BEFORE THE
SUBCOMMITTEE ON SPACE AND AERONAUTICS
COMMITTEE ON SCIENCE AND TECHNOLOGY
UNITED STATES HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.

Testimony of
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On

Federal Aviation Administration's R&D Budget Priorities for Fiscal Year 2008

March 22, 2007

Good morning. My name is Steve Alterman and I am the President of the Cargo Airline Association, the nationwide organization representing the interests of the all-cargo air carrier industry, as well as other businesses and entities with a stake in the all-cargo supply chain. (A list of current members is attached). I also have the honor of serving as the current Chairman of the Environmental Subcommittee of the FAA's Research, Engineering and Development Advisory Committee (REDAC). Thank you for the opportunity today to present some industry thoughts on FAA R&D efforts.

Initially, I think it is important for Congress to understand the critical importance of research and development as we move toward a new paradigm in airspace management. As a practical matter, today's R&D forms the basis for tomorrow's operational products, and any delay in this element of work has significant negative long term effects. All too often, this component of the modernization equation is overlooked in the contentious debate over future system funding. It should not be.

Over the past decade, our industry segment has worked closely with the FAA on various portions of the research and development portfolio, from the development of Automatic Dependent Surveillance – Broadcast (ADS-B) capabilities to the balancing of environmental sensitivity with the needs of the traveling and shipping public. If we have learned one thing from these efforts, it is that there must be a firm commitment from both industry and government to both the necessary research **and the** transition from the research mode to one of implementation. If either side breaks down, useful projects may be doomed.

Put somewhat differently, the FAA research and development effort must be a true partnership – with each participant willing to support the other. From the industry perspective, the research should include, not only the scientific elements of the project, but also an analysis of the benefits and costs to both government and industry.

Another preliminary point worth noting is that recent "re-prioritizing" of NASA research to concentrate on space missions, and downgrade aeronautics activities, has seriously affected the FAA research effort. In order to compensate for the decrease in NASA activity, it is vitally important that the FAA R&D budget be increased to permit needed research to be undertaken in a timely fashion.[1]

Moving to more specific aspects of the FAA R&D program, I would like to concentrate on three separate areas of activity, all of which contain valuable lessons.

[1] In the alternative, NASA aeronautics research funding should be restored to former levels, with specific Congressional guidance on how the money should be spent.

- The Cargo Airline Association's involvement with **ADS-B technology** began over 11 years ago when member companies were searching for a collision avoidance alternative to the radar-based TCAS system. While we were not successful in developing this new capability (I think we were ahead of our time), we soon realized that the technology held promise for projects over and above airborne collision avoidance. Providing better and more timely information to both cockpit crews and controllers, both in the air and on the ground, appeared to be a realistic goal. Working with the newly-formed FAA Safe Flight 21 Office, all-cargo airlines developed both new Surface Management Systems and potential airborne applications using ADS-B technology, with test-beds established both in Louisville, Kentucky and Memphis, Tennessee. In addition, a companion project in the State of Alaska, Project Capstone, demonstrated the operational and safety benefits of ADS-B technology to the General Aviation community.

Over the years, it became obvious to all those involved in these research and development efforts that ADS-B would have a central place in any modernized air traffic system. And the FAA agreed. In December 2005, the agency announced that ADS-B would form the basis for future system surveillance. To facilitate this transition, the FAA also announced that a new ADS-B Program Office would be formed to provide the implementation vehicle. Today, this Office is in the process of laying the groundwork for the purchasing and installing the ground stations necessary for initial ADS-B applications.

While this progress is certainly encouraging, we cannot stop there. Plans must be made for future improvements involving air-to-air ADS-B applications – applications that will provide significant benefits to commercial aviation users. The research necessary for such improvements must be done now if we expect implementation in a timely manner. The House of Representatives recognized this need in its proposed Fiscal Year 2007 Appropriations package wherein it added $20 million to the Administration's $80 million budget request for ADS-B development **and** specified that the extra $20 million be spent on air-to-air application development.[2]

What have learned in the course of this process? First, things take too long. To a large extent, delays are inherent in any process that requires the involvement of a massive bureaucracy, but there should be ways to accelerate R&D efforts that have the potential for significant airspace improvements. Second, research and development may in fact be the easy part. As a colleague from Federal Express noted early in the ADS-B development process, "This ain't no science project!" Indeed, we must have the resources and leadership to transform the research into products for the National Airspace System. We cannot let either industry or government inertia overwhelm these efforts.

- The second area of research in which the all-cargo industry has participated involves the development of **new operational procedures**. These procedures are the low-tech cousins of technological improvements and possess the promise to provide near term benefits while longer term solutions to problems are being developed. Specifically, one

[2] These funds were never actually appropriated since no Transportation Budget was ever enacted for FY 2007 and we are now operating under a Continuing Resolution.

of our members, UPS Airlines, has been working cooperatively with the FAA on the concept of Continuous Descent Arrivals (CDAs), an operational procedure that provides more efficient vertical profiles in the landing process. To test the viability of such arrivals, nighttime operations at Louisville were selected since UPS provides the overwhelming majority of operations. The results have been encouraging, with the airline experiencing more efficient operations and significant fuel savings and the public enjoying the measurable environmental benefits of less noise and aircraft engine emissions. The challenge now is to migrate the Louisville experience into "mixed environments" where many different airlines operate in high density airspace. These tests are currently in the planning stages. Of course, after all the research is completed, and all the necessary data collected, the ultimate goal will be to incorporate these procedures into the national airspace system. Again, this effort will require both industry and government involvement and cooperation. The major challenge for the airline community is to adequately quantify and understand both the costs and benefits of the modified flight procedures and then to work cooperatively with the agency and controller communities to ensure a smooth, safe transition to the new flight procedures.[3]

- Perhaps the most aggressive area of FAA research and development is in the area of **environmental issues** confronting the industry and the nation. To put this challenge in perspective, the FAA, in the context of the ongoing JPDO activity, has established a goal of reducing noise and emissions **in absolute terms**, by the year 2025, notwithstanding an expected major leap in air traffic. This ambitious program depends

[3] In order to give the Subcommittee more detail on this initiative, attached hereto is the testimony of Captain Karen Lee of UPS Airlines before the Senate Aviation Operations, Safety and Security Subcommittee on March 22, 2007.

on a robust research and development effort and we are encouraged by, and support, the initiatives set forth in sections 601 *et seq.* of the FAA's proposed *Next Generation Air Transportation System Financing Reform Act of 2007*. These proposals include environmental mitigation demonstration pilot programs (section 604); airport grant eligibility for assessment of advanced flight procedures to mitigate noise (section 605); and the establishment of a research consortium within the existing PARTNER Center of Excellence to address advanced engine and airframe technology.

Finally, with respect to the specific issue of how to address the issue of aviation's impact on climate change, we respectfully suggest that R&D challenges be funneled through the existing PARTNER Center of Excellence. This university-based consortium is the best forum for analyzing the complicated issues inherent in any discussion of climate change and aviation's contribution to it.

In summary, it is clear to the all-cargo industry that a robust FAA research and development program is absolutely essential if we are to meet the future goals of modernizing the airspace system and providing the capacity needed to serve passengers and shippers worldwide. We believe that the agency has established a strong track record in this area and we are committed to working with all parties to this process in the coming years. If there is any word of caution, it is that we cannot let the bureaucracy delay the implementation of those projects that prove, in the research and development phase, to be beneficial.

Thank you very much.

THE CARGO AIRLINE ASSOCIATION
The Voice of the Air Cargo Industry

MEMBERSHIP LIST

ALL-CARGO AIR CARRIERS

* ABX Air, Inc.	Wilmington, OH
* Atlas Air, Inc.	Purchase, NY
* FedEx Express	Memphis, TN
* United Parcel Service	Louisville, KY
* Air Transport International	Little Rock AR
Capital Cargo International	Orlando, FL
DHL Express	Miami, FL
First Air	Gloucester, Canada
Kalitta Air	Ypsilanti, MI
Kitty Hawk Inc.	Dallas, TX
USA Jet Airlines, Inc.	Belleville, MI

AIRPORT ASSOCIATE MEMBERS

Ft. Wayne International Airport	Ft.Wayne, IN
Louisville International Airport	Louisville, KY
Memphis-Shelby County Airport Authority	Memphis, TN
New Orleans International Airport	New Orleans, LA

OTHER ASSOCIATE MEMBERS

Aviation Facilities Company, Inc.	McLean, VA
Bristol Associates, Inc.	Washington, DC
Campbell-Hill Aviation Group	Alexandria, VA
Keiser & Associates	Oakland, CA

* Member, Board of Directors

Hearing Before the Senate Commerce Committee
Subcommittee on Aviation
Federal Aviation Administration (FAA) Modernization
March 22, 2007
Testimony of Karen Lee
Director of Operations, UPS Airlines

Chairman Rockefeller, Senator Lott and members of the committee, my name is Karen Lee and I am Director of Operations at UPS Airlines. Thank you for the opportunity to testify this morning on air traffic modernization and what we at UPS have been doing over the last 10 years with Automatic Dependent Surveillance-Broadcast (ADS-B). We believe that modernization of our current aviation system should be the major priority in the FAA Reauthorization this year. Our efforts on ADS-B demonstrate the benefits that modernization will provide.

UPS has been committed to the development and implementation of ADS-B systems and applications for over 10 years. ADS-B is a satellite-based surveillance technology that allows each aircraft to broadcast information about itself such as position, speed and altitude. It does this continuously, as often as once per second, and this surveillance information is available to any user equipped to receive and display it.

UPS, along with the Cargo Airline Association, first became involved with ADS-B in 1996 as a potential means of meeting collision avoidance requirements. Although we ultimately installed T-CAS in order to meet those requirements, our early work with ADS-B demonstrated many potential benefits, such as improved efficiency and safety, as well as environmental benefits. As a result, UPS continued its work on the technology.

Use of ADS-B technology creates a new level of safety and redundancy in our airspace system since pilots will now be able to see the traffic around them and controllers will have surveillance data that is much more accurate and timely than they have today. There are many applications that are enabled when aircraft are equipped to see other aircraft. Many of those applications create opportunities to make aircraft operations safer and more efficient while reducing noise and emissions.

ADS-B is now recognized as the foundation of the Next Generation Air Traffic System. Administrator Blakey has been a strong proponent of ADS-B and has been very supportive of the efforts we have undertaken at our international air hub in Louisville, Kentucky.

There are two basic scenarios in which ADS-B surveillance can be very beneficial. The first is in geographic areas that do not have radar surveillance. ADS-B surveillance information can be provided from the aircraft to air traffic controllers through inexpensive ground receiving stations and shown on a display that looks exactly like a radar display. Controllers use the ADS-B surveillance data exactly the same way they would use radar information; it just comes to them directly from the aircraft.

You are probably familiar with the FAA Capstone project in Alaska where more than 250 light aircraft are equipped to broadcast ADS-B position information. Using ADS-B, Alaska has reduced its accident rate by 47 percent and has done so in areas that radar could not be installed because of rugged terrain.

The second scenario is in high density airspace. Let's use Louisville as an example. During the UPS rush hour, from 11:00 at night until 1:30 in the morning, we can land 47-52 aircraft per hour. We should be able to land 60-62 aircraft per hour in most weather conditions. Our inability to do so represents a loss of capacity and efficiency that costs us millions of dollars every year.

Our traffic arrives somewhat randomly and the flow and sequence of arriving aircraft is unpredictable. The enroute center directs our aircraft into the terminal area as they arrive from all directions and the approach controllers then must organize and sequence the aircraft to line up for final approach. Our flights end up "driving" around at low, highly inefficient altitudes while waiting for their turn for landing – sometimes flying 60 or 70 miles to travel the last 40 miles of flight.

In addition, due to high controller workload and lack of shared traffic information with our pilots, our flights arrive at the runways with very uneven spacing. If you were to stand at the end of the runway and measure the time between landing aircraft, you would find a high level of variation – 90 seconds, then 105 seconds, then 80 seconds, then 180 seconds and so on. What we really need is 95 seconds, 95 seconds, 95 seconds (or the appropriate time interval for the night's conditions – it is variable). Anything more than that interval is loss of capacity. And because our aircraft arrive somewhat randomly and unpredictably and all under radar vectors, they are scattered over a wide area as they enter the terminal area – making the controller's job that much more difficult to get us organized and lined up.

This is very similar to every busy airport in the world. Some are worse than others, but all capacity and efficiency losses are driven by the same factors: less than perfect surveillance information, each aircraft handled individually by a controller to be sequenced, each aircraft spaced and vectored to final approach and pilots who are blind to traffic around them. This results in wide variations in spacing on final approach and much higher fuel burns.

We are on the verge of a major milestone in the effort to become more efficient and to optimize the airspace capacity available to us. There is a wonderful convergence of emerging technologies and procedures that have created the dawn of a new era in aviation – indeed created the dawn of the next generation air transportation system.

In July we will fly the world's first Next Gen RNAV Continuous Descent Arrival procedures using an ADS-B application called merging and spacing. This will mark the first time that pilots will be given responsibility for spacing their aircraft, at very accurate time intervals, using ADS-B surveillance information in the cockpit from cruise altitude all the way to the runway. The goal is to accurately, consistently and precisely deliver our aircraft to the end of the runways, in the most efficient way possible, in almost all weather conditions, night after night. When we accomplish this, we anticipate we will save over 800,000 gallons of fuel

annually, reduce our noise footprint by 30 percent and our emissions by 34 percent below 3000 feet, and increase the capacity of our airport by 15-20 percent or more.

We are confident of our success for several reasons. ADS-B technology is maturing rapidly. In fact, UPS has 107 Boeing 757 and 767 aircraft equipped with a first generation system and has accumulated thousands of hours of experience using the simple, but powerful application of Enhanced See and Avoid. We have seen significant improvements in our operations at Louisville as a result of this implementation and have gathered enough experience to validate our next implementation this year.

Our air traffic controllers are willing partners in our ADS-B work and have enjoyed benefits by working with us. We have a wide base of industry support and have worked closely with FAA and others throughout this project. Our pilots have enjoyed the early benefits of enhanced situational awareness and traffic displays in the cockpit for several years now and are actively involved in the preparation for the next steps in 2007. And, as I have mentioned, Administrator Blakey and the FAA are moving forward with ADS-B plans in the United States and are a strong ally in this effort.

Although aircraft equipage is always seen as an obstacle to progress, we believe that the architecture we are implementing is very practical. We are using one set of hardware to house several different applications. The electronic flight bag provided by Boeing will allow us to provide electronic charts and manuals for our pilots, electronic logbooks for maintenance, graphic satellite weather for inflight use, and a display for CPDLC for datalink communications with ATC in the future. The same display used for all of those applications will also be used for ADS-B applications, the first of which is the Continuous Descent Arrivals using merging and spacing.

It will also house a very important safety enhancement: a moving surface map with traffic for ground operations. Studies show that the threat of most runway incursions and potential ground collisions will be solved by using the surface map with traffic.

We all have a major challenge ahead in transforming and modernizing the best aviation system in the world. We must do this in order to provide the capacity needed to accommodate future growth, to provide an additional margin of safety and to achieve the environmental improvement that is required. We believe that ADS-B will be the foundation for the modernized system.

Thank you and I am pleased to answer any questions you may have.

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CURRENT POSITIONS

President, Cargo Airline Association, a nationwide (U.S.) trade organization that promotes the use of air freight and represents the United States all-cargo industry before Congress, State and Local Governments and the Courts.

Senior Partner, Meyers & Alterman, a Washington, D.C. law firm specializing in air transportation law.

FORMER POSITIONS

Chief of the Legal Division, Bureau of Enforcement, U.S. Civil Aeronautics Board, and, before that, Trial Attorney for the Bureau of Enforcement (1968-1975).

EDUCATION

Educational experience includes a law degree from **Boston University School of Law** (1968) and an undergraduate degree in Political Science from **Brown University**, Providence, Rhode Island (1965).

Other past and present positions include:

- Chairman, Environment Subcommittee, FAA Research, Engineering and Development Advisory Committee, 2003-Present.
- Member, Steering Group, Environmental Integrated Product Team (JPDO), 2005-Present.
- Member, Aviation Security Advisory Committee, 1996-Present.
- Member, Federal Advisory Panel on Land Use Planning, 1993-1995.
- Member, FAA Aviation Rulemaking Advisory Committee, 1991-Present.
- Member, Federal Airport Noise Working Group, 1987-1991.
- Member, Federal Advisory Committee on Fuel Savings, 1991.
- Member, Federal Advisory Committee on Passenger Facility Charges, 1990.