REMARKS BY JOSEPH M. DEL BALZO
ACTING ADMINISTRATOR
FEDERAL AVIATION ADMINISTRATION
RTCA TASK FORCE ON DIGITAL COMMUNICATIONS
APRIL 6, 1993

Good morning:

It is my pleasure to welcome each of you to this inaugural meeting of RTCA task force 2. This task force has been assembled to study one of the most promising...and daunting...challenges facing civil aviation since radar was introduced over two generations ago. That challenge is the transition from voice to digital communications.

The special focus of this task force is an outgrowth of an earlier study by RTCA to identify the most promising applications of satellite technology and reach an industry-wide consensus on how best to integrate them with the air transportation system we have today. In its report to industry, the task force noted that before we can begin to realize the full benefits of satellite technology, all of us in the aviation community...the FAA,,,the airline operators...the airframe and avionics manufacturers...all of us must first make the decisions that will permit the systematic and orderly transition to digital communications.

This is a call to action which none of us can afford to ignore. We all know that U.S. aviation industry is in a state of crisis. Over the last three years, our national air carriers have lost close to 10 billion dollars.

Their trade group, the Air Transport Association, says that's enough to wipe out more than fifty years of accumulated profits.

I won't try to tell you that the implementation of digital communications, alone, will reverse that trend. But I will tell you that it opens the way to potential savings of billions of dollars each year. Our radio and ground-based system of air traffic control system dates from World War II. It's a <u>good</u>, <u>reliable</u> system, but it wasn't developed to handle the volume of air traffic, the sophisticated high-speed aircraft, or the torrent of information with which ground and flight crews must cope today...and every day.

One of our air carriers told us that communications-related delays cost it more than $300 million dollars each year. In a single 12-month period, the company experienced more than 8.5 million minutes of delay while either in flight or taxiing...delays which added $173 million dollars to its direct

operating costs. Air traffic imposed an additional 14,000 hours of delay at the departure gate. Once airborne, altitude and speed restrictions, together with inefficient routings, cost them another 108 million dollars in wasted time and increased fuel consumption.

Inefficient communications are a drain on resources when airlines need to be conserving their cash. At a time when companies are desperately shaving expenses every way they can...from laying off pilots to leaving off olives on the dinner salads...here we have a way to introduce fundamental savings.

Implemented wisely, digital communications means real savings...real increases in capacity...and real improvements in safety. On a typical three-hour flight, a pilot communicates with multiple air traffic controllers and changes radio frequencies about two dozen times. Most communications are routine, but each exchange must be written down. During peak periods, it's not unusual for a controller to talk on a single radio channel with 25 or more aircraft. It's hardly surprising, under these circumstances, that nearly one-fourth of all domestic operational errors are caused, either directly or indirectly, by mis-communication.

The potential to improve safety by reducing, even eliminating, these errors is one of the most compelling reasons to implement digital communications.

We now have the capability to do this and more. For the past ten years, the FAA has pursued an aggressive research program to make digital communications possible in a dynamic air traffic control environment.

Today that research is paying off. By the end of this decade, a new communications process called data link will be available for every facet of flight, and for all users of the airspace. In its simplest form, data link will replace or augment many of today's routine voice messages with non-voice digital communications. In a later, more complex form data link will become part of a vast, interlocking system of computers, satellites, sensors and software called the Aeronautical Telecommunications Network, or ATN. The purpose of ATN is to integrate automation systems on the ground with computers in the aircraft.

Here's how it works. The ATN takes real-time data from FAA air traffic control and flight information computers and feeds it into a concentrator. The concentrator packages the information in hi-speed, digitized data bursts and sends it to an ATN router. The router then sorts the data out electronically and forwards it to the appropriate user in record time.

Simply stated, the ATN provides a communications

architecture that takes those services which presently function through independent networks...air traffic control...fixed base operations... flight, airport, and airline operations...and makes them manageable.

The Aeronautical Telecommunications Network is being designed to create a seamless common air traffic control system that can be used, worldwide, sometime after the turn of the century. I'm not talking about a revolutionary new concept. The International Civil Aviation Organization--ICAO--has already made the decision that this technology will be the international standard. What concerns us today isn't whether the aeronautical telecommunications network will be developed...the issue is how fast can we make this service available and begin to accrue the benefits.

Later on today, you'll hear about a new idea that has been advanced by The MITRE Corporation. It involves the establishment of a consortium between government and industry to develop the ATN hardware and software. Under this proposal, the development of ATN would be a collaborative effort, in the form of a Limited Liability Corporation, through which both the private sector and the FAA would contribute. We think it's an exciting possibility. In theory, such a consortium arrangement could have two very positive benefits: it could speed up the development and acquisition process by as much as two years, and it could enhance our nation's competitive position by promoting the transfer of highly advanced technology between government and industry.

This is just one of the institutional concerns that will be addressed by this task force. We're also looking for your recommendations on which data communications applications will have the highest payoff and what it will take to implement them. You may well find that your most difficult task is not the identification of applications, but making selections from among many worthy proposals. I fully expect each proposal will have its advantages and its disadvantages. This is as it should be. This will produce a productive debate.

I would like to thank Dave Watrous and the RTCA for agreeing to undertake this important effort. I'd also like to thank our chairperson, Lou Mancini, the Vice-President of Engineering and Fleet Operations at Northwest Airlines. Finally, I would like to thank each of you who are volunteering your time to serve on this task force. I'm confident you will give us a balanced and thoughtful evaluation of the possible applications of digital communications. And I know that your recommendations will enable us to plan prudently for the transitions we know are ahead.

Thank you.

REMARKS BY JOSEPH M. DEL BALZO
ACTING ADMINISTRATOR
FEDERAL AVIATION ADMINISTRATION
ICAO FLIGHT SAFETY/HUMAN
FACTORS CONFERENCE
APRIL 12, 1993

Thank you.

On behalf of the Federal Aviation Administration, I'm pleased to welcome you to the United States and to this international conference here in our nation's capital. I note from the agenda that many of the world's foremost flight safety and human factors experts are here. I can also tell from the agenda that you have a busy three days ahead of you. Despite this crowded schedule, I hope that you will find some time to enjoy the beauty of the cherry blossoms at the tidal basin and the hospitality of the American people.

I'm particularly pleased that Congressman James Oberstar will be speaking to the conference this afternoon. As the Chairman of the Aviation Subcommittee, Congressman Oberstar has been a leader on Capitol Hill in promoting legislation on aviation issues. He has been especially effective in using his leadership to advance human factors research as well as other important safety concerns. We at the FAA certainly appreciate the support he has given to our programs and I'm delighted he could join us.

As we open this conference today, I would also like to acknowledge the important contributions that the International Civil Aviation Organization has made in advancing safety and enhancing civil aviation throughout the world.

Over the years, ICAO and its member states have collaborated to develop the uniform standards and recommended practices that have brought order to our industry and allowed it to grow and prosper. Together, the international aviation community has confronted the crucial issues of wind shear, midair collisions, aging aircraft, and terrorism. We've combined information and technology to meet each new challenge, each new threat. And through our collective efforts, we've made air travel the safest form of transportation in all the world. Yet there is still much to be done. For today, the world of aviation, like the world at large, is experiencing a period of unprecedented change and unparalleled opportunity.

We see it in this industry in technology. This is especially true with regard to the explosive growth of automation

in the cockpit and in air traffic control operations. Combined with advances in telecommunications and the availability of space-based technologies, these new capabilities offer us virtually unlimited opportunities for worldwide improvements in safety, capacity, service flexibility, and operating efficiency.

Yet despite so many remarkable achievements, statistics still point to human error as a probable cause in at least 65 percent of all fatal civil air transport accidents. The percentage for general aviation is even higher.

It's a sad paradox that, with all the great technology available to us, human error can still bring down the most sophisticated aircraft...the most experienced pilot. If we needed a justification for this conference, there could be no more compelling reason than this.

Many of you know that the United States is in the midst of a massive program to modernize our national airspace system. It's an undertaking that's been compared, in size, to the building of the Suez Canal or the Transcontinental Railroad. We're literally replacing all our old, outmoded equipment with new technology, including the most advanced real-time computer system ever developed.

We've also developed the new digital communications system to replace the voice-based radio system that's been in use since before World War II. It's been a good, reliable system, but it wasn't developed to handle the volume of air traffic, the sophisticated high-speed aircraft, or the amount of information with which ground and flight crews must cope today...and every day.

We've found that one-fourth or more of all domestic operational errors were caused either directly or indirectly by mis-communications. New technology like digital communications, or data link, as our program is called, will help, certainly or will they?. Advanced in-flight computers that lessen workload and stress in the cockpit will also help or will this?. I say will this because, aircraft are flown by people...air traffic is controlled by people...our ground systems and equipment is maintained by people...and will be for the foreseeable future.

One of the lessons we learned, early on in our modernization program, was that ignoring human factors in our major acquisitions can cost us dearly, both in the expense of re-engineering and in schedule delays. We've made it a requirement that human factors must be systematically integrated at each critical step in the design, testing, and acquisition of any new technology introduced into the air traffic control system.

But that's only one part of the solution. What's also needed is an aggressive and well-coordinated program of research into the main sources of human error, and to share what we learn with the aviation community at large. In a world of escalating problems...and shrinking resources...no one country can provide the answers. And all of us know there will be no easy answers...no quick fixes.

But with constancy of purpose and a strong sense of mission, we can be confident that many solutions are within our reach. Forums like this, and the ideas they generate, will help us find this solutions. In closing, let me reaffirm that we value your presence here and I wish you a very productive week.

Thank you.

Final

STATEMENT OF JOSEPH M. DEL BALZO, ACTING ADMINISTRATOR OF THE FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON APPROPRIATIONS, SUBCOMMITTEE ON TRANSPORTATION, CONCERNING THE ADVANCED AUTOMATION SYSTEM. APRIL 19, 1993.

Mr. Chairman and Members of the Subcommittee:

I am pleased to appear before you today to discuss the status of the FAA's Advanced Automation System program, which we refer to as the "AAS" program.

The AAS program is the cornerstone of the FAA's Capital Investment Plan, which represents a variety of technological efforts to modernize our air traffic control system. Awarded in 1988, the AAS was at that time the largest automation contract ever in the civil sector. AAS will provide the capacity to handle projected air traffic load well into the 21st century. It offers increased productivity and safety benefits, increased reliability, and the adaptability to take advantage of new capabilities offered by satellite technology.

The President's budget for Fiscal Year 1994 recognizes the importance of the AAS program to our Nation's air transportation system, and seeks the necessary funding to maintain its momentum. The Facilities and Equipment budget request for AAS is $455.7 million. The requested amount is comprised of $424,650,000 to continue development of all segments of the AAS program and $31,100,000 to prepare the Air Route Traffic Control Centers for

installation of AAS equipment. Twenty five million dollars is requested separately as part of the President's investment package.

There are five segments to the AAS program. The first element is the Peripheral Adapter Module Replace Item (PAMRI). PAMRI provides increased data communication capability, and supports an increased number of radars at our air traffic centers, while providing the needed redundancy to support transition to the second phase of the AAS program--the Initial Sector Suite System (ISSS).

The ISSS component will introduce new air traffic control work stations into our air traffic facilities that control en route flight. It will rely principally on the automation capacity afforded by our earlier acquisition and installation of improved main frame computers in all of our air traffic centers. These "Host" computers have performed extremely well since their completion in 1988.

Each work station or "sector suite" will consolidate controller functions now performed at several scopes or workplaces into one suite. Improved data portrayal will be available to our controllers through much enhanced displays that offer higher resolution, color, and better depicted weather information. Electronic flight data, in lieu of handwritten paper strips, will also be available. The sector suite configuration, along with

communications improvements, will enable us to simply and speedily reconfigure airspace within an air traffic center to respond to staffing or workload requirements. It also enables a supervisor to monitor on one screen air traffic activity at any control station under that supervisor's authority. Today, a supervisor must walk around the control room in order to observe air traffic activity.

The ISSS portion of the AAS program provides the needed platform for the subsequent achievement of a variety of user benefits that are offered by other elements of the AAS program. Remaining elements of the overall AAS program include: TAAS--Terminal Advanced Automation System--new equipment and software for the terminal operational environment; TCCC--Tower Control Computer Complex--new software and selected hardware upgrade for airport control tower operations; ACCC--Advanced Computer Complex--new software and selected hardware upgrade for en route air traffic operations; and AERA--Automated En-Route Air Traffic Control to facilitate fuel savings and other efficiencies in the en route air traffic environment.

When AAS is completed, computers will perform many existing controller functions that can be done more efficiently and precisely by automation, freeing controllers to perform functions that humans can do better, such as resolving conflict resolution and flight planning. For example, the AERA portion of the AAS will evaluate radar data to combine aircraft locations, altitudes,

and velocities along with wind speed predictions. Looking ahead as much as 20 minutes into the future, it will scan for potential conflicts with other aircraft, highlighting in bright red the potential collision course on the controller's display. AERA will then rank potential course corrections for the controller who will decide what action to take. This will help tremendously in assigning aircraft more direct and fuel efficient routes, saving time and money.

Our success in the overall AAS program to date has been mixed. PAMRI is a real success story, with the final system implemented in February, well ahead of schedule. And our controller and technician user teams and the creation of the Development Demonstration Facility have been invaluable in helping to assure that fielded products will be usable, acceptable, and appropriate to the task. But we have experienced problems with ISSS, as I will describe.

About 2 years ago, FAA and IBM modified the AAS contract, which resulted in a 19-month delay for ISSS. Five months of the delay were due to FAA changes in requirements and the remaining 14 months resulted from software development difficulties encountered by IBM. This past November, IBM advised us that it would experience an additional 14 month slippage in the program due to significant software development and testing problems.

Following that notice, we acted promptly to insist upon a proposed

plan from IBM to cure this problem, to set course corrections, and firm up a schedule. IBM responded with an initial proposed cure plan. A senior-level FAA team was appointed to work directly with IBM officials to see that this plan was strengthened to meet our requirements. IBM subsequently provided us with its final cure plan, which underwent technical review within FAA. Both IBM and FAA are working to the plan, and are taking the steps necessary to include the plan as part of the contract.

For our part, within the FAA, we have taken several major steps to change the way we previously have done business with the AAS program. First, we conducted a top to bottom review of the program. Our review of the problems encountered with the program indicates to us that we previously did not exercise sufficient, continuing top-management focus on the program; that we have generally taken far too long to respond to technical issues or problems raised by IBM; and that we were not providing adequate top-level attention to requirements changes in the program. The recent changes we have now instituted address all these issues.

We have restructured our management of the AAS program to provide program support and oversight at the top. A program director for the overall AAS program now reports directly to the Administrator. The program director is empowered to make decisions on issues affecting requirements, except where schedule or cost of the program will be affected by a requirements change. That authority is reserved to the Administrator. The program director is

accountable for cost containment and keeping the program on schedule.

The FAA's Acquisition Review Council, chaired by the Administrator, reviews the status of the AAS program at least every two weeks, and more often if necessary. We also are establishing separate program managers for the different segments of the AAS program. We have already selected the program manager for the ISSS segment. The segment program managers will report directly to the AAS program director, who will have responsibility for overall direction and program coordination.

We established a dedicated ISSS team on site at IBM. The team is led by the ISSS Program Manager and includes representatives from our air traffic and airways facilities organizations, as well as a contracting specialist. This team is fully empowered to resolve issues as they arise, eliminating the decision-making delays of the past where it simply took too long for us to come to grips with technical problems. The other segment program managers will exercise the same authority.

Another key step we have taken is to freeze the requirements for ISSS. We need to assure that we have everything our controllers need under this program, but we recognized that we also needed to provide a steadier target for IBM to work toward. It is important to separate the "nice to haves" from the "need to haves," and we have acted to do that by establishing an operational suitability

action team. On April 1, we froze the user requirements for ISSS. I want to stress that this freezing of requirements does not mean that there will be no additional changes to the system. Based on prior experience, I am sure that operational testing of ISSS will highlight some aspects of the system that need tweaking or changing before full-scale deployment can begin. Even these changes will have to be justified in terms of the cost or schedule penalty they may create. We are committed to maintaining much closer control over any requirements changes than was the case before and I am confident that we will have ISSS acceptance at the FAA Technical Center by September 1994.

One of the management corrections we have made with the AAS program entails the establishment of a more detailed and closely spaced series of checkpoints to help us watch more closely the progress we are making with ISSS. System Checkpoint #1 is one of the checkpoints established for this purpose. It involves the continuous operation of 28 common consoles for a 6 hour period. The testing associated with this checkpoint demonstrates the stability, performance, and user functionality elements of ISSS. I am pleased to report that we successfully completed the series of tests under System Checkpoint #1 ahead of schedule. We are now working on a series of follow-up checkpoints of increasing difficulty, and we have begun testing under System Checkpoint #2 ahead of schedule.

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So far, I have discussed our success with PAMRI and what we have

done to address problems with the ISSS segment of AAS. I would like to briefly touch on the status of the rest of the AAS program. The terminal AAS or TAAS will introduce the same new controller workstations for TRACON controllers along with new computer hardware and software into the terminal operational environment. TAAS is the fundamental AAS building block for terminal air traffic control automation. It provides the approach and departure control functionality to replace aging ARTS equipment. It will be the automation system for our Metroplex Control Facilities, and provides a sound and scalable hardware and software architecture, which can be sized to meet current needs and can be expanded to add terminal area automation enhancements. Most importantly, it will provide the computer architecture for implementation of the Terminal Air Traffic Control Automation system in our major TRACONs. TATCA will increase the efficiency of handling terminal traffic by providing top-of-descent, approach spacing, and sequencing aids to air traffic controllers, offering additional economic benefits to system users.

With respect to AERA, we are currently reviewing what actions we need to take to make AERA available as soon as possible after completion of ISSS. The Center for Advanced Aviation Systems Development operated for us by MITRE is assisting us with this effort. AERA, as I mentioned earlier, offers significant benefits to the user community. Therefore, we plan to bring it on line at an earlier phase of the program than was first conceived. This is a high priority with us, as it is with industry groups.

In fact, I should add that we have met recently with aviation industry representatives to bring them up to date on where we are with AAS, the management steps we have now taken to keep this program on track, and our strategy for fielding ISSS in Seattle in 1996. In general, I believe it is fair to say that industry users recognize the importance of pressing forward with the AAS program, and they support doing so. In particular, they have expressed to me the need to bring on line at the earliest time those elements of the program, such as AERA, that will provide the most direct benefits to them, and we are attempting to do just that. They have also indicated their general satisfaction with the kinds of management corrections we have made, but have expressed concern that we remain vigilant in our monitoring of the AAS program.

The Area Control Computer Complex is the segment, which, in its first phase, replaces the existing Host computer and the 1970's vintage software for en route air traffic control. We have completed the critical design review conference, and begun software work on the most challenging portion of the system--flight data processing. The goal is to make processing of direct routes the rule rather than the exception, providing more flexible routing services to our users.

As part of our continuing evaluation of the AAS program, we have decided to break the Tower Control Computer Complex, or TCCC, portion of the program into smaller steps. The first step, known

as TCCC Type 3, is a fundamental building block that will go into Air Traffic Control Towers to replace existing analog instrumentation, such as the barometer and Runway Visual Range instrument, with modern displays to ease the controller's reading of these parameters. It will also make space available for additional tower cab enhancements. TCCC Type 3 can be implemented independently of TAAS and other AAS segments, and is a low-cost approach to providing an incremental upgrade to tower automation capability sooner than the previous TCCC program plan.

During this coming fiscal year, development of the ISSS software to conduct operational test and evaluation at the FAA Technical Center will be completed and delivered to the Technical Center. TAAS software coding and integration will continue. ACCC efforts to replace the Host computer and its aging software will resume in 1994. Once these three systems are fielded, air traffic controllers and maintenance technicians will have more reliable and maintainable systems. Requirements for the initial AERA services and the second ACCC/AERA software package will be frozen during FY 1994, and design and development of the software will begin. Other activities, designed to support the ISSS schedule as modified earlier this year, will be underway.

I am happy to report today that after long analysis and review, we have reached agreement on a strategy for facility consolidation. When AAS was conceived in the early 1980's, we believed that in order to make full use of AAS it was necessary to

concentrate air traffic control in 23 facilities. More recently, we have grown concerned that this proposed number of air traffic facilities was too small, and that impacts on the national system could be too great from any unplanned interruption in air traffic service from a particular facility. Since AAS design development and advances in computer technology make it possible today to achieve operational benefits regardless of the number of automated facilities, we have reexamined our original consolidation plan.

With Secretary Peña's personal involvement, we have now agreed within the Administration on a fundamental change to our earlier consolidation plan. Taking advantage of today's technology, we will consolidate only where it is justified either operationally or economically.

In other words, our existing Centers will remain en route centers. We will have a limited number of metroplex control facilities of which 5 are already funded. Most of our existing TRACON's will be modernized with new equipment. Some TRACON's will be consolidated where required facility reconstruction results in economies of scale by incorporating nearby facilities that would otherwise have to be modernized. We are defining

evaluation criteria and refining the methodology used to determine future consolidation. We would be happy to involve you as we proceed. We will have a report to Congress shortly.

AAS restructuring is based upon a shift from a "one-step" transition to a flexible system architecture. A flexible architecture approach permits a gradual introduction of new technology as soon as it becomes available. Additionally, unlike full consolidation, limited consolidation does not require an immediate determination of the final number of consolidated facilities but rather, permits the review and justification process to proceed over a period of time.

In closing, Mr. Chairman, I would like to emphasize the importance we place on the AAS program, and the need for its timely completion. AAS is an investment in our air transportation infrastucture that is needed to take the aviation industry into the 21st century. The steps we have taken reflect our commitment at the top to provide a much improved foundation for managing the program in a way that will keep it on budget and on schedule. I assure you that we will not relent in these efforts.

That completes my prepared statement. I would be pleased to respond to questions you may have at this time.

Statement of Joseph M. Del Balzo
Acting Administrator
Federal Aviation Administration
Before the House Committee on Appropriation,
Subcommittee on Transportation
April 26, 1993

Mr. Chairman, I appreciate the opportunity to appear on behalf of the Federal Aviation Administration (FAA) to present our budget for Fiscal Year 1994. I want to thank you and the other members of this committee for your continued support for and interest in FAA's activities and programs.

The President's budget requests a total of $9.2 billion in budget and obligation authority for the FAA...a 3.5 percent increase over our FY 1993 enacted level. It presents a balanced program of funding to provide for the safe and efficient operation of the National Airspace System (NAS), enhances the capacity of the nation's existing airports and available airspace, maintains U.S. competitiveness in the world aviation market, and assesses the impact of aviation on the environment. The small increase we are requesting recognizes that the FAA must do its share to slow the growth in Federal spending and control the deficit.

The complex inter-connections among all the NAS components and how our controllers use our new equipment do not come across well in static columns of numbers or in individual line items of a budget. I believe that I can help better defend the many elements of our budget for you by briefly describing the way the

system uses our new equipment to manage the continuous flow of information which is crucial to the air traffic control process.

I would like to begin with a brief comment about the FAA workforce. On a typical day, the FAA will handle 168,000 aircraft operations and provide over 110,000 flight services to general aviation pilots. We will perform 800 safety inspections, 82 security inspections, and 14 safety seminars. To guarantee the high level of performance and reliability that are demanded in the U.S. air transportation system, airway systems specialists will maintain and monitor an infrastructure consisting of some 28,000 hardware and software systems.

There are few workforces anywhere in the federal government who carry a greater day-to-day responsibility than do the men and women of the FAA. They have set demanding standards of professionalism, which are unsurpassed anywhere in the world of aviation. Of equal quality are the complex electronic systems, which are critical to modern air traffic control. The Congress and the American people have made a very substantial investment in both the FAA workforce and in our advanced technology. This investment was a necessary one, and I believe that it has been managed with prudence, foresight, and imagination. But we cannot be complacent about what we have achieved, nor should we take for granted what the system delivers.

The United States air transportation system is the busiest and most complex in the world--we have 21 of the 25 busiest airports in the world. At its heart is a vast network of airports and sophisticated air traffic control, navigation, surveillance, and communication equipment that are constantly evolving to meet the needs of a dynamic industry. As this Subcommittee knows all too well, the airline operators have been hit by the worst financial losses in history. U.S. aircraft and avionics industries are facing stronger competition from foreign companies than ever before. After nine decades as the undisputed leader in world aviation, many now fear that the United States could lose its leadership position.

A safe and efficient national airspace system, capable of meeting the demand for air service, is fundamental to the economic stability of the airlines and the aviation industry. Our latest aviation forecasts predict that, over the next decade, the number of passengers using U.S. commercial air services will increase from an average of 1.3 million a day to nearly 2 million. We further predict that a 25 percent increase in air carrier operations will be needed to meet this demand. Today, the top 100 of the nation's busiest airports account for 95 percent of all air carrier passengers and 92 percent of all air carrier operations. Such concentration leads inevitably to delays. The problem lies in the limited capacity of airports to accommodate aircraft on the ground, the limited capacity of the air traffic

management system to accommodate aircraft in the air, and the difficulties in integrating the two. Compounding the problem is mounting public concern over noise, congestion, and pollution created by urban airports.

One way that the FAA and this Subcommittee can help the airlines, for now and the future, is by investing in infrastructure improvements to increase capacity and reduce operating costs. We simply have to move quickly to meet the demands of the 1990's and to prepare for a new era of air transportation in the coming century. The FAA's Capital Investment Plan is intended to do just that. This plan, along with our Research and Development (R&D) program, introduces new technologies that are either available now or could be deployed in the near future to cut the cost of flying for all users of the airspace.

Many of these savings will accrue from new capabilities which will permit flexible and dynamic modifications to aircraft routes in response to changes in weather or traffic conditions. An adjunct to the Advanced Automation System, called Automated En Route Air Traffic Control, will provide automatic reconfiguration of blocks of managed airspace to better meet real-time user demand and permit increased granting of user-preferred trajectories and altitudes. The Traffic Management System 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 at high altitudes are currently being provided to a limited number of aircraft between designated city pairs or on individual flight requests.

When fully implemented, air carriers are estimated to save over 35 billion gallons of fuel and over 30 million aircraft hours. These direct operating cost savings equate to over $62 billion through the year 2025, or on average nearly $2 billion annually.

For flights over the ocean, programs such as Data Link and Automatic Dependent Surveillance provide the means for immediate electronic communication of accurate position reports between pilot and controller instead of voice relay and manual key-entry of position data that exists today. Combined with new automation programs such as Dynamic Oceanic Tracking System, these programs will provide greater capacity and more fuel-efficient routes over the oceans than today's technology allows.

The FAA is pursuing an aggressive research program to make digital data link available for every facet of flight and for all users of the airspace. Data link opens the way for transmitting a host of new information to and from aircraft that will significantly alter the way air traffic is managed...from pre-departure through landing, dramatically improving capacity, productivity, and efficiency.

In its simplest form, data link will replace or augment many of today's routine voice messages with non-voice digital communications. In a later, more complex form, data link will become part of a vast, interlocking system of computers, satellites, sensors, and software called the Aeronautical Telecommunications Network or ATN. The purpose of ATN is to integrate automation systems on the ground with computers in the aircraft.

Another project, Terminal Air Traffic Control Automation (TATCA), is expected to decrease delays by increasing arrival capacities. TATCA provides advisories directly to controllers to assist them in optimizing traffic flow in terminal areas.

We are also aggressively pursuing R&D programs that are aimed at reducing runway incursions at the busiest airports. These programs combine radar technology with a series of incrementally more sophisticated automation capabilities (Airport Movement Area Safety System and Aircraft Surface Traffic Automation) to achieve a dramatic reduction in runway incursions. Projects such as these will ensure that growth in aviation demand is met without compromising safety.

If the U.S. aviation industry is to maintain its world leadership position, it must be on the leading edge of technology. One such

advancement with revolutionary implications for air traffic control, is satellite technology. The use of the Global Positioning System, combined with advancements in telecommunications and small, powerful computers, offers us virtually unlimited opportunities for improvements in safety, capacity, service flexibility, and operating efficiency. We cannot afford, as an agency, to miss this opportunity to better fulfill our public mandate. We cannot afford, as a country, to lose out in the competition for the vast worldwide market in satellite technology. And we must not, as the world's leader in aviation, miss this chance to continue to assert our technological leadership.

Perhaps no other issue so compels us to take a global perspective than does our common concern with the environmental impact of aviation. It is essential that we accurately assess aviation's impact, and then identify a reasonable and responsible course of action to address it. We are requesting funds to address this issue on two fronts: the first is to continue studies aimed at reducing aircraft noise and engine emissions; the second is energy conservation.

Our FY 1994 budget also requests funds to ensure that the FAA complies with all laws and regulations regarding hazardous materials to ensure that those materials used in air traffic control equipment and facilities are disposed of safely and

properly, and do not harm our environment.

Here, briefly are the highlights of our budget submission:

Highlights of the FAA Budget for FY 1994

Facilities and Equipment (F&E)

To support projects that modernize and improve the National Airspace System (NAS), $2.524 billion is requested for the F&E program in FY 1994. The FY 1994 F&E request a 7.4 percent increase over the FY 1993 enacted funding. The budget supports implementation of the Capital Investment Plan to provide new facilities with modern equipment capable of handling the volume of air traffic predicted for the 1990's and beyond. It represents the financial commitment necessary to achieve the cost-saving benefits so important to our system users.

Operations Funding

The FAA request for Operations places continued emphasis on safety, security, and efficiency of the National Airspace System. For Fiscal Year 1994, the Operations appropriation requests $4.576 billion. This is an increase of 0.8 percent or $38 million over the FY 1993 level.

This request supports the day-to-day resources necessary to maintain the facilities and support the men and women responsible for keeping our system operating. In line with the President's

Economic Plan, we have carefully targeted some reductions in our workforces and in our administrative spending. Despite these reductions, we believe our request includes sufficient resources to support the current operating level of the NAS.

As part of our Operations appropriations request, we also recommend certain cost-cutting measures such as early termination of the Pay Demonstration project and discontinuance of the subsidy for the Direct User Access Terminal (DUAT) service. The Pay Demonstration project was scheduled to end in June 1994, but will now end 9 months early in September 1993. Our demonstration to entice pilots to use the DUAT service for weather briefing and flight plan filing has served its introductory purposes. Similar commercial on-line services exist and the toll free 800 service will be retained.

These reductions will help defray increased expenses associated with inflation, non-discretionary pay increases, and other mandatory costs of operating and maintaining new systems, particularly expenses associated with the provision of maintenance and supply support to new systems that were fielded and commissioned in previous years.

Research, Engineering, and Development (R,E&D)

Our FY 1994 request for the R,E&D appropriation is $250 million, an 8.7 percent increase over the FY 1993 enacted level. It funds

the development work of many of the projects which I have just described. We will continue to work aggressively on joint ventures with industry, other government agencies, and the international community on the development and implementation of new air traffic control system capabilities.

Among the major efforts in the R,E&D program are system capacity, satellite navigation, advanced air traffic control technology, aging aircraft, automation enhancements, airport security, and a strengthened focus on human factors. A vigorous R,E&D program is critical to conceiving and developing new technologies that will provide the foundation for further improvements in safety and efficiency in our air transportation system.

Grants-in-Aid for Airports

An obligation limitation of $1.879 billion is requested for the Grants-in-Aid for Airports. This amount is a 4 percent increase over the FY 1993 level of $1.8 billion and recognizes the continued need for investment in our nation's airport infrastructure. Reauthorization legislation for Airport Grants is required for FY 1994 and will be forwarded shortly.

Trust Fund Issues

Funding levels in FY 1994 assume 75 percent trust fund financing for the FAA programs.

Before I close I would like to reaffirm the importance we place on the timely completion of the Advanced Automation System (AAS). When I appeared before this Subcommittee one week ago, I outlined the steps that we have taken to change the way we manage the AAS program. These steps reflect our commitment at the top levels of the FAA to keep the AAS on budget and on schedule. I cannot overemphasize the importance of this program to our overall modernization plans. The Interim Sector Suite System is needed to replace 25 year old equipment and to provide the means for introducing new software features. The Terminal Advanced Automation System is critical to allowing us to introducing new delay-reducing methodologies in the terminal airspace environment. The reforms we have put in place reflect this commitment and I ask for your continued support.

This concludes my statement, Mr. Chairman. I will be happy to answer any questions you or other members of the subcommittee may have at this time.

GPS: A GLOBAL BARGAIN FOR CIVIL AVIATION
Looking Beyond National Boundaries

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April 28, 1993

Good morning:

It's the custom for speakers to start out by saying how delighted they are to be here. This time, I'm not just being polite--I really mean it. This is budget season in Washington. I've spent the last two days before a Congressional committee, where I did my best to defend the FAA's programs for the next fiscal year. It's a little like being on Jeopardy...but without the consolation prizes.

Today the world of aviation, like the world at large, is experiencing a period of unprecedented change and unparalleled opportunity. We find ourselves in the throes of a transition between the kind of industry we have been for the last 50 years, and the kind we will be...or want to be...for the next 50 and beyond.

Right now, virtually every air carrier in the world is going through a period of financial hardship. Many are looking beyond their borders for mergers and more profitable routes. The downturn in the global economy has caused everyone..the air carriers, the airframe and avionic manufacturers...and those of us who manage the airspace...everyone is looking for new and better ways to reduce the cost of flying. The availability of space-based technologies...new, more powerful computers...and advanced telecommunications, combined with the emergence of the European Community and the changes that have taken place in the former Soviet Union, provides the opportunity to create a truly global air traffic control system. The aviation community has always had the will to make revolutionary changes, but seldom had the technology. Now, at last, we have a powerful technology but are suddenly less confident that we have the collective will.

This morning I'd like to talk about how the FAA's plans to modernize our air traffic control system are progressing, and the important features which will distinguish the next generation of technology from what we have today.

Let me say, straight off, that the transition has already begun. The FAA is literally reinventing itself with new technology, including an Advanced Automation System that is one of the most complex...and powerful computer systems ever developed. When the AAS is in place, computers will perform many routine functions, leaving the controller free to concentrate on matters which call for human judgement and decision-making.

One phase of the AAS replaces the old computer workstations in the en route centers with new initial Sector Suites. The new workstations will have enhanced displays that offer higher resolution, color, and better depictions of weather conditions. Electronic flight strips will be available to replace handwritten paper strips. We're on a parallel track to replace the Bell-300 voice switch with a state of the art voice switching and control system. The new switch will be faster, more flexible, and much more reliable. And, unlike the Bell-300 switch, VSCS can be fully integrated with all the new advanced systems.

Soon after the completion of the Sector Suite, an adjunct of the AAS called Automated En-route Air Traffic Control, or AERA, will become available. AERA will enable our managers to dynamically reconfigure airspace...simply and quickly...to adjust to workload, to reroute aircraft around bad weather, and to provide pilots with the route of their choice. Aircraft will move through the airspace with a greater margin of safety, fewer delays, and with a wider choice of fuel efficient routes. The same controller workstations that we're installing in the centers will also go into several of our larger Terminal Radar Approach Control facilities. These sector suites provide the computer architecture to support another improvement called Terminal Air Traffic Control Automation...or TATCA. When TATCA is in place, controllers will have top-of-descent, approach spacing, and sequencing aids to handle higher levels of traffic in the terminal area with greater efficiency and safety. The payoff from TATCA will be additional capacity at those airports which today are choked with congestion.

When will all this happen? Perhaps sooner than many believe...despite the delays in the AAS program that I'm sure most of you have read about. Our new management strategy calls for fielding the first Initial Sector Suite in Seattle in 1996. Ten days ago, I presented a plan to the Congress to restructure the AAS program to keep it on schedule and on budget. The plan calls for freezing the requirements, placing a dedicated team on site at the prime contractor's plant, and providing greater oversight at the top. We've also changed the implementation strategy for AERA, so that we can begin to receive the benefits much more quickly.

The Advanced Automation System is a "must have" program if we are to cope effectively with the future demands for air traffic control services.

Another program that we must have, for both safety and economic reasons is digital communications. For the past ten years, the FAA has pursued an aggressive research program to make digital communications possible in a dynamic air traffic control environment. Today that research is paying off. At 31 airports in the United States, pilots can receive predeparture briefings over a digital datalink instead of the old radio-based system. By the end of 1995, we plan to extend this service to 60 airports. And by the end of the decade, if not sooner, data link will be available for every facet of flight, and for all users of the airspace.

On a typical three-hour flight, a pilot communicates with multiple air traffic controllers and changes radio frequencies about two dozen times. Most communications are routine, but each exchange must be written down. During peak periods, it's not unusual for a controller to talk on a single radio channel with 25 or more aircraft. It's hardly surprising, then, that nearly one-fourth of all domestic operational errors are caused, either directly or indirectly, by mis-communications. The potential to improve safety by reducing, even eliminating, these errors is one of the most compelling reasons to implement digital communications.

Here's the other reason. One of our air carriers told us that communications-related delays cost it more than $300 million dollars each year.

In a single 12-month period, the company experienced more than 8.5 million minutes of delay while either in-flight or taxiing...delays which added $173 million dollars to its direct operating costs. Air traffic imposed an additional 14,000 hours of delay at the departure gate. Once airborne, altitude and speed restrictions, together with inefficient routings, cost them another 108 million dollars in wasted time and increased fuel consumption. Inefficient communications are a drain on resources when airlines need to be conserving their cash. At a time when companies are desperately shaving expenses every way they can...from laying off pilots to leaving the olives off the dinner salads...here we have a way to introduce fundamental savings.

In it's simplest form, data link will replace or augment many of today's routine voice messages with non-voice digital communications. In a later, more complex form, data link will become part of a vast, interlocking system of computers, satellites, sensors, and software called the Aeronautical Telecommunications Network, or ATN.

We've been working with the MITRE Corporation to develop an ATN for some time now. The ATN will provide a communications architecture that takes those services which presently function through independent networks...air traffic

control...fixed base operations...flight, airport, and airline operations...and integrate them into a single, coherent management system.

In the past few months, MITRE has advanced a bold new proposal. Under MITRE's approach, the development of ATN would be a collaborative effort, in the form of a Limited Liability Corporation, through which both the private sector and the FAA would contribute. We think this consortium arrangement could speed up the development and acquisition process by as much as two years.

I've asked Dave Watrous of RTCA to conduct a study for us on the orderly implementation of digital communications, and to provide us a report similar to the one they recently completed on satellite technology. We'll share the results with you as soon as they finish the study. ATN isn't a revolutionary new concept. The International Civil Aviation Organization--ICAO--has already made the decision that this technology will be the international standard. What concerns us isn't whether the aeronautical telecommunications network will be developed...the issue is how fast can we make this service available and begin to accrue the benefits. And that is precisely where we stand with the Global Navigation Satellite System as well.

Two years ago, the International Civil Aviation Organization endorsed the concept of a worldwide air traffic management system based on the use of satellites. Not unexpectedly, there are many technical and institutional questions to be resolved. What are the most promising early applications? Which implementation strategy will work best? What new policies, procedures, and international agreements will be required? Can system integrity and availability be guaranteed? How will we integrate this new technology with the system we have today? And, of course, there is the question of ownership.

Despite these questions, GNSS is a concept which has very quickly gained momentum. You don't have to be a visionary to see ahead to the very substantial savings once it's proven and in place. The combined impact of GNSS, data link, and automatic dependent surveillance could amount to enormous savings--some estimate as much as $5 billion a year. We would no longer need to replace aging primary radar. We would no longer need to buy, install, and maintain VORs and Category I instrument landing systems.

It's hard to over-estimate the magnitude of these changes, or to exaggerate the force of the technological and economic imperative which has powered the rise of GNSS as a concept. The use of this technology gives civil aviation an opportunity to change the way we've done business for the past four decades. If implemented properly, it can, quite literally, eliminate the disparities among the level of air traffic services around the globe. To help fulfill that vision, the United States has offered its NAVSTAR Global Position System to civil aviation around

the world, free of charge, starting in 1993. Our original offer was for a minimum of ten years. We have extended that offer and will make GPS available for the foreseeable future.

There are some who feel that we're pushing too hard and too fast on GPS. That with all this momentum, we'll be led to make rash and premature decisions. The U. S. Government is well aware of the hazards of committing too soon to a course of action, no matter how compelling. It is for this reason that the FAA has been exploring all the most reasonable alternatives. Earlier this month at the FANS Institutional Working Group meeting in Annapolis, Maryland, the group outlined five alternative ways to construct a GNSS. These are all technically acceptable options, and together they lay out flexible plans for the gradual phasing in of a technology which will certainly continue to evolve even as it is being implemented. None of these options is clearly preferable at this stage in our thinking and planning. Each has advantages. Each has drawbacks. But the important thing is that we can begin <u>now</u> to achieve early benefits, while we resolve questions about the long-term system.

The reservations which have been voiced in international aviation circles about the risks of dependence on a military-controlled satellite system...these reservations have been expressed just as forthrightly within DOT and the FAA. We all recognize that the question of control is a very legitimate issue. We all realize that access to GPS must never be a bargaining chip to further the diplomatic or military aims of one country. World aviation must never be held hostage to the geopolitical ploys of a single power. Secretary Pena has been very clear in calling for greater civilian supervision and oversight of GPS. This is a matter of fundamental importance not just to the civil aviation authorities of other nations. It is a basic question for us at the FAA as well. This is <u>not</u> an issue which divides us.

When I reflect on the objections to the use of GPS, I remember a struggling Hollywood screen writer whose scripts were never rejected outright but never got made into movies, either. What she learned from those frustrating years, she said, was that "There are a thousand ways to say no, but only one way to say yes." What we need today is a simple "yes". If we delay, I see a real danger that this great concept will be sentenced to slow death by stipulation,,,as bureaucrats and politicians squabble over all the endless details.

I believe that the presence of all of you at this symposium is strong evidence of the momentum which has built up in support of a truly global system of air space management. GNSS will serve the vital interests of every nation and every sector of the aviation industry. In this day of proliferating problems and shrinking resources, it's a technological and economic imperative.

Forums such as this...and the ideas they generate, provide the intellectual energy we need to power our progress in the months ahead. We value your participation at these sessions, and I wish you a very productive conference.

Thank you.