



AAR-100

Human Factors Newsletter # 02-10

May 18, 2002 – June 7, 2002

Volpe NTSC Research Report - Following the successful publication of *Human Factors for Air Traffic Control Specialists: A User's Manual for Your Brain*, AAR-100 requested and sponsored the development of a similar booklet on runway safety. The result was *Runway Safety: It's Everybody's Business*. This booklet took the results of AAR-100 sponsored research on pilot and controller error in surface operations (DOT/FAA/AR-00/51, *Controller and Pilot Error in Airport Operations*) and put this information in the same humorous and easy to read format as its predecessor. Written and produced by the Volpe Center, the runway safety booklet drew upon the talents of representatives from NATCA, the Airline Pilots Association (ALPA) and the Allied Pilots Association (APA).

Runway Safety: Its Everybody's Business tells pilots and controllers what they can do to help prevent runway incursions by providing operational “tips” and alerting them to situations where extra vigilance is required. It also provides information on how pilots and controllers can help each other work together more effectively, both to prevent errors and to catch each other's errors before they result in collisions. The book is divided into two sections, one for pilots and the other for controllers. The pilots' section includes the following chapters:

1. Pilot-Controller Communications or “Was That For Us?”
2. An Elephant Might Never Forget, But We're not that Lucky: How to Make the Most of the Memory you Have
3. Navigation – How to get to Where You Should Be
4. Surveillance – The Art of “See and Avoid” – or “Seek and Ye Might Be Surprised What Ye Might Find”

The controllers' section included the following chapters:

1. Operational Errors in the Tower: What Causes Them and How to Avoid Them
2. How to Make the Most of the Memory You Have
3. Controller-Pilot Communications: How to Help Pilots Hear What You Want Them to Hear
4. The Importance of Teamwork: Four Eyes and Ears are Better Than Two, Six are Better Than Four, etc.

The booklet also contains a common chapter entitled “Fatigue Busters: Tips for Sleeping Better and Maintaining Alertness on the Job”. By containing advice to pilots and controllers in the

same booklet, it helps alert pilots to the types of mistakes controllers are likely to make (and why) and helps controllers understand the types of errors pilots are subject to. To date, almost 5000 copies of the booklet have been distributed. In addition to the wide distribution at Runway Safety Seminars, NATCA volunteered to mail several copies of the booklet to every FAA tower in the country. The material is also being used for controller training by NAV CANADA and for pilot training by several airlines. AAR-100 is also sponsoring the development of a multi-media runway safety training tool for tower controllers. This initial prototype of this tool is expected to be completed by FY03. For more information, contact Dr. Kim Cardosi /VNTSC - <mailto:kim.m.cardosi@volpe.dot.gov>

Air Transportation Human Factors - As part of their FAA-funded research grant work, researchers from the University of Central Florida (UCF) hosted two senior captains from the South American airline Lan Chile between May 15 and May 17, 2002. Marcelo Jara (Captain on the Boeing 767) and Patricio Rybertt (Captain on the Boeing 737) came to Orlando for training on the Rapidly Reconfigurable Line-Oriented Evaluations (RRLOE) scenario generation software which was developed by UCF with FAA funding. The software allows airlines to speed up the process of generating scripts for simulation scenarios. It is available to interested U.S. and international airlines via the FAA's Advanced Qualification Branch (AQP) Office, AFS-230. The meeting also served to set up further joint research between the university and Lan Chile. UCF already has a Memorandum of Understanding with Lan Chile to support the carrier in its implementation of simulator and CRM training in return for research opportunities. Headed by Drs. Eduardo Salas, Clint Bowers, and Florian Jentsch, the UCF research team plans to collect data from Lan Chile in support of the FAA's international cooperation mission in such areas as simulator training, automation use, and redesign of Notices for Airmen (NOTAMs). Lan Chile and its affiliates form one of the major Latin American air carriers. The airline operates aircraft of the types Airbus A320, Airbus A340, Boeing B767-300, and Boeing B737-200 Adv. In 2002, Lan Chile was selected by SkyTrax as the best Latin American airline for the second year in a row. (E. Edens, AFS-230; F. Jentsch, UCF)

FAA/EUROCONTROL TIM on Performance Metrics - Human factors practitioners from AAR-100 and CAMI participated in a FAA/EUROCONTROL Action Plan 2, 5, and 6 Technical Interchange Meeting (TIM) on May 15-17, 2002 in Toulouse, France. Some 45 managers, engineers, and academicians from the U.S. and Europe attended. Three tracks addressed metrics and validation, post-day metrics, and targets of metrics. Highlights of conclusions from the metrics and validation track included: simulation results are not always extensible to actual operations; many metrics are concept independent and tailoring a measure to a concept may reduce its extensibility to other concepts; clear definition of operational requirements is needed from which to derive top-down system and human performance metrics; and the gap needs to be bridged between system and human performance measures (such as how changes in eye-tracking results relate to safety and capacity metrics). Briefing reports from the three tracks along with all presentations are to be available on the FAA/EUROCONTROL Web site as well as via CD-ROM. (P. Krois, AAR-100)

French Human Factors ATC Research - Human factors practitioners from AAR-100 and CAMI met with French human factors researchers from CENA on May 16, 2002 in Toulouse, France. Common research themes included addressing controller flight data information requirements with replacement of paper flight progress strips using electronic display media, and

assessment of human performance including visual performance in association with biomedical measures across different levels of traffic complexity. Research studies by CENA and EUROCONTROL have indicated that some fonts provide better legibility for the display of ATC information. (P. Krois, AAR-100)

ADS-B - Researchers from Embry-Riddle Aeronautical University and the National Aviation Research Institute progressed in their efforts to examine the human factors aspects of ADS-B by presenting plans for a Gulf of Mexico simulation at a meeting of the Helicopter Safety Association Committee (HSAC) on May 15-16, 2002. The HSAC consists of helicopter operators, oil industry staff, FAA Headquarters and FAA Southern Region staff, and controllers. Highlights included discussion that oil companies lose an estimated \$300K per hour when weather conditions preclude VFR operations, which is the case for much of the winter months; IFR procedures tend to be inefficient, and with limited equipage there are few requests to fly IFR; and there is considerable focus on a project to place additional automated weather buoys into the Gulf of Mexico to provide better weather and VHF coverage. The researchers also made a site visit to the New Orleans TRACON on May 17, 2002. Houston ARTCC has radar coverage down to about 4,000 feet, so the TRACON uses non-radar procedures which include the helipads a majority of the helicopters operate out of located to the west of New Orleans. These procedures require helicopters to fly circuitous routes at higher levels than they would normally. The researchers will use information from these activities to prepare for a human-in-the-loop simulation. (P. Krois, AAR-100)

Award – U.S. Air Force Major Clark E. Davenport received the 2002 Harry G. Mosley Award, which is given annually by the Aerospace Medical Association for the most outstanding contribution to flight safety. As the Program Manager of Human Factors Investigation and Analysis at the USAF Flight Safety Center, Major Davenport has conducted research and analysis which indicated that spatial disorientation mishap contributors are primarily in the cognitive realm. His analysis was a cornerstone in the development of the Spatial Disorientation Countermeasure Group, which is currently working at the Joint Cockpit Office, AFRL/HEM. His proposed solutions to mitigate the spatial disorientation problem, which are driving the current USAF effort, include engineering systems that recover the aircraft automatically or provide super-salient warnings to the crewmember, development of a research program to evaluate the possibility and efficacy of training aviators about spatial disorientation (not demonstration, but true training where there is a measurable outcome), or the combination of the two. He has written articles for Flying Safety and made presentations about spatial disorientation at AsMA and the spatial disorientation workshop in San Antonio in November 2000. Retiring in July 2002 with over 20 years of military service, Maj. Davenport will work with the FAA Rotorcraft Standards Staff as an Engineering Research Psychologist at the FAA Southwest Regional Center, Ft. Worth, TX. (B. Berger, AAR-100)

ATC: Researchers from the NAS Human Factors Group (ACB-220) presented a briefing on preliminary results of the New York Arrival Simulation to the New York Airspace Redesign Team, representatives of management from the New York TRACON and Center, and others working on the New York Integrated Control Complex. The simulation was conducted in the William J. Hughes Technical Center's Research, Development and Human Factors Laboratory

and completed May 14th. The results were generally supportive of the new operations concept. Departure simulations will be conducted June 18-27. (E.Stein. WJHTC)

Aviation Maintenance Grant – The FAA (AAR-100) recently awarded a grant to Clemson University for research into the use of advanced technology to support inspection training in the general aviation industry. This research is focused on the aircraft inspector and the aircraft maintenance technician. Since it is difficult to eliminate errors altogether, continuing emphasis must be placed on developing interventions to make the inspection/maintenance system more reliable and/or more error-tolerant. Training has been identified as the primary intervention strategy for improving the quality and reliability of aircraft inspection and for reducing errors. In light of this finding, this research project will demonstrate how advanced technology can be used for inspection training and for reducing inspector errors within the general aviation industry. It will extend earlier work on computer-based inspection training for the commercial aviation system, applying it as an inspection training system (tool) for the general aviation industry. Specifically designed for training aircraft maintenance technicians in inspection skills, the tool will use a multi-media presentational approach with interaction opportunities between the user and the computer. It is anticipated that the use of this tool will systematize and standardize the inspection training process in the general aviation industry.

- **Research Objectives**

The research will be pursued over three years with the following specific objectives: (1.) conduct task analyses of existing inspection operations at geographically dispersed GA locations, (2.) develop and organize content to support inspection training, (3) deliver a prototype training system and (4) disseminate the findings of the research to both the general aviation and aviation research communities.

- **Benefits to the FAA and the general aviation industry:**

- Extends tested computer based technology to inspection training in the general aviation environment to enhance inspector performance and standardize the inspection training process.
- It will help reduce inspection errors and improve inspection performance, ultimately impacting the safety and reliability of aircraft inspection and maintenance operations.
- It will standardize the inspection training process providing an industry-wide benchmark for inspection training.
- It will alleviate problems inherent to on-the-job-training and can be combined with existing training programs to facilitate consistency in inspection training, to provide adaptive training and to support record keeping and performance monitoring.
- The research will directly support FAA requirements and the AAR mandate of reducing general aviation accidents by conducting guidelines-based human factors

research and identifying and implementing intervention strategies. (W. Krebs, AAR-100)

Aviation Maintenance Documents - The FAA published Wichita State University grant Technical Report DOT/FAA/AR-02/34, "Survey of Aviation Technical Manuals Phase 2 Report: User Evaluation of Maintenance Documents," authored by Dr. Alex Chaparro, Mr. Loren Groff, Dr. Barbara Chaparro, and Miss Deborah Scarlett. The Phase 2 report (1) examines the procedures used by industry to develop aircraft maintenance manuals, (2) documents the problems encountered by the users of these documents, and (3) identifies ways in which human factors principles can be used to improve the development of these documents. This phase includes a survey and interviews of technicians responsible for maintenance of a wide variety of Federal Aviation Regulations Part 25 aircraft. The researchers queried the technicians about technical manual usage rates, manual errors, general manual quality, and the potential safety impact of manual problems, as well as asking for suggestions to improve the manual. In summary, the results show that the accuracy and quality of technical manuals rated as being good but have poor usability. (T. Kraus, AAR-200)

Electronic Map Displays - From May 13-17, 2002, a researcher from Volpe NTSC participated in a joint RTCA and Eurocae meeting in Brussels, Belgium. Highlights included his presentation to the navigation avionics working group which detailed an outline for a chapter on minimal operational performance standards for electronic map displays to be used in an RNP environment. He also participated in a breakout meeting of the map displays working group to develop minimal operational performance standards for profile and surface map displays. (M. Zuschlag, VNTSC)

OASIS - Engineering Research Psychologists from the NAS Human Factors Group (ACB-220) conducted a human factors assessment of proposed replacement monitors for the Operational and Supportability Implementation System (OASIS). The proposed monitors are 19" flat panel LCDs. Personnel from Automated Flight Service Stations (AFSSs) nationwide examined the monitors in a structured usability assessment. Factors of interest included readability, color presentation, viewable area, off-angle viewing, performance under varying lighting conditions, and maintainability. The assessment concluded that the proposed monitors provided benefit over the current OASIS monitors due to their reduced physical size and weight. Controllers can adjust the location and viewing angle of the proposed monitors more easily. The greatest human factors benefit will be derived from how easily the monitors can be removed by Airway Facilities personnel. The original monitors could not be removed from the consoles safely by one person; the proposed monitors can be safely lifted and removed by a single technician. (K. Allendoerfer, WJHTC/ACB-220).

Aviation Security Human Factors

- **Imagery for Control Screening's Threat Image Projection (TIP) X-ray System** - Personnel from the Aviation Security Human Factors Program captured images of benign carry-on passenger baggage with Control Screening's Dynavision 6550 X-ray machine. These images will be used to develop Control Screening's computer-based training on their TIP x-ray system. (T. Kraus, AAR-200)

- **International Aviation Security Human Factors Technical Advisory Group -** Researchers from the Aviation Security Human Factors Program attended the 12th Bi-Annual International Aviation Security Human Factors Technical Advisory Group was held in Montreal, Canada, from May 7 through May 9, to participate in discussions about global airport security issues. Michael Barrientos (AAR-510) presented information on the new requirements established in the Functional Requirements for Second Generation TIP Systems. Other participants included members of the International Civil Aviation Organization (ICAO) and the new Canadian Air Transport Security Authority (CATSA), formerly the security sector of Transport Canada. (T. Kraus, AAR-200)

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

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FAA (AAR-100)



June 13-14, 2002 – Aviation Conference and Exposition, Oklahoma City, OK
<mailto:skymarket@aol.com>

June 25-27, 2002 – FAA ARA ISS Workshop/Conference, Clarion Hotel and Convention Center, Atlantic City, NJ <mailto:Meredith.Gibbs@faa.gov>

July 7-12, 2002 – 25th International Congress of Applied Psychology, Singapore
<http://www.icap2002.org/>

August 5-8, 2002 – AIAA Guidance, Navigation and Control Conference and Exhibit, Hyatt Regency Monterey, Monterey, CA <http://www.aiaa.org/>

August 22-25, 2002 – 110th Convention of the American Psychological Association, Hilton Chicago Hotel/Hyatt Regency McCormick Place Hotel, Chicago, IL
<http://www.apa.org/convention>

August 27-30, 2002 – Measuring Behavior 2002, 4th International Conference on Methods and Techniques in Behavioral Research, University of Amsterdam, Amsterdam, The Netherlands
<http://www.noldus.com/events/mb2002/index.html>

September 16-18, 2002 – Conference on Aerospace Materials, Processes and Environmental Technology, Huntsville, AL <http://ampet.msfc.nasa.gov/>

September 17-18, 2002 – FAA R,E&D Advisory Committee, Holiday Inn Rosslyn Westpark Hotel, Arlington, VA <mailto:gloria.ctr.dunderman@faa.gov>

September 17-20, 2002 – International Air Cargo Forum, Hong Kong <http://tiaca.org/>

September 30- October 4, 2002 – Human Factors and Ergonomics Society 46th Annual Meeting, Baltimore Waterfront Marriott Hotel, Baltimore, MD <http://www.hfes.org/>

October 10-19, 2002 – *The World Space Conference, Houston, TX* www.aiaa.org/wsc2002

October 14-16, 2002 – Third LOSA Week, Dubai, United Arab Emirates
<mailto:dmaurino@icao.int>

October 23-25, 2002 – International Conference on Human-Computer Interaction in Aeronautics, Massachusetts Institute of Technology, Cambridge, MA <http://www-eurisco.oncert.fr/events/hci-aero2002.html/>

October 27-31, 2002 – 21st Digital Avionics Systems Conference, Hyatt Regency Hotel, Irvine, CA <http://www.dasconline.org/>

April 7-27, 2003 – Aviation World's Fair, Newport News/Williamsburg, VA
<http://www.worlds-fair.com/> or <http://aviation-worlds-fair.com/>

May 4-9, 2003 – 74th Annual Scientific Meeting of the Aerospace Medical Association, Convention Center, San Antonio, TX <http://www.asma.org/>

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

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

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

May 2-7, 2004 – 75th Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK <http://www.asma.org/>

September 20-24, 2004 – Human Factors and Ergonomics Society 48th Annual Meeting, Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.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
or via e-mail at bill.ctr.berger@faa.gov