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# ACCELERATION RESEARCH - 1951-1990 - A 40 YEAR SELECTED BIBLIOGRAPHY OF SIGNIFICANT WORK PERFORMED ON THE NAVAL AIR DEVELOPMENT CENTER (JOHNSVILLE) CENTRIFUGE

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1951

51.1 Comparative Analysis of an Airborne Acceleration Laboratory Versus the Human Centrifuge. C. F. Gell. Journal of Aviation Medicine 22: 375.

1952

- 52.1 Effects of Acceleration upon the Cerebral Metabolism and Cerebral Blood Flow. Phase I: "Development of a New Method for continuous Measurement of Cerebral Blood Flow in Humans under Acceleration". R. L. Wechsler. NADC-MA-5202.
- 52.2 Effects of Acceleration upon the Cerebral Metabolism and Cerebral Blood Flow. Phase IV: "Some observations on Negative G Developed in Aerobatics". E. L. Beckman. NADC-MA-5203.
- 52.3 Effects of Acceleration upon the Cerebral Metabolism and Cerebral Blood Flow. Phase II: "Studies on Cerebral Physiology of Monkeys at 12 Negative G". T. D. Duane, R. L. Wechsler, J. E. Ziegler and E. L. Beckman. ASTIA AD-133 234, J. Av. Med. 23: 479-489, 1952. NADC-MA-5204.
- 52.4 Effects of Acceleration upon the Cerebral Metabolism and Cerebral Blood Flow. Phase III: "The activation of Aerobic Phosphorylation by the Addition of Xanthenes and Analogous compounds to the Inhibited Enzyme Systems". B. D. Polis, L. Jedeikin and E. Polis. ASTIA AD-1031, NADC-MA-5205.
- 52.5 Development of Biological Research Apparatus for Use in Acceleration and Deceleration Studies. Phase I: "The Evaluation of Pressure Transducer Systems". E. L. Beckman, L. H. Peterson and J. Parnell. ASTIA AD-1061, NADC-MA-5206.
- 52.6 Human Tolerance to Combined Accelerations. T. D. Duane, H. Hunter and J. E. Ziegler. ASTIA-AD-54 252, NADC-MA-L5207.

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1953

- 53.1 Human Tolerance to Combined Accelerations. Phase II. "Preliminary Studies on Primates Subjected to Maximum Simple Accelerative Loads". E. L. Beckman, J. E. Ziegler, T. D. Duane, and H. N. Hunter. ASTIA AD-15 117, NADC-MA-5301.
- 53.2 Human Tolerance to High Positive G Applied at a Rate of 5 to 10 G Per Second. E. L. Beckman, T. D. Duane, J. E. Ziegler and H. N. Hunter. NADC-MA-5302, ASTIA AD-20 520, J. Av. Med. 25: 50-60, 1954.
- 53.3 Preliminary Investigation into the Study of the Fundus Oculi of Human Subjects Under Positive Acceleration. T. D. Duane. ASTIA AD-20 519, Arch. Opth. tl: 343, 1954. NADC-MA-5303.
- 53.4 An Investigation of the Effects of Acceleration Forces on a Pilot During an Automatic Interceptor Attack. P. G. Ecker, R. J. Crosbie and H. Hunter. ASTIA AD-13 805, NADC-MA-L5304.
- 53.5 Some Observations on Human Tolerance to Exposures of 15 Transverse G. T. D. Duane, E. L. Beckman, J. E. Ziegler and H. N. Hunter. ASTIA AD-20 518, J. Av. Med. 26: 298, NADC-MA-5305.
- 53.6 Data Sensing and Recording Techniques Established for the Human Centrifuge. C. E. Brooks. ASTIA AD-133 235, NADC-MA-5306.

1954

- 54.1 Some Effects of Cyclic Acceleration in Rhesus Monkeys. M. Lipken and H. L. Ratcliffe. ASTIA AD-36 626, J. Av. Med. 25: 594-599, 1954, NADC-M-5404.
- 54.2 Physiological Investigation of Increasing Resistance to Blackout by Progressive Backward Tilting to the Supine Position. C. F. Gell and H. N. Hunter. ASTIA AD-36 856, J. Av. Med. 25: 568-577, 1954, NADC-MA-5406.
- 54.3 Responses of Blindfolded Subject to Tilt from the Horizontal Position. R. F. Gray. ASTIA AD-41 658, NADC-MA-5407.
- 54.4 Development of Scintillation Counting Techniques for Use in Acceleration Stress Studies. W. C. Sipple, C. H. Fugitt, W. B. Wentz and C. F. Gell. ASTIA AD-39 396, NADC-MA-5411.
- 54.5 Evaluation of Anti-Blackout Suit with Parachute/Safety Harness as Integral Part. C. F. Gell. NADC-MA-LR2.

# NAWCADWAR-92049-60

1955

- 55.1 The Effects of Tonic Electrical Stimulation as a Means of Combating Adverse Circulatory Disturbances Caused by Acceleration. R. F. Gray, ASTIA D-55 215, NADC-MA-5501.
- 55.2 Acceleration and Human Performance: A Survey of Research. J. L. Brown and M. Lechner. ASTIA AD-59 257, J. Av. Med. 27: 32-49, 1956, NADC-M-5503.
- 55.3 A Post-Mortem Study of Rhesus Monkeys (Macaca mulatta) at Intervals After Single or Repeated Exposure to Negative Acceleration. E. Beckman and H. L. Ratcliffe. ASTIA AD-67 387, J. Av. Med. 27: 117-130, 1956, NADC-MA-5504.
- 55.4 Human Tolerance to Positive G as Determined by Physiological End Points. A. M. Stoll. J. Av. Med. 27: 356-367, 1956, NADC-MA-5508.
- 55.5 Optical Sighting: The Effect of Positive Acceleration on Pilot's Head Position. J. L. Brown, L. K. Woodward and G. B. Pidcock. ASTIA AD-79 592, NADC-MA-5509.
- 55.6 Cam Designing for the Human Centrifuge. R. J. Crosbie. ASTIA AD-86 293, NADC-MA-5512.
- 55.7 The Electroretinogram in Man During Blackout. D. H. Lewis and T. D. Duane. ASTIA AD-83 491, J. Appl. Physiol. 9: 105-110, 1956, NADC-MA-5514.
- 55.8 Pilot's Ability to Actuate Cockpit Controls Under G Conditions. H. Hunter. NADC-MA-LR11.55.9 Development of Supine Seat and Related Components. H. N. Hunter, NADC-MA-LR13.
- 55.9 An Analysis of Some Current Methods of G Protection. D. H. Lewis. Journal of Aviation Medicine 26: 479.

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1956

- 56.1 The Effect of Partial Supination Combined with Anti-G Suit on G Tolerance in Navy Pilots. A Preliminary Report. P. J. Dorman and R. W. Lawton. ASTIA AD-98 515, J. Av. Med. 27: 490-496, 1956, NADC-MA-5606.
- 56.2 Utilization of a System of Gimbals on the Human Centrifuge for the Control of Direction of Acceleration with Respect to the Subject. R. J. Crosbie. ASTIA AD-107 772, J. Av. Med. 27: 505-511, 1956, NADC-MA-5608.
- 56.3 Relationships Between Oculogyral Illusions and Nystagmus. R. F. Gray. ASTIA AD-107 773, NADC-MA-5609.
- 56.4 Forces Developed On A Car Travelling Radially Along A Moving Centrifuge Arm. R. J. Crosbie. ASTIA AD-108 391, NADC-MA-5610.
- 56.5 Arterial Blood Pressure Responses to G Forces in the Monkey. R. W. Lawton, L. C. Greene, G. H. Kydd, L. Peterson and R. J. Crosbie. ASTIA AD-127 901, NADC-MA-5611.
- 56.6 Anti-Blackout Equipment, Determination of Limitations of Equipment and Personnel. H. N. Hunter. NADC-MA-LR14.
- 56.7 Integrated Anti-Blackout Suit. B. F. Burgess, NADC-MA-LR15.
- 56.8 Establishment of a Qualified Products List for Type Z-2 and Type Z-3 Anti-Blackout Suits, Conforming to MIL-S-508 (Aer)-3 Submitted By Seymour Wallas and Company. R. Z. Snyder and E. T. Kephart. NADC-MA-LR16.

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1957

- 57.1 Arterial Blood Pressure Responses to Abrupt Positive Acceleration. R. W. Lawton, G. H. Kydd, L. C. Greene and R. J. Crosbie. ASTIA D-127 901, NADC-MA-5704.
- 57.2 The Effect of inflation of a Pressure Suit Upon Pulmonary Diffusing Capacity in Man. B. M. Lewis, R. E. Forster and E. L. Beckman. ASTIA D-134 510, J. Appl. Physiol. 12: 57-64, 1958, NADC-MA-5705.
- 57.3 Mechanical System Suggested for G Protection. R. F. Gray. ASTIA AD-144 106, NADC-MA-5708.
- 57.4 The Effect of Positive Acceleration on Visual Reaction Time. J. L. Brown and R. E. Burke. ASTIA AD-143 551, J. Av. Med. 29: 48-58, 1958, NADC-MA-5712.
- 57.5 G Tolerance in Primates: I. Unconsciousness End Points. G. H. Kydd and A. Stoll. ASTIA AD-156 855, J. Av. Med. 29: 413, 195, NADC-MA-5717.
- 57.6 The Effect of Simulated Catapult Launching on Pilot Performance. J. L. Brown, W. H. B. Ellis, M. G. Webb and R. F. Gray. ASTIA AD-156 851 NADC-MA-5719.
- 57.7 Test and Evaluation of Anti-Blackout Equipment When Used in Various Combinations. M. G. Webb. NADC-MA-LR17.
- 57.8 Acceleration Problems Associated with Projected Research Aircraft; Investigation of Human Tolerances and Performance Concerning. C. C. Clark and R. J. Crosbie. NADC-MA-LR18.
- 57.9 Test and Development of Anti-Blackout Equipment; Letter Report Concerning Development of a G-Capsule. R. F. Gray, M. G. Webb and W. H. B. Ellis. NADC-MA-LR19.
- 57.10 Pilot's Ability to Actuate Cockpit Controls Under G Conditions. M. G. Webb. NADC-MA-LR20.
- 57.11 Pilot's Ability to Activate Cockpit Controls Under G Conditions. J. H. Hill. NADC-MA-LR21.
- 57.12 Human Performance Limitations in Aircraft Catapulting and Arresting. J. L. Brown and J. H. Hill. NADC-MA-LR22.
- 57.13 Some Physiological and Pathological Effects in Chimpanzees Exposed To 40 Transverse G for 15 and for 60 Seconds. A. M. Stoll. NADC-MA-LR27.
- 57.14 Establishment of a Qualified Products List for Type Z-3 (Cutaway) Anti-Blackout Suit, Conforming to specification MIL-S-5085 (Aer)-3. B. F. Burgess. NADC-MA-LR29.
- 57.15 Centrifuge Simulation of Flight Accelerations: Open-Loop Computer Control and Closed-Loop Subject Computer Control of the Human Centrifuge. C. C. Clark and R. J. Crosbie. NADC-MA-LR30.
- 57.16 Human Performance Limitations in Aircraft Catapulting and Arresting. J. L. Brown. NADC-MA-LR31.
- 57.17 Effect of Positioning in Exposure of Chimpanzee to 40 Transverse G for 60 Seconds. A. M. Stoll. NADC-MA-LR34.

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- 57.18 Subjective Preference Among Different Modes of Closed-Loop Operation of the Centrifuge for Flight Simulation. J. L. Brown. NADC-MA-LR35.
- 57.19 End Points for Acceleration Tolerances on the Centrifuge. M. G. Webb. North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Conference, preprint of paper given in Germany.

# NAWCADWAR-92049-60

1958

- 58.1 Tracking Performance During Simulated Exit and Reentry Flights of the X-15 Research Aircraft. J. L. Brown. NADC-MA-5801.
- 58.2 Air-To-Air Tracking During Closed-Loop Centrifuge Operation. J. L. Brown. ASTIA AD-159 716, J. Av. Med. 29: 794-804, 1958, NADC-MA-5803.
- 58.3 The Effect of Hypoxia on Tolerance to Positive Acceleration. B. F. Burgess. ASTIA AD-209 174, J. Av. Med. 29: 754-757, 1958, NADC-MA-5804.
- 58.4 Erythrocyte Hydration Under Positive Acceleration. R. L. Fenichel and G. H. Kydd. ASTIA AD-200 085, J. Appl. Physiol. 13: 393-395, 1958, NADC-MA-5805.
- 58.5 Variation in Duration of Oculogyral Illusions as a Function of the Radius of Turn. R. F. Gray and R. J. Crosbie. ASTIA AD-202 822, NADC-M-5806.
- 58.6 The Effects of Positive Acceleration Upon the Performance of An Air-To-Air Tracking Task. D. E. Fletcher, J. L. Brown and C. C. Collins. ASTIA AD-201 175, J. Av. Med. 29: 091, 1958, NADC-MA-5807.
- 58.7 Some Effects of Acceleration on Human Subjects. M. G. Webb. ASTIA AD-209 082, J. Av. Med. 29: 879-884, 1958, NADC-MA-5812.
- 58.8 The Development of Dynamic Flight Simulation. J. D. Hardy and C. C. Clark. ASTIA AD-216 508, Aero Space Eng. 13 (6): 48-52, NADC-MA-5817.
- 58.9 Fire Resistant Z-2 Anti-Blackout Coverall Suit Manufactured by David Clark Company; Qualification Test Of. R. Z. Snyder NADC-MA-LR38.
- 58.10 Test and Evaluation of Anti-Blackout Equipment. B. F. Burgess NADC-MA-LR42.
- 58.11 Circulatory and Respiratory Effects of Acceleration. R. W. Lawton and H. G. Shepler. NADC-MA-LR44.
- 58.12 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. J. H. Hill and J. L. Brown. NADC-MA-LR46.
- 58.13 Proposed Study of Acceleration Patterns in Flight. C. C. Clark. NADC-MA-LR47.
- 58.14 Investigation of Defective Type Z-2 Anti-G Suits Furnished by Seymour Wallas and Company, St. Louis, Missouri under Contract N383-40133A. B. F. Burgess. NADC-MA-LR48.
- 58.15 Test and Evaluation of U.S. Air Force Experimental Cut Away Type Anti-Blackout Suits, Designated MA-1. B. F. Burgess. NADC-MA-LR51.
- 58.16 Human Tolerance to High Acceleration Stress. M. G. Webb and R. F. Gray. NADC-MA-LR52.
- 58.17 Preliminary Study of G Tolerance of a Subject in the G-Capsule, Prone Position. R. F. Gray and M. G. Webb. NADC-MA-LR59.

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- 58.18 Pilot Performance and Tolerance Studies of Orbital Reentry Acceleration.  
C. C. Collins, R. J. Crosbie and R. F. Gray. NADC-MA-LR64.
- 58.19 Physiological and Pathological Effects in Chimpanzees During Prolonged Exposure to 40 Transverse G. A. M. Stoll and J. D. Mosely. J. Aviat. Med. 29: 575.

# NAWCADWAR-92049-60

1959

- 59.1 A Stress Analysis on the Inner Gimbal Drive Shaft of the Human Centrifuge for Various Gondola Loading Conditions. R. J. Crosbie and F. Gollub. ASTIA AD-217 637, NADC-MA-5901.
- 59.2 G Tolerance in Primates. II. Observations on the Relationship of Carotid Pressure and End Point During Acceleration. G. H. Kydd, R. L. Fenichel and R. J. Crosbie. ASTIA AD-226 557, J. App. Physiol. 15: 903, NADC-MA-5903.
- 59.3 A Study of the Effects of Positive Acceleration Upon Erythrocyte Hydration in Human Subjects. R. L. Fenichel and G. H. Kydd. ASTIA D-218 885, NADC-MA-5904.
- 59.4 The Effect of Temperature on Tolerance to Positive Acceleration. B. F. Burgess, ASTIA AD-218 957, Aerospace Med. 30 (8): 567, 1959, NADC-MA-5905.
- 59.5 The Requirements for Modification of the Human Centrifuge for High Performance Aircraft and Space Vehicle Simulation Research. R. J. Crosbie. ASTIA AD-225 000, NADC-MA-5907.
- 59.6 Acceleration Problems in Space Flight. J. D. Hardy, C. C. Clark and R. F. Gray. ASTIA AD-230 379, 21<sup>st</sup> Inter. Cong. of Physical Science Volume 2, August 1959, NADC-MA-5909.
- 59.7 High G Protection. R. F. Gray and M. G. Webb. ASTIA AD-235 338, Aerospace Med. 32 (5): 425, 1961, NADC-MA-5910.
- 59.8 Behavioral and Physiological Effects of Exposure to A Simulated Juno II Acceleration Pattern. R. M. Herrick, G. H. Kydd and R. L. Fenichel. ASTIA AD-230 005, NADC-MA-5913.
- 59.9 A discussion of Restraint and Protection of the Human Experiencing The Smooth and Oscillating Accelerations of Proposed Space Vehicles. C. C. Clark and R. F. Gray. ASTIA AD-234 497, NADC-MA-5914.
- 59.10 Centrifuge Simulation of the X-15 Research Aircraft. C. C. Clark and C. H. Woodling. ASTIA AD-233 340, NADC-MA-5916.
- 59.11 Preliminary Study of Damping of the Otolith Organ System by Epicyclic Rotation. R. F. Gray and D. M. Morway. ASTIA AD-231 600, ADC-MA-5919.
- 59.12 Pilot's Ability to Actuate Ejection Controls; Final Report Concerning. J. H. Hill and M. G. Webb. ASTIA AD-257 520, NADC-MA-LR75.
- 59.13 Test of Water-Filled Capsule in the Prone Position. R. F. Gray and M. G. Webb. NADC-MR-LR82.
- 59.14 Chance Vought Project for the Study of Pilot Performance During Centrifuge Simulation of the Boost Accelerations of the Dyna-Soar Orbital Vehicle Exit Flight. J. L. Brown. NADC-MA-LR84.
- 59.15 Johnsville Centrifuge Bracket for Attaching the NASA Mercury Capsule. C. C. Clark NADC-MA-LR87.
- 59.16 Test and Evaluation of Integrated Cotton-Fortisan Anti-Blackout Summer Flying Coverall. B. F. Burgess NADC-MA-LR88.

1959 - continued

- 59.17 Pilot Performance and Tolerance Studies of Orbital Reentry Acceleration. C. C. Collins and R. F. Gray. NADC-MA-LR90.
- 59.18 Navy Centrifuge Simulation of the National Aeronautics and Space Administration Project Mercury Vehicle, Program 1, August 1959. C. C. Clark. NADC-MA-LR92.
- 59.19 Final Report on Evaluation of Frankenstein Anti-Blackout Suit. K. R. Coburn. NADC-MA-LR90.
- 59.20 Protection Against Acceleration by Water Immersion. R. F. Gray and M. G. Webb. American Rocket Society Preprint ARS Meeting, San Diego, CA.
- 59.21 Closed-Loop Centrifuge Simulation of Space Vehicle Performance. R. M. Chambers and H. V. Doerfel. American Rocket Society, preprint.
- 59.22 Pilot Performance During Centrifuge Simulated Boost and Reentry of Proposed Space Vehicles. R. M. Chambers and J. M. Eggleston. North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Conference, preprint of paper given in Greece.

# NAWCADWAR-92049-60

1960

- 60.1 Navy Centrifuge Simulation of Low Altitude Flight of the A2F, Program 1; Report on the Centrifuge Program and the Conferences Of. C. C. Clark. NADC-MA-L6005.
- 60.2 Comparison of Tracking Performance in the TV-2 Aircraft and the ACL Computer/AMAL Human Centrifuge Simulation of this Aircraft. J. L. Brown, H. Kuehnel, F. T. Nicholson and A. Futterweit. ASTIA AD-250 129, NADC-MA-6016, NADC-AC-6008.
- 60.3 Anti-Blackout Protection, Development, Test, Evaluation and Service Engineering. K. R. Coburn. NADC-MA-L6011.
- 60.4 Film Report on Navy Centrifuge Studies for the NASA Project Mercury, Program 1, August 1959. C. C. Clark. NADC-MA-L6014.
- 60.5 Coveralls, Anti-G Standardization Study. K. R. Coburn. NADC-MA-L6022.
- 60.6 An Analysis of the Magnaflux Inspection Record of Welded Joints on The 50-Foot Centrifuge. F. Gollub. NADC-MA-6027.
- 60.7. Gravity Problems in Manned Space Stations. C. C. Clark, and J. D. Hardy. ASTIA AD-255 592, Aero Space Eng. 19 (5): 36-39, 1960, NADC-MA-6033.
- 60.8 Explicit Expressions for the Angular Accelerations and Linear Accelerations Developed at a Point off Center in a Gondola Mounted Within A Three Gimbal System on the End of a Moving Centrifuge Arm. R. J. Crosbie and R. A. Hall. ASTIA AD-248 216, NADC-MA-6034.
- 60.9 Test and Evaluation of Anti-Blackout Valve Model 19400 Manufactured by The Firewell Company. R. J. Zabelicky and R. Z. Snyder. NADC-MA-L6043.
- 60.10 Some Body Displacements and Medical Effects of Lateral Accelerations During Navy Centrifuge Simulation of Ejection Capabilities From the Army AO Aircraft. C. C. Clark. ASTIA AD-257 371, NADC-MA-6044.
- 60.11 Nondestructive Testing of the Aviation Medical Acceleration Laboratory Human Centrifuge. R. Z. Snyder. Minutes of 11<sup>th</sup> Annual Conference on Nondestructive Testing.
- 60.12 A New Method of Protection Against the Effects of Acceleration on the Cardiovascular System. M. G. Webb and R. F. Gray. American Journal of Cardiology 6: 1070-1077.
- 60.13 Acceleration Terminology in Aerospace Medical Research. J. D. Hardy and C. C. Clark. North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development Conference, preprint of paper given in Turkey.
- 60.14 Pilot Performance Capabilities During Centrifuge Simulations of Boost and Reentry. R. M. Chambers and J. G. Nelson. American Rocket Society, reprint No. 1401-60.

# NAWCADWAR-92049-60

1961

- 61.1 Modification of the Human Centrifuge at AMAL. R. J. Crosbie. AD-251 947, NADC-MA-L6101.
- 61.2 A3J-1 Spin Simulation Program on the Navy Human Centrifuge. R. Z. Snyder. AD-256 260, ASME Paper No. 61-AV-51, March 1961, NADC-MA-6104.
- 61.3 Human Acceleration Studies. C. C. Clark, J. D. Hardy and R. J. Crosbie. National Academy of Sciences - National Research Council, Publication 913.
- 61.4 Control Performance Under Acceleration with Side-Arm Attitude Controllers. R. M. Chambers. AD-269 487, NADC-MA-6110.
- 61.5 Preliminary Report on an Automated System for the Study of Mental Function in the Human Subjected to Acceleration Stress. F. W. Cope and R. E. Jensen. NADC-MA-6113.
- 61.6 A Proposed Physiological Acceleration Terminology with an Historical Review. C. C. Clark, and J. D. Hardy. NADC-MA-6118.
- 61.7 Effects of G Environments on Psychomotor Abilities. R. M. Chambers. NADC-MA-6121.
- 61.8 Considerations in Testing for Intellectual Impairment Due to Acceleration. R. M. Chambers and R. G. Lathrop. NADC-MA-6125.
- 61.9 Motion Pictures, Scene Descriptions, and Safety Procedures of Navy Centrifuge Simulations of the X-15 Research Aircraft; Progress Report Concerning. C. C. Clark. NADC-MA-L6126.
- 61.10 Centrifuge Studies of Human Acceleration Tolerance and Protection (Med 9-61) and Flight Simulation and Training with the Navy Centrifuge, 1957-1960 (Med 8-61); Technical Film Reports and Scene Descriptions Of. C. C. Clark. NADC-MA-L6127.
- 61.11 Navy Centrifuge and North American Aviation "G Seat" Simulations of Low Altitude Flight, Program 2. C. C. Clark. NADC-MA-L6128.
- 61.12 The presence or Absence of Visual Coriolis Illusions at various Combined Angular Velocities. R. F. Gray, R. J. Crosbie, R. A. Hall, J. Weaver and C. C. Clark. NADC-MA-6131.
- 61.13 Effects of Weightlessness as Simulated by Total Body Immersion Upon Human Response to Positive Acceleration. V. G. Benson, L. Beckman, K. R. Coburn and R. M. Chambers. AD 453263, NADC-MA-6132.
- 61.14 Effects of Positive G on Chimpanzees Immersed in Water. K. R. Coburn, P. H. Craig and E. L. Beckman. NADC-MA-6139.
- 61.15 Limitation of Ocular Motility and Pupillary Dilatation in Humans Due to Positive Acceleration. E. L. Beckman, T. D. Duane and K. R. Coburn. NADC-MA-6140.
- 61.16 Principles concerning Pilot Performance in Centrifuge Simulations of Space Vehicles. R. M. Chambers and N. E. Nelson. ARS Journal, Vol. 31, No. 11, Nov. 1961, NADC-MA-6143.
- 61.17 Problems and Research in Space Psychology. R. M. Chambers. AD 275 830, Physiology of Man in Space Academic Press, NADC-MA-6145.

1961 - continued

- 61.18 Observations on the Relationships between Human Acceleration End Points and the Centrifuge Acceleration Pattern. G. H. Kydd, R. L. Fenichel and R. J. Crosbie. NADC-MA-6146.
- 61.19 Encapsulation of Humans in Rigid Polyurethane Foam for Use As a Restraint System in High Acceleration Environments. J. Weaver, H. Rubinstein, C. C. Clark and R. F. Gray. AD 9044 62L, NADC-MA-6147.

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1962

- 62.1 Effects of Positive Pressure Breathing on Performance During Acceleration. R. M. Chamber, R. Kerr, W. S. Augerson and D. M. Morway. AD 298 009, NADC-MA-6205.
- 62.2 The Perception of Oculogravic Illusions by Inverted Subjects. J. Weaver and R. F. Gray. AD 28 2544, NADC-MA-6207.
- 62.3 The Effects of Applied Ocular Pressure and of Positive Acceleration on Photic Driving in Man. T. D. Duane, D. H. Lewis, S. D. Weeks and J. F. Toole. AD 298 112, NADC-MA-6214.
- 62.4 Effects of Acceleration on Pilot Performance. R. M. Chambers and L. Hitchcock. AD 408 686, NADC-MA-6219.

1963

- 63.1 Preliminary Comparison of Human Centrifuge Capabilities in the United States. R. M. Chambers and J. C. Ferguson. NADC-MA-L6304.
- 63.2 Pilot Biomedical and psychological Instrumentation for Monitoring Performance During Centrifuge Simulations of Space Flight. R. M. Chambers and J. G. Nelson. AD 424 030, NADC-MA-6308.
- 63.3 Dynamic Simulation of the A4D Flash Blindness Protective System. G. T. Chisum and J. H. Hill. AD 414398, NADC-MA-6312.
- 63.4 The Effect of Positive Pressure Breathing on Arterial Oxygen Saturation and Pulmonary Ventilation in Subjects Exposed to High Transverse Acceleration. J. H. Reed, B. F. Burgess and H. Sandler. AD 424 922, NADC-MA-6323.
- 63.5 Powered Torso Harness: Mechanical System and Human Tolerance Evaluation. R. F. Gray. AD 42 8065, NADC-MA-6330.
- 63.6 Physiological Effects of a Simulated Space Flight Profile. E. Hendler. Federation Proceedings Vol. 22, No. 4, July-August, 1963.

1964

- 64.1 Electroencephalographic Changes in Human Subjects During Blackout Produced by Positive Acceleration. R. D. Squires, R.E. Jensen, W. C. Wipple and J. J. Gordon. AD 438 485, NADC-ML-6402.
- 64.2 A Discussion of Medical Monitoring in Relation to Safety in Centrifuge Operations. S. Ragland. AD 602 779, NADC-MA-6410.
- 64.3 Simulation and Effects of Severe Turbulence on Jet Airline Pilots. S. Ragland, R. M. Chambers and R. J. Crosbie. AD 448 067, NADC-ML-6411.
- 64.4 Hemodynamic and Cine-Radiographic Study of Transverse (+G.) Acceleration. H. Sandler. AD 457-840, NADC-ML-6413.
- 64.5 A Proposed Method of Error Scoring Continuous Tasks in Psychological and Physiological Experiments. A. Futterweit. NADC-AC-6405.
- 64.6 Application of Harmonic Analysis in a Study of Tracking Performance in the TV-2 Aircraft and in Centrifuge and Stationary Simulations of that Aircraft. H. G. Tremblay, J. L. Brown and A. Futterweit. NADC-AC-6406.
- 64.7 Isolation and Disorientation. Chapter 8, pp. 231-297, R. M. Chambers, In, *Physiological Problems in Space Exploration.* (J. D. Hardy, ed.) Springfield, Ill., Charles C. Thomas, Publisher, 1964.

1965

- 65.1 Cineradiographic Observations of Human Subjects During Transverse Accelerations of +5G, and +10G. H. Sandler. NADC-MR-6501, AD625254.
- 65.2 Pulmonary Function in Man During Prolonged Acceleration. I. Diffusing Capacity and Blood Flow. G. G. Power, R.W. Hyde, R. J. Sever, F. G. Hoppin and J. R. Nairn. NADC-ML-6512, AD467142.
- 65.3 Distribution of Pulmonary Blood Flow Under Forward (+G) Acceleration. F. G. Hoppin, E. York, D. E. Kuhl and E. W. Hyde. NADC-MR-6517, D633473.
- 65.4 Pulmonary Function in Man Under Prolonged Acceleration II. Correlation of Arterial Blood Oxygen Saturation with Ventilation and Gas Being Breathed. F. G. Hoppin, R. J. Sever and L. Hitchcock. NADC-MR-6519, AD636723.
- 65.5 Studies to determine Dynamic Displacement of Seat/Man Center of Gravity Due to Rocket Thrust. G. D. Horne and J. J. McDonnell. NADC-ACEL-531.

1966

- 66.1 Catechol Amine Measurements Associated with Autonomic-Labyrinthine Responses in Man Exposed to Positive (+G.) Acceleration. E. York, K. R. Brown and A. Goldfien. NADC-MR-6602, AD634519.
- 66.2 Human Biochemical Parameters of Accelerative Stress. E. York, N. J. Colosi and J. H. Roediger. NADC-MR-6603, AD632817.

1967

- 67.1 Human Acceleration Experience at the Aerospace Medical Research Department, Johnsville: U.S. Naval Air Development Center 1 January 1961-30 December 1965. E. York, Oleynik and Patton. NADC-MR-6711, AD655436.
- 67.2 Effects of Transverse G-Stress on Running Memory. B. M. Ross and R.M. Chambers. NADC-MR-6712, AD655835. Perceptual and Motor Skills, 1967, 24, 423-435. Southern Universities Press, 1967.

1968

- 68.1 A Dynamic Simulation Study of the Swept-Wing Transport Aircraft in Severe Turbulence. L. Hitchcock and D.M. Morway. NADC-MR-6807, D845095.
- 68.2 Review of the Dynamic Response Index (D.R.I.). G. H. Kydd and C.T. Reichwein. NADC-MR-6810, AD843496.
- 68.3 Dynamic Simulation of Spin on the Human Centrifuge, Report of, Phase I. E. I. Fessenden, R.A. Hall and R. J. Crosbie. NADC-MR-6813, AD842082.

1969

- 69.1 Renal Hemodynamic Response of Unanesthetized Dogs to Positive Acceleration. J. E. Chimoskey. AD 708 379, NADC-MR-6905.
- 69.2 Assessment and Control of the Undesired Components of Human Centrifuge Acceleration Response to a Single Axis Command. R. L. Fortenbaugh. NADC-AM-6923.

1970

- 70.1 Renal Hemodynamic Response of Unanesthetized Dogs to Negative Acceleration. J. E. Chimoskey. AD 702 745, NADC-MR-7002.
- 70.2 Review of Experimental Data on the Cardiovascular Response to Acceleration. G. Goodhart and C. T. Reichwein. AD 719 902, NADC-MR-7004.
- 70.3 Coronary Blood Flow and Electrocardiogram During Headward Acceleration in Unanesthetized Dogs. J. E. Chimoskey. AD 708 380, NADC-MR-7005.
- 70.4 Observations of the Fundus Oculi in Man During Acceleration. G. T. Chisum and R. Rosenblum. AD 871 560, NADC-MR-7007.
- 70.5 Dynamic Flight Simulation in Aircraft Accident Investigation. L. H. Blackburn, W. R. Crawford, R. J. Crosbie and J. Eney. AD 871 61, NADC-MR-7009.
- 70.6 A Cardiovascular Dynamic Response Index. R. J. Crosbie, E. Fessenden and C. Reichwein. AD 708 383, San Francisco, 1969, NADC-MR-7010.
- 70.7 Physiologic Responses to Short Duration G. G. H. Kydd and A. Ashley. AD 710 987, NADC-MR-7012.
- 70.8 Anti-G Valve Qualification Study. F. J. Formeller. AD 876 452, NADC-MR-7019.
- 70.9 Effects of G and Target Position on Static Helmet Sighting. C. T. Reichwein, J. W. Cunningham and R. J. Crosbie. AD 731 728, NADC-MR-7023.
- 70.10 Results of Helicopter Emergency Flight Simulation. L. Hitchcock. NADC-MR-7023.
- 70.11 Evaluation of the Human Centrifuge as a Flying Qualities Simulator. R. L. Fortenbaugh. Report No. NADC-AM-7032.
- 70.12 Sensory-Motor Adaptation and Aftereffects of Exposure to Increased Gravitational Forces. M. M. Cohen, Aerospace Medicine, 1970, 41:318322.
- 70.13 Hand-Eye Coordination in Altered Gravitational Fields. M. M. Cohen. Aerospace Medicine, 1970, 41:647-649.

1971

- 71.1 Pilot Controlled Dynamic Spin Simulation of the F-4 Phantom Jet on the Human Centrifuge. E. I. Fessenden, R. Hall and R. J. Crosbie. AD 73326, NADC-CS-7111.
- 71.2 The Dynamic Environment During Emergency Descent of High Altitude / Multi-Mach Transport Aircraft. J. J. Von Beckh and S. J. Gerathewohl. AD 741686 NADC-CS-7133.
- 71.3 Evidence for Activated Interfacial Charge Transport in Low-G Acceleration Stress. F. W. Cope. AD 749338, NADC-CS-7136.
- 71.4 Dynamic Simulation of Spin on the Human Centrifuge; Disorientating Effects of Aircraft Catapult Launchings; Buffeting in Air Combat Maneuvering. R. J. Crosbie. Report of 12<sup>th</sup> Meeting Air Standardization Coordinating Committee pp. 79-84, Aerospace Medical and Life Support System, Ministry of Defence, London, England. 20-24 Sep 1971.
- 71.5 Disorienting Effects of Aircraft Catapult Launchings. M. M. Cohen, R. J. Crosbie and L. H. Blackburn. Conference Preprint No. 95 AGARD Conference, 7 Rue Ancelle 92 Nenilly-Sur-Seine, France. Sep 1971.

1972

- 72.1 G Protective Tilting Aircraft Seats. H. J. Von Beckh. AD 741202, NADC-72063-CS-7111.
- 72.2 G Protective Aircraft Seats with Special Consideration Given to Pelvis and Legs Elevating (PALE) Seats. H. J. Von Beckh. AD 756630 NADC-72262-CS.
- 72.3 Disorienting Effects of Aircraft Catapult Launchings. M. M. Cohen, R. J. Crosbie and L. H. Blackburn. AGARD Conference Proceedings, CP-95, art I. The Disorientation Incident, Neuilly-sur-Seine, France: North Atlantic Treaty Organization, pps. A6-1 - A6-6, 1972.
- 72.4 Proprioceptive and Otolithic Variable in the Perceived Elevation of Visual Targets. M. M. Cohen. Preprints, Aerospace Medical Association, pps. 52-153, 1972.

1973

- 73.1 Acceleration Protection by Transverse Positioning of the Pilot. H. J. Von Beckh. NADC-73098-40.
- 73.2 Disorienting Effects of Aircraft Catapult Launchings. M. M. Cohen, R. J. Crosbie and L. H. Blackburn. NADC-73211-40.
- 73.3 U. S. Navy Development of a Mission Specific Fighter Helmet. M. J. Lamb. AD 773756, NADC-735252-40.
- 73.4 Disorienting Effects of Aircraft Catapult Launchings. M. M. Cohen, R. J. Crosbie and L. H. Blackburn. Aerospace Medicine, 1973, 44:37-39.
- 73.5 Elevator Illusion: Influences of Otolith Organ Activity and Neck Proprioception. M. M. Cohen. Perception and Psychophysics, 1973, 14:401-406.

1974

74.1 The Influences of Buffet, Sustained Normal Accelerations, and Basic Aircraft Flying Qualities on Tracking Performance in Air Combat Maneuvering. A. G. Piranian. NADC-73257-30.

1975

- 75.1 Integrated Simulation of Atmospheric Pressures and Dynamic Forces During Accidental Decompression and Subsequent Emergency Descent of High Altitude Transport Aircraft. H. J. Von Beckh and W. P. Baas. NADC-75021-40.
- 75.2 Human Centrifuge Testing of the HGU-35/P Experimental Integrated Oxygen Mask/Helmet System. R. Z. Snyder. NADC-75041-40.
- 75.3 Influence of Various Acceleration Environments on the ability to Activate Controls for Emergency Devices. E. I. Fessenden. ADA 014 545  
NADC-75079-40.
- 75.4 Human Spatial Orientation in the Pitch Dimension. M. M. Cohen and C. H. Laison. AD A014 390, NADC-75187-40.
- 75.5 Comparative Evaluation of the APH-6D, HGU-35/P (Low Pressure), HGU-35/P (High Pressure), VTAS II and VTAS III Helmet Systems on the Dynamic Flight Simulator. R. Z. Snyder. NADC-75195-40.
- 75.6 Human Performance Under Acceleration: Actuation of Ejection Seat Lower Firing Control. W. P. Orrick, P. E. York and M. M. Cohen. NADC-75268-40.
- 75.7 Disorienting Effects of Aircraft Catapult Launchings II Visual and Postural Contributions. M. M. Cohen ADA 030990, NADC-76296-40.

1976

- 76.1 Psycho-Physiological and Physio-Chemical Assessment of Acceleration Induced Changes in Humans Positioned in Various Seatback Angle Configurations. H. J. Von Beckh (with V. M. Voge and J. S. Bowman). Advisory Group for Aerospace Research and Development (AGARD/NAT), Aerospace Medical Panel Specialists' Meeting, April 5-9, 1976, Copenhagen, Denmark. Published in *The pathophysiology of high sustained +G<sub>z</sub> acceleration, limitation to air combat manoeuvring and the use of centrifuges in performance training*, AGARD-CPP-189:1-8, 1976.
- 76.2 Human Performance Under Acceleration: Actuation of Ejection Seat Lower Firing Control. W. P. Orrick, Jr., P. E. York and M. M. Cohen. Report Number NADC 75268-40, Warminster: Naval Air Development Center, 41 pps., 1976.
- 76.3 Disorienting Effects of Aircraft Catapult Launchings: II. Visual and Postural Contributions. M. M. Cohen. *Aviat. Space Environ. Med.* 1976, 47: 39-41.
- 76.4 Actuation of Ejection Seats in Acceleration Environments. M. M. Cohen, W. P. Orrick Jr. and P. E. York. Preprints, Aerospace Medical Association, pps. 162-163, 1976.

1977

- 77.1 Piloting Performance Following Simulated Catapult Launchings. M. M. Cohen, P. E. York and W. P. Orrick, Jr. Preprints, Aerospace Medical Association, pps. 105-106 (1977).
- 77.2 Aircraft Emergency Devices Must be Designed for Emergency Use. M. M. Cohen and E. I. Fessenden. Proceedings of the 15<sup>th</sup> Annual SAFE Symposium, pps. 41-44 (1977).
- 77.3 Disorienting Effects of Aircraft Catapult Launchings: III. Cockpit Displays and Piloting Performance. M. M. Cohen. Aviat. Space Environ. Med. 48: 797-804 (1977).

1978

- 78.1 Some Human Responses to Repeated +Gz Pulses. Hendler, E. and Johanson, D. C. Advisory Group for Aerospace Research & Development (AGARD) NATO Conference Preprint No. 253, Nov. 1978.
- 78.2 Human Performance During Exposure to Combined Linear and Angular Accelerations. Cohen, M. M. Final Report, NASA Defense Purchase Contract number MPRT-8477C, Warminster: Naval Air Development Center, 131 pps., 1978.
- 78.3 Perceived Versus Applied Rotations About the Roll, Pitch, and Yaw Body Axes: An Application to the Stevens' Power Law. Cohen, M. M. and Nelson, J. G. Preprints, Aerospace Medical Association, pps. 130-131, 1978.
- 78.4 Physiological Responses as a Measurement of Acceleration Exposure. Johanson, D. C., Hendler, E. and Cohen, M. M. Proceedings, 31<sup>st</sup> Annual Conference on Engineering in Medicine and Biology, pps. 309, 1978.

1979

- 79.1 Physiologic and Performance Measurements in Simulated Airborne Combined Stress Environments. H. J. Von Beckh (with J. S. Bowman). *Aviat. Space Environ. Med.* 1979 604-608.
- 79.2 Effects of Sweeping Linear Accelerations on the Perceived Locations of Visual Targets. Cohen, M. M. and Nelson, J. G. Preprints, Aerospace Medical Association, pps. 224-225, 1979.
- 79.3 Research on Visual Enhancement for High-Speed, Low-Level Flight Sponsored by the Naval Air Systems Command. Rosenwasser, H., Wolbarht, M. L., Chisum, G. T., Cohen, M. M., Kulik, J. J. and Lewis, A. AGARD Conference Proceedings CP-267. *High-Speed, Low-Level Flight: Aircrew Factors*, Neuilly-sur-Seine, France: North Atlantic Treaty Organization, pps. 22-1 - 22-11, 1979.
- 79.4 Continuous Evoked Responses as an Indicator of G Tolerance. In: Rosenwasser, H., Chisum, G. T., & Morway, P. E. (Eds.) *Research Needs Relating to Aircrew Visual Requirements*; Proceeding of the 1979 Symposium held at the National Academy of Sciences. Report Number NADC-79235-60, Warminster: Naval Air Development Center, pps. 135-140, 1979.

1980

- 80.1 Timing of G-Protective Techniques. Cohen, M. M. Preprints, Aerospace Medical Association, pps. 94-95, 1980.
- 80.2 Performance During Exposure to Acceleration. Hendler, E. Preprints, Aerospace Medical Association Annual Scientific Meeting, pp. 106-107, 1980.

1981

- 81.1 On the Additivity of Acceleration Protection. Cohen, M. M. Preprints, Aerospace Medical Association, pps. 9-10, 1981.
- 81.2 Biofeedback Training of the M-1 Maneuver. Houghton, J. O., Cohen, M. M. and Bellenkes, A. H. Abstracts of Papers, XXIX International Congress of Aviation and Space Medicine, pps. 94-95, 1981.
- 81.3 Visual-Proprioceptive Interactions (Chapter 6). Cohen, M. M. In: R. D. Walk, & H. L. Pick, Jr. (Eds) *Intersensory Perception and Sensory Integration*, New York: Plenum Publishing Co., pps. 175-215, 1981.
- 81.4 Pulmonary Function Measures Before and After Exposure of Human Subject to +G<sub>x</sub> and +G<sub>y</sub> Acceleration Loads. Hendler, E. (Report No. ADC-81236-60). Warminster, PA: Naval Air Development Center, September 1981.

1982

- 82.1 Development of New Centrifuge Control Algorithms. Crosbie, R. J. NADC IR/IED Summary Report for FY82 - 15 Nov 1982 NAVMAT 3920-1.82.2 G-Induced Changes in Heart Rate and Performance, Hendler, E. Preprints, of Aerospace Medical Association Annual Scientific Meeting, pp. 165-166, 1982.
- 82.3 Effects of +G, and +G, on Some Human Responses. Hendler, E. Essex Corp. Task Report. 0017, Contract N62269-79-C-0233, dated 29 June 1982.
- 82.4 Respiratory Training and Tolerance to Accelerative Forces. Cohen, M. M. Preprints, Aerospace Medical Association, pps. 20-21, 1982.

1983

- 83.1 Combining Techniques to Enhance Protection Against High Sustained Accelerative Forces. Cohen, M. M. Aviat. Space Environ. M ed., 1983, 54:338-342.
- 83.2 Enhanced G, Tolerance Through the Use of a Liquid-Cooled Garment. Cohen, M. M., and Hrebien, L. Preprints, Aerospace Medical Association, pps. 34-35, 1983.
- 83.3 Use of Ultrasonic Dimension Measurement to Monitor Blood Shift from the Head During Exposure to +G. Nickell, W. T., Bhagat, P. K., Hrebien, L. and Cohen, M. M. Preprints, Aerospace Medical Association, pps. 180-181, 1983.
- 83.4 Loss of Visual Evoked Potential as an Endpoint in Acceleration Research. Nelson, J. G., Hrebien, L., Palumbo, J. J., and Cohen, M. M. Preprints, Aerospace Medical Association, pps. 77-78, 1983.
- 83.5 A Servo Controlled Rapid Response Anti-G Valve. Crosbie, R. J. SAFE Journal Winter Quarter-1983 Volume 13, Number 4.
- 83.6 A Total G Force Environment Dynamic Flight Simulator. Crosbie, R. J. and Eyth, J. Proceedings of the AIAA Aerospace Sciences Meeting, Flight Simulation Session. Jan 1983. Report AIAA-83-1100-CP.
- 83.7 A Servo Controlled Rapid Response Anti-G Valve. Crosbie, R. J. Report No. NADC-83087-60, 17 October 1983.
- 83.8 Application of Experimentally Derived Pilot Perceptual Angular Response Transfer Function. Crosbie, R. J. Proceedings of the AIAA Flight Simulators Technologies Conference and Technical Display. 13-15 June 1983.
- 83.9 Blood Flow Measurements Under High-G Conditions: Early Prediction of G,-Tolerance. Hrebien, L. Naval Air Development Center Technical Report ADC-83115-50, August 1983.

1984

- 84.1 Analysis of the Transient Response of Temporal Artery Blood Flow Data Relative to Various Anti-G Suit Pressure Schedules. Crosbie, R. J. Proceedings of the Aerospace Medical Panel Symposium of AGARD-NATO, 30 April - 4 May 1984.
- 84.2 Factors Affecting Human Tolerance to Sustained Acceleration. Hendler, E. and Hrebien, L. SAFE Journal 14(1): 6-11, 1984.

1985

- 85.1 Synchronized External Pulsation for Improved Tolerance to Acceleration Stress. Moore, T., Jaron, D., Chu, C., Dinnar, U., White, M., Hendler, E., and Dubin, S. IEEE Trans. Biomed. Eng. 1985; BME-32: 158-165.
- 85.2 Factors Affecting Human Tolerance to Sustained Acceleration. Hrebien, L., and Hendler, E. Aviat. Space Environ. Med. 1985; 56: 19-26.
- 85.3 Matched Filtering of Visual Evoked Potentials to Detect Acceleration (+G) Induced Blackout. Nelson, J. G., Hrebien, L., and Cammarota, J., NADC Report No. NADC-85040-60, January 1985.
- 85.4 Anti-G Suit Inflation Effects on G-Protection. Hrebien, L. and Hendler, E. Aviat. Space Environ. Med., 56(1): 19-26, January 1985.
- 85.5 External Counterpulsation for Improved Tolerance to Acceleration Stress: Model Studies and Preliminary Experiments. Moore, T., Jaron, D., Chu, C-L., Dinnar, U., Hrebien, L., White, M. J., Hendler, E., and Dubin, S. IEEE Trans. Biomed. Eng., Vol. BME-32, No. 2, February 1985.
- 85.6 Centrifuge Testing of a G Compensated/Pressure Demand Oxygen Regulator. Whitley, Phillip E. and Hrebien, Leonid. 1985 SAFE Symposium Proceedings, November 1985.
- 85.7 Anti-G Suit Protection and Body Position. Hendler, E., Hrebien, L. and Whitley, P. 1985 SAFE Symposium Proceedings, November 1985.
- 85.8 Controlling the Human Centrifuge as a Force and Motion Platform for the Dynamic Flight Simulator. Crosbie, R.J. and D.A. Kiefer. Proceedings of the AIAA Flight Simulation Technologies Conference, St. Louis, MO July 1985. Report AIAA-85-1745.

NAWCADWAR-92049-60

1986

- 86.1 Anti-G Suit Protection and Body Position. Hendler, E., Hrebien, L. and Whitley, P. Proc. 23<sup>rd</sup> Annual SAFE Symposium 1986. p. 299-302.
- 86.2 Centrifuge Testing of a G-Compensated Pressure Demand Oxygen Regulator. NAVAIRDEVCEN Technical Report NADC-86139-60 April 1986.
- 86.3 The Development of a New Manikin Prototype and Instrumentation System for Crash/Impact Testing. Frisch, G. D., Whitley, P. E., and Frisch P. H. National Specialist's Meeting on Crashworthy Design of Rotocraft Proceedings, April 1986.
- 86.4 Anti-G Suit Protection and Body Position. Hendler, E., Hrebien, L., Whitley, P. E. Naval Air Development Center Technical Report NADC 6067-60.
- 86.5 Tactical Aircrew G-Strain Familiarization Study. Hrebien, L., Eyth, J. and Bernard, G. W. Naval Air Development Center Technical Report NADC 87021-60, September 1986.
- 86.6 Training Methods for the Dynamic Tracking of Peripheral Vision Limits. Cammarota, J. P. NAVAIRDEVCEN Report No. NADC-86072-60, 1986.

## NAWCADWAR-92049-60

1987

- 87.1 Analysis of Pole Migration During Acceleration in Humans. Whitley, P. E. and Cammarota, J. 9<sup>th</sup> Annual Engineering in Medicine and Biology Society Conference Proceedings. November 1987.
- 87.2 Endpoint Determination During -G, Acceleration Stress in Man. Whitley, Phillip E. 13<sup>th</sup> Northeast Bioengineering Conference Proceedings. March 1987.
- 87.3 F/A-18 Breathing Systems Analysis. Phase II - Breathing Requirements Evaluation. NADC-87061-60.
- 87.4 Reflectance Photoplethysmography as an Adjunct to Assessment of Gravitational Acceleration Tolerance: Preliminary Findings. Jaron, D., Moore, T. W., Reddy, B. R. S., Hrebien, L., Foley, J. M. and Kepics, F. Aviat. Space Environ. Med., 58(6): 604-12, June 1987.
- 87.5 Automatic Cardiac Pacing Technique for Electrophysiologic Investigations: Measurement of Myocardial Excitability in the Dog During Exposure to +G. Hrebien, L. and Harrison, J. E. Naval Air Development Center Technical Report NADC 87098-60, June 1987.
- 87.6 Evaluation of Night Vision Goggles in the Dynamic Flight Simulator. Cammarota, J., NAVAIRDEVCCEN Report No. NADC-87006-60, 1987.
- 87.7 Detection of Acceleration (+G) Induced Blackout by Matched Filtering of Visual Evoked Potentials. Nelson, J. G., Cammarota, J. P. and Hrebien, L. AGARD Conference on Electric and Magnetic Activity of the Central Nervous System: Research and Clinical Applications, May 1987.

# NAWCADWAR-92049-60

1988

- 88.1 G-Induced Loss of Consciousness. Burton, R. R., Cohen, M. M., and Guedry, F. E. Aviat. Space Environ. Med., 59:1,1988.
- 88.2 G-LOC Panel: Questions, Answers, and Discussion. Burton, R. R., Cohen, M. M. and Guedry, F. E. Aviat. Space Environ. Med., 1988, 59:36-39.
- 88.3 Current and Emerging Technology in LOC Detection: Pulse Wave Delay for +G Tolerance Assessment. Hrebien, L. Aviat. Space Environ. Med., 9(1):29-31, January 1988.
- 88.4 Cephalic Impedance Changes as a Consequence of +G Stress. Shender, B. S., Hrebien, L., and Dubin, S. Abstract in Aviat. Space Environ. Med., 59:489, 1988.
- 88.5 Non-Invasive Cardiovascular Parameter Analysis During Acceleration. Whitley, P. and Cammarota, J. (Abstract) Aviat. Space Environ. Med., 59(5):470, May 1988.
- 88.6 F/A-18 Breathing Systems Analysis. Phase IV - Evaluation of Two Man-Mounted Systems. NADC-88024-60.
- 88.7 Converging Research on +G Induced Loss of Consciousness. Whinnery, J. E. Aviat. Space Environ. Med. 59:9-11, 1988.
- 88.8 Acceleration Induced Electrocardiographic Interval Changes. Whinnery, C. C. Aviat. Space Environ. Med. 59:102-106, 1988.
- 88.9 Recovery from +G-Induced Loss of Consciousness: Psychophysiologic Considerations. Forster, E. M. and Whinnery, J. E. Aviat. Space Environ. Med. 59:517-522, 1988.
- 88.10 On the Theory of Acceleration Tolerance. Whinnery, J. E. Naval Air Development Center Technical Report, NADC Report No. NADC-88088-60, 15 Feb 1988.
- 88.11 Considerations on Aircraft Autorecovery Based on +G-Induced Loss of Consciousness Characteristics. Whinnery, J. E. Naval Air Development Center Technical Report, NADC Report No. NADC-88091-60, 1 Dec 1988.
- 88.12 Reflex Heart Rate Response to Variable Onset +G. Forster, E. M. and Whinnery, J. E. Aviat. Space Environ. Med. 59:249-254, 1988.
- 88.13 Acceleration Induced Loss of Consciousness - A Review of 500 Episodes. Whinnery, J. E. Naval Air Development Center Technical Report, NADC Report No. NADC-88100-60, 1 Dec 1988.

# NAWCADWAR-92049-60

1989

- 89.1 Pilot Respiratory Requirements for Performance of the Anti-G Straining Maneuver. Whitley, P. E. (Abstract) Aviat. Space Environ. Med. 60(5):512, May 1989.
- 89.2 Rheoencephalography In Simulated Aviation Environmental Stress. Shender, B. S. NADC Technical Report No. NADC-89042-60, 1 June 1989.
- 89.3 A Bioimpedance Technique to Monitor the Effectiveness of the Respiratory Portion of Anti-G Straining Maneuvers. Shender, B. S., Abstract in Aviat. Space Environ. Med. 60:504, 1989.
- 89.4 Effects of Rapid Onset Acceleration on Cephalic Pulsatile Blood Volume Impedance Waveforms in Humans. Shender, B. S., Proc. of the IEEE 15<sup>th</sup> Annual NE Bioengineering Conf., p. 129, 1989.
- 89.5 Research in a High-Fidelity Acceleration Environment, Cammarota, J. Proceedings of the National Aerospace Electronics Convention, May 1989.
- 89.6 Methods for Describing and Quantifying +G<sub>i</sub>-Induced Loss of Consciousness. Whinnery, J. E. Aviat. Space Environ. Med. 60:798-802, 1989.
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- 89.8 Recovery to +1G<sub>i</sub> and +2G<sub>i</sub> Following +G<sub>i</sub>-Induced Loss of Consciousness: Operational Considerations. Whinnery, J. E., Fischer, J. R. and Shapiro, N. L. Aviat. Space Environ. Med. 60:1090-1095, 1989.
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- 89.13 Contribution of Skeletal Muscle Activity to the Natural History of Acceleration-Induced Loss of Consciousness (G-LOC). Bagshaw, R. J. and Whinnery, J. E. Medical Hypotheses 30:123-128, 1989.

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- 90.1 G-LOC During Closed Loop Simulated Aerial Combat. Cammarota, J. P. NAVAIRDEVCCEN Technical Report #N1808-TR-90-00156, January 1990.
- 90.2 Evaluation of a Full-Sortie Closed-Loop Simulated Aerial Combat Maneuver. Cammarota, J. P. Proceedings of the National Aerospace Electronics Convention, May 1990.
- 90.3 Enhancing Aircrew Centrifuge High-G Training Using On-Line Videotape Documentation. Cammarota, J. P. and Whinnery, J. E. Aviat. Space and Environ. Med., December 1990.
- 90.4 The New Zealand White Rabbit as a Model to Simulate the Effects of Acceleration and Altitude Stress on the Vasodynamics of the Brain. Shender, B. S. Abstract in Aviat. Space Environ. Med., 61:472 (1990).
- 90.5 Human Capabilities in High Angle of Attack Aircraft. Whitley, P. E. Proceedings of the NASA-Langley Conference on High Angle of Attack Aircraft, 31 October 1990.
- 90.6 The Combined Physiological Effects of -G, and Assisted Positive Pressure Breathing. Whitley, P. E. (Abstract) Aviat. Space Environ. Med., 61(5):595, May 1990.
- 90.7 High +G, Centrifuge Training: The Electrocardiographic Response to +G,-Induced Loss of Consciousness. Whinnery, A. M., Whinnery, J. E. and Hickman, J. R. Aviat. Space Environ. Med. 61:609-614 (1990).
- 90.8 Acceleration Induced Loss of Consciousness. Whinnery, A. M. and Whinnery, J. E. Archives of Neurology 47:764-776 (1990).
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