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

To: General Aviation Human Factors TCRG, (POC: Mike Brown, AFS-800)

Subj: Proficiency Standards for Technically Advanced Aircraft Execution Plan

Ref: (a) FY04 GA TCRG "FAA/Industry Training Standards (FITS)" requirement

1. Requirement Background: The FITS (FAA/Industry Training Standards) proposes to modernize aviation pilot training while also improving training effectiveness and safety. The FITS training program targets pilots at all levels of experience who are transitioning to technically advanced aircraft (TAA). The present version of the FITS Master Training Syllabus and Standards calls for a general emphasis on four skills valuable to pilots of all types of aircraft: aeronautical decision making, risk management, situational awareness, and single-pilot resource management. In addition to these important skills, previous research has identified more specific challenges that most pilots face when learning to use advanced avionics. Aside from technical challenges presented by the design of avionics systems, students often struggle in acquiring a conceptual understanding of the functions offered by the avionics, developing system monitoring skills and habits, developing mode management and awareness skills, understanding when and when not to use automation, and maintaining manual flying skills. Deficiencies in these areas have been shown to result in common student error patterns, some of them presenting serious consequences (e.g., overrunning missed approach points, failure to capture an approach course, altitude deviations, descending to minimums without checking for navigational integrity, etc). These findings suggest that operating an aircraft with advanced avionics requires an additional set of knowledge elements and skills. The aim of this project is to provide both pilots and flight instructors with more detailed guidance when learning, teaching, and evaluating the use of advanced avionics.
2. The study's approach will include operational experience and research that can inform the creation of proficiency standards for advanced avionics. A first step is to gather existing FAA publications pertaining to advanced avionics and technically advanced aircraft (e.g., AIM, advisory circulars, etc). To avoid duplication, the project will complement and enhance ongoing work to ensure that this project does not result in a separate (and possibly conflicting) proficiency standard for avionics. Next, the scientific literature offers a growing body of observational studies of pilots

learning to use advanced avionics. Flight instructors, especially factory instructors employed by manufacturers of TAA (e.g., Cirrus, Cessna, etc), have valuable experience and insights to offer. Instructors and training managers at airline carriers have similar experience, especially regional carriers who transition new-hire pilots from piston-engine flight training environments to glass cockpit regional jets.

3. Review inputs from existing FAA literature, research, and aviation professionals will be used to prepare a document that will contain:

- i. Proficiency standards for advanced avionics; gather all existing FAA publications related to advanced avionics; resources and references to help pilots meet the standards; an operational or research basis for each element in the standards; likely amounts of training required to meet the standards supported by in-flight observations of pilots learning to fly technically advanced aircraft; common student errors.
- ii. The project will address the following questions:
 - a. Emphasis will be placed on IFR
 - b. Initial and transition training
 - c. Stratified list of technology (e.g., GPS navigator, full integrated cockpit, etc) will be addressed.
 - d. Researcher will account for pilots' experience. Most likely, knowledge skills and abilities will differ between aircraft
- iii. Quarterly (December, March, June, September) research progress status reports: Informal e-mail reports from the program manager aviation maintenance human factors to General Aviation Human Factors TCRG.
- iv. Annual Report: Grantee will submit an annual report.
- v. Program Review: Grantee will participate in the annual program review.

4. Deliverables:

- i. Create a detailed list of knowledge and skill elements for advanced avionics. Use focus-group techniques to solicit inputs from factory and other authorized instructors, airline training managers and instructors, research community, and FAA.
 - ii. Create a draft of a generic technical reference, similar to FAA-H-8083 publications, to support each knowledge and skill element.
 - iii. Present results from an empirical evaluation to compare the generic technical reference to an equipment-specific technical reference.
 - iv. Quarterly research progress reports.
 - v. Annual report
5. AFS-800 Responsibility
- Identify AFS-800 FITS point of contact who will serve as AFS-800 representative between the researcher and AAR-100 for this project
 - Make available personnel and resources to investigator

- Implement project deliverable into the FITS program

6. Schedule:

Project time line (1 year duration)

- Bi-monthly telephone meetings will be conducted between the investigator, AAR-100 representative, and AFS-800 FITS team representatives. The purpose of the telephone meetings will be to monitor the project's progress and to obtain sponsor feedback.
- The researcher will present six times the status of the project to AAR-100 and AFS-800 FITS representatives. Unless directed by AAR-100, primary location of meeting location will be FAA headquarters. Meeting dates planned include:
 - i. 1 Feb 2005 (Washington DC): JSC meeting, researcher will present project to JSC
 - ii. 2 Feb 2005 (Washington DC): GA TCRG meeting, researcher will present project progress to GA TCRG members
 - iii. 23 Mar 2005 (Daytona Beach, FL): FITS meeting, researcher will present project progress to FITS attendees
 - iv. May 2005 (Washington DC): GA TCRG meeting, researcher will present project progress to AFS-800 FITS team
 - v. July 2005 (Washington DC): GA TCRG meeting, researcher will present project progress to AFS-800 FITS team
 - vi. Sept 2005 (Washington DC): GA TCRG meeting, researcher will present final results to GA TCRG members
- December 31, 2004: Finish literature review.
- April 30, 2005: Complete list of knowledge and skill elements.
- August 31, 2005: Complete empirical evaluations.
- September 30, 2005: Deliver document and final report.

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