STATEMENT OF JOSEPH M. DEL BALZO, EXECUTIVE DIRECTOR OF SYSTEMS DEVELOPMENT, FEDERAL AVIATION ADMINISTRATION, BEFORE THE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION, SUBCOMMITTEE ON AVIATION CONCERNING THE CIVIL TILTROTOR INITIATIVE. April 25, 1990.

Mr. Chairman and Members of the Subcommittee:

It is indeed a pleasure to appear before you to discuss FAA's role in the National Civil Tiltrotor Initiative and to update for you the progress we have made since we last testified in November 1987 at a hearing held jointly by this subcommitee and the Subcommittee on Transportation, Aviation, and Materials. Accompanying me today is Jim McDaniel, Acting Director of our Vertical Flight Program Office.

For Members of the Subcommittee who are not familiar with the tiltrotor, we are talking about an aircraft with the versatility to use on-airport vertiports that operate on a simultaneous but non-interfering basis with either commuter or jet traffic, or remove some of those passengers from the airport environment entirely -- to urban-center vertiports. The tiltrotor's strength is in its vertical take-off and landing capability. Its potential value to the national transportation system is as a turboprop airplane that does not need a runway.

We in the FAA remain optimistic about the potential benefits which the tiltrotor offers the National Airspace System and the country as a whole. These benefits include the potential to increase the system capacity, increase productivity at congested airports, provide direct urban-area to urban-area transportation, improve efficiency in special applications such as servicing the off-shore petroleum industry, and provide for U.S. penetration of the international market for 20 to 75 seat commuter aircraft.

As you know, the National Civil Tiltrotor Initiative was established by the FAA in the summer of 1988. Our involvement is threefold. First and foremost, our primary mission is to provide a safe and efficient aviation system. We believe that the tiltrotor has the potential to improve the efficiency of the airspace system while maintaining our high level of safety. Secondly, if we ultimately decide that tiltrotor technology is a viable means of intercity travel, the FAA will act as a catalyst for the introduction of tiltrotor technology. Tiltrotor

reluctance to change -- change from the standpoint of modifying existing infrastructure as well as from accepting a dramatically new type of aircraft. Thirdly, our air traffic control, certification and regulatory responsibilities require us to ensure the safety of the tiltrotor from the drawing board to actual flight operations.

Since March 1988, when the FAA Administrator indicated to the then chairman of this subcommittee that the "FAA would take the lead," the FAA has been in the forefront of coordinating actions of both government and industry to facilitate implementation of the civil tiltrotor. (DOD is leading actual development of the military V-22 aircraft.)

Later in 1988, the agency announced its 5-Point strategy for civil tiltrotor, which included working closely with DOD and the V-22 program, increasing our R&D activities, and increasing efforts in infrastructure, certification criteria, and standards development. A Civil Tiltrotor Special Project Office was also established. Incidentally, we have recently expanded the scope of that office to include helicopters and other powered lift aircraft, in addition to tiltrotors. Renamed the Vertical Flight Program Office, it reports to me.

The agency also announced goals to certify a V-22 for demonstration purposes by 1992, and to be ready to certify a civil design tiltrotor by 1995. As a result of changes in the V-22 development schedule, our certification dates have slipped one year to 1993 and 1996, respectively.

To date, the U.S. government has invested over $2 billion in research and development for the tiltrotor, most of which is associated with military development. FAA's tiltrotor R&D is conducted as part of its rotorcraft program, which was funded at approximately $9.5 million over the last two years. In addition, we have awarded approximately $2.7 million in Airport Improvement Program (AIP) Grants for fifteen vertiport planning and feasibility studies in response to our 5-Point strategy.

I would like to briefly review for you some of our major accomplishments and activities as well as projected activities. Currently, we are in the final stages of coordination with the Administrator on the Rotorcraft Master Plan update and a Civil Tiltrotor Program Plan. These plans delineate necessary actions to determine the role of civil tiltrotor service in the national airspace

system. In conjunction with results of the AIP grant studies, the Civil Tiltrotor Program Plan will help government and industry determine what the transportation requirements and needs are. In addition, the Department of Transportation is engaged in a new study of transportation requirements in high-density intercity corridors. Tiltrotor service will be one of the transportation options under study. The AIP studies will provide insight into short-haul systems with a different, regional insight, and provide data for future planning. Another significant activity is the development by our Rotorcraft Directorate of interim-powered lift criteria, which is being used for certification planning by manufacturers in developing a civil tiltrotor.

We are also conducting a follow up to the 1987 FAA/NASA/DOD Civil Tiltrotor Missions and Applications Study. Jointly funded by the FAA and NASA, the follow-on study will provide a more detailed analysis of the technical requirements, markets, economics, and other areas addressed in the first report. The results of that study are due this summer.

Our Research, Engineering and Development Advisory Committee has recently formed a Tiltrotor Technology Subcommittee. Norman Augustine, CEO of Martin/Marietta Corporation, has accepted the chair of the new subcommittee, and Jim McDaniel will be serving as the executive secretary. Preparation is ongoing for the first subcommittee meeting tentatively scheduled for early June. A Senate Armed Services Subcommittee has requested Secretary of Defense Cheney, in conjunction with the Department of Transportation and the FAA, to examine key questions concerning capacity impacts, foreign potential, and industry actions toward a civil version of the V-22 tiltrotor. We are supporting DOD, and a coordinated response should be available this summer. One of the Tiltrotor Subcommittee's first agenda items will be to review the FAA's proposed response to these questions.

If tiltrotor is to become a reality before the end of this century, we must begin planning now for its certification, its special infrastructure requirements, and an industry-based demonstration program to prove the concept and the aircraft's viability.

Several areas of certification are unusual for the V-22 derivative tiltrotor, including extensive use of composite materials, glass cockpit, fly-by-wire control systems and the software redundancy problems

they pose, extensive use of automation, extremely high pressure hydraulic systems, and the tilting nacelles and proprotors which are unique to the tiltrotor.

Infrastructure requirements for tiltrotor operations include the design and construction of vertiports, which are heliports designed to accommodate a commercial tiltrotor; communications, navigation, and surveillance systems; terminal instrument procedures (TERPS) development; and ATC enroute and terminal airspace and procedures development that will allow simultaneous and non-conflicting operations with fixed-wing aircraft in high-density areas. Of course, one must address the noise issues implicit in the technology for its effects around an airport.

Infrastructure requirements are critical, since it is difficult to get potential operators and manufacturers to invest in tiltrotor technology when there are no established facilities (vertiports) for tiltrotor operations. Conversely, it is difficult to build vertiports until there are tiltrotors and operators wanting to fly into them. For the helicopter industry, the lack of adequate landing facilities is the problem most often cited as inhibiting operations and expanded service.

On the FAA side of the ledger, we must develop special enroute and terminal airspace procedures for the tiltrotor. We believe, however, that the most promising precision navigation and landing system for the tiltrotor is the microwave landing system (MLS). Because of its capabilities for curved approaches, segmented glide paths, and offset approaches, MLS appears tailor-made for tiltrotor operations. It is important to emphasize that the tiltrotor's full economic potential cannot be reached if it is required to operate only in fixed-wing enroute and terminal airspace, and by fixed-wing rules.

We believe that a successful demonstration program should be an important part of our civil tiltrotor program. Prospective operators must be convinced that the technology is safe, reliable, affordable, and will operate as claimed before a financial commitment is made. A demonstration program would afford us the opportunity to collect vital technical and operational data, and to test the tiltrotor concepts of non-interfering airspace structure and any necessary modifications to air traffic control procedures. Secondly, a demonstration program would allow us the opportunity to make necessary refinements to enhance safety and test our ideas for improving capacity.

It is important to stress at this juncture that the FAA's role in any demonstration program is limited to certifying the aircraft and flightcrews, providing necessary infrastructure support, data collection, and maintaining coordination between industry and government. The actual conduct of the demonstration is an industry or a state or local government responsibility. We do not consider it an appropriate FAA role to actually conduct demonstration programs.

We are currently formulating criteria for a demonstration program. The demonstration will require a cooperative effort between industry, local governments, and the Federal government. It would provide vital data to government and industry in the areas of tiltrotor safety, reliability, training, maintenance, economics, environmental concerns, and operational scenarios. The demonstration program may include more than one element, with the first "phase" possibly being conducted in a relatively "low-density", less congested environment such as in Alaska, or perhaps the Caribbean Basin, with a follow-on phase in a more complex, congested area of the United States after the more basic operational aspects are evaluated. The follow-on phase would concentrate on integrating tiltrotor operations into the national airspace system, and would look specifically at both enroute and terminal ATC routing and procedures, terminal instrument procedures, aircraft operating characteristics, schedule reliability, public acceptance, and physical vertiport needs.

Our initial thinking for a demonstration is centered on air cargo operations. While a passenger commuter demonstration in a highly congested area would be ideal, it is not likely because of the more stringent certification requirements needed to carry revenue passengers. Also, as an unpressurized aircraft, the V-22 would be forced to remain at a lower than optimum altitude, and likely would not produce accurate data for evaluating later commercial tiltrotor operational profiles, economics, or passenger acceptance.

Before closing, the Subcommittee should be aware of foreign interest in tiltrotor. There are three foreign groups with interest in high speed, vertical flight aircraft. The first, the Europeans, have been interested in the tiltrotor for several years, and are in the final stages of studying its feasibility. They have developed a five-country consortium called "EUROFAR", which stands for European Future Advanced Rotorcraft. They have not committed to build an aircraft to date, but their study results closely parallel ours, and in a number of

areas have actually validated our 1987 study results. The Europeans are following V-22 closely, and project 1991 to start development of their own tiltrotor, with commercial service beginning around the end of the century. They have also identified 50 percent of their market potential as being in the United States.

The Japanese are very interested in tiltrotor, and have contracted with a Texas firm to build a tiltwing aircraft designated the TW-68. They have reportedly committed funding to complete FAA certification of their tiltwing, and have stated their intention to beat an U.S. tiltrotor to commercial production. The Japanese Ishida Corporation has recently purchased eight acres at the Alliance Airport in the Dallas/Fort Worth area, and intends to develop and manufacture the TW-68 there. The TW-68 will carry 12-14 passengers, which makes it smaller than the V-22, and slightly larger than the XV-15. Private interest in Japan are also planning to develop a series of heliports, many of them on water, and are counting on high speed vertical flight aircraft to help relieve their pending transportation crisis.