given of the helmet protection to the pilot during airplane crashes. The ideal helmet must be a compromise between protection and comfort in day-to-day wear.

698

Jones, W. L. 1962 ANTHROPOMETRY OF U.S. NAVY PILOTS
Aerospace Medicine 33(11):1298-1303, Nov. 1962

ABSTRACT: The results of any anthropometric survey are only applicable to the population on which that survey was taken. In the past, the Navy has had to violate this principle because of the lack of anthropometric data on its pilots. Other surveys have included data on pilots, but the data was combined with that on non-pilots. It is believed that the present survey is the only one which contains a fairly large and representative sample and is the only one which has been conducted exclusively on Navy pilots. (AUTHOR)

699

Jones, W.L. & W.F. Madden 1963 EJECTION SEAT ACCELERATIONS AND INJURIES
(Paper, 34th Annual Meeting of the Aerospace Medical Association, Statler-Hilton Hotel, Los Angeles, Calif., April 28-May 2, 1963)

ABSTRACT: A review of accelerations measured on ejection seat catapult tests, over the past four years, indicates a much wider range of values than was originally believed. This explains, in part, the occasional injury where no injury occurred in an almost similar set of circumstances. To reduce these values and obtain more performance capability a Rocket Assisted Propulsion Ejection Catapult (RAPEC) was developed by the Naval Ordnance Test Station, China Lake. This system is completely interchangeable size-wise with the present catapults resulting in much lower accelerations with increased trajectory. A review of the back injuries is given along with clinical management and results.

RESTRAINT, PROTECTION, AND EMERGENCY ESCAPE SYSTEMS

K

700

Kalogeris, J. G. 1956 PILOT EMERGENCY ESCAPE UPPER TORSO HARNESS SUPPORT DEVELOPMENT TEST MODEL F 106A. (General Dynamics Division, Convair Aircraft Corp.) Convair Rept. No. 9999, Aug. 1956. ASTIA AD-144 950

ABSTRACT: An upper torso harness was developed to relieve a share of the forces resulting from accelerations above 20 g. The harness was fabricated from standard CVAC FAB 375 (nylon cloth), CVAC WEB 217 (1 3/4- x 1/8- in. nylon webbing) and standard parachute hardware. Initial seat drop tests were conducted with a fully anthropomorphic test dummy without the upper torso harness to determine the various loads the torso is subjected to under varying g forces. The harness was then secured to the body in a manner which simulated the instant prior to actual ejection. Drop tests were then conducted with the torso harness from 5 to 28 g's. About 10 human drops at accelerations up to 11 g's were conducted with and without the harness. Satisfactory seat and spinal lead relief (about 50% of the loads were relieved) was realized with the harness. About 70% of the spinal and pelvic loads were relieved with the harness and proportional load system combination. The harness maintained its effectiveness when worn over several combinations of flight clothing. No physical discomforts were reported during the drop tests. (ASTIA)

701

Kalogeris, J. G. 1956 PILOT EMERGENCY ESCAPE SYSTEM: UPPER TORSO HARNESS WORN OVER PRESSURE SUIT; BREATHING TEST OF (Convair, San Diego, Calif.) Rept. No. 9999-1; ASTIA AD-144 951; 11 Sept. 1956

ABSTRACT: The effects on breathing were determined when the Convair torso harness (cinched-up) was worn by a live subject, over a pressure suit inflated to 10 psi. The torso harness was put over the subject's pressure suit. The harness was then tightened in a manner simulating the instant prior to ejection. The pressure suit capstans were then inflated to 10 psi, with the MB-5 pressure helmet at 100 mm of Hg. During the breathing period, the subject was questioned to determine discomfort. At the end of 10 min, the subject's skin was examined. Results indicated that the harness over a pressure suit causes no additional discomfort and does not restrict the normal operation of the pressure suit or of the pilot.

702

Kalogeris, J. G. 1957 TORSO HARNESS SOLVES EJECTION PROBLEMS. Aviation Age 27(3):66-69. March 1957.

703

Kalogeris, J. G. 1958 INDUSTRY (ICESC) SUPERSONIC UPWARD EJECTION PILOT'S ESCAPE SYSTEM: Part I, Development Phase Sled Tests. Convair Report 57-100F-1; USAF Contract AF 33(600) 30169 May 1958.

ABSTRACT: Two basic seat configurations were under consideration during the early development phase of the upward ejection supersonic pilot's escape system. Seat configuration "A" was a conventional upward ejection type incorporating an aerodynamically clean contour and a mechanism for launching the seat from a supine position (head aft) above the cockpit. Prior to launching, the seat is raised and rotated to the supineposition. This position provides minimum drag and maximum windblast protection for the "B" seat configuration.

Wind tunnel and free-flight model tests conducted on both configurations demonstrated that the "B" seat had the better stability and drag characteristics. Further "A" seat development was discontinued in favor of the "B" seat.

704

Kanowski, M. B. 1959 ULTRA-FAST OPENING PARACHUTE (Air Force Flight Test Center, Naval Auxiliary Air Station, El Centro, Calif. AFFTC TN 59-9; ASTIA AD-205 771; June 1959

ABSTRACT: Tests were conducted to determine the operational suitability and performance limitations of the Ultra-Fast Opening Parachute assembly, XMP-2, back style. The parachute was designed for use by personnel operating individual lift platforms. The parachute canopy was projected from the wearer's back and ejected radially by explosive charges. Six ground and 21 aerial tests were conducted. During all aerial tests the portion of the canopy toward the line of flight tended to collapse. During aerial tests when the canopy was projected horizontally in the direction of flight, the dummy descended below the level of the canopy before full inflation occurred. The base of the dummy's skull was damaged by the carrier frame during several tests. The Ultra-Fast opening Parachute assemblies tested were unsuitable for personnel use. (AUTHOR)

705

Karlsen, Asbjorn (Karl) 1959 HERE'S HOW TECO PULLS THE "STOP" ON HIGH G'S! (Teco Aircraft Seats, Burbank, Calif.)

706

Karnes, C. H., J. W. Turnbow, et al. 1959 HIGH-VELOCITY IMPACT CUSHIONING, PART V, ENERGY-ABSORPTION CHARACTERISTICS OF PAPER HONEYCOMB. (Structural Mechanics Research Lab., Texas University, Austin, Texas) Contract No. DA 19-129-qm-150; ASTIA AD-225 216; 25 May 1959

707

Karstens, A.I., & H.J. Jacobs 1948 PHYSIOLOGICAL EVALUATION OF THE PARTIAL PRESSURE SUIT, REPORT NO. 1. Memo Rept. No. MCREXD-696-104J, 9 Sept. 1948.

708

Kearney, A. P., B. J. Mills & R. S. Huey. 1959 EMERGENCY ESCAPE CAPSULE STUDIES. PHASE I: PRELIMINARY LABORATORY FLOTATION STUDIES. WADC Tech Rept 59-247 (1) ASTIA AD 226 055;

ABSTRACT: Preliminary studies using aircraft canopy escape-type capsules are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inhabitation and communication studies were conducted as individual facets of the program. The studies were culminated with a test in which a human subject remained in a closed capsule for 72 hours. Findings from these preliminary studies are presented. The capsule with an air exchange system successfully served as a temporary shelter while floating in a test pool for a period of 72 hours. Throughout the test, the hatch was closed to simulate a situation which might be necessary operationally only as a result of the most severe environmental conditions.

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Karstens, A.I. 1959 ESCAPE AND SURVIVAL DURING MANNED BALLISTIC FLIGHT. Proceedings of AGARD Meeting, Athens, Greece, May 1959.

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Karstens, A.I., and H.J. Jacobs 1948 PHYSIOLOGICAL EVALUATION OF THE PARTIAL PRESSURE SUIT, REPORT NO. 1. (United States Air Force, Air Materiel Command) Technical Report No. 5953, July 1950

711

Keating, C.E. 1954 40-G DITCHING SEATS (Century Eng., Inc.) Rept. No. 664; 26 April 1954

712

Keating, D.A. & R.W. Roundy 1961 CLOSED ECOLOGY (Life Support Systems Lab., Aerospace Medical Lab., Wright Air Development Division Air Research and Development Command, USAF, Wright-Patterson AFB, Ohio) WADD technical report 61-129, Proj. no. 6373, Task No. 63120, March 1961; ASTIA AD-255 976

ABSTRACT: The concepts of closed ecology as well as the design requirements for three degrees of closure in closed ecological systems have been presented in a fundamental manner basic to the reader's understanding of such aerospace life support systems.

The degree of ecological system closure is dependent upon reliability, weight, bulk, energy input, and mission duration.

The basic closed ecological system concepts are presented fully with the understanding that the design of such systems is dependent upon future research Design philosophy has therefore been presented in place of actual design.

713

Kearney, A. P., B. J. Mills, & R. S. Huey 1959 EMERGENCY ESCAPE CAPSULE STUDIES: PHASE I: PRELIMINARY LABORATORY FLOTATION STUDIES. (Wright Air Development Center, Wright-Patterson AFB, Ohio) WADC TR 59-247 (1); ASTIA AD-226 055; June 1959

ABSTRACT: Preliminary studies using aircraft canopy escape-type capsules are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inha-

bitation and communication studies were conducted as individual facets of the program. The studies were culminated with a test in which a human subject remained in a closed capsule for 72 hrs. Findings from these preliminary studies are presented. The capsule with an air exchange system successfully served as a temporary shelter while floating in a test pool for a period of 72 hrs. Throughout the test, the hatch was closed to simulate a situation which might be necessary operationally only as a result of the most severe environmental conditions. (AUTHOR)

714

Keegan, J. J. 1953 ALTERATIONS OF THE LUMBAR CURVE RELATED TO POSTURE AND SEATING. Journal of Bone and Joint Surgery, July 1953.

715

Kellaway, C.H. 1941 NOTES ON THE ANTI-"G" DEVICE FROM DR. COTTON, SIDNEY UNIVERSITY, TRANSMITTED BY COL. C.H. KELLAWAY OF FPRC, AUSTRALIA
(National Research Council, Committee on Aviation Medicine, Washington, D.C.) CAM Rept. No. 27; 21 October 1941

ABSTRACT: Photographs of the centrifuge at Sydney. Cotton suit consists of air-filled bladders pressurized by a hydrostatic resevoir. Weight of the suit is 30 pounds. Suit protects against 9.3 "g" for 19 $\pm$ 1 seconds with no visual symptoms, minimum discomfort.

716

Kelley, R.E. & R.F. Stauffer 1950 A DEVICE FOR THE AUTOMATIC CONTROL BY G FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. SDC PROJECT 9-U-37a
(Naval School of Aviation Medicine, Pensacola, Fla.) Project No. NM 001 059. 02.05; 31 March 1950; ASTIA ATI 79 310

ABSTRACT: Herein is described a device which controls the back rest position of the controllable supine seat: SDC Project 9-U-37a. This device is operated by G. When the G-level exceeds a given amount, the back rest rotates, on an axis about its lower end, backward to a horizontal position. When the G-level falls below a given amount, the horizontal rest rotates upward to its original

position. An individual seated therein is then automatically changed from a seated position to a supine position, or vice versa, at specific G-levels. The G-level at which operation occurs is controlled by a 17-position switch which provides automatic supination control at levels from 1.0-6.0 G. The supination and recovery levels are dependent upon each other, and the recovery level is slightly below that of supination. The difference between these levels at any particular setting increases with the G - being 0.8 G at 2.5 G for supination and 1.6 G at 6.0 G for supination.

Such a device should be of practical value in aircraft equipped with such movable seats, as automatic protection can then be provided for air personnel exposed to positive and negative radial acceleration. (DACO)

717

Kelley, R. E., & F. R. Stauffer 1950 A SYSTEM OF CONTINUOUS INDICATION AND RECORDING OF THE BACK REST POSITION OF THE CONTROLLABLE SUPINE SEAT: SDC PROJECT 9-U-37a. (Naval School of Aviation Medicine, Pensacola, Fla.) Research Project MR 005.15-0001.1.3., 3 March 1950; ATI-76 470

ABSTRACT: (1) A system has been described to provide for continuous indication and for recording of the back rest position of the controllable supine seat: SDC Project 9-U-37a. (2) The need for such a system both from the standpoint of the interpretation of physiological responses in subjects undergoing positional changes during radial acceleration and from the standpoint of safety to the subject has been mentioned. (3) As described the system applies only to movements of the back rest. It would seem desirable, however, that if any future adjustable seats are constructed for experimental work they should incorporate a similar system for all significant movable parts. (AUTHOR)

718

Kelly, H. B.,Jr. 1956 FLIGHT TEST OF INTEGRATED HARNESS SYSTEM EQUIPMENT. (US Naval Air Test Center) TED PTR AE-5205, 24 Oct 1956

719

Kelly, R. E., & F. R. Stauffer 1950 A DEVICE FOR THE AUROMATIC CONTROL BY G FORCE OF THE POSITION OF THE CONTROLLABLE SUPINE SEAT. (Naval School of Aviation Medicine, Pensacola, Fla.) SDC Project 9-U-37a., MR005.15-0001.1.5 3/31/50. ASTIA ATI 79310.

ABSTRACT: A device which controls the back rest position of the controllable supine seat is described. This device is operated by G. When the G-level exceeds a given amount, the back rest rotates, on an axis about its lower end, backward to a horizontal position. When the G-level falls below a given amount, the horizontal rest rotates upward to its original position An individual seated therein is, then, automatically changed from a seated to supine position, or vice versa, at specific G-levels. The G-level at which operation occurs is controlled by a 17 position switch which provides automatic supination control at levels from 1.0-6.0 G. The supination and recovery levels are dependent upon each other, and the recovery level is slightly below that of supination. The difference between these levels at any particular setting increases with the G, being 0.8 G at 2.5 G for supination and 1.6 G at 6.0 G for supination.

Such a device should be of practical value in aircraft equipped with such movable seats, as automatic protection can then be provided for air personnel exposed to positive and negative radial acceleration.

720

Kendall, S.K. 1942 OPERATIONAL USE OF THE FRANKS FLYING SUIT. (National Research Council, Canada) Report #C-2847, November 24, 1942

ABSTRACT: Reports are included of the operational use of the Franks Flying suit in the 807 Squadron by F/O Martin and pilots reports of their experiences while wearing the FFS operationally and a short extract of a report of the operations from the Commanding Officer, 807 Squadron. It is noted that the pilots reactions to the FFS were almost universally very favourable.

721

Kendricks, E.J. 1952 AEROMEDICINE: THE DOMINANT SCIENCE
Aero Digest 64(1): 72-80, 82, 90. Jan. 1952

ABSTRACT: The physiological problems resulting from the advances of modern aviation in high-altitude and high-speed flying are briefly discussed. New methods and techniques in meeting problems such as temperature and pressure changes, anoxia, bio-acoustic effects, bailing out from high altitudes, and instrument control (human engineering) are summarized. In conclusion, the requirements for and the functions and duties of the flight surgeon are outlined.

722

Kennedy, W.P. EXTRACTS FROM GERMAN LITERATURE. PERVITIN. BLOOD PROCUREMENT. GAS. EYE INJURIES DUE TO AIRPLANE BOMBS. DISCOMFORT FROM MILITARY BELTS. CARDIOVASCULAR EFFECTS OF ANOXIA AND ACCELERATION. PSYCHIC SHOCK AND CRASHES.
(Flying Personnel Research Committee, Farnborough) FPRC Rept. #321 and 321-C (WAM-153-1) ASTIA ATI 206 431

723

Kenney, John F. 1950 STATIC TEST OF SEAT ASSEMBLY #72451
(Air Materiel Command, Wright-Patterson Air Force Base, Dayton, Ohio) USAF Technical Report No. TR-029AF ASTIA ATI 82 456

ABSTRACT: Static-load tests were conducted on the crew member seat assembly No. 72451 to demonstrate its compliance with USAF structural requirements. The seat is essentially the same as the previously tested seat assembly No. 71349, but the arm rests are removed. Loads were applied to the seat with calibrated hydraulic jacks and a calibrated tension ring. An ultimate load of 1600 lbs. was applied to the seat-belt mountings, and an ultimate load of 1700 lbs. was applied in a uniform manner over the bottom of the seat. The loads were held at ultimate for a period of one minute or more without failure occurring in the seat structure.

724

Kenney, J.F. 1950 STATIC TEST OF CREW SEAT NO. 72244 (Aircraft Division, Weber Showcase & Fixture Co., Inc. 2001 Belgrave Ave., Huntington Park, Calif.) Contract No. AF 33-038-9345, 9 Nov. 1950, ASTIA ATI-95 617

ABSTRACT: The seat operated after each and all limit loads. After ultimate loading there was little outward sign of yielding. The seat would swivel and travel fore and aft, but bound when moved vertically which was due to some bending in the sliding tubes.

This seat is an exact duplicate of the approved USAF SEAT; AIRCREW, ADJUSTABLE, SWIVEL, TYPE E-1, Spec. #45009, dtd 24 January 1949, except for arm rests and will naturally sustain the same loads. It is, therefore, acceptable as complying with USAF Spec. #45009.

725

Kent, S. J., & A. E. White 1961 DEVELOPMENT AND QUALIFICATION OF THRUSTER, CARTRIDGE ACTUATED, T30. (Aeronautical Systems Division, Wright-Patterson AFB, Ohio) ASD TR 61-454; FA Report R-1601; ASTIA AD-271 390; Oct. 1961

ABSTRACT: Frankford Arsenal was requested by the Air Force to design, develop and qualify a thruster which would operate the integrated harness release mechanism used by aircraft personnel. The thruster was to provide an automatic means of releasing the harness from the pilot or crew member during an emergency escape, thereby eliminating the possibility of human error. The thruster would be mechanically initiated by a lanyard during the emergency escape cycle. The project was divided into two phases, namely development and qualification. During the development phase, several models of a thruster, designated the T30 thruster, were fabricated and tested and the resultant test data analyzed. Modifications in the interest of better performance, simplicity, and interchangeability were made. When a satisfactory level of performance was achieved, the qualification phase of the project was initiated. The qualification phase consisted of various operational tests which established that the final model of the T30 thruster satisfied all performance requirements, and that its operational characteristics were reproducible. (AUTHOR)

726

Keraney, A. P., B J. Mills and R. S. Huey 1959 EMERGENCY ESCAPE CAPSULE STUDIES. PHASE I. PRELIMINARY LABORATORY FLOTATION STUDIES.
WADC Tech Rept. 59-247 (1) 2 Oct 59 AD-226 055

Summary: Preliminary studies using aircraft canopy escape-type capsules are described. Design of capsule clothing, donning of clothing in confined space, stowage of emergency survival items, air exchange requirements, flotation, inhabitation and communication studies were conducted as individual facets of the program. The studies were culminated with a test in which a human subject remained in a closed capsule for 72 hours. Findings from these preliminary studies are presented. The capsule with an air exchange system successfully served as a temporary shelter while floating in a test pool for a period of 72 hours. Throughout the test, the hatch was closed to simulate a situation which might be necessary operationally only as a result of the most severe environmental conditions. (author)

727

Kerr, C. E., W. K. Stewart, & J. R. Tobin 1942 NOTE ON PRONE POSITION IN AIRCRAFT. (RAF, Institute of Aviation Medicine, Farnborough) FPRC Rept.500

ABSTRACT: Reclining in a prone position as a protection against "g" has been abandoned by the RAF because: (1) Visual difficulties are apparently insuperable; the blind area above the pilot is too large although the visual field behind him is not affected and the field below him is improved. (2) The position is extremely uncomfortable and produces much fatigue. The Germans report that a prone position raises the "g" threshold to 14 to 17 "g" on the centrifuge. A Heinkel has been reported to have been equipped with reclining seats.

728

Kerr, T.H. 1952 PILOT ESCAPE FROM SPINNING AIRCRAFT. (Royal Aircraft Establishment, Farnborough) ATI 199859, December 1952

ABSTRACT: A series of pilot escape tests from models of elementary and advanced trainers, and fighter aircraft in the spin are presented. Escapes were made from varying points relative to the wing chord, on the inboard and outboard sides of the spin. The analyzed results show that if the pilot requir to bail out from a spinning aircraft, it is best to leave on the outboard side of the craft and in the crouching attitude. In this condition it is most probable that he will clear the aircraft cleanly and be outside the spiral flight path within a half turn of the spin. If he bails out on the inboard side, his flight path will probably be through or very near the propeller disc and it will probably take at least two turns of the spin for him to clear the helical flight path of the aircraft.

729

Khromushkin, A.I. 1944 PARASHIUTNYE PRYZHKI IZ STRATOSFERY (Parachute Jumps From the Stratosphere)
Tekhnika vozdoshnogo flota No. 8-9, P. 18-21