



AAR-100

Human Factors Newsletter # 02-19

October 19, 2002 – November 8, 2002

Project Report: *Alternative Night Vision Imaging System (NVIS) Lighting Compatibility Field Assessment*

Background. Interest and use of NVIS technology is increasing. The currently accepted practice for making a final determination of the compatibility of a lighting system with a night vision goggle (NVG) is to compare visual acuity through the NVGs with and without the lighting activated. The configuration for this procedure was developed by the military and requires relatively expensive illumination sources and radiometric measurement equipment (costs in excess of \$100K). In addition, the military method has not been validated for repeatability or reproducibility. The RTCA organized a special committee (SC-196) to address the area. This committee has described one method for determining NVIS acceptability that is very similar to the method employed by the military, which uses relatively expensive equipment. Although the procedure developed by the military and supported by the RTCA committee is the only one proven to be safely employed as an effective evaluation process, applicants applying for NVG certification have the right to not use this method if another method is appropriately documented and justified. As a result, the FAA and Department of Defense are concerned that alternate means of compliance that are suggested from applicants may not be proven totally safe, and the FAA will be confronted with unverified alternative methods by applicants who cannot afford the expensive equipment that is used in the evaluation process developed by the military.

Current Research. This project is investigating two alternative means to address NVIS acceptability. The first approach will examine possible NVIS compatibility test methodologies that do not depend on any type of measurement equipment. The second approach will investigate methods that require a bare minimum of inexpensive or easily fabricated equipment. An example of the first approach is to have observers make judgments on light level by viewing through the NVGs. It is not critical to know the exact light level but rather just that the NVGs are operating at their optimum. This occurs if the NVG is providing a lot of light output but is not saturated. One way of judging this light level condition may be to have the observer increase the light level until the NVG output scene does not get any brighter, then have the observer lower the light level until the output is judged to be about 80% of the saturated level. The actual light level would not be known, but even with a considerable margin of error on the judgment of the 80% level (say from 95% down to 50%), this would still mean the NVGs are operating at optimum. In a similar fashion, an inexpensive, non-calibrated light meter could be attached to

the output of the NVGs to achieve an output level of about 80% of saturated using the same basic technique.

In order to investigate NVIS acceptability, researchers created a NVIS lighting simulator (NLS). The purpose of the NLS is to duplicate, in a precisely controlled manner, the types of lighting interference mechanisms that can occur in the cockpit. Ideally, the NLS should provide multiple adjustable levels of potentially interfering (non-compatible) light in a highly repeatable fashion. This will enable the systematic investigation of proposed NVIS lighting evaluation methods in a laboratory environment. It should be stressed that this entire research effort is directed only at the NVIS lighting interference with the operation of the NVGs, and does not address other important aspects of a full NVIS assessment such as daylight and night time readability of cockpit instruments.

Status. To date, a baseline measurement methodology has been established and numerous alternate methods and their associated test equipment have been identified. Some methods require observers to view resolution charts while other methods (e.g., measuring NVG luminance output levels) are purely objective. The next phase is to perform laboratory studies to assess each method's ability to achieve baseline or better performance for the lowest cost and ease of implementation. (K. Krebs, AAR-100; <mailto:william.krebs@faa.gov>)

Line Operations Safety Audit: A conference on the University of Texas Line Operations Safety Audit (LOSA) was held in Dubai, United Arab Emirates October 14-16, 2002. The meeting was sponsored by the International Civil Aviation Organization (ICAO), The University of Texas Human Factors Research Project, and Emirates Airlines. The meeting was attended by 117 participants from 27 airlines from the Middle East, Europe, Asia/Pacific, Africa, and North America, six civil aviation authorities, three aircraft manufacturers, four international organizations, two universities, and three training establishments. Robert Helmreich and James Klinec from the University of Texas were the FAA-sponsored representatives. Captain Bruce Tesmer described the LOSA experiences at Continental and demonstrated the Threat and Error Management training derived from LOSA data. The meeting provided an extraordinary opportunity to exchange information on LOSA. (E. Edens, AFS-230)

Runway Incursions: Dr. Julia Pounds (AAM-510) presented an invited paper at the ICAO NAM/CAR/SAM Runway Safety/Runway Incursion Conference in Mexico City, October 22-25, 2002. The paper was titled *Retrospective Human Factors Analysis of US Runway Incursions. Focus: Air Traffic Control.* (P. Krois, AR-100)

AF Operations: Dr. Todd R. Truitt, an Engineering Research Psychologist from the NAS Human Factors Group, ACB-220, presented a paper at The International Conference on Human-Computer Interaction in Aeronautics. The paper titled "Human-in-the Loop Simulation for Airway Facilities Operations" was presented to a mixed audience of human factors specialists, aircraft manufacturers, and airline representatives from the international community. The conference was organized by the European Institute of Cognitive Sciences and Engineering, Eurisco International, and was held at the Volpe National Transportation Center in Cambridge, Massachusetts, October 23-25, 2002. The paper was published in a peer reviewed conference proceedings. (E. Stein, WHTC)

AFSSVS: Kenneth Allendoerfer, ACB-220, attended a kickoff planning meeting to develop a charter for the Automated Flight Service Station Voice Switch (AFSSVS) human factors team. The charter contains the team's purpose, rules of operation, responsibilities, etc. It was loosely based on charters that were used on previous teams. One significant difference is that human factors is a consensus-building (i.e., voting) member of this team. (E. Stein, WJHTC)

Vision Research: In October, Jing Xing, AAM-510, traveled to NASA-Ames, Stanford University, and San Francisco. While at NASA-Ames, he set up a vision research graphics computer, tested its software, and prepared the system for shipment to CAMI. He also toured the airspace operations research unit and discussed the following research projects: cockpit displays, design and evaluation of flight deck displays in space shuttles, eye movement and perception, eye movement tracking, and weather displays for ATC. A report will be prepared based on these discussions. During his visit to Stanford University, he accomplished the following: (1) Made a presentation to the Color Vision and Digital Imaging group entitled: "Color Vision Studies and Problems in Aviation Systems"; (2) Participated in an informal workshop/discussion with group members on how to evaluate the efficiency of color coding in automation displays; (3) Conducted a literature search on vision research. In San Francisco, he participated in the Optical Society Fall Vision Meeting and gave a presentation entitled: "Spatial Interactions are Different at Threshold and Suprathreshold Contrasts". (Jing Xing, CAMI)

STARS: A representative of ACB-220 met with the tower CHI working group. He assisted them in examining five candidate replacement monitors for the STARS TDM (the primary monitor in the TDW). The group selected three of these candidates to assess further in the tower cab in mid-November or early December. (E. Stein, WJHTC)

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)



November 19-20, 2002 - FAA/NASA IAIPT Human Factors Technical Interchange Meeting on Role of Human Factors in Progressing Capabilities Through R&D to Acquisition and Deployment, William J. Hughes Technical Center, Atlantic City, NJ <mailto:paul.krois@faa.gov>

November 21-24, 2002 – 43rd Annual Meeting of the Psychonomic Society, Hyatt and Westin Hotels, Kansas City, MO <mailto:psp@psychonomic.org>

December 2-5, 2002: Interservice/Industry Training, Simulation and Education Conference (IITSEC), Orlando, FL <http://www.iitsec.org>

December 10-14, 2002 – Neural Information Processing Systems 2002, Vancouver, Canada
<http://www.nips.cc/>

January 13-17, 2003 – SAE S-18 Airplane Safety Assessment Committee, Salt Lake City, UT
<mailto:lemon@sae.org>

January 14-16, 2003 – SAE Aircraft Seat Committee, San Diego, CA <mailto:elizd@sae.org>

January 16-17, 2003 – *National Research Council, Committee on Human Factors, The National Academies, Wash, DC* http://www7.nationalacademies.org/bcsse/BCSSE_Meetings.html

January 27-30, 2003: Annual Reliability and Maintainability Symposium (RAMS), Tampa, FL
<http://www.rams.org/>

January 27-31, 2003 – SAE G-10 Aerospace Behavioral Engineering Technology Committee, Melbourne, FL <mailto:lemon@sae.org>

February 4-6, 2003 – SAE North American Aviation Safety Conference, Atlanta, GA
<http://www/sae.org/calendar/aeromtgs.htm>

February 25-26, 2003 – *FAA Research, Engineering and Development Advisory Committee, Subcommittee on Human Factors Meeting, FAA Headquarters, Room 932*
<mailto:gloria.dunderman@faa.gov>

March 3-6, 2003 – SAE 2003 World Congress, Cobo Center, Detroit, MI
<http://www/sae.org/congress/index.htm>

March 17-19, 2003 – 15th Annual European Aviation Safety Seminar presented by the Flight Safety Foundation and European Regions Airlines Association, Hotel Intercontinental Geneva, Geneva, Switzerland <http://www.flightsafety.org/seminars.html>

March 24-28, 2003 – SAE Airplane Safety Assessment Committee, Lisbon, Portugal
<mailto:lemon@sae.org>

April 2-8, 2003 – Sun ‘n Fun EAA Fly In, Lakeland, FL <http://www.sun-n-fun.org>

April 5-10, 2003 – CHI 2003 Conference on Human Factors in Computing Systems, Broward Convention Center, Ft. Lauderdale, FL <http://www.chi2003.org/>

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

April 9-11, 2003 – SAE Aircraft Environmental Systems Committee, Dayton, OH
<mailto:elizd@sae.org>

April 22-23, 2003 – 48th Annual Corporate Aviation Safety Seminar, presented by the Flight Safety Foundation and the National Business Aviation Association, Westin Diplomat Resort and Spa, Hollywood, FL <http://www.flightsafety.org/seminars.html>

April 27-30, 2003 – Symposium on Interactive 3D Graphics, Monterey Marriott, Monterey, CA <mailto:Pausch@cmu.edu>

May 3-10, 2003 – International Conference on Software Engineering, Hilton Portland, Portland, OR <mailto:ldillon@cse.msu.edu>

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

May 12-17, 2003 - 2003 IEEE International Conference on Robotics and Automation, The Grand Hotel, Taipei, Taiwan <http://www.icra2003.org/>

June, 2003 – SAE Digital Human Modeling for Design and Engineering, Location TDB <http://www.sae.org/calendar/aeromtgs.htm>

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

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 24-26, 2003 – Human Systems Integration Symposium “Enhancing Human Performance in Naval and Joint Environments”, Sheraton Premier Hotel, Tyson’s Corner, VA <http://www.navalengineers.org/>

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 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 9-11, 2003 – SAE Aerospace Congress and Exhibition, Palais des Congrès, Montreal, Quebec, Canada <http://www.sae.org/calendar/aeromtgs.htm>

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

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

July 27-August 2, 2004 – 52nd Annual AirVenture, Oshkosh, WI <http://airventure.org/>

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

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



Comments or questions regarding this newsletter?
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