AAR-100

Human Factors Newsletter # 03-09

May 22, 2003 – June 6, 2003

Recent Publications/Project Reports:

Human Factors Design Standard: The FAA has recently released a Human Factors Design Standard (HFDS). The HFDS replaces Human Factors Design Guide (HFDG), which served as a primary reference for seven years. The new standard provides updated and reorganized information, allowing easier access to what systems developers need.

Sponsored by AAR-100 and carried out by ACB-220, the HFDS takes information from a broad range of sources including government and industry standards and academic research. It presents the information in the form of "should" and "shall" statements. These statements can be easily converted into system-specific requirements documents or checklists. With over 100 new rules and guidelines and a reorganization of material based on information from users of the HFDG, the new HFDS is designed to provide updated information in a clear, concise format that will improve usability of the document.

Program managers within the FAA face an abundance of human factors issues in the development and procurement of systems. The HFDS provides "one-stop-shopping" for human factors information. Program managers could use the HFDS instead of going to multiple, different outside sources. The HFDS provides ready access to human factors information, saving the FAA the time and money to research each issue as it arises.

Since its release in 1996, the HFDG has served as a primary human factors reference in the acquisition and development of systems for the FAA. Available in CD ROM and downloadable from the Internet, the HFDG has not only been used by the FAA and related contractors, but by organizations across the aerospace industry (including major airlines, aircraft and helicopter manufacturers, and civil aviation organizations from around the world) and agencies within the government (including the Department of Defense, Air Force, Army, Navy, Coast Guard, the NTSB, NASA, the FDA, and the FHA). Although created for the FAA, the HFDG has also been used by educational, ergonomic, and aerospace organizations within the United States and in over 40 different countries. It is also used by an amazing cross-section of industries, including nearly every major car manufacturer, pipeline companies, electric companies, small appliance manufacturers, computer manufacturers, telephone companies, and many other companies that

produce everything from chocolate, prescription drugs, plastics and baby shampoo, to bandages. The companies that have used the HFDG touch billions of people throughout their everyday life. The release of the HFDS has the potential for broad impact both within and beyond the FAA.

The HFDS has been under internal review since September 2002 and has been available in draft form to the public for external review and comment since January 2003. The final version, incorporating comments from the review period, has been added to the AAR-100 Web site at http://www.hf.faa.gov/hfds.htm for your convenience. It is also available in CD ROM format by sending a request to:

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CAMI Laboratory Inspection: The Civil Aerospace Medical Institute's Bioaeronautical Sciences Research Laboratory (Aerospace Medical Research Division) completed its College of American Pathologists Inspection May 22-23, 2003. The inspection process was a complete in-depth review of the processes, procedures and capabilities of the Forensic Toxicology Research and Biochemistry Research/Bioinformatics Research Support functions within the Laboratory. The inspectors were extremely laudatory in their comments concerning the program and its scientists - "This is an excellent forensic laboratory." The Laboratory was found to have no deficiencies and was rated "Outstanding Rating with Distinction." Dr. John Soper was the lead CAMI scientist for the inspection. Congratulations go to Dr. Canfield, Dr. Chaturvedi, Dr. Soper and Dr. Lewis along with all the individuals within the laboratory who have made this accomplishment possible. This is the second straight time that the Laboratory has received the Outstanding Rating! Quite an accomplishment for all! (J. Whinnery, CAMI)

Aerospace Medical Association Meeting: Earlier we reported on human factors researchers from CAMI who attended the 74th Annual Scientific Meeting of the Aerospace Medical Association in San Antonio, TX. Additional presentations, workshops and awards included:

- T. Nesthus, C.E. Cruz, A. Boquet, and L. Dobbins. L. *Comparisons of Sleep Duration and Quality, Mood, and Fatigue Ratings during Quick-Turn Shift Rotations for Air Traffic Control Specialists*.
  Introduction. As part of a larger research effort, a field study known as the Air Traffic Shift Work and Fatigue Evaluation (AT-SAFE) was conducted to learn more about typical shift schedules and their effects on the controller workforce. Sleep and associated subjective measures were acquired during an integrated operational study in a Tower/TRACON and an Air Route Traffic Control Center (ARTCC). **Method**. Seventy-one controllers participated in a 3-week protocol during their routinely scheduled shifts. Actigraphy and logbook entries of sleep quality (SQR), mood (PANAS), and fatigue (Stanford Sleepiness Scale) were collected. An evaluation of changes in these measures was made during the quick-turn (QT) rotations from afternoon to early morning shifts (A/EM) and from early morning to night shifts (EM/N). Comparisons were also made between the 8-, 9-, and 10-hr QT time-off periods. **Results**. Analyses found reduced sleep duration from A to EM (7.2 to 5.4 hrs) and from EM to N (6.1 to 3.3 hrs), but not between the 8-, 9-, and 10-hr QT time off.

Significant differences were noted, however, for both negative effect and fatigue for the A/EM rotation, and for sleep quality and positive effect for the EM/N rotation, favoring 9 hrs off between shifts. SQR was best for the nap before the midnight shift for the 9-hr QT as was positive effect following the midnight shift. Numerous trends consistent with total sleep time reductions and time-of-day were found within the QT time-off across both shift rotation conditions. **Discussion**. Total sleep times were similar to previous studies and reflected the influence of shift start time. The QT between shifts required controllers to compress the time available for commuting, personal hygiene, sleep, eating, and returning to work. Some evidence in these data favored a longer time between shifts with better sleep quality, mood, and reduced fatigue.

- E. Pfleiderer, *(The) Relationship between Computer-Detected Altitude, Heading, and Speed Changes and Controller Clearances in En Route Air Traffic Control.*
  Introduction. Previous research has demonstrated a relationship between communication events and controller workload. Unfortunately, a substantial amount of time and effort is required to transcribe and code these events. Consequently, alternative measures might be preferable if they could be obtained more easily. One possibility is the use of computer-derived measures to account for the same amount of variability in controller workload that has been associated with communications events. **Method.** Two 20-minute samples of live air traffic data were collected from each of four sectors in the Kansas City en route airspace. Communications data were transcribed from audio recordings and coded (e.g., altitude, heading, and speed clearances). Altitude, heading, and speed changes were computed from System Analysis Recordings (SAR). The 20-minute samples were parsed into 4-minute intervals, and the number of communications events and changes were tallied for each interval. In addition, Air Traffic Workload Input Technique (ATWIT) measures were provided by 16 subject-matter experts for each 4-minute interval for all samples. **Results.** The correlation of combined clearances with combined changes was statistically significant at $p < .001$ ($r = .57$; $N = 40$). Standard multiple regression of altitude, heading, and speed clearances on mean ATWIT scores yielded an $R = .59$ ($R^2 = .35$). Standard multiple regression of the number of computer-detected altitude, heading, and speed changes on mean ATWIT scores yielded the same results. Adding the number of aircraft controlled to the set of predictors increased the multiple correlation to $R=.86$ ($R^2 = .74$) for both predictor sets. **Discussion.** Results suggest that computer-derived measures of altitude, heading, and speed changes may be a viable substitute for more labor-intensive communications events as predictors of subjective air traffic controller workload. Shared and unique variance described by the two variable sets is discussed.

- O.V. Prinzo, *Automatic Dependent Surveillance-Broadcast (ADS-B)/Cockpit Display of Traffic Information (CDTI): Plot Use of the Approach Spacing Application.*

  Introduction. Pilots may benefit from surveillance technology that enhances their ability to maintain pre-determined distances from other aircraft during initial and final approach. Avionics devices that provide a cockpit display of traffic information (CDTI) enable pilots to acquire, verify, establish and maintain pre-defined spacing intervals from other aircraft. It is of interest to the FAA to determine how the use of these displays influences safety, capacity, and efficiency. The second operational evaluation of ADS-B/CDTI provided an opportunity to evaluate procedural modifications needed to support operational approval for Approach

Spacing and Visual Acquisition/Traffic Awareness applications. **Method**. Twelve flight crews flew 86 approaches during three day and two night operations. Subject-matter experts read transcripts and listened to nine hrs of audiotapes for the presence of problems and operational concerns stemming from pilot use of the CDTI. **Results.** Controllers issued 172 traffic calls that resulted in 73% positive visual acquisitions (82% displayed on CDTI, 18% not displayed) that resulted in a 42% increase in visual approach clearances (up from 25 to 44). Eighty-four percent of the approach clearances included instructions for the pilot to "follow that traffic" were transmitted 2s after pilots reported that the traffic was visually acquired. Approximately 55% of these visual approaches involved one or more problems (84% traffic displayed on CDTI, 17% not displayed). Problems included uncertainty (33%), speed overtakes (28%), lost visual contact (11%), confusion (8%), stolen clearance (8%), follow traffic not sighted (6%), and aircraft call sign (6%). **Conclusions**. The use of a CDTI created some problems for the participants, including several from the call sign procedure that distinguished between the aircraft being talked to versus talked about. In light of the findings and the participants' comments, changes to proposed procedures and supporting phraseology will be constructed and evaluated for the approach spacing application.

- Scarborough, J. Pounds, and L. Bailey. *A Preliminary Classification of Runway Incursions Involving Ground Operations.*
  Introduction. Runway incursions (RI) continue to be a top safety issue for the Federal Aviation Administration (FAA). This study focused on one type of runway incursion, vehicle and pedestrian interference with aircraft operations on runways and taxiways. The event typically involves crossing the taxiway or runway without approval or clearance from the air traffic control tower. Research suggests that 20% of runway incursions (based on the period 1997-2001) were associated with vehicle or pedestrian (VPD) movements. Although the percentage is small, unauthorized vehicle or pedestrian movements pose a threat to airport safety. The FAA Runway Safety Office's database provides descriptive statistics for tracking VPDs; however, it is unclear as to why the VPDs occurred. The objective of this study was to identify human factors associated with VPDs. **Method.** Two hundred seventy-seven VPD runway incursion narratives were extracted from the database for the period 1998-2001. Data for 1997 were incomplete and not utilized. The narratives were classified based on whether there was communication (COM) with air traffic control (ATC) prior to the incident (authorized movement) or no communication (NOCOM) with ATC (unauthorized movement). **Results.** NOCOM VPDs included both vehicle (n=151) and pedestrian (n=55) movements. For vehicle movements, 93% involved a lack of radio contact, 6% were due to failure to observe standard operating procedures, and in 1% of the cases, the vehicle operator initiated movement in anticipation of receiving ATC approval. All pedestrian movement (100%) involved a willful violation of airport rules or a lack of understanding of the rules. COM VPDs included only vehicle movements (n=71). The factors that emerged included hear-back/read-back errors (39%), acknowledgment by operator but incorrect vehicle action (17%), operator ignored ATC instructions (17%), ATC inferred operator understanding (9%), operator provided ATC with incorrect information (7%), and operator in contact with ATC not relaying directions to those being supervised (1%). Finally, in 10% of the cases, it was not possible to identify a human factor theme. **Conclusion.** The results point to the need for a more comprehensive reporting of the human factors associated with VPDs. The lack of radio communications accounts for the greatest number of NOCOM VPDs. However, it is not

clear whether a radio was installed, not turned on, the volume was too low, or the operator was distracted by the task at hand. For COM VPDs, the situation is similar to the "hear-back/read-back" kinds of communication problems involving ATC and pilots. It is likely that the interventions used to improve communications between ATC and pilots would be applicable to ground operations as well.

- S.A. Shappell, and D. Wiegmann. *Human Error Associated with General Aviation Controlled Flight into Terrain.* .
  Introduction. Although all aviation accidents, regardless of severity, are of concern, perhaps none is more compelling than those where a fully functioning aircraft is inexplicably flown into the ground. These so-called controlled flight into terrain (CFIT) accidents continue to be a major safety concern within military and civilian aviation, in particular general aviation (GA). Previous work as part of the FAA's *Safer Skies* agenda reviewed 160 GA CFIT accidents occurring over a 2-year period between 1993 and 1994 and developed 55 interventions to address the causes (CFIT JSAT, 1999). While a root cause analysis technique was employed during the review, the findings might have benefited from a more traditional human error analysis. **Method.** Five independent pilot-raters using the Human Factors Analysis and Classification System (HFACS) independently analyzed over 16,500 GA accidents and categorized the accidents as either CFIT or non-CFIT using criteria set forth by the GA CFIT JSAT (1999). **Results.** A total of 1397 CFIT accidents were identified and compared with non-CFIT accidents using HFACS. Not surprising, given our previous findings, nearly 80% of CFIT and non-CFIT accidents were associated with skill-based errors, followed by decision errors, violations, and perceptual errors, with the latter two error forms occurring more often during CFIT accidents. What was interesting was that, while roughly 50% of all CFIT accidents occurred in visually impoverished conditions (i.e., at night or in IMC) and were often the result of violations, nearly the same amount (48.5%) occurred in clear daytime conditions and were more likely due to skill-based and perceptual errors. **Conclusions.** These findings support many of the interventions identified by the JSAT, including decision-making aides and recurrent pilot training. However, the information provided by the HFACS analysis will assist in the development, refinement, and more importantly, tracking of the effectiveness of selected intervention strategies.

- **AsMA Workshop**: "A Human Factors Approach to Accident Analysis and Prevention", presented by S. Shappell and D. Wiegmann..
  Human error is implicated in nearly all aviation accidents, yet most investigation and prevention programs are not designed around any theoretical framework of human error. This popular all-day workshop provides the information needed to conduct a comprehensive human error analysis of aviation accidents. To accomplish this, participants will be trained to use the Human Factors Analysis and Classification System (HFACS) that incorporates Reason's (1990) model of latent and active failures as a foundation. Widely disseminated among military and civilian organizations, HFACS encompasses all aspects of human error, including the conditions of operators and organizational failure. The workshop begins with didactic instruction on the principles of human error analysis, followed by a demonstration of how HFACS can be used as an accident analysis tool. Participants will then gain hands-on experience applying HFACS to selected accident reports. The workshop concludes with a discussion of how a thorough human error analysis can be used to identify intervention and prevention strategies for reducing both the occurrence and consequences of human error.

- **Other AsMA Reports, Panels, Workshops:**
    - V. Nakagawara, R. Montgomery, A. Dillard, L. McLin, C. Connor. *Effects of Laser Illumination on Operational and Visual Performance of pilots Conducting Terminal Operations*
    - A. Chaturvedi, A. Akin, D. Canfield. *Prevalence of SSRIs in Pilot Fatalities of Civil Aviation Accidents 1990-2001*
    - C. DeJohn, A. Wolbrink, J. Larcher. *Safety Center Year in Review" Civil Aviation 2002*
    - C. DeJohn. *Medically Related Accidents of Self- Certified Pilots*
    - Various presenters. *Medical Aspects of Aircraft Accident Investigation – Workshop*
    - J. Whinnery. *Panel Discussion – Acceleration*
    - G. McLean, C. Corbett, R. Odom. *Repeated Measurement of Effects of Aircraft Configuration and Subject Motivation on Egress in Simulated Emergency Aircraft Evacuations*
    - C. Corbett, G. McLean. *Caring for Precious Cargo II: Emergency Aircraft Evacuations with Infants through the Type II Overwing Exit*
    - A. Wolbrink. *Panel Discussion: Safety Implications of International Vision Requirements Differences – Vision Related Accidents in the US*
    - J. Soper, A. Chaturvedi, D. Canfield, K. Wood. *Evaluation of Data from No-Physiological Workplace Drug Testing Urine Samples*
    - R. Lewis. *Workshop: Current Topics in Forensic Toxicology*
    - C. DeJohn. *Workshop: Medical Aspects of Aircraft Accident Investigation*
    - S. Veronneau. *Trinational Strategic Safety Work Group Update*

- **<u>AsMA Awards.</u>**

  "Harry G. Mosley Award – For Outstanding Contributions to Flight Safety". S. Shappell CAMI) and D. Wiegmann (University of Illinois at Urbana-Champaign)

  "Raymond F. Longacre Award – For Outstanding Accomplishments in the Psychological and Psychiatric Aspects of Aerospace Medicine". Raymond E. King (CAMI)

Joint Safety Analysis Team: Dr. Kevin Williams participated in the initial meeting of the Remaining Risk Joint Safety Analysis Team (RRJSAT) at the Airline Pilots Association headquarters in Herndon, VA. The RRJSAT includes three separate thrusts intended to include all remaining risk categories. The three areas are icing, mechanical failures, and midair/cargo accidents. Dr. Williams was assigned to the midair/cargo accident group, and review of a midair accident was initiated. The goal of the JSAT process is to identify primary causes for a group of

accidents falling into a specific category and suggest interventions that will prevent such accidents in the future. (K. Williams, CAMI)

Realistic Radio Communications Simulation: Volpe Center staff has been invited to present their AAR-100 sponsored research exploring the need for realistic radio communications in simulations at the Royal Aeronautical Society's conference on "Simulation of the Environment" in November 2003. This work was initiated by the FAA's Advanced Qualification Program to ensure that the simulator environment during airline pilot training and evaluation accurately represents the "quick pace of an airline environment and its distractions" (quote from a pilot after deviating from assigned altitude). This research came to the attention of the Society by Volpe's participation in drafting the International Air Transport Association's Flight Simulator Working Group paper on "Realistic Simulated Aircraft Communication Environment."(Judith Bürki-Cohen, Volpe Center)

Integrated Information Display System: Engineering Research Psychologists from the NAS Human Factors Group (ACB-220) at the William J. Hughes Technical Center met with flight service specialists from the field to evaluate and refine a prototype of the Integrated Information Display System (IIDS). The IIDS will provide these specialists with a single point of entry for current information on weather, outages, and emergency procedures. It will also serve as a database for airport information, maps, charts, and FAA documents. The specialists stepped through scripted procedures that exercised various functions and design concepts. (T. Yuditsky, ACB-220)

ADS-B: The NAS Human Factors Group (ACB-220) supported the Safe Flight 21 program office and the Surveillance Integration Team (SIT) in the development of user interface requirements for presenting Automatic Dependent Surveillance Broadcast (ADS-B) information on the Common Automated Radar Terminal System (CARTS). ACB-220 used the Distributed Environment for Simulation, Rapid Engineering and user-centered design techniques to develop numerous design options. Important issues included controller information requirements (i.e., determining what information is needed for each application, procedure, or situation), target symbology including size, shape, and colors, and ADS-B status and equipage indicators. The SIT members were able to view the various options on a realistic radar display, request modifications, and quickly see their requests implemented. This iterative process eventually led to a design that met the information requirements and was also simple for controllers to learn, interpret, and use. ACB-220 and the SIT will now develop "thinspecs" that describe the selected user interface design and can be incorporated into formal specification documents by the program office. The selected design will be validated in a simulation/demonstration to be conducted by ACB-220 later this year. (M. McAnulty, K. Allendoerfer, ACB-220).

Adverb Intensifiers for Questionnaire Construction: Human factors practitioners may be interested in visiting the website of Bill Mahoney at the University of Dayton. Dr. Mahoney presented a workshop a couple of years ago at the FAA on questionnaire and survey design. His website provides the results of a study of positive and negative adverb-intensifiers of acceptability, adequacy, and relative goodness for use on questionnaires and surveys. (E. Wilson, AND-300, G. Hewitt, AAR-100). The Web address is:
http://academic.udayton.edu/williammoroney/adverb_intensifiers_for_use_in_r.htm

More information on human factors research can be found at the FAA Human Factors (AAR-100) web site: http://www.hf.faa.gov

Mark D. Rodgers
FAA (AAR-100)

June 9 – July 4, 2002 – World Radio Communication Conference, Geneva, Switzerland http://www.itu.int/ITU-R/conferences/wrc/wrc-03/index.asp

June 9-13, 2003 - Institute of Electrical and Electronics Engineers (IEEE) Intelligent Vehicles Symposium (IV 2003), Columbus, OH *http://www.eleceng.ohio-state.edu/~umit/IV2003/*

June 9-13, 2003 – COE for General Aviation Annual Meeting, Anchorage, AK

June 10-12, 2003 – NASA Turning Goals into Reality Conference, Williamsburg, VA *http://www.aerospace.nasa.gov/curevent/tgir/index.htm*

June 10-12, 2003 – Royal Aeronautical Society Aerodynamics Research Conference 2003, London, UK http://www.raes.org.uk/homepage.asp

June 14-17, 2003 - Association for the Advancement of Medical Instrumentation (AAMI) 2003 Annual Conference and Expo, Long Beach, CA http://www.aami.org/meetings/aami2003/index.html

June 15-22, 2003 – 45th Paris Air Show le bourget http://www.paris-air-show.com/index3.htm

June 16-19, 2003 –SAE Digital Human Modeling for Design and Engineering, Montreal, Canada http://www.sae.org/calendar/dhm/index.htm

June 18-19, 2003 – 6th GAIN World Conference, Alitalia Auditorium, Rome, Italy http://www.gainweb.org/whatsnew.html

June 19, 2003 – Royal Aeronautical Society Conference on "Simulation and Integrated Test and Evaluation". Boscomb Down, UK http://www.raes.org.uk/homepage.asp

June 19-20, 2003 – FAA/EUROCONTROL R&D Committee Meeting, Budapest, Hungary *http://www.eurocontrol.be/newsroom/events/index.html*

June 19-20, 2003 – 31st Annual Meeting of the FAA/NASA Joint University Program, Ohio University, Athens, OH http://www.aec.ohiou.edu.

June 22-27, 2003 – 10th International Conference on Human-Computer Interaction, Institute of Computer Science Foundation, Research and Technology, Science and Technology Park of Crete, Heraklion, Crete, Greece mailto:info@hcii2003.gr

June 23-25, 2003 – Human Systems Integration Symposium "Enhancing Human Performance in Naval and Joint Environments", Sheraton Premier Hotel, Tyson's Corner, VA http://www.navalengineers.org/Events/HSIS2003/HSIS.html

June 23-26, 2003 – Electronic Industries Alliance SSTC & G33/G47 Quarterly Meeting, Charleston, SC *mpetitt@eia.org*

June 23-27, 2003 – 5th EUROCONTROL/FAA ATM R&D Seminar, Budapest, Hungary *http://atm2003.eurocontrol.fr/*

June 25, 2003 – AFS-820 Flight Safety Seminar, FAA Headquarters Auditorium, Washington, DC. For questions or more information, please contact Al Peyus, AFS-820, at 202-267-3840.

July 7-10, 2003 – SAE 33rd International Conference on Environmental Systems, The Westin Bayshore Resort and Marina, Vancouver, Canada http://www/sae.org/calendar/aeromtgs.htm

July 14-17, 2003 – AIAA/ICAS International Air & Space Symposium and Exposition, Dayton Convention Center, Dayton, OH http://www.flight100.org/

July 20-24, 2003 - 2003 International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS '03*)*
http://www.scs.org/confernc/coninfo.html#spects2003

July 21 – 23, 2003 - 4th Australian Pacific Vertiflite Conference on Helicopter Technology, Melbourne, Victoria, Australia. Contacts: Dr. Arvind K. Sinha and Mr. Raden Kusumo

July 29-August 4, 2003 – 51st Annual AirVenture, Oshkosh, WI http://airventure.org/

August 7-10, 2003 – 111th Convention of the American Psychological Association, Toronto, Ontario, Canada http://www.apa.org/convention

September 3-10, 2003 – EUROCONTROL 11th Air Navigation Conference and Exhibition, Montreal, Canada *http://www.eurocontrol.be/newsroom/events/index.html*

September 8-12, 2003 – EUROCONTROL 9th Global TRAINAIR Conference and Training Symposium, *http://www.eurocontrol.be/newsroom/events/index.html*

September 8-12, 2003 – SAE Aerospace Congress and Exhibition, Palais des Congrès, Montreal, Quebec, Canada http://www/sae.org/calendar/aeromtgs.htm

September 15-17, 2003 – FAA/TCA/CAA Safety Management in Aviation Maintenance Symposium, Toronto, Canada

September 16 – 18, 2003 - 29th European Rotorcraft Forum, Friedrichshafen, Germany. Contact B. Gmelin at bernd.gmelin@dir.de

September 16-18, 2003 – MRO Europe, Cardiff International Arena, Cardiff, Wales http://www.awgnet.com/conferences/meumain.htm

September 16-19, 2003 – Investigation and Reporting of Incidents and Accidents (IRIA), Williamsburg, VA *http://shemesh.larc.nasa.gov/iria03/*

September 17-18, 2003 – FAA Research, Engineering and Development Advisory Committee (REDAC) Meeting, Washington, DC mailto:gloria.dunderman@faa.gov

September 17-21, 2003 - Institute of Electrical and Electronics Engineers (IEEE) 25th Annual Engineering in Medical and Biology Society International Conference, Cancun, Mexico *http://itzamna.uam.mx/cancun/*

September 18-19, 2003 – National Academy of Engineering 2003 Frontiers of Engineering Symposium, Irvine, CA *Welcome to the National Academy of Engineering (NAE)*

September 22-24, 2003 - 41st Annual SAFE Symposium, Jacksonville, FL *http://www.safeassociation.org/2003symposium1.htm*

September 22 – October 3, 2003 – ICAO 11th Air Navigation Conference, Montreal, Canada *http://www.icao.int/icao/en/anb/meetings/anconf11/index.html*

September 24-25, 2003 –IATA/ICAO/Flight Safety Foundation ICARUS Committee/University of Texas LOSA Meeting, Montreal, Canada mailto:helmreich@mail.utexas.edu

September 24-26, 2003 - Institute of Electrical and Electronics Engineers (IEEE) International Symposium on Technology and Society, Amsterdam, The Netherlands *http://radburn.rutgers.edu/andrews/projects/ssit/istas03.pdf*

October 5-8, 2003 - Institute of Electrical and Electronics Engineers (IEEE) International Conference on Intelligent Control, Houston, TX *http://vlab.ee.nus.edu.sg/~isic2003/*

October 5-8, 2003 - 2003 IEEE International Conference on Systems, Man, and Cybernetics, Washington, DC *http://becat.engr.uconn.edu/IEEE_CSMC_2003/*

October 6 – 9, 2003 - NATO Research and Technology Agency, Applied Vehicle Technology Panel (AVT) will present "The Vehicle Propulsion Integration Symposium" in Poland. For more information contact cheynes@rta.nato.int

October 7 – 9, 2003 - National Business Aviation Association Annual Meeting & Convention, Orlando, Florida. Contact: www.nbaa.org

October 13-17, 2003 – Human Factors and Ergonomics Society 47th Annual Meeting, Adams Mark Denver Hotel, Denver, CO http://www.hfes.org/

October 17-19, 2003 – EUROCONTROL IFATCA European Regional Meeting, Porto *http://www.eurocontrol.be/newsroom/events/index.html*

October 26-30, 2003 – ATCA 48th Annual International Technical Program and Exhibits, Marriott Wardman Park Hotel, Wash, DC http://www.atca.org/static2_item.asp?item_ID=19

October 27-28, 2003 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC http://wwwsearch.nationalacademies.org/

October 27-30, 2003 – SAE DoD Maintenance Symposium and Exposition, Valley Forge Convention Center, King of Prussia, PA http://www.sae.org/calendar/aeromtgs.htm

November, 2003(tentative) – DOD TAG-50, Fall 2003, Phoenix, AZ http://hfetag.dtic.mil/meetschl.html

November 5-6, 2003 – Royal Aeronautical Society Flight Simulation Group Conference on "Simulation of the Environment", London, UK http://www.raes.org.uk/homepage.asp

November 5-7, 2003 – FAA Centers of Excellence 3rd Joint Annual Meeting, Daytona Beach Hilton Oceanside Resort, Daytona Beach, FL *http://www.embryriddle.edu/research/FAA_COE_Meeting/index.html*

November 17-20, 2003 – 56th Annual Air Safety Seminar, A Joint Meeting of Flight Safety Foundation, International Federation of Airworthiness, and International Air Transport Association, Bangkok, Thailand http://www.flightsafety.org/seminars.html

December 2-4, 2003: National Training Systems Association Inter-Service/Industry Training, Simulation and Education Conference (I/ITSEC), Orlando, FL *http://www.trainingsystems.org*

December 9-12, 2003 - Institute of Electrical and Electronics Engineers (IEEE) Decision and Control Conference, Maui, HI *http://www2.acae.cuhk.edu.hk/~ycliu/cdc03/*

January 11-15, 2004 – Transportation Research Board Annual Meeting, Washington, DC http://www4.trb.org/trb/annual.nsf

January 21 – 23, 2004 - AHS 4th Decennial Specialists' Meeting on Aeromechanics, Fisherman's Wharf, San Francisco, CA. For more information contact the Technical Chairman, Tom Maier at tmaier@mail.acr.nasa.gov

March 22-25, 2004 – HPSAA II Conference, Human Performance, Situation Awareness, and Automation Technology, hosted by Embry-Riddle Aeronautical University and the University of Central Florida, Hilton Oceanfront Resort, Daytona Beach, FL
http://faculty.erau.edu/vincenzd/hpsaa

April, 2004 – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita*, KS* http://www/sae.org/calendar/aeromtgs.htm

May 3-6, 2004 – 75th Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK http://www.asma.org/

May 6-8, 2004 - AHS International 60th Annual Forum and Technology Display, Virginia Beach, VA. Contact Staff@vtol.org
July 27-August 2, 2004 – 52nd Annual AirVenture, Oshkosh, WI http://airventure.org/

July 28 – August 1, 2004 – 112th Convention of the American Psychological Association. Honolulu, Hawaii http://www.apa.org/convention

September 20-24, 2004 – Human Factors and Ergonomics Society 48th Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA http://www.hfes.org/

October 18-19, 2004 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington, DC *http://wwwsearch.nationalacademies.org/*

May 9-12, 2005 - 76th Annual Scientific Meeting of the Aerospace Medical Association, Kansas City, MO *http://www.asma.org/*

October 24-25, 2005 – National Academies Institute of Medicine Annual Meeting, National Academy of Sciences, Washington*, DC http://wwwsearch.nationalacademies.org/*

Note: Calendar events in Italics are new since the last Newsletter

Comments or questions regarding this newsletter?
Please contact Bill Berger at (334) 271-2928
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