STATEMENT OF JOHN BURT, EXECUTIVE DIRECTOR FOR SYSTEM DEVELOPMENT, FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY, SUBCOMMITTEE ON TECHNOLOGY, ENVIRONMENT, AND AVIATION, CONCERNING THE FAA'S RESEARCH, ENGINEERING, AND DEVELOPMENT PROGRAM. JULY 29, 1993.

Mr. Chairman and Members of the Subcommittee:

I am pleased to appear before you today to discuss the FAA's research and development program, and, in particular, our priorities and plans over the next several years. Accompanying me this morning are Martin T. Pozesky, Associate Administrator for System Engineering and Development, Harvey Safeer, Director of the FAA Technical Center, Jon L. Jordan, Federal Air Surgeon, and Anthony J. Broderick, Associate Administrator for Regulation and Certification.

I would first like to acknowledge the many contributions this Subcommittee has made in advancing our Research, Engineering, and Development Program. Your guidance and direction have helped us achieve one of the most clearly focused R&D programs that we have had in over a decade.

Our plan guiding our research programs builds on the recommendations advanced by FAA's R&D Advisory Committee review panel. That panel, chaired by Mr. Norman Augustine, provided its findings to FAA in November 1991. In January 1993, the panel issued an updated report concerning its original review.

We used the panel's report as a cornerstone in developing our R&D vision and priorities. Our plan concentrates on the use of academic, scientific, and industry resources. It is a plan we believe will have major impacts on the competitiveness and profitability of U.S. aviation.

Before I explain our overall research and development efforts, I would like to discuss with you the current concern about the quality of air on passenger aircraft. Due to the recent resurgence of tuberculosis in the United States, one of the questions under investigation by the Center of Disease Control and Prevention (CDC) is the possible contraction of communicable diseases from the air in passenger aircraft. The FAA has recently reviewed the research conducted thus far on the aircraft cabin environment and has found no indication that cabin ventilation is a factor in spreading disease. However, we encourage the research being conducted by CDC and hope to contribute to it in a valuable way. The FAA has advised CDC of its desire to participate in the CDC study and we have offered our assistance as appropriate. In addition, we have provided CDC with the report prepared by Geomet Technologies, Inc., published in 1989, on the health risks to airliner occupants from exposure to environmental pollutants.

There are several regulations in place to ensure that passenger and crew compartments are suitably ventilated. The current rules regulate air flow, carbon monoxide and carbon dioxide levels as well as ozone levels. We believe that these regulations protect passenger and worker health and that these standards are met in all current aircraft operations. And, for increased passenger comfort, the FAA will propose rule changes in the airplane certification regulations to require increased fresh air flow in all occupied areas and to further limit carbon dioxide in the passenger cabin for newly certificated transport airplanes. These rulemaking actions are in executive coordination.

Let me concentrate on specific areas where we are placing emphasis on building a balanced program aimed at achieving greater benefits for increasing the capacity of our air traffic system, lowering operating costs for all users of the airspace, achieving greater passenger safety and security, and adding safeguards to reduce the impact of aviation on the environment.

The use of satellite navigation, specifically the Global Positioning System (GPS), will likely revolutionize the way air traffic management is performed in the 21st Century. Satellite technology is high on our list of R&D priorities. The goal of our GPS research program is to enable pilots to use GPS as the single navigation system for all phases of flight--oceanic, domestic en route, approach and landing, and on the airport surface, especially during low visibility conditions.

I believe we are making remarkable progress in this area. Just last month, FAA approved the use of GPS as a supplemental system for en route navigation and for conducting instrument approaches at U.S. airports currently having non-precision approach aids such as very high frequency omni-directional radar (VOR's) and non-directional beacons (NDB's). This approval will enable aircraft equipped with GPS to fly approaches to approximately 5,000 runways at 2,500 U.S. airports.

Our R&D program will next focus on extending GPS navigation performance to support landings in limited visibility conditions--from Category I capability, down to the severest conditions, called Category III landing capability.

A sole navigation capability with GPS translates into aircraft fuel and time savings through direct routings, reduced avionics costs, and improved airport capacity. For FAA, full GPS implementation for civil users means that we can begin relying less on ground navigation aids, which are expensive to establish and maintain. The future for GPS use in aviation, indeed for all transportation modes, is quite bright.

Equally exciting, we think, is the progress we can report on ATC automation--particularly in the terminal area where most accidents happen and congestion exists. About 2 years ago, we embarked on a program to apply a technology, developed by NASA, called CTAS for Center TRACON Automation System. When CTAS is in place, starting in 1994, controllers will have improved capabilities to sequence aircraft in near optimal arrival flows. Once the system is fully operational, controllers will have aids available to handle higher levels of traffic in the terminal area with greater efficiency and safety. The payoff is additional capacity and associated operating fuel savings at those airports, which today are choked with congestion.

Our R&D program to deliver improved air traffic control automation technologies includes other projects to provide controllers and pilots with more fuel efficient and safe routes over the ocean and in domestic en route airspace. The Advanced Traffic Management System (ATMS) incorporates better prediction and modeling techniques with tools for air traffic managers that will help minimize delays and other adverse impacts of congestion. User preferred routes are currently being provided to a limited number of aircraft between designated city pairs or on individual flight requests.

This summer we will be using, for the first time, an innovation we are calling HARS, for High Altitude Route System, developed under our Operational Traffic Flow Planning Project. HARS uses dynamic programming to select the most fuel-efficient, high-altitude route between pairs of cities, taking into account winds and temperatures at various altitudes.

Its initial tryout will occur during this summer's thunderstorm season, when HARS will help in the rerouting of traffic around severe weather disturbances. A pre-prototype version has already been turned over to our flow control staff so that they can practice with it before summer storms begin to become disruptive to domestic air travel. Depending on our experience during the next few months, HARS will undergo further refinement and modification. Eventually, we expect that it will prove to be extremely valuable in optimizing routes all over the country. For flights over the ocean, the FAA's Oceanic Automation Program will provide data link and Automatic Dependent Surveillance for direct communication between pilot and controller. Improvements in display technology and man-machine interface for digital communications will allow controllers to meet the ever increasing traffic demand of oceanic travel.

For the past 10 years, the FAA has pursued an aggressive research program to employ digital communications in a dynamic air traffic control environment. Now that research has paid off. At 31 airports in the United States, pilots can receive pre-departure briefings over a digital data link instead of the old radio-based system. Digital communications are twice as fast and far less prone to error than the old voice system. They cut down on this phase of a controller's workload by a half or more. By the end of 1994, we plan to extend this service to 60 airports.

Finally, we are applying several ATC technologies including advanced radar processing, and eventually GPS, to achieve a dramatic reduction in runway incursions. Prototypes of two such systems are now operating at San Francisco and Boston Logan airports.

In FAA, safety is the number one concern in aviation, and that applies to our research program as well. Roughly 44 percent of our R,E&D budget is applied to research projects directly aimed at improving safety. Among these, research centered on fire safety, aging aircraft, and occupant survivability stand-out. We are developing fire safety design improvements for the aircraft fuselage in three major areas: fire management; materials; and systems. Our fire management research includes the development of a cabin water spray system designed to improve passenger survivability during a postcrash fire. Numerous full-scale tests conducted at the Technical Center indicate that water spray can increase survival time by approximately 2 minutes in all but the most severe fire conditions. Moreover, recent optimization tests have shown that a zoned system may provide 20 seconds of additional time for escape for each gallon of water discharged. Despite these positive results, the system is still relatively heavy and expensive. Work in FY 1994 will try to reduce the weight. We will also continue our cost analysis and complete the design requirements.

Because the fuselage remains intact in approximately 50 percent of survivable aircraft crash fires, we also have a cooperative project with the British Civil Aviation Authority to improve the resistance of a fuselage to burn through by an external fuel fire. Next year we will be evaluating promising materials and concepts under full-scale postcrash fire conditions in order to identify the best approach for hardening the fuselage. Other projects are directed at developing a fire resistant cabin. In particular, we are looking into advanced fire resistant resins, fabrics, foams, and thermoplastics.

Our aging aircraft research program includes the development of an analytical model to predict the onset of widespread fatigue damage. We are also continuing the development of an automated system so that our aircraft safety inspectors can retrieve a wide range of critical safety performance data quickly and efficiently. And in the area of maintenance and inspection, we are working on improved methods to detect fatigue cracks and corrosion in airplane structures. In fact, in support of this work, FAA, in partnership with the Department of Energy's SANDIA Laboratory, dedicated a nondestructive inspection validation center in Albuquerque, New Mexico, in February 1993. This center will evaluate and demonstrate aircraft inspection technologies so that they can be transferred to industry.

Passenger security is yet another critical category of safety research. Our priorities continue to be the hardening of aircraft components against damage from explosives, and the development of prototype systems to screen passengers, checked luggage, and carry-on baggage.

The majority of our security research centers on the development of prototype explosive detection systems: the most promising uses x-rays to penetrate and identify explosives in carry-on and checked baggage. We will continue to improve upon the technical capabilities of these systems, evaluate new promising technologies, and explore ways to reduce the size and cost of prototype equipment. In fact, as we speak, we are conducting operational tests of the most promising systems. To assure that all tests are conducted in a comparable manner we are using a standardized protocol for baggage testing developed by the National Academy of Sciences.

Our research into the hardening of critical aircraft components against blast damage has led to some very promising developments. Complementing the work on detection, we have developed a prototype baggage container, which could provide substantial protection against blast effects. Work is continuing to develop a production version of this container that will be both blast-protective and cost-effective for industry application.

The final thrust of our safety research is human factors. We have an aggressive, well-coordinated program of research into the main sources of human error--from the perspectives of the pilot, maintenance technician, air traffic controller, and security inspector. We have also made it a requirement that human factors be systematically integrated at each critical step in the design, testing, and acquisition of any new technology introduced by FAA into our National Airspace System. This past year, we dedicated the Human Factors Laboratory at the Technical Center. Work at this facility will complement research being performed at NASA and other laboratories.

Mr. Chairman, our fiscal year 1994 budget request is $250 million. This is almost a 9 percent increase over our 1993 level. However, budget amounts tell only a partial story.

To optimize results from these funds, we are leveraging our resources with those of other federal laboratories. In particular, we have engaged in cooperative research with NASA, DoD, the Department of Energy, and industry toward accomplishing our aggressive R&D program. This cooperative research spans many areas. For example, in mid-October 1992, the FAA and NASA signed an Interagency Agreement for a cooperative subsonic noise reduction technology program. The program falls under the FAA-NASA Memorandum of Understanding for Environmental Compatibility Research. The purpose of the program is to develop subsonic noise reduction technology that will provide for increased air traffic growth into the 21st Century, while limiting community noise exposure to the levels anticipated in the year 2000.

The noise reduction technology developed through this program would serve to (1) alleviate the noise constraints on aviation system capacity, (2) enhance/maintain the competitiveness of U.S. airplane manufacturers in overseas markets, and (3) provide the technological and economic bases for a more stringent noise certification regulation for subsonic turbojet airplanes.

We recognize that competition for funding of Federal programs will remain high, and that it is incumbent upon the FAA to maximize benefits to the traveling public through careful management of our programs and cooperative work with other capable, interested organizations. We remain strongly committed to these important objectives.

Mr. Chairman this concludes my prepared statement. We will be happy to respond to any questions you may have at this time.