STATEMENT OF THE HONORABLE J. LYNN HELMS, FEDERAL AVIATION ADMINISTRATOR, BEFORE THE HOUSE SCIENCE AND TRANSPORTATION COMMITTEE, SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS, CONCERNING FAA'S FY 84 R&D PROGRAM. MARCH 22, 1983.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to report to you on the FAA's proposed 1984 research and development program. With me today are Al Albrecht, Associate Administrator for Development and Logistics, and his Deputy for Engineering, Neal Blake.

I understand you are especially interested in how the FAA is progressing in carrying out the National Airspace System (NAS) Plan, for which long-term authorizations were made available last year with the help of this Subcommittee. Although, I know that you are very familiar with the air traffic control system and the original NAS plan, Mr. Chairman, I think a brief outline of these topics might be helpful to the new members of the Subcommittee to serve as background for the more technical presentation that will follow.

The FAA is responsible for providing air traffic control services, from take-off to landing, to all aircraft flying under instrument flight rules (IFR). This involves air traffic control towers for airport operations; approach and departure control facilities for flight segments near the airports; and en route control centers for those segments of flight between terminal areas. Aircraft flying under visual flight rules

(VFR) often involve FAA tower operations as well. In addition, our flight service stations brief pilots on weather, assist them in filing flight plans, and provide other assistance to aircraft in flight.

To meet these responsibilities, the FAA currently operates 429 towers, 25 en route control centers, 180 automated terminal facilities, 318 flight service stations, and thousands of navigation aids and communication facilities, for a total of 20,000 facilities. In 1982, these facilities handled 50.6 million aircraft operations at towers, 27.8 million aircraft at en route centers, and 62.4 million flight services.

The U.S. air traffic control and air navigation system is the safest in the world. However, the current facilities the FAA uses to provide these services are becoming outmoded. They consist largely of vacuum tube equipment which is costly to operate and maintain. Computer capacity is gradually being reached. The large number of facilities means large overhead costs. Facilities have a variety of different computer software and controller consoles to display information. In short, the current system is labor-intensive, expensive to operate and maintain, has little capacity to accommodate future growth, and no capability to accommodate future automation needs.

Therefore, when I took office, I undertook an exhaustive review of the entire National Airspace System. Part of that effort, the National Airspace Review (NAR)--a study of the operational use of the nation's airspace, including air traffic control procedures, flight regulations, and airspace environment--is still underway, in partnership with user groups. The final NAR meeting has been moved up to November of 1984, and we expect a completed report in 1985.

Another important element of this effort is the airport plan, known as the National Plan of Integrated Airport Systems. It will be issued next year, and will identify the type and estimated cost of airport development considered necessary to provide a safe and efficient system of public-use airports in the U.S. Essentially, it will spell out for the airports the improvements that will be needed to keep their development in balance with the development and improvement of the rest of the aviation system.

The portion of the review dealing with upgrading and modernizing the ATC system was completed in 10 months and published in January of 1982 as the National Airspace System (NAS) Plan. It outlined a comprehensive plan to modernize our nation's airways--to build a safer and more efficient system.

This was a total system approach. The policy emphasis was to maximize automation--in order to increase productivity and

capacity, and to improve vital safety services, such as collision avoidance, landing systems, and weather information gathering and dissemination.

One key to the NAS plan is replacement of the present IBM 9020 computers in the centers. We have designed a phased-in approach to ensure that there will be no disruption of service in the transition to the new computers. We must have 100% success when we switch over. Therefore, the first phase will be the introduction of new "host" computers which will operate with virtually the same software currently used. This stage alone will increase capacity and improve reliability. Once we are satisfied with the new hardware, we will then introduce advanced software and new "sector suites," the consoles and displays which present information to the controllers. This will further improve reliability, and also will permit the introduction of advanced automation which will improve productivity and safety. We intend to use the same hardware, software and sector suites for our towers as well as our en route centers, thus gaining economies in development, procurement, maintenance, and training.

The higher levels of automation, known as the Automated En Route Traffic Control (AERA) concept, will reside in the same hardware and will include capabilities such as fuel efficient en route planning, flow planning and traffic management, strategic clearance planning, and full tactical clearance generation and execution--which will generate significant fuel

savings, reduce the size of the controller workforce, and reduce the incidence of system errors.

Other system improvements which have been incorporated into the NAS plan include:

Flight Service Station (FSS) automation and consolidation - which will reduce costs, provide more rapid retrieval of information by flight service specialists, and allow direct pilot access to automated weather information, flight plan filing, and ATC system status. This program was approved by the Congress in 1980, and funded by appropriations in 1981, 1982, and 1983.

Upgrading FAA's Weather Program - to provide better and more timely weather data to controllers and pilots. This program involves many elements, including:

Next Generation Radar (NEXRAD) - the joint development (with the Departments of Commerce and Defense) of a new Doppler weather radar system, which will provide us with improved hazardous weather information.

The Automated Weather Observing System (AWOS) which will make surface weather observations at locations that do not have observers and automatically transmit them into the weather communications network and to pilots. It will

include sensors for wind speed and direction, altimeter, temperature, dewpoint, ceiling, visibility, and, possibly, freezing precipitation.

The Center Weather Processor (CWP) which will more efficiently distribute and display real-time weather information to controllers and meteorologists at our en route centers. This will improve safety and reduce the high percentage of weather-related air traffic delays.

Wind Shear Detection and Forecasting - Special programs are designed to upgrade our knowledge and handling of wind shear phenomona.

Microwave Landing System (MLS)- is a precision approach and landing navigation system which will improve safety, enhance terminal area capacity, and assist in airport noise abatement through the use of its segmented or curved approach capabilities.

MODE-S/DATALINK - is a cooperative surveillance and communication system to support ATC and provide data link services such as weather information and instructions from the automated ATC system directly to the cockpit. It employs ground-based sensors (interrogators) and airborne transponders. Ground-to-air and air-to-ground data link

communications is integral with the surveillance interrogation and replies. In Mode S, each aircraft is assigned a unique address code. Using this code, interrogations can be directed to a particular aircraft and replies unambiguously identified. Interference is minimized because a sensor limits its Mode-S interrogations to targets of interest, and proper timing of interrogations permits replies from closely spaced aircraft to be received without mutual interference.

Traffic Alert and Collision Avoidance Systems (TCAS) - This concept is based on agency and international development efforts in the areas of beacon-based collision avoidance systems and air-to-air/air-to ground discrete address communications techniques utilizing Mode-S message formats. The TCAS approach provides a range of collision avoidance equipment alternatives that can provide collision protection for the full spectrum of airspace users ranging from small general aviation aircraft to large transport aircraft. TCAS equipment operates independent of the ATC system. It provides an aircraft separation assurance back-up to normal ATC surveillance coverage, and primary separation outside ATC surveillance coverage. Development and operational demonstrations of this program have run considerably ahead of the program schedule. We now have two manufacturers ready to release production drawings.

In sum, the NAS Plan is a comprehensive and integrated modernization of the nation's airways in a manner which will improve productivity, reduce costs, increase safety, and allow flexibility. It provided the comprehensive planning background against which the Congress had the confidence to pass the Airport and Airway Improvement Act in 1982. This legislation provides for the authorization of the resources required to carry out the FY-82 to FY-87 portions of the NAS Plan and airport programs. In accordance with the Act, FAA is preparing an update of the NAS plan showing our current plans including cost estimates as we move along with the airways modernization program. I will provide you with a copy of the update as soon as it is finalized. Specific areas in which changes have been made to the plan include the following:

We have adopted an Area Control Facility (ACF) concept, which will eventually lead to the execution of both en route and terminal air traffic control from collocated facilities utilizing common equipment. This revision eliminates the Terminal Hub Consolidation from the plan and will provide for many economies in manpower, equipment, maintenance, and supply support. ACFs will be based upon optimum operational considerations and requirements, and artificial boundaries, such as FAA regions, will not be of concern. We expect to use the existing en route facilities, augmented, as necessary, to carry out the ACF

program. Implementation will start in 1985, with the initiation of construction. Operationally, they will begin to come on board in the late 1980's, coinciding with the availability of the sector suites.

Originally, mandatory carriage of beacon transponders was proposed starting in 1986. My current assessment is that overall system considerations would be better served by:

(1) requiring that all beacon transponders manufactured after a specific date in 1986 be Mode-S compatible, and

(2) deferring until 1991 or 1992 the mandatory carriage of beacon transponders. If traffic population presently forecast does not occur, then carriage may not be mandatory.

This decision will provide for a reasonable match-up of ground and airborne capabilities without introducing any early special equippage requirements on the industry.

There have been some other changes in the plan, mainly related to refinements in schedules and quantities which will not affect the overall plan implementation. In several cases, a slippage of several months in making a contract award has

appeared more significant than it really is, because the three months crosses a fiscal year. However, it is merely a three month slip. Overall, I am pleased that we are generally maintaining the schedules and the funding profiles of the Plan.

Now, I'd like to give you a progress report on a few of the major NAS Plan items.

Advanced Automation

The Host Request for Proposal (RFP) was issued in December of 1982, and we expect to award the Design Competition contracts in July of this year. The production award is planned for April of 1985 and the first systems should be delivered in early 1986.

The RFP for the Advanced Automation systems--new software and sector suites--will be issued next month and the Design Competition contract awarded in February 1984. These schedules reflect a slippage of 3-9 months. Frankly, the problem was one of start-up times--we simply underestimated them.

MODE-S

The Mode-S RFP will be issued this month. Our planning was to award the MODE-S production contract by the end of this fiscal

year. We are still striving to meet that date, but I would not be overly surprised if we went a couple of months past that and brought the contract in around the end of the calendar year. If we do slip two or three months, we have good reason to believe we can pick that much time up during the production cycle. At any rate, the systems will start being delivered in 1987 and become operational several months after delivery. Thus, I believe this program is in good shape.

Microwave Landing Systems (MLS)

The MLS Request for Proposal will be issued once the Office of Secretary of Transportation (OST) has approved the MLS Key Decision Memorandum. We're planning for a September award and expect to accept deliveries in early 1985. I believe we are going to meet that first delivery date without too much trouble.

TCAS

This program is proceeding very well. The final design guidelines for TCAS-I were issued in September of 1982. The job now rests with industry. The minimum TCAS-II is also moving along. The Minimum Operational Performance Standards

(MOPS) are essentially complete. The 600 page document provides a comprehensive description of the system based upon a thoroughly validated surveillance design of threat detection and resolution logic. We have in hand an established independent airborne collision avoidance capability that meets the operational requirements it was designed for. This is a major accomplishment. We are now working to finalize the operational procedures to accompany the implementation of this system. We will have them completed by the end of this year. The enhanced version of TCAS-II is also proceeding on schedule. The final MOPS for it will be issued in January of 1985. I'm very confident we will have TCAS operational well ahead of my original targets of 1984 and 1985.

WEATHER PROGRAMS

Mr. Chairman, I am very pleased that I took your suggestion to select a Program manager to serve as the focal point within FAA to coordinate our weather programs. As I advised you, I appointed Neal Blake to that position, and he has made great strides in pulling the various elements of the program into an integrated, agency-wide program.

At this time our efforts on NEXRAD, AWOS, and CWP are proceeding on schedule. As you no doubt are aware, we received some very direct instructions from the last Congress concerning efforts relating to wind shear. We have reached agreement with

the National Academy of Science on some specific studies on wind shear and are proceeding with the analysis of the JAWS data upon which we hope to install additional low level wind shear equipment in a productive manner. We intend to use the New Orleans installation to evaluate that phase of the results of the JAWS tests. Our plans are to have the installation in and operating by January 1984.

TRANSITION PLANNING

A vital element in the successful implementation of the NAS Plan will be the means by which the new systems and equipment are introduced into the ATC system. Our planning must provide for an evolutionary, in-service introduction into the system. We are at this time developing transition plans to provide the guidelines on how we will carry out this phase of the plan. We anticipate the first of these transition plans will become available within the next eighteen months.

SYSTEMS CONTRACTOR/MANAGEMENT OF THE NAS PLAN

A topic of great interest to Congress, the White House Science Council, and industry is how we are going to use the expertise of industry to assist us in the systems engineering, integration and implementation of the NAS Plan. We are currently working on what I hope will be the final statement of work for such a contract. We urgently need to award this

contract and get the systems contractor on board. I'm personally hopeful we can achieve that milestone before the end of the year.

The systems contractor will carry out all of the systems engineering and integration associated with the NAS Plan projects. However, the FAA will remain in control of the overall management of the program and institutional program continuity will be provided from within FAA, primarily by its career management personnel.

In this regard, I want to point out an important organizational change I've ordered which will improve FAA's ability to manage the airway's modernization program. My experience has shown me that the key to good management is accountability. When you have a large undertaking such as the NAS plan, which has many sub-projects that must fit together, there must be one office responsible for coordination of all of these elements. In the past, FAA has been criticized because its R&D efforts did not dovetail with its Facilities and Equipment program--which implements the introduction of new technology into the field. I have combined these functions into one complex, reporting to the same Associate Administrator - Al Albrecht. Al will thus have overall responsibility for the NAS plan implementation, from R&D through field deployment of the new systems. The two new offices which will carry out the plan, the System

Engineering Service and the Program Engineering and Maintenance Service are headed by people integrally involved in the development of the NAS plan. In addition, Al has a new Deputy who brings to his office strong Airways Facilities and R&D background plus acquisition experience as the former head of FAA's Logistics Service. Thus, I feel that we have a strong management team in place to oversee the implementation of the NAS plan.

We will have in place by the end of this year the method of institutionalizing the continuity of technical appraisal, management focus, technical evaluation, and continuation of planning that will ensure the NAS Plan will be completed as envisioned.

Finally, Mr. Chairman, I know that some concerns have been raised about the FAA's forecasts for increased aviation activity. The recent forecast projects less growth for general aviation through the mid-nineties than our previous forecasts. The question arises, then, as to whether the NAS Plan is needed if aviation activity does not grow as fast as FAA predicted. My response is the same as it was in testimony before the Congress last year. While I am confident that aviation will experience tremendous growth over the next two decades, the improvements and upgrading of the ATC system covered by the NAS Plan are not derived solely from forecast growth in air traffic

activity. They are needed to replace the obsolete, labor-intensive elements of the system to facilitate its operation in a safer, more reliable, more efficient, and cost effective manner. Thus, the NAS Plan is needed even in the absence of any growth. However, if any degree of expansion of traffic activity is encountered, the improved and upgraded system must be in place to handle it.

With regard to forecasted growth, we announced at the recent Eighth Annual Forecast Conference that we expected the industry will rebound from the losses in the past several years and will outstrip the growth of the general economy in the 1983-98 time period. We expect our air traffic control facilities to regain their pre-strike operational capabilities by the end of this fiscal year. From there, operations at airports with control towers are expected to grow from 56.4 million to 99.7 million in the 1983-94 timeframe. IFR operations handled by the en route centers are forecast to jump from 23.3 million to 41.6 million over the same period. The number of active pilots will increase from the current 776,000 to just over 1,000,000. General aviation aircraft will grow from 215,000 to 315,000, and their hours of operation will increase from 43 million to 66 million. We believe that all of the capabilities we can build into the new system will be well utilized by a revitalized aviation community.

To summarize, I believe the FAA is making good progress in implementing the NAS plan. Of course, we will continue to make adjustments as the plan unfolds--there will be some advances and some delays--but I have been quite well satisfied at how few adjustments we've had to make so far. I welcome the continued interest and assistance of the Subcommittee, and look forward to working with you as we move ahead with the airways modernization program.

That concludes my prepared statement, Mr. Chairman. At this time, we would be pleased to respond to your questions.