



FEDERAL AVIATION ADMINISTRATION  
AAR-100 (Room 907)  
800 Independence Avenue, S.W.  
Washington, D.C. 20591

Tel: 202-267-8758  
Fax: 202-267-5797  
william.krebs@faa.gov

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From: General Aviation Human Factors Program Manager, AAR-100

To: General Aviation TCRG

Subj: GENERAL AVIATION HUMAN FACTORS FOURTH QUARTER '02  
REPORT

1) Below is a summary of the projects that address the general aviation TCRG requirements. Please note, some of these projects may or may not address the sponsor's requirement due to the lack of or outdated information for this requirement. In FY03, this discrepancy will not exist.

2) FY02 projects:

- a) Causal factors of accidents and incidents attributed to human error. The fine-grained analyses of fatal GA accidents from 1990 to 1998 continues to be on track.

Doug Wiegmann and Scott Shappell presented an HFACS workshop at the 110<sup>th</sup> Annual Meeting of the American Psychological Association.

Wiegmann, D.A. (2002). *Development and use of the human factors analysis and classification tool for incident analysis*. Invited address to the California State Lands Commission's Prevention First 2002 Symposium.

Faaborg, T., Wiegmann, D. & Shappell, S. (under review) *Decision errors and general aviation accidents: A fine-grained analysis using HFACS*. Paper submitted for presentation at the Annual Scientific Meeting of the Aerospace Medical Association.

Shappell, S. A., & Wiegmann, D. A. (under review). *Human error associated with general aviation controlled flight into terrain (CFIT) accidents*. Paper submitted for presentation at the Annual Scientific Meeting of the Aerospace Medical Association.

Wiegmann, D. A., Shappell, S.A., & Fraser, J. R. (under review). A comparison of U.S. military and civilian aviation accidents using the human factors analysis

and classification system (HFACS). Paper submitted for presentation at the International Symposium of Aviation Psychology.

Shappell, S.A., & Wiegmann, D.A. (under review). *Reshaping the way we look at general aviation accidents using the human factors analysis and classification system (HFACS)*. Paper submitted for presentation at the International Symposium of Aviation Psychology.

*All indications indicate that this project is on track to complete the milestones as planned.*

b) CFIT/Terrain displays.

Development of an Aerospace Recommended Practices (ARP) paper on Perspective Flight Guidance Displays continues. Information from the HSIAC document entitled, "Flight Perspective Displays, Volume I: Final Report", will be incorporated into the ARP. HSIAC input is now concluded.

*Indications are that there are minor risks to the activity being completed as planned. This requirement will be completed September 30<sup>th</sup> 2002.*

c) Comparison of the Effectiveness of a Personal Computer Aviation Training Device, a Flight Training Device and an Airplane in Conducting Instrument Proficiency Checks. The researcher will continue to collect data until April 2004. The purpose of this study will be to directly compare the performance of pilots receiving an IPC in a Frasca (IPC #1) and in an airplane (IPC #2) and to compare the performance of pilots receiving an IPC in a PCATD and in an airplane. This comparison will investigate the effectiveness of the Frasca and the PCATD as a device in which to administer an IPC. In addition, performance of pilots receiving IPC #1 in an airplane and IPC #2 in an airplane with a second CFII will be compared. This comparison will permit the determination of the reliability of IPCs conducted in an airplane. A total of 22 out of 105 subjects have completed the project.

*All indications indicate that this project is on track, however this project does not have an execution plan and it is unclear how the project's deliverable will meet the sponsor's objectives.*

*Recommend that this project be evaluated at the TCRG to determine who is the sponsor point of contact and how this project will meet the TCRG objectives.*

d) Credit for Instrument Rating in a Flight Training Device or Personal Computer

- i. Phase I: Survey UAA, Part 61, and Part 141 institutions. A Part 141 approved flight schools mailing list was created from the current issue of AC 141-2DD. Four hundred and thirty-three surveys were sent to Part 141 approved flight schools during the week of August 12<sup>th</sup>, 2002.

Schools who participated in the first survey did not receive a second survey. Of those 433 surveys sent, 87 (~20%) were returned. For those who did not respond, follow-up interviews will commence late September through early November. In reference to the Part 61 schools, there is no central listing of these schools. The researchers will distribute the survey to as many Part 61 schools as possible.

*Indications are that activity is on track to be completed as planned. The draft report is due November 30, 2002 and the final report due on December 15, 2002.*

- ii. Phase II: Capabilities of FTDs/PCATDs. ERAU waiting final approval from the FAA Tech Center grants office. Due to the award date delay the final deliverable will slip from November 30<sup>th</sup> to January 30<sup>th</sup>.

*Indications are that there are minor risks to the activity being completed as planned. The requirement will be completed in January 2003.*

- iii. Phase III: Transfer of Training Effectiveness of a Flight Training Device (FTD). This project began August 28, 2002. Currently 41 subjects have started the study. The researcher is collecting data that will continue until August 2005.

*Indications are that this activity is on track.*

- e) Developing And Validating Criteria for Constraining False & Nuisance Alerts For Cockpit Display Of Traffic Information Avionics. The grant was officially awarded on 8/23/02. The work on the grant has commenced and the literature review on automation reliability and operator trust has been completed. Review of literature on human ability to deal with probabilistic information, techniques to display such information, and the role of the CDTI in the mature Free Flight environment is continuing. The researcher began to obtain material relevant to CDTI development and algorithms; similar efforts with respect to TCAS and URET will commence in the next couple of weeks.

*Indications are that this activity is on track.*

- f) Establish certification requirements for the use of helmet-mounted display technology in General Aviation

No progress report from researcher.

*Indications are that there are minor risks to the activity being completed as planned. The requirement will be completed in September 2002.*

- g) General Aviation Training.

*Completed: researcher's objectives have been met. The requirement will not receive any further funding.*

h) JSAT ADM Panel.

*Completed: Task/activity's objectives have been met. The requirement will not receive any further funding.*

i) Loss of Primary Flight Instruments during IMC.

*Completed: Task/activity's objectives have been met. The requirement will not receive any further funding.*

j) Low Visibility and Visual Detection. Grant submitted and under review. AAR-100 will fund first year using FY02/FY03 funds.

*Indications are that this activity is on track*

k) Pilot field-of-vision capabilities/limitations.

Zedasoft delivered the head-mounted display and interfaced it with the BGARS. They will return in the next quarter, upon conclusion of a study now being run in the AGARS and after the I/O upgrade is completed, to interface the device with the AGARS. The acceptance tests indicated acceptable update rates and acceptable transport delays, but some minor alignment issues remain to be resolved that involve the out-the-window forward-looking view.

*Indications are that there are major risks to the activity being completed as planned.*

*This requirement will need to be reevaluated at the TCRG meeting. The requirement description is outdated and does not contain objectives, metrics, and deliverables, and schedule milestones. In addition, there is no execution plan for this requirement.*

l) Priorities, organization, and sources of information accessed by pilots in various phases of flight.

No progress report from researcher.

*Indications are that there are minor risks to the activity being completed as planned. The requirement will be completed in October 2002.*

m) Reduction of Weather-Related and Maneuvering Flight GA Accidents. Data collection is underway for our next study. This study is examining ways of

influencing risk perception, over-confidence, and excessive optimism in non-instrument rated pilots. Individual differences in perceived piloting skills, as well as knowledge of weather hazards and risks are being assessed. Next, pilots are being exposed to a VFR flight into IMC simulation and required to exit the adverse weather by executing a 180-degree turn. A control group simply performs these maneuvers in VMC. Re-assessments of individual differences in confidence and risk perception are then being performed. Correlations between pilots' initial self-ratings and their abilities to execute the 180-degree maneuver to FAA standards will be explored. The effects of risk exposure on changes in these self-ratings will also be examined.

Goh, J. & Wiegmann, D.A. (2002). Human factors analysis of accidents involving visual flight rules flight into adverse weather. *Aviation, Space, and Environmental Medicine*, 73, 817-822.

Goh, J., & Wiegmann, D. A. (2002). Relating flight experience and pilots' perceptions of decision-making skill. *Proceedings of the 46<sup>th</sup> Annual Meeting of the Human Factors and Ergonomics Society*, Baltimore, MD.

Wiegmann, D., Goh, J., & O'Hare, D. (in press). The role of situation assessment and experience in pilots' decisions to continue visual flight rules (VFR) flight into adverse weather. *Human Factors*.

*Completed: Task/activity's objectives have been met.*

*The researcher has entered the third and final year of the grant. Recommend to the TCRG to re-evaluate requirement to determine whether further research is needed.*

William K. Krebs