



## GARY R. WHITMAN, B.S.M.E. PROFESSIONAL BIOGRAPHICAL OUTLINE

### BACKGROUND

Mr. Whitman earned his BS in Mechanical Engineering and attended graduate courses in Medical Science at Drexel University. Currently, Mr. Whitman's focus is research, test, design, and development of occupant crash safety systems. He has collaborated with the National Highway Traffic Safety Administration, the American Academy of Pediatric Child Injury Prevention, National SAFE KIDS Campaign, the Children's Hospital of Philadelphia in child restraint research and investigation projects. Because of his dedication and special contributions, he was honored with the 1997 Pennsylvania Governor's Highway Safety Award for Occupant Protection. Mr. Whitman was the technical lead on several programs to develop an advanced occupant crash protection systems for Army ground vehicles and a program with NIOSH to study occupant crash protection of ambulance occupants. Mr. Whitman was the Subject Matter Expert on another Army program to improve the occupant crash protection in the HMMWV ground vehicle.

He has spent his entire career in the fields of occupant crash protection, restraint systems, emergency escape, crash safety and survival, system safety, and life support engineering. Mr. Whitman has over 30 years of experience in the investigation of automotive and aircraft mishaps, and provides expert testimony in his specialty fields. He is co-inventor of a passenger vehicle safety seat system; another patent for a vehicle occupant crash protection system is pending.

- Child Restraint Specialist
- Human Subject Crash Testing
- Air and Vehicle Safety Analysis
- Crash Investigation and Analysis
- Life Support Engineering
- Occupant Kinematics
- Injury Mechanism Analysis
- Crash Survivability Research
- Occupant Restraint Systems Design & Testing
- Safety Product Design and Development

### SUMMARY OF EXPERIENCE

- Directed special technical programs, including a NHTSA study of the biofidelity of state-of-the-art child dummies
- Directed a project to develop a technically advanced occupant crash protection system for ARMY ground vehicles
- Conducted numerous simulated crash sled test programs assessing child occupant crash protection systems
- Conducted hundreds of investigations of crashes involving child occupants
- Lead the development of an advanced blast and crash occupant crash protection seating and restraint system for Army ground vehicle occupants
- Developed, tested and evaluated safety equipment for Navy aviators
- Led a technical engineering team in the development of advanced restraint concepts for high performance aircraft
- Developed a new approach for seat integrated restraints, which resulted in development of state-of-the-art occupant restraints



- Spearheaded the design and development of a night vision goggle detachment system for prevention of serious cervical spine injury to ejecting aircrewmembers
- Led a team of Navy specialists in assessing, testing and analyzing crash and escape systems
- Selected as Program Manager for a number of projects in the fields of safety restraint systems, occupant crash protection, crash safety and survival, emergency escape, and life-support engineering

## EDUCATION

- B.S.M.E., Mechanical Engineering, Drexel University, 1979
- Graduate Studies, Medical Science I, II, & III, Drexel University
- Anatomy and Physiology I & II, Bucks County Community College
- Certified Child Passenger Safety Technician 2002-Current

## PROFESSIONAL EXPERIENCE

### October 1993 – Present | ARCCA, Incorporated | Director of Crashworthiness

- Leads ARCCA Crashworthiness Group in research, development and investigation in the field of occupant crash protection
- Lead ARCCA Research and Development Group in projects aimed at improving occupant protection for both adults and children
- Investigates automotive and aircraft mishaps
- Acted as Lead Engineer in a National Highway Traffic Safety Administration research program to study the biofidelity of state-of-the-art child dummies
- Served as principal investigator for an Army-sponsored projects to improve occupant crash and blast protection in Army ground vehicles
- Served as principal investigator on a NIOSH program on the test and evaluation of ambulance patient compartment occupant crash protection

### January 1978 – October 1993 | Naval Air Warfare Center | Senior Engineer

- Coordinated programs such as the Survival Technology and Restraint Improvement Program (STRIP) and the CATEYES Emergency Detachment System (CEEDS)
- Oversaw mission analysis, requirements, development specifications, requirements allocation, design, integration, testing, evaluation, and engineering specialties
- Developed life support equipment for ejected aircrew of several Navy aircraft
- Led a team that established requirements, tested and evaluated restraint and life support systems developed for Navy Aircrew Common Ejection System (NACES) to ensure proper crew station integration
- Led a team of Navy specialists to design, assess, analyze and test candidate occupant restraints
- Performed as project engineer in programs to improve crew protective equipment and survivability
- Executed design, testing and evaluation on projects such as: the Encapsulating Life Raft; the TACAIR Anti-Exposure System; the Patrol Aircrew Anti-Exposure System; and the Survival Stowage Backpack for the Maximum Performance Ejection
- Lead the preparation of the Technical Data Indoctrination Packages (TDIP) and manuals for several of the above programs, which were the first TDIP's prepared for crew system equipment

## PROFESSIONAL AFFILIATIONS

- Society of Automotive Engineers
- The SAFE Association

## PATENTS

- Co-inventor of Seat-Mounted Occupant Crash Protection System, U.S. Patent No. 6,155,601, December 5, 2000
- Co-inventor of Vehicle Safety Seat System in Passenger Vehicles, USSN 08/339,859 Vehicle Safety Seat System, Patent No. 5,553,924, September 1996
- Actuation System for an Encapsulating Life Raft, U.S. Patent No. 4861298, August 29, 1989
- Occupant, Reach and Mobility Apparatus, 5,490,517, February 13, 1996
- Co-inventor of Dual Stage Variable Load Energy Absorber for Vehicle Seating, U.S. Patent No. 8,162,374B2, April 24, 2012
- Co-inventor of Dual Stage Variable Load Energy Absorber for Vehicle Seating, U.S. Patent No. 8,439,420B2, May 14, 2013.

## PUBLICATIONS

D'Aulerio, Louis, **Whitman, Gary**, Sicher, Larry, Cantor, Alan, Markushewski, Mike. (2018): Forensic Performance Analysis of Load-Limiting Devices in Automotive Seat Belt Retractors, Journal of Forensic Sciences, DOI:10.1111/1556-4029.13955.

*\*Chosen by the JFS Associate Editors and Editor-in-Chief as a 2019 Noteworthy Article*

**Gary R. Whitman**, Dave Scott, Louis D'Aulerio, Larry Sicher, Brian Benda, Dennis Shanahan & Alfred Finch (2015): Rollover testing with volunteer live human subject, International Journal of Crashworthiness, DOI:10.1080/13588265.2015.1027563

**Whitman, Gary**, Sicher, Larry. (2013) *Dual Stage Weight-Variable Energy Absorbers*. Army Research Laboratory. ARL-CR-718.

**Whitman, Gary R.**, Hart, Arlie V., Sicher, Larry, Benda, Brian, and D'Aulerio, Louis A. (2013) *Minimizing the Risk of Lap/Shoulder Belted Children Submarining the Lap Belt*. Proceedings of the 23<sup>rd</sup> ESV Conference. May 27-30, 2013.

**Whitman, Gary R.**, Hart, Arlie V., Sicher, Larry, Benda, Brian, and D'Aulerio, Louis A. (2013) *Rear-facing Child Safety Seat Performance in Frontal NCAP Level Crashes*. Proceedings of the 23<sup>rd</sup> ESV Conference. May 27-30, 2013.

**Whitman, G.**, D'Aulerio, L., Benda, Brian J., and Sicher, Larry. (2012) *Considerations for Optimizing Occupant Protection to Children in Side Impact Crashes*. Proceedings of the ICRASH 2012 Conference. July 18-20, 2012.

Green, J. D., Yannaccone, J.R, Current, S., Sicher, L.A., Moore, P.H., **Whitman, G.R.**, (2010) *Assessing the performance of various restraints on ambulance patient compartment workers during crash events*. International Journal of Crashworthiness, Vol. 15 No. 5.

**Whitman, G.R.**, D.L. Gushue, L. Sicher, (2009). *Crash Protection for Infants Transported in Incubators*. (No. 2009-01-2832). Warrendale, PA, Society of Automotive Engineers.



Current, R.S., Moore, P. H., Green, J. D., Yannaccone, J., **Whitman, G.R.**, Sicher, L. A. (2007) "Crash Testing of Ambulance Chassis Cab Vehicles." (No. 2007-01-4267). 2007 Transactions. Warrendale, PA, Society of Automotive Engineers.

Joganich, T., Sicher, L., Nicholson, K., **Whitman, G.**, Butch, F. and Nichols, C. (2007). Human Factors Evaluation of Restraint Systems for Military Vehicles. Proceedings of the Human Factors and Ergonomics Society, 51st Annual Meeting. October 1-5, Baltimore, Maryland.

Yannaccone, J., **Whitman, G.**, Sicher, L., D'Aulerio, L. (2006). *Analysis of Nij in Simulated Real-World Crashes with a 3-year-old Hybrid-III*. International Journal of Crashworthiness, Vol. 11 No. 5.

**Whitman, G.**, L. Sicher, et al. (2006). *Dolly Rollover Testing of Child Safety Seats* (No. 2006-01-0914). Warrendale, PA, Society of Automotive Engineers.

Sicher, L., **G. Whitman**, et al. (2006). *Validation of Loading Marks on Child Safety Seats Through Testing* (No. 2006-01-0906). Warrendale, PA, Society of Automotive Engineers.

Yannaccone, J., **G. Whitman**, L. Sicher. (2005). *Pretensioners and Injury Risk*. 2005 Safe Symposium. Salt Lake City Utah, October 24-26. SAFE.

**Whitman, G.R.**, J. R. Yannaccone, et al. (2003). *Occupant Kinematics With Child Safety Seats Tested Under Real World Conditions*. 47th Annual Proceedings Association for the Advancement of Automotive Medicine, Lisbon, Portugal, AAAM.

Sicher, L. A., **G.R. Whitman**, et al. (2002). *Lateral Restraint: Comparison of Lap/Shoulder Belt vs. Lap/Shoulder Plus Supplemental Shoulder Belt Restraint Systems*. SAFE Association's 40th Annual Symposium, SAFE.

Sicher, L., **Whitman, G.R.**, et al. (2002). *Lateral Restraint for Children*. SAFE Association's 40th Annual Symposium, SAFE.

**Whitman, G.R.**, L. A. D'Aulerio, et al. (2002). *Children In Rollover Crashes*. Biomedical Engineering: Recent Developments, Medical and Engineering Publishers, Inc.

**Whitman, G.R.**, J. R. Yannaccone, et al. (2001). *A Method for the Assessment of Tethered and Untethered Child Restraint Systems using Hybrid III Three Year Old Dummy*. Injury Biomechanics Research, Proceedings of the Twenty Seventh International Workshop. San Diego, CA.

**Whitman, G.**, (2000). *Multi-Media Occupant Crash Protection Development Guide for 21st Century Trucks*. (No. 2000-01-3427). 2000 Transactions. Warrendale, PA, Society of Automotive Engineers.

**Whitman, G.**, (2000). *Effect of Cognitive Workload on Automatic Restraint System Usage*. (No. 2000-01-0174). Warrendale, PA, Society of Automotive Engineers.

Sicher, L., J. Yannaccone, **G.R. Whitman**, et al. (2000). *Occupant Protection During Rollover Events*. SAFE Association 38th Annual Symposium. Reno, NV.

Joganich, T. G., M. L. Markuszewski, A. Cantor, L.A. D'Aulerio, **G.R. Whitman**, et al. (2000). *Effect of Cognitive Workload on Automatic Restraint System Usage (SAE 2000-01-0174)*. SAE 2000 World Congress. Detroit, MI, Society of Automotive Engineers.



Sicher, L. A., **G.R. Whitman**, et al. (2000). *Common Occupant Crash Protection for Army Wheeled Trucks (SAE 2000-01-1395)*. SAE 2000 World Congress, Society of Automotive Engineers.

Reed, J., **G.R. Whitman**, L. Sicher, et al. (2000). *Designing a More Survivable Seat Systems: The Test and Evaluation of a Crash Occupant Protection System (COPS) for the HMMWV*. 11th Annual US Army Ground Vehicle Survivability Symposium. March 27-30.

**Whitman, G.**, T. Joganich, J. Dayman, B. Holmberg. (2000). *Multimedia Occupant Crash Protection Development Guide and Its Application to All Modes of Human Transport*. 38th Annual SAFE Association Symposium. October 9-11, SAFE.

**Whitman, G.R.**, K. A. Brown, et al. (1997). *Booster-with-Shield Child Restraint Case Studies (SAE 973307)*. Second Child Occupant Protection Symposium (A special joint session sponsored by Stapp, AAAM, and IRCOBI). Lake Buena Vista, FL, Society of Automotive Engineers.

Markushewski, M. L., A. Cantor, W. H. Muzzy III, L. A. D'Aulerio, **G.R. Whitman**, et. al. (1997). *Assessment of Asymmetrical Anchor Points and Load-Limiting Loops with the Lap Portion of Automotive Occupant Restraints*. 35th Survival and Flight Equipment SAFE Association. Phoenix, AZ.

Eisentraut, D. K., W. H. Muzzy III, A. Cantor, L. A. D'Aulerio, **G.R. Whitman**, et al. (1997). *Assessment of Timely Retractor Lockup in Automotive Seat Belt System (SAE 971515)*. Warrendale, PA, Society of Automotive Engineers.

Cantor, A., W. H. Muzzy III, D. K. Eisentraut, L. A. D'Aulerio, **G.R. Whitman**. (1995). *Assessment and Control of Dynamic Overshoot with Automotive Seating During Vertical Impacts (SAE 951084)*. Proceedings of the IX International Conference on Vehicle Structural Mechanics and CAE, Troy, MI, Society of Automotive Engineers.

*CATS-EYES Emergency Detachment System (CEEDS) Initiation Method Trade Study*, Report No. NAWCADWAR-93040-60, April 1993.

*CATS-EYE Emergency Detachment (CEEDS) Power Source Trade Study*, Report No. NAWCADWAR-93056-60, June 1993.

*Survival Technology and Restraint Improvement Program (STRIP) Fault Tree Analysis IH-2 Harness*, Report No. NAWCADWAR-93036-60, April 1993.

*Survival Technology and Restraint Improvement Program (STRIP) Fault Tree Analysis, MA-2 Harness*, Report No. NAWCADWAR-93037-60. May 1993.

*Survival Technology and Restraint Improvement Program (STRIP) Fault Tree Analysis, Simplified Combined Harness*, Report No. NAWCADWAR-93038-60. March 1993.

## AWARDS AND RECOGNITIONS

- Safe Kids 2014 Child Passenger Safety Award
- Safe Kids 2010 Champion Award
- SAE Technical Paper "Crash Protection for Infants Transported in Incubators" judged to be among "Most Outstanding of 2009"
- SAE Technical Paper "Crash Testing of Ambulance Chassis Cab Vehicles" judged to be among "Most Outstanding of 2007"



- SAE Technical Paper “Effect of Cognitive Workload on Automatic Restraint System Usage” judged to be among “Most Outstanding of 2000”
- SAE International Recognition Award, Professional Development Program, Research Program to Increase the Safety and Crashworthiness of Military and Commercial Ambulances, September 12, 2001
- Governor’s Highway Safety Award - Occupant Restraint Programs, October 1997
- Award for Glove/Mitten Assembly, January 1987
- Invention Awards for Actuation System for an Encapsulating Life Raft, December 1989, June 1986
- Superior Performance Awards for the years 1988 through 1993

## PRESENTATIONS

- February 19-24, 2018**      *A Forensic Performance Analysis of Load-Limiting Devices in Automotive Seat Belt Retractors* presented at the American Academy of Forensic Sciences 2018 Annual Scientific Meeting, Seattle, WA
- September 30, 2014**      *The Principles of Occupant Crash Protection and How They Apply to Child Passenger Safety* presented for the PA Chapter of the American Academy of Pediatrics
- September 2013**      *What Ensures that U.S. Child Passenger Crash Protection is State-Of-The-Art?* 2013 The Safety Institute Conference
- April 2006**      *Dolly Rollover Testing of Child Safety Seats* presented at SAE World Congress
- September 2002**      *Lateral Restraint for Children* presented at SAFE Association's 40th Annual Symposium
- September 22 – 23, 2003**      *Occupant Kinematics with Child Safety Seats Tested Under Real World Conditions*, presented at the 47th Annual Proceedings of the Association for the Advancement of Automotive Medicine, Lisbon, Portugal
- September 12, 2001**      *Research Program to Increase the Safety and Crashworthiness of Military and Commercial Ambulances*, SAE International, Military and Emergency Vehicles Safety TOPTec, Tempe AZ
- December 2000**      *New Occupant Protection Technology and Its Effect on Children*, presented at 2000 Transportation Engineering And Safety Conference, Penn State University, University Park, PA

## PEER REVIEWED LEARNED TREATISES

- Occupant Crash Protection Handbook for Tactical Ground Vehicles (Light, Medium & Heavy), Department of the Army, 2000
- Navy Aircrew Common Ejection Seat (NACES) Specification, Department of the Navy, 1985