

## President's Report on Aeronautics and Space

In FY 2001, human factors and aeromedical scientists conducted research to provide the FAA and industry with human performance information critical to the design, operation, regulation, and certification of equipment, training, and procedures, thereby facilitating safe and efficient National Airspace System (NAS) operations and reducing operator error as an accident causation factor. The agency conducted aeromedical research with a focus on improving the health, safety, and survivability of aircraft crews and passengers.

The air transportation human factors research program conducted Line Oriented Safety Audits to collect and analyze data on the antecedents and responses to crew error. The results of these investigations are used by the air carriers to modify current line operations and pilot training programs to enhance safety. Researchers completed a survey of over 12,000 US air carrier pilots regarding the effectiveness of current pilot training programs. The results revealed that pilots view their training as effective and important in preparing them to fly in the NAS. Researchers also continued development of a system air carriers and local FAA offices use in designing pilot training simulator scenarios that are challenging, fair, and operationally relevant when evaluating pilot performance. Phase 2 of the Model Advanced Qualification Program (AQP) was completed in 2001. This training analysis and training development system allows air carriers to design an AQP from task analysis using performance data collection and analysis. The training development system is targeted toward encouraging regional airlines to participate in AQP. A pilot knowledge assessment tool was developed in 2001. This software allows air carriers to evaluate the level of understanding pilots have in regard to automated flight deck systems. With this information, pilot training departments can target automation training topics to their particular pilot population.

General aviation researchers completed an analysis of causal factors in accidents and incidents attributed to human error using the military Human Factors Analysis and Classification System (HFACS). Aviation maintenance researchers continued their investigation of methods and guidelines that can be used to reduce fatigue-producing factors in the maintenance environment. The goal of these research projects is to reduce errors and accidents and increase general aviation and maintenance safety. Flight technologies and procedures research completed a project addressing issues and design characteristics of profile situation awareness displays. Researchers in this area also investigated human factors considerations in the design and evaluation of electronic flight bags. The results from both of these research projects will facilitate development of regulatory and certification guidance material.

In FY 2001, the FAA researched a new incident investigation technique called JANUS that leverages HFACS to assess underlying causal factors of operational errors in Air Traffic Control. This project is harmonized with a research project on human error by EUROCONTROL, a body established to address air traffic safety and efficiency in Europe. Research also examined human-factor issues in runway incursions, including development of a new booklet for controllers and pilots entitled *Runway Safety: It's Everybody's Business*, that provides helpful information on memory, pilot/controller communication, and situation awareness. Completion of the Congressionally-directed review of the effect of fatigue and shift patterns in the controller workforce involved feedback to controllers and educational information on fatigue countermeasures.

The largest cabin evacuation study ever conducted was completed evaluating aircraft design and human factors affecting passenger egress through Type III (over wing) emergency exits in transport aircraft. An altitude research study evaluating the physiological protection provided by three different types of continuous flow oxygen masks used with portable oxygen bottles for flight attendants was completed. The 747 Aircraft Environmental Research Facility was completed and is in service supporting a variety of safety, security, training and testing functions and programs. Research was conducted to address the FAA's goal for an equivalent level of safety for all aircraft occupants with targeted areas including seats/restraints/inflation devices for infants and small children and side-facing seats in corporate aircraft. In addition, three research studies aimed at providing information on 1) the accessibility of under seat life preservers on transport aircraft, 2) the tension average passengers apply to their seat belts during normal and emergency conditions and 3) the optimum lever motion for rapid seat belt release were completed. Researchers continue to investigate the nature of in-flight medical emergencies and the use of defibrillators on commercial flights, as well as perform epidemiological assessment of biochemical and toxicological factors from fatal civilian aviation accidents. The aviation medicine research program continued to support the 5-year National Institute for Occupational Safety and Health cabin environment study ordered by Congress. In addition, the CARI-6 radiobiological computer program developed provides guidelines and dosage estimates for ensuring flight crew health during solar particle events.