☑ Airport Grant Announcement

Before we get started, I have an announcement to make.

- I am pleased to tell you that the FAA is awarding a grant of $1,208,000 to the State of Wisconsin to support general aviation development at the Wittman Regional Airport here at Oshkosh.

  The project calls for extending taxiway P-2 and installing fencing for taxiway access to the west side general aviation area.

- For spectators and participants at the airshow, the improvements will provide an even safer environment. For the State of Wisconsin and this region, the grant will ensure that Wittman Regional Airport continues to meet the needs of general aviation now and well into the next century.

# # #

☑ Introduction:

It's good to be back at Oshkosh once again. The airshow is one of the world's largest fly-ins and one of America's most prestigious aviation events. A million people from 75 countries come here to catch a glimpse of aviation's past ... and its future.

In the early days of this century we were a nation of tinkerers, and inventors were our folk heroes. People built their own airplanes in barns and backyards all across America.

We are *still* a nation of tinkerers, and EAA nurtures that spirit of inventiveness.

☑ General Aviation is on the Rebound [Chart 1]

- General aviation is on the rebound, and passage of the General Aviation Revitalization Act, a robust economy, low interest rates, and low inflation create a climate for a sustained recovery.

- One year ago there were 19 active small airplane projects, worldwide. This year there are 30.

- Four type certificates have been issued since Oshkosh '95. [Zenair CH2000, (Canada); Cessna 172B (U.S.), Air Tractor T-602 (U.S.), and SIAI Marchetti SF600A (Italy).]

  And, since President Clinton signed the bill limiting lawsuits in crashes of small older planes, U.S. manufacturers have started work on 17 new GA airplanes.

☑ **Maintaining momentum: Getting Rid of Regulations and Red Tape**

- Last year, Flying Magazine asked 1,000 pilots what they thought was the greatest threat to general aviation's future. More than half said "over regulation."

- I know from experience that unneeded regulations create a costly burden on pilots and small businesses struggling to survive.

- Since I have been at the FAA, the agency has eliminated 13 percent of its regulations and substantially revised 37 percent.

- In my first six months at the FAA, I asked pilots and the public to tell us the top three regulations that bothered them the most.

  Some were changes that GA had wanted for years.

- **<u>Flight Simulator Training</u>**. A final rule was published July 2, 1996, clarifying the requirement that a flight instructor certify training in a flight simulator in order for a pilot to log that time. The rule (61FR34508) went into effect last Thursday, August 1.

- **<u>Third-Class Medical Certificates</u>.** The final rule extending the validity period from two years to three years for pilots under age 40 was issued March 13, and goes into effect in September. The final rule *does not* require a resting electrocardiogram for third-class medical certification.

- **<u>Pilot, Flight Instructor, Ground Instructor, and Pilot School Certification Rules (Parts 61, 141, and 143)</u>.** Of the 5,400 comments received to this proposed rulemaking, two changes drew the most response:

  (1) eliminating the medical certificate requirement for recreational pilots and

  (2) deleting the 50-mile restriction. We received many thoughtful comments on both sides of the issues.

- The review is taking longer than we would like, but this has been one of our largest and most complex revisions in recent memory. Your comments were very important in helping us sort through the issues.

■ Child Pilot Safety Bill

- The House approved the Child Pilot Safety Bill on July 22 by a vote of 395 to 5 and sent it to the Senate.

  The so-called "record-breaking flights" by non-pilots -- encourage poor judgment and reckless behavior. We can't legislate good behavior. But we can stop those with bad judgment from damaging the entire GA industry.

- The **EAA Young Eagles** is one example of an excellent program which introduce youngsters to aviation under the tutelage of our most experienced general aviation pilots. The Child Pilot Safety bill preserves such programs.

■ **The FAA knows what it means to be handicapped by too many regulations.**

- **<u>Acquisition and Personnel Reform</u>**. In April, the FAA implemented its first major set of reforms since the since the FAA was established in 1958.

  <u>Controller Pay</u>. Within a day, FAA announced a 10 percent pay raise for the controllers in the busiest, hard-to-staff facilities. We couldn't have done that under our old personnel system.

  <u>GPS/WAAS</u>. The new WAAS contract was put in place in five days. Before reform, this action would have taken months -- if we had been able to do it at all.

  <u>Flight Service Station Automation</u>. This is one of FAA's three lead projects using the new acquisition procedures. The project replaces and upgrades the 15-year old flight service automation system. Our goal is to get this system in the field in half the time it took under the old rules.

■ **The Pending Budget Crisis: The FAA needs a stable source of funding**

- **Making Difficult Choices**. The FAA has already reduced its annual budget by $600 million. We try to minimize the impact of these cuts on any one sector.

    DUATS. In May, the agency awarded two new contracts to GTE Government Systems and Data Transformation Corporation for toll-free DUATS service. Both companies have been providing weather and aeronautical information to GA pilots since 1990. Each received a one-year contract, with four one-year options. The cost of the two contracts is $26.3 million.

    Designated Engineering Representative. With fewer people to do the work, the FAA is encouraging greater use of Designated Engineering Representatives. DER's charge for their services, but take less time than the FAA with its limited resources.

- **Outlook for FY 1997 and beyond**. By 2002, America will put its fiscal house in order through hundreds of billions of dollars in cuts, continued reductions in the federal workforce, and the termination of many federal programs.

Even if the FAA does well in FY 1997, without major financial reform, the demands of a balanced budget will almost surely impact the FAA in a major way.

■ **The Aviation Trust Fund is an uncertain source of revenue**.

- Few disagree that the FAA needs a stable source of funding that will grow along with its workload. Last Wednesday, Congress agreed to extend the aviation tax to the end of the year, while a solution is worked out.

- We are at a critical stage when a sure and steady source of funding is essential if the FAA is to do all that the public expects and demands.

- No expectation is higher, no demand more adamant, than that air transportation in the United States continues to meet the highest standards of safety.

■ **An Unwelcome Trend: The Number of Homebuilt Accidents and Fatalities Is Going Up.**

[Four charts]

- **Chart 1: Fatal Accidents Per 100K Hours [Homebuilts & Total GA Since 1980)**

  The number of homebuilt aircraft in the GA fleet has increased from 2,100 in 1970 to 23,000 today. About 18,000 of these are active, compared to 176,000 active general aviation aircraft.

  In 1995, homebuilt aircraft logged 781,000 flight hours, compared to 20 million for GA. The homebuilt fatal accident rate per 100,000 aircraft hours was 8.71, compared to 2.04 for general aviation.

- **Chart 2: Accidents Per 100,000 Hours [Homebuilts & Total GA Since 1980] --**

  1995 Accident rate for homebuilts, 28.30, compared to 10.33 for GA.

Fatal Accidents Per 100K Hrs
Homebuilts & Total GA Since 1980
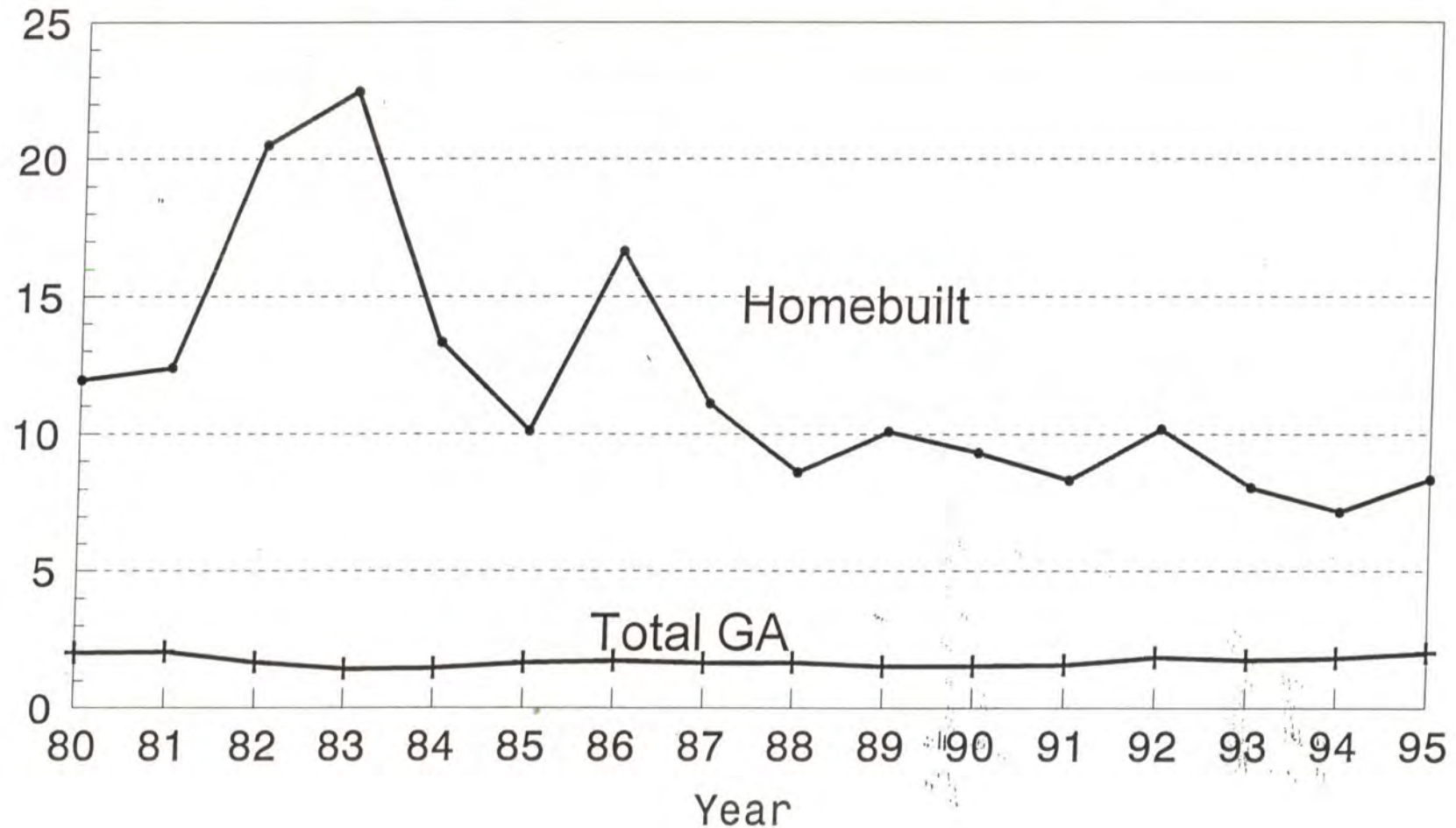
Accidents Per 100K Hours
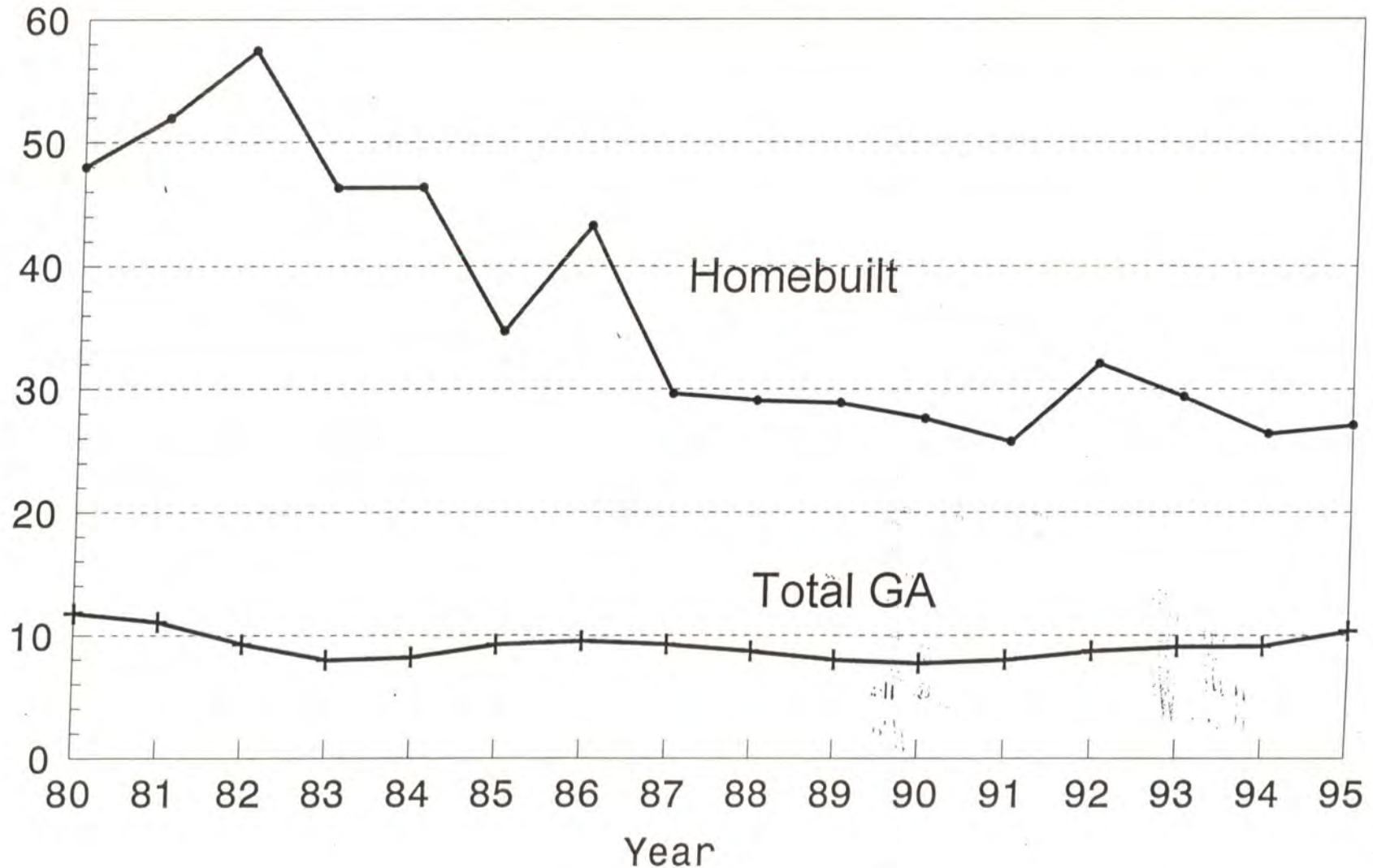## Homebuilts & Total GA Since 1980

Chart 3: Homebuilt Aircraft Accidents [1980 - 1995]. NTSB reported 221 homebuilt accidents in 1995, compared to 2,066 for GA.

- **Chart 4: Homebuilt Accidents [1993 - 1995]**

  (By type of aircraft.

  The United States operates the busiest and safest aviation system in the world, and we can all take pride in that accomplishment. But the events of the past few months dictate that we **all** must do more.

■ **Tighter Security at the Nation's Airports**

- Ten days ago the President announced new measures to strengthen airport security.
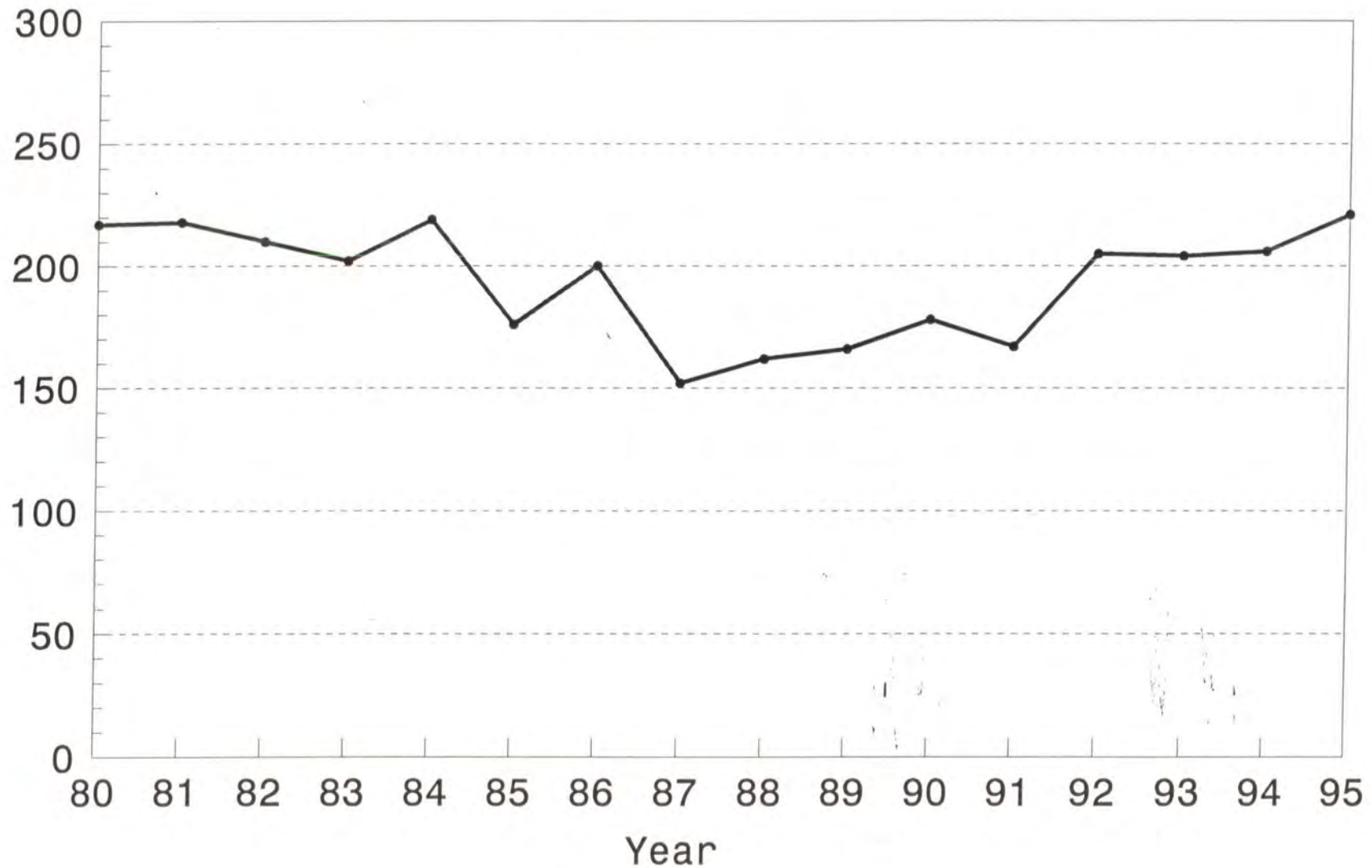
  If you travel on a commercial carrier, you may be asked to show a photo id.

  Your bags will be screened with greater vigilance.

  The lines may be longer at the security check-in points.

Homebuilt Aircraft Accidents
Since 1980

HOMEBUILT ACCIDENTS
1993 - 1995

TYPE OF AIRCRAFT	1993	1994	1995
FIXED WING	186	181	205
GLIDER	1	3	2
ROTORCRAFT	3	8	4
ULTRALIGHT	3	5	7
GYROCOPTER	11	9	3
	204	206	221

GA pilots may notice tighter security in the controlled access areas.

- We will do everything we can to minimize the inconvenience and the cost, but safety must be maintained.

- These are difficult times for all of us. But if we all pull together, I am confident that we will get through them.

I know you have a great many questions. I will be glad to respond to them now.

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DAVID HINSON
FAA ADMINISTRATOR
LUNCHEON ADDRESS
NATIONAL HISPANIC COALITION OF FAA EMPLOYEES
1996 NATIONAL TRAINING CONFERENCE
THEME: "CHALLENGING THE 21ST CENTURY WITH PRIDE"
ATLANTIC CITY, NJ
TUESDAY, AUGUST 6, 1996

Introduction: Why the FAA will be one of the key organizations to lead the way into the 21st century.

It's a privilege to take part in this year's national training conference. You picked a very timely theme. For we must not allow the events of recent months to diminish our justifiable pride in our work or to undermine our confidence that we can and will make aviation even safer in the next century than it is today.

You know, as I do, that the FAA is a totally dedicated organization respected throughout the world for its high level of professionalism and integrity. Those are qualities which will be even more important in the years ahead.

Today I would like to explain why the FAA can be counted among those organizations which will lead the world into the 21st century. The jobs you have in the agency will be increasingly recognized -- and rewarded -- as vital to our national interest and essential to the vigor of our economy.

The new power base: technology, education and institutional flexibility

Several writers on current affairs have argued that in the century we are about to enter, power will gravitate to those who have built strength in three key areas: technology, education and institutional flexibility.

In each of these areas, the FAA is uniquely well positioned

The significance of FAA reform

This year, the FAA has initiated what is probably the most significant change in its 38 year history. Less than six months ago, we were given a degree of freedom available to no other federal agency. The FAA now has the authority to write its own policies for personnel and procurement.

With the FAA reform package, we have bettered our ability to keep up with the rapid pace of change in the industry. We at last have the flexibility to upgrade our workforce and speed up the deployment of the latest technology.

What the FAA does <u>not</u> have, as yet, is a dependable source of funding that will grow along with the agency's increasing workload. I hope and expect that that issue will soon be resolved, as well.

Our reliance on technology to cope with future growth

The rapid growth of air travel which almost all forecasts predict for the next decade will be a severe test for the FAA. The anticipated volume could overwhelm our capacity to manage the airspace with efficiency or to provide the level of service expected.

The impending conflict between expanding responsibilities and shrinking resources can only be resolved by the introduction of increasingly sophisticated information systems.

The FAA is leading the world aviation community in developing an entire portfolio of advanced technologies. It has been a pioneering effort, beset with all the difficulties and delays which are unavoidable when working with so many unknowns.

But as I wrote in the FAA's annual report this year, many of our long-range plans and projects are now beginning to take definite shape. Our investments are beginning to yield long-promised benefits, and we see a pattern of completion.

Our investment in fundamental technological innovation has far-reaching implications both for this nation and its aviation industry.

The knowledge and information sector: prime source of economic power and growth

In a recent article in the journal *Foreign Affairs*, it was pointed out that "knowledge, more than ever before, is power. The one country that can best lead the information revolution will be more powerful than any other. For the foreseeable future, that country is the United States."

The knowledge and information sector is now our prime source of economic growth. Employees in the information industry are now creating far more wealth for their companies than workers in basic manufacturing or retail services.

The Bureau of Labor Statistics doesn't track knowledge workers in their monthly statistics yet, and its an omission which distorts our view of what is happening to our economy.

If the Bureau did compile these statistics, they'd discover that more than 36 million people qualify as knowledge workers in the United States -- 33 percent of the total labor force. By contrast, workers in manufacturing jobs account for just over 10 percent of total employment -- down from 23 percent in 1960.

The growth of knowledge jobs is one of the most impressive achievements of our economy. From 1991 to 1994, almost four million new knowledge jobs were created. That's an 11 percent increase Compare that with the loss of 88 thousand manufacturing jobs over the same period.

Knowledge-intensive jobs vary across sectors

Knowledge-intensive jobs are also the fastest growing throughout the federal government -- and especially in the FAA.

Someone who has calculated the Knowledge Ratios of American business and government organizations found that engineering firms and medical research labs had the highest proportion of knowledge workers compared to all other workers.

The lowest concentration of knowledge workers was found in beauty salons and barbershops, car dealerships, and private detective agencies.

Government agencies, overall, fell just about midway between the top and the bottom. Along with the air transport industry and aircraft manufacturing.[1]

The pace-setter in the knowledge industry, of course, is Microsoft. They have a head start in using information technology to achieve high levels of productivity.

Knowledge-intensity in aviation: Internet marketing as the third revolution

But aviation is catching up -- both in the private and public sectors.

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[1] Nuala Beck, *Shifting Gears: Thriving in the New Economy*, HarperCollins, 1992.

The airlines are learning to use the Internet to sell tickets. On-line auctions have enabled carriers to fill seats which would otherwise have been empty.

One leading Wall Street analyst predicts that the airlines' growing use of the Internet would produce the third revolutionary change in the industry. And this this change will be comparable to the impact of jet aircraft in the late 50's, and early 60's, and airline deregulation in 1978.[2]

Knowledge-intensity in aviation: digitizing the design of the 747

Aircraft manufacturing has always been considered one of America's prime high tech industries. But it is now becoming even more knowledge intensive.

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[2] Julius Maldutis of Salomon Brothers, quoted in the *New York Times*, May 13, 1996.

Boeing, for example, has revolutionized the way it builds planes. The 777 was designed completely on computers, providing greater precision in component manufacture and enabling Boeing to assemble "snap together" aircraft.

The 747, in contrast, belongs to an earlier generation of technology. Because the 747 was first developed as long ago as the mid-1960s, its design is still on two-dimensional line drawings rather than in a digitized form.

The result is that components for the 747 can vary slightly in size and shape, causing wastage and adding to costs. This is a significant problem since the 747 has 6 million parts.

Boeing has now taken the lessons of building the 777 and begun to apply them retroactively to the 747. The group has begun to digitize the old 747 design drawings.

It's a lengthy process, which will take until 1998 to complete. But it means that Boeing will have digital designs when it begins building the 747's successors -- the "stretched" 747s or super jumbos, which will carry over 500 people.[3]

Some similarities between the 747 and the FAA

Digitizing the plans for the 747 is symbolic of the transformation which is underway within the FAA. Like the 747, the FAA has been a workhorse of American aviation -- trustworthy, capable of handling heavy loads, and certain to play an important role in the next century.

But like the 747, the FAA first needed to be brought fully into the digital age.

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[3] Michael Skapinker, "Workers' ideas taken on board," *Financial Times*, July 29, 1996.

The transformation of the FAA: from old-line service provider to a knowledge-intensive organization

We are already seeing the transformation in the FAA from an old-line service provider to one more closely resembling a company belong to the "knowledge industry."

I have often said that software is integral to everything we do at the FAA, and in the future, the agency will essentially run on software.

This is a radically different conception of how the FAA not only <u>will</u> function ... but <u>must</u> function. It is a totally new paradigm, dictated by the realities we face as an agency.

I'd hazard the guess that even the old FAA was one of the most knowledge-intensive organizations in the world. As we keep pace with the rapid evolution of the aviation industry, our Knowledge Ratio -- measured over the next decade -- will far surpass our present level.

The importance of education and training in the FAA

Everyone agrees that knowledge is the prized asset of the 90s. That's why there is so much emphasis today on raising the educational level of employees. The importance the FAA gives to training and retraining attests to our recognition that new technologies and skills are replacing the old.

The integration of complex information systems

If I were to single out one aspect of technology which will be especially important in the years ahead -- it would be the integration of complex information systems. This is clearly an area where America is the global leader, and it is an area which will be central to the FAA's future mission.

Let me briefly mention three FAA programs that illustrate this point.

Global Analysis and Information Network

The first is called the Global Analysis and Information Network, or GAIN for short.

The rationale for GAIN is that almost all of what we know about aviation safety has been learned from after-the-fact investigations of accidents. Yet there may have been advance warnings of unsafe conditions that went unnoticed because no one recognized their significance.

We don't know enough about the characteristics of normal flights to always notice when something is abnormal.

It's important to establish a baseline of routine flight characteristics, using information that is readily available, but now largely neglected.

Everyday, on almost every flight, massive amounts of real-time data are continuously collected by onboard flight recorders and air traffic control radar.

The purpose of GAIN would be to sift through this steady stream of information to identify deviations and anomalies that might point to future trouble.

The information would be widely available -- perhaps on something like the Internet, with governments and industry voluntarily cooperating because everyone stands to benefit from the information being circulated.

GAIN is still in the planning phase, but another important example of the FAA's leadership in integrated information management is already being tested in the field.

Safety Performance and Analysis Subsystem (SPAS)

We call it the Safety Performance and Analysis Subsystem or SPAS. If there's anyone here from Flight Standards, you've probably heard about SPAS.

The hardware components are personal computers which will be available throughout our safety inspection offices.

The software is a Windows-95 based program which gives an inspector immediate access to the vast storehouse of historical data collected from the more than 365 thousand inspections the FAA conducts each year.

These reports are filed electronically from all of our 99 field offices and incorporated into a central data base which is updated every 24 hours.

Whenever inspectors encounter a situation about which there is a question or concern, they can quickly determine if other inspectors have seen this before -- when, where, and under what circumstances.

In the past, we were swamped by so much information that it was very difficult and time-consuming to search for patterns. Trends were slow to detect and warning signs were hard to spot.

With SPAS, we can compare the performance of carriers and aircraft to spot early signs of trouble. Trend analyses which once took several days .. and sometimes months ... to perform, can now be done in hours.

SPAS represents a convergence of technologies for networking and data base management. In fact, the FAA worked closely with Microsoft in the early developmental phases of Windows-95 and served as both an alpha and beta test site.

Integrated technologies in air traffic control

My third example is even more ambitious in scale and complexity. It is hard to think of anything the FAA has ever undertaken in its history that rivals our program to tie together satellites, digital data link, and automated decision support to create an integrated system of air traffic management.

This is not just an FAA initiative, though we've taken the lead. The ultimate objective is a seamless system which spans the globe.

Last month, Japan Airlines began testing avionics equipment for satellite navigation on the airline's Tokyo to New York flights. This November, JAL will use the system on two planes, and will equip all its aircraft by the year 2000.[4]

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[4] "JAL to test FANS System toward actual use," *Nihon Keizai Shimbun*, July 20, 1996.

The development of technology to achieve higher levels of integration in cockpit avionics has been called the single most important change now going on in the aviation industry.[5]

The ultimate objective is free flight -- allowing pilots to choose their own routes on the basis of fuel efficiency and weather conditions.

Once we have made this transition -- over the next ten years or so -- we will have made an historic break with the past. We will have totally replaced one technology with another.

All three of the examples I have mentioned -- GAIN, SPAS, and space-based air traffic management -- demonstrate the FAA's growing sophistication in the integration of complex information systems.

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[5] "GPS will drive avionics market, new Frost & Sullivan study says," *CNS Outlook*, June 16, 1996.

The FAA's impressive record in anticipating future problems

But they show something else which is even more important. They are evidence of the FAA's developing capacity to think clearly about the future and plan effectively for what we foresee.

Over the years, the agency has time and again anticipated problems before they became public issues.

The vigilance and intelligence of our professional workforce has been a vast early warning network which almost always has raised an alert well in advance of crisis. The FAA has rarely been caught completely off guard.

This is not to say that we always solve problems before they become pressing national concerns. But usually we had arrived at some tentative conclusions about the magnitude of the risk and the prospects for practical solution.

Whatever the problem, the best thinking was almost always to be found inside the FAA.

It's a record in which we can take honest pride.

Conclusion: trying to stay ahead of the curve

Now, on the threshold of the next century, we have tried to foresee the impact that rapid growth and fast-changing technology will have on our system of aviation.

We have tried to stay ahead of the curve, preparing for a future which we know will be very different from what we know today.

Once again, I am confident that much of the best thinking about the future of aviation can be found within our agency.

I say this not in arrogant disregard of the many essential contributions that come from throughout the industry and around the world. We depend on our partners and counterparts.

But I believe that the FAA has been, and will continue to be, in a privileged position to integrate ideas drawn from many sources.

We will retain this capacity not only because of our continued technological advantage, but because our flexible organizational structure encourages innovation and initiative.

The FAA in the next century will be an environment which places a high value on knowledge and intellectual rigor.

In a world which rewards knowledge-intense enterprise, the FAA will be at the forefront.

This is the reason I endorse the theme of this year's conference. We can all look forward to "Challenging the 21st Century with Pride."

DAVID R. HINSON
Administrator, Federal Aviation Administration
AVIATION IN THE AGE OF INFORMATION
America's Technological Edge
8th Annual International Representatives Meeting
AUGUST 12, 1996

Introduction: American power and aviation leadership

Henry Luce is remembered for proclaiming the 20th century the
"American Century" For it was during the past ten decades that our nation
became a world power. Not coincidentally, this is also the century that saw
the United States become a world leader in aviation.

Concurrent with the rise of aviation, another technology was evolving
which today has revolutionized virtually every sector of our nation's
economy. We are now in the Age of Information, and no industry has been
more transformed than aviation itself.

We cannot imagine aviation without computers and
telecommunications. Soon we won't be unable to imagine what air traffic
control was like before the advent of satellite navigation.

The main topic: Aviation in the age of information -- America's technological edge

This morning I will discuss why America's lead in information
technology -- specifically, our unrivaled ability to integrate complex
information systems -- will continue to give our nation a strong competitive
advantage in the coming century. And I will discuss the impact of this
technology on aviation -- with particular emphasis on certain key functions
of the FAA.

The FAA in the new power equation

In a recent article in the journal *Foreign Affairs*, Joseph Nye and
William Owens point out that in the old world of power politics what
counted most was population, geography, and natural resources.

But the basis of economic and political power is now changing. The new power equation factors in technology, education, and institutional flexibility.

That point stood out for me because about the time I read the article, the FAA was going through what is probably the most significant change in its 38 year history.

Just a few months ago, we were given a degree of freedom available to no other federal agency. The FAA now has the authority to write its own policies for personnel and procurement.

Those of you who have held positions in government will grasp the significance of this step. Those of you who have never worked in Washington cannot understand the limitations of working under a rigid system of regulations originally intended to prevent crooked horse traders from cheating the U.S. Cavalry.

With the FAA reform package, we have bettered our ability to keep up with the rapid pace of change in the industry. We at last have the flexibility to upgrade our workforce and speed up the deployment of the latest technology.

What the FAA does *not* have, as yet, is a dependable source of funding that will grow along with the agency's increasing workload. Hopefully, that issue will soon be resolved as well.

Looking to information technology to bridge the gap

The rapid growth of air travel which almost all forecasts predict for the next decade will be a severe test for the FAA. The anticipated volume could overwhelm our capacity to manage the airspace with efficiency or to provide the level of service expected.

The impending conflict between expanding responsibilities and shrinking resources can only be resolved by the introduction of increasingly sophisticated information systems.

The FAA is leading the world aviation community in developing an entire portfolio of advanced technologies. It has been a pioneering effort, beset with all the difficulties and delays which are unavoidable when working with so many unknowns.

But as I wrote in the FAA's annual report this year, many of our long-range plans and projects are now beginning to take definite shape. Our investments are beginning to yield long-promised benefits, and we see a pattern of completion.

Global Power in the Information Age

Our investment in fundamental technological innovation has far-reaching implications both for this nation and its aviation industry.

As Nye and Owens wrote in their *Foreign Affairs* article, "knowledge, more than ever before, is power. The one country that can best lead the information revolution will be more powerful than any other. For the foreseeable future, that country is the United States".

The United States was one of the first nations to invest in the Information Age. It is also one of the first to enjoy the benefits.

The U.S. economy in the last 100 years has passed through three eras: the era of commodity production and processing, the era of mass manufacturing, and our present period -- the era of information technology.

Each of these eras is associated with a crucial ingredient whose abundant supply, at falling prices, acted as a catalyst for levels of growth never before witnessed.

In the first era, it was steel. In the second, energy -- especially oil. Today it is microchips.

Our economy is driven --not by railroads, as in the commodity era -- or by machine tools, as in the manufacturing era -- but by computers, semiconductors and telecommunications.[1]

But, unlike the other eras, information technology does not require major facility and material investment. Spending large sums on computers and system analysts is no guarantee of success. Excellence results from the way a company integrates and harmonizes its uses of information resources.[2]

America's edge in integrating information systems

This is the key point in the *Foreign Affairs* article by Nye and Owens. And it is the main idea I want to stress this morning: American leadership in information technology is largely based on our "unparalleled ability to integrate complex information systems".

There is no better example than the new generation of cockpit with its digital flight management system. Navigation, communication and operations -- systems which once operated independently -- are now smoothly integrated.

The Boeing 777, with its 187 computers and 7.5 million lines of software code, stands at the beginning of what is certain to be a long line of evolutionary development as system integration becomes more and more complex.

Every aspect of aviation will be profoundly affected by this growth of knowledge.

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[1] Nuala Beck, *Shifting Gears: Thriving in the New Economy*. HarperCollins, 1995.
[2] Paul Strassmann, "The myth of best practices," *Computerworld*, December 18, 1995.

We are already seeing the transformation in the FAA from an old-line service provider to one more closely resembling a company belonging to the "knowledge industry"

I have often said that software is integral to everything we do at the FAA, and in the future, the agency will essentially run on software.

This is radically different conception of how the FAA not only *will* function ... but *must* function. It is a totally new paradigm, dictated by the realities we face as an agency.

The sophisticated integration of powerful information systems is essential if we are to assure the safety of air travel and the efficient management of an ever more crowded airspace.

Let me briefly mention three FAA programs that illustrate this point.

Global Analysis and Information Network

The first is called the Global Analysis and Information Network or GAIN for short.

Recent airline crashes have underscored what we have known for some time --that even heightened surveillance is not going to be enough to prevent every accident.

What the times require is a fundamental change in the FAA's primary mode of intervention -- from regulation and inspection to risk management and collaborative problem solving.

The rationale for GAIN is that almost all of what we know about aviation safety has been learned from after-the-fact investigations of accidents. Yet there may have been advance warnings of unsafe conditions that went unnoticed because no one recognized their significance.

We don't know enough about the characteristics of *normal* flights to always notice when something is *abnormal*.

It is important to establish a baseline of routine flight characteristics, using information that is readily available, but now largely neglected.

Every day, on almost every flight, massive amounts of real-time data are continuously collected by onboard flight recorders and air traffic control radar.

The purpose of GAIN would be to sift through this steady stream of information to identify deviations and anomalies that might point to future trouble.

This would be a collaborative undertaking. There would be no centralized authority, no single clearinghouse, no coercion to participate.

But there would be *standardization* of information, creating a lingua franca for world aviation. Everyone in the global aviation community would be able to speak the same language when talking about issues related to safety.

The model might be something like the Internet, with governments and industry voluntarily cooperating because everyone stands to benefit from the information being shared.

For now, the FAA is taking the lead in planning the basic design of the network. But eventually this is a venture that will require very broad participation at the international level. It is not something the FAA can or should do alone.

GAIN is still in the planning phase, but another important example of the FAA's leadership in integrated information management is already being used in the field.

Safety Performance and Analysis Subsystem

We call it the Safety Performance and Analysis Subsystem or SPAS.

The hardware components are personal computers which are available throughout our safety inspection offices.

The software is a Windows-95 based program which gives an inspector immediate access to the vast storehouse of historical data collected from the more than 365 thousand inspections the FAA conducts each year.

These reports are filed electronically from all of our 99 field offices and incorporated into a central data base which is updated every 24 hours.

Whenever inspectors encounter a situation about which there is a question or concern, they can quickly determine if other inspectors have seen this before -- when, where, and under what circumstances.

In the past, we were swamped by so much information that it was very difficult and time-consuming to search for patterns. Trends were slow to detect and warning signs were hard to spot.

With SPAS, we can compare the performance of carriers and aircraft to spot early signs of trouble. Trend analyses which once took several days ... and sometimes months ... to perform, can now be done in hours.

In February, 180 aircraft inspectors in 56 field offices began testing out SPAS. By the first of next year, all our inspector workforce will have this new capability.

This is the culmination of a four year project costing 8.7 million dollars, and it is the product of a very fruitful collaboration between the FAA and the Defense Department. SPAS, in fact, will eventually replace DOD's own aviation safety data base.

I believe others will be interested as well, for this is a technology which can be readily transferred abroad. Its benefits would be greatly enhanced if thousands of inspectors working in hundreds of countries were constantly enlarging the data base, creating an asset of worldwide value.

This could be a goal well worth considering, given our expanding bilateral agreements on aircraft inspections and maintenance.

The FAA signed its first bilateral air safety agreement last September with the Netherlands, a second accord was signed in December with Britain. And just a few months ago we signed a third with France. Others are certain to follow.

SPAS could prove to be an important tool in promoting harmonization of standards throughout the world.

Whatever its international applications, SPAS will add significantly to the rigor and thoroughness of aircraft inspection in the United States.

SPAS represents a convergence of technologies for networking and data base management. In fact, the FAA worked closely with Microsoft in the early developmental phases of Windows 95 and served as both an alpha and beta test site.

Integrated technologies in air traffic control

My third example is even more ambitious in scale and complexity. I refer, of course, to the integrated system of air traffic management which ties together satellites, digital data link, and automated decision support.

Our ultimate objective is *free flight* -- an innovative plan to allow pilots to choose their own routes and file the most economical flight plans.

Once we have made this transition -- over the next ten years or so -- we will have made an historic break with the past. We will have totally replaced one technology with another.

All three of the examples I have mentioned this evening -- GAIN, SPAS, and space-based air traffic control -- come about through the linking together of existing technologies to achieve new purposes.

Each is invented by combining ideas which were once unconnected. Discrete technologies converge because the modular elements are compatible.

The global integration of aviation infrastructure

One likely consequence of this technological convergence is that aviation will be among the first industries with a globally integrated infrastructure.

And because the United States has taken the lead in the development of these technologies , we are well-positioned to set the pattern which will be followed in the decades ahead.

We have, in effect, structured the information infrastructure. This is clearly to the advantage to the United States as we face increasingly fierce competition in the next century.

But our gain is not at the expense of rival economies.

A recent issue of *The Economist* reviews evidence that the creation of knowledge spreads its benefits across borders.[3] By sharing our technology with other nations, we stimulate their economic growth which, in turn, sustains our own prosperity.

What is true for technology in general, is especially true -- I believe -- for aviation. And it is a persuasive rationale for our open-handed policy on the Global Positioning System.

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[3] *The Economist*: "The road from imitation to innovation," May 18, 1996.

Last year, the International Civil Aviation Organization and its 185 member nations endorsed the use of GPS as an early component of the universal air traffic management system envisioned for the 21st century.

Ten countries have accepted and approved GPS as a supplemental means of navigation in their airspace. Approval is pending in six other countries.

The acceptance of GPS throughout the world will be advanced by President Clinton's important decision announced in March. The United States has promised -- as you no doubt know -- to make GPS continuously available, without charge, for the foreseeable future.

Furthermore, the current practice of degrading the accuracy for non-military users will end within ten years, making a uniform signal available to all.

This is a far-sighted policy. For by offering it without charge to all users everywhere in the world, we are establishing GPS as a *de facto* global utility.

Conclusion: the 21st Century as the American Century

This strategy is a sign of confidence and a show of strength.

It is a signal to the rest of the world that our nation is determined to remain what it has been throughout its history -- the birthplace of new ideas and a seedbed of new technology.

It may be true, as Henry Luce claimed, that the 20th century was the "American Century". But not even his 1950's optimism could have prepared him for what was to happen in the 1990s.

No man of his time and place could have foreseen the fusion of information and aviation technologies which is today transforming our country.

This powerful synergy will assure that the century of American preeminence is not, in fact, the one which is now ending -- but the one which is about to begin.

Thank you very much.

REMARKS BY DAVID HINSON
ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION
TOWN HALL OF LOS ANGELES
AUGUST 14, 1996

When I left Los Angeles three years ago to join the Clinton Administration, California and the rest of the nation was still gripped by recession.

Aerospace industries, large and small, had been badly crippled by the cutbacks in defense funding. Then came the economic downturn in 1990 and the Gulf War in 1991. These events, occurring in rapid succession, hit aerospace manufacturers and U.S. air carriers hard.

Between 1991 and 1992, after a decade of strong growth, the number of air travelers declined by 12 million passengers. In a three-year period, U.S. air carriers lost $10 billion dollars.

Aircraft orders slowed to a trickle. By the time President Clinton took office in January 1993, one fourth of all U.S. aerospace workers ... that's over 300,000 people ... had lost their jobs.[1]

California was especially hard-hit. Forty percent of the state's aerospace employees lost their jobs. Los Angeles County was even worse off. According to a recent study by the Rand Corporation, the aerospace industry lost half its job base in eight years..[2]

I was here. I remember what it was like.

It was these events that led me to sign on with the Clinton Administration.

I was concerned by what was happening in California, and to aviation in this country. After devoting almost forty years to this business -- in good times and bad -- I thought I might have something to offer that would help turn the situation around.

The top priority of the Clinton Administration in those early days was to get the nation's economy back on its feet. No where is the turn-around more evident than here in California.

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[1] Report of the National Airline Commission, June 1994. [In 1989 aerospace industry employment stood at 1,331,000. Estimated employment for 1993 was 942,000.] See also: RAND Research Brief; "California's Small Aerospace Suppliers: Surviving Defense Downsizing", February 1996
[2] RAND Research Brief, "Life After Cutbacks: Tracking California's Aerospace Workers", February 1996

Last year, California's employment grew 2.3 percent. The State Controller predicts it will be an even higher 2.6 percent this year ... well ahead of the national trend.[3] *[for the first four months of 1996, nationwide employment grew at a rate of 1.7 percent.]*

Ten million jobs have been added to the nation's payroll in the past three and a half years. In the last year alone, more than 300,000 new jobs were created here in California. That's twice the number of jobs previously lost in aerospace employment. [4]

Governor Wilson predicted that, given the strong pace of job growth, California's total employment would return to the pre-recession levels by mid-year. Many of these jobs are in high-wage industries that pay more than $50,000 a year.[5]

On the first of this month, we received word that the nation's economy grew at a better-than-expected 4.2 percent in the last quarter. The deficit has been cut by more than half and is now the smallest it's been since 1981. Consumer confidence is at its highest level in six years, and real wages are on the rise again. According to the State Controller, personal income growth in California in 1995 was the best it has been since 1990.[6]

Aviation is one of the principal generators of wealth for our nation and an indispensable feature of modern life in our society.

Last year, nearly 71 million air travelers boarded a plane at California's airports. That's 48 percent more than just a decade ago. Growth will be at an even higher 56 percent over the next decade. That means 40 million new passengers by year 2007.

California also has one of the busiest general aviation sectors in the nation and the world. Last year, air traffic controllers handled nearly six and a half million general aviation operations.[7]

To put that in perspective, two mostly general aviation airports, Long Beach, and Santa Ana (John Wayne) each handle more aircraft operations than London's Heathrow.[8]

Over the past three years, the FAA has provided more than $400 million in federal grants for the improvement and expansion of California's airports. Nearly half came from a reserve set aside for top priority safety improvements, capacity enhancements, and noise abatement projects.

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[3] California Economy: Controller's Outlook. Controller's Quarterly, May 1996.
[4] Overview of the Governor's 1996-97 Budget, January 10, 1996
[5] Ibid.
[6] California Economy: Controller's Outlook, Controller's Quarterly, May 1996
[7] FAA Office of Aviation Policy and Plans California Summary Report, August 5, 1996
[8] Top 30 ACI Airports by Passenger Traffic/Cargo Volume/Aircraft Movements (Preliminary 1995); Airports Council International/NA, March 1996

Los Angeles is one of the great gateway cities of the world and Los Angeles International Airport is the fourth busiest in the world.[9] The 21st century tower we dedicated in March is filled with 21st century technology. The new tower sums up our faith in the continuing growth of this region, and our faith in the future of air travel.

I came to the FAA with a clear mandate from the President, Secretary Peña, and the Congress. That mandate is to provide travelers with the safest and most efficient air transportation system possible.

This has been the mandate of every FAA Administrator since the agency was established in 1958 -- the same year the first passenger jets began service in the United States. It was a hard task back then, and it hasn't gotten any easier.

Three challenges had to be confronted right away.

The first was to get the modernization of the air traffic control system back on track.

The second was to introduce best business practices into the management of the FAA.

The third and most urgent challenge is to eliminate the few remaining hazards to air safety.

I'd like to summarize the progress that's been made since I joined the agency.

Air Traffic Control Modernization

When I arrived in Washington in August 1993, I found my work already cut out for me. The FAA's program to replace aging air traffic control computers and install modern controller workstations was spinning out of control. This 5-year old contract was 33 months behind schedule and $2.7 billion over budget the day I walked in the door.

Today that effort is under new management. The task has been broken up into manageable pieces, and rigorous controls are in place. Controllers are already testing new high tech computers and software.

Investment in technology pays off only when its deployed. I brought in Dr. George Donohue from the RAND Corporation to oversee our modernization program. On an average workday, we are now commissioning five ... sometimes six ... new systems throughout the United States.

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[9] Top 30 ACI Airports by Passenger Traffic/Cargo Volume/Aircraft Movements (Preliminary 1995; ACI/NA, March 1996

FAA and Best Business Practices

The second challenge, putting the best American business practices to work in the FAA, turned out to be harder than I thought. The agency, through no fault of its own, had become entangled in a web of well-intentioned -- but dysfunctional -- government rules.

The act that created the FAA in 1958 subjected it to the same rules and regulations that apply to every government agency. It would take another act of Congress to free us from them.

Many of our federal procurement rules originated shortly after the Civil War ... in the days of the great westward migration. Congress, as the story goes, set up the rules to keep horse traders from cheating the young Cavalry officers arriving from the East.

Whatever their origins, regulations, once in place, take root and grow. Acquiring new air traffic control equipment was a process governed by some 233 rules and regulations.

Rigid personnel rules made it virtually impossible to hire employees when we needed them, or to offer incentives to fill jobs at hard-to-staff locations.

The vagaries of the federal budget process are such that we never know, from one year to the next, how much money we will have to hire new inspectors, buy new equipment, or operate the air traffic control system.

No business could operate this way.

Two years ago, the Clinton Administration began working with the Congress on a set of major reforms for the FAA. This past April, we finally got rid of our rule-bound acquisition and personnel system.

The new legislation gave us the freedom to adopt best business practices and to make common sense choices. With the reform package, we have bettered our ability to keep up with the rapid pace of change in the industry. It was an enormous bipartisan victory

What we don't have as yet is a dependable source of funding that will grow along with the agency's increasing workload. But even this issue may be resolved by the end of the year.

The third challenge -- to eliminate the few remaining hazards to aviation safety -- has been the most pressing of my tenure at the FAA and the focus of my most urgent efforts from the moment I was sworn in.

We are attacking the problem on four fronts: First, with air traffic improvements that target safety. Second, with new government regulations. Third, with new inspection and certification procedures. Fourth, by heightening security.

Air traffic improvements that target safety.

We all know that sudden, violent weather can still bring down the most experienced pilot and the most sophisticated aircraft. And that mishaps between planes and vehicles on the taxiways and runways can have deadly results. Both are leading causes of aviation accidents and we have programs underway to eliminate these hazards.

We just placed the 18th Doppler weather radar in operation at Chicago O'Hare. Doppler radar virtually eliminates the threat of undetected wind shears. Eventually 45 of the nation's biggest airports will have this new technology.

In May, we began evaluating a new system at San Francisco International Airport to alert controllers to potential runway incursions. We call this system the airport movement area safety system, or AMASS. Thirty-four airports around the country are getting this new system. It is one of the industry's most-wanted safety initiatives.

We are also vigorously pursuing the development of satellite technology for civil aviation use to provide precision guidance at airports even in bad weather.

Last October, we began using two-way satellite communications at the Oakland air route traffic center. This may not sound impressive, but it's a tremendous breakthrough for aviation. It means pilots and controllers can communicate directly with each other, quickly and accurately, over oceans and remote areas. They've never been able do this before.

Safety through regulation

Last year, 544 million passengers flew 5 billion miles in our skies. In a dozen years -- perhaps less -- U.S. air carriers will fly 856 million passengers over 7 billion miles. We take pride in the fact that our airspace is not only the safest in the world, but the most heavily traveled as well.

A study by Boeing Company shows how vital it is that we keep raising the level of safety. According to the study, unless we take steps now to reduce the already low rate of accidents, the number of accidents and fatalities will escalate along with the growth of air traffic.

As the crash of ValuJet flight 592 and TWA flight 800 so tragically demonstrate, safety can never be taken for granted. All of us at the FAA recognize as well as anyone that statistics offer no comfort to those who lost loved ones on those flights. At times like these, statistics do little to reassure a shocked and skeptical public.

All sorts of questions are raised, and rightfully so, about the regulatory role of government and if more can done to prevent future accidents.

We in the FAA ask ourselves these same questions. We ask them all the time -- not just when there has been an accident.

Last year, we took the decisive step to ensure that the millions of Americans flying on smaller, commuter aircraft would have the same level of safety as those flying on larger commercial airlines.

We changed the qualification requirements for air carrier and commercial pilots to clearly define the experience levels that pilots must have before they can work together on the same flight crew.

And, for the first time ever in the United States , there are now limits on duty time for flight attendants, assuring that they will have adequate rest periods.

The FAA's annual report for 1995 contains a good description of more than 100 of our most important safety accomplishments last year. I hope you will get a copy and read about them for yourself. I believe you will see that we have a lot to show for our investment and our effort.

We have yet to find out what caused the crash of ValuJet flight 592 or TWA flight 800. But there are already some hard and important lessons to be learned from both.

Safety Through Inspections

In the case of ValuJet, it is apparent now that the extraordinarily rapid growth of this airline created problems that should have been more clearly recognized and dealt with sooner.

I announced several weeks ago that our inspectors will require airlines to demonstrate the regulatory compliance of each of their major contract maintenance and training programs. Let me stress that we have no indication or reason to believe that there is any relationship between the crash in the Everglades and the new safety surveillance we are putting in place.

As to one possible cause of the accident -- a fire caused by oxygen generators -- we have taken steps to prevent the future mishandling of hazardous materials.

I have asked for a seven-fold increase in resources devoted to inspection, outreach, and public education regarding hazardous materials in air transportation. This will give us an additional 130 inspectors to assign to this task. I also called for action to ban passenger aircraft from transporting certain materials that can fuel fires.

Safety through increased security.

It may be many weeks, or months, before the NTSB completes its investigation of TWA flight 800. But, whether or not the crash is found to be the work of terrorists, we know that we live in a world where the threat of terrorism is on the rise.

Commercial air travel now extends to every corner of the globe, breaking down the barriers of time and distance, and building a sense of global community. But as President Clinton told the nation, "This new openness also makes us more vulnerable to the forces of destruction that know no national boundaries".

Following the bombing of Pan Am 103 over Lockerbie, Scotland, the Congress identified 38 actions to improve aviation security, which it directed the FAA to implement. We followed through on all 38, and added a few of our own.

We placed Federal Security Managers in 19 of our largest and busiest domestic airports and at 18 locations overseas.

We introduced new employment and training standards for screeners and other security personnel.

And, last year, the FAA began field testing new high-tech explosive detection machines in Atlanta and San Francisco.

U.S. airports have been on heightened alert since last August. This summer we recently organized a special working group to examine U.S. vulnerabilities and to develop an array of countermeasures.

Following the TWA crash, President Clinton announced new measures to tighten security -- including more intensive screening of passengers on international flights, and more vigilant screening of carry-on bags on all flights.

The President also announced that Vice President Gore is leading a commission on aviation security that is to report back to him within 45 days. The commission is to produce an action plan to deploy machines that can detect the most sophisticated explosives, and other changes.

No one disputes that these are all necessary measures in a world where the most radical elements have ready access to the most dangerous technologies of destruction. Many warn that the threat of terrorism has now become a constant in our lives and will require constant vigilance.

I agree with this assessment and believe that we have yet to fully prepare ourselves for the realities of this menacing environment. When the Congress returns from its August recess, I will urge the members, on behalf of America's travelers, to strengthen the hand of our law enforcement agencies.

We have made remarkable progress in recent years in upgrading our air traffic technology, in improving the management of the FAA, and in raising the standards of air safety. I have every confidence that our nation has both the will and the means to assure that our aviation system remains a secure system.

Thank you very much.

REMARKS BY DAVID HINSON
ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION
TOWN HALL OF LOS ANGELES
AUGUST 14, 1996

"As Delivered"

Three years ago ... it seems more like 15 years ago ... I was asked to go to Washington to run the FAA. I see that many of my friends are here today. I've said hello to you and I appreciate your coming. Especially, Bob Hood, one of my colleagues from McDonnell Douglas who told me "David, you'll really enjoy running the FAA -- it's a flying job." I don't know how you got me to believe that Bob. We've got to have a long talk about that.

It is a flying job, but it's not much of a flying job. It's really an administrative job.

The FAA would be about the 158th largest Fortune 500 company if we were in the Fortune 500. We have about 50,000 employees ... actually we are down to about 48,000 employees. We have 5,000 less than when I came to the FAA three years ago. And we have about $9 billion in revenue.. So we would be about the 158th company in the Fortune 500.

And, as you might expect, we have all the problems attendant to managing a company of that size. We have a lot of geographic diversity plus a lot of different responsibilities. We provide security for the airports. We certify airplanes. We certify airports. We do research and development to find out new science for aeronautics and its application. We make sure that we have money to give to all the airports. Los Angeles International Executive Director Jack Driscoll is here this afternoon. Jack is a good friend of ours -- beginning his major master plan for the entire Los Angeles airport area affecting the entire Los Angeles basin. A very important undertaking within which the FAA will be an active partner. Even though it is fundamentally a local decision, we do play a role. So the FAA is many things to many people.

I want to talk a bit about some brief history, tell you some things we are doing, then I will be pleased to answer your questions.

I left Los Angeles a little over three years ago to join President Clinton at his invitation to ... I guess you could say ... to become the country's chief pilot. At least I like to think of it that way.

When I left, the aerospace industries, large and small, had really started to shrink from the downsizing in defense spending. We had an economic downturn in 1990 and the Gulf War in 1991. And while there may have been some benefit, the overall result of all those activities was a major decrease in business activity, especially in aerospace.

Between 1991 and 1992, after a decade of strong growth, the number of air travelers on commercial carriers declined by 12 million. That is the first time, by the way, in a long period of years that there had been that shrinkage in air carrier traffic. In a three-year period, U.S. air carriers lost $10 billion dollars -- which is more than all their combined profits in history.

Aircraft orders essentially stopped. By the time President Clinton took office in January 1993, one fourth of all U.S. aerospace workers ... that's over 300,000 people ... had lost their jobs.

California was especially hard-hit. Forty percent of the state's aerospace employees lost their jobs. Los Angeles County was even worse. According to a recent study by the Rand Corporation, the aerospace industry here in Los Angeles lost half its job base in eight years..

Many of us were here then. We remember.

Many of us who decided to go to Washington to help the President were concerned, not only by what was happening here in California, but to aviation all over the country. I was very encouraged by the indication from the President that he wanted to help in whatever way was appropriate to get our aviation industry headed in the right direction again. I think you can all agree that has been successful.

I would point out that a month after he was sworn in, the President called all the aerospace CEO's to Seattle for a meeting and -- if you remember he had a number of roundtables early on --. He sat down with all the heads of the major aerospace companies in the United States -- air carriers and others -- and said to them: what is it we need to do as an administration working with congress to help you in this industry of aviation to begin to put your house in order. And out of that came a number of things that have been very special in helping the industry get turned around.

Of course, the most important is the economy overall.

Last year, California's employment grew by 2.3 percent. Your State Controller says it will grow an even higher 2.6 percent this year. For reference purposes, the national average per state was 1.7 percent. So you are substantially ahead of the national average for employment growth.

Ten million jobs have been added to the nation's payroll in the past three and a half years. In the last year alone, more than 300,000 new jobs were created here in California. That's twice the number of jobs previously lost in aerospace employment in California.

Governor Wilson predicted that, given the strong pace of job growth, California's total employment would return to the pre-recession levels by mid-year. Many of these jobs are in high-wage industries that pay more than $50,000 a year.

On the first of this month, we received word that the nation's economy grew at a better-than-expected 4.2 percent during the last quarter. The deficit has been cut by more than half and is now the smallest it's been since 1981. It is even more dramatic as a percentage of the gross domestic product. Consumer confidence, as measured at the University of Michigan, is at its highest level in six years, and real wages are on the rise again. Very important. According again to your State Controller here in California, personal income growth in California in 1995 was the best it has been since 1990.

Aviation is one of the principal generators of wealth not only for our nation but for California as well. It is obviously indispensable.

Last year here in California, 71 million -- remember that number -- 71 million air travelers boarded airplanes. That's 48 percent more than in 1985. Almost 50 percent more passengers got on airplanes in California than 10 years ago. The growth will even be more -- we estimate about 56 percent -- over the next decade. That means that between now and 2007, there will be 40 million new airline passengers in California.

California also has one of the busiest general aviation sectors ... not only in the United States but in the world. Last year, air traffic controllers handled nearly six and a half million general aviation operations in California. Did you know, for example that Long Beach, and John Wayne (Santa Ana) because of their general aviation traffic handle more aircraft operations than London's Heathrow on an annual basis.

Over the past three years, the FAA has provided more than $400 million in federal grants to expand California's airports. And Jack (Driscoll: Los Angeles International Airport) gets a lot of that money. Nearly half came from a reserve set aside for top priority safety improvements.

Los Angeles is, indeed, one of the great gateway cities of the world and Los Angeles International Airport is the fourth busiest in the world. Recently we dedicated our 21st century new tower -- not without some controversy I might add, depending on where you sit relative to the architect. Jack and I like it. We think it is a great looking tower. It's supposed to represent an airplane ... a vintage 1920's or 1930's airplane. This new tower, with its state of the art technology, is an important part of the FAA's air traffic control modernization. In fact, we have over 30 new control towers being erected all across the United States today in major cities like Chicago, Kansas City, and Miami.

Now let me talk a bit about the FAA.

Since the FAA was established back in 1958 -- the same year that passengers first flew in jet aircraft here in the United States -- safety has always been the FAA's principal mandate.

The FAA has been remarkably successful. I want to editorialize just a little bit, not only

about what the facts are, but about where we have been. For it is very important that air safety in the United States be seen in perspective, and that perspective is not a one-day issue.

If you were to take a curve of aviation safety, and let's do it from about 1960 until 1995, and if you were to compare them -- let me give you a couple of interesting facts. Many of us here in this room were flying commercially in 1960, riding around on the major airlines we all knew about under a regulated environment. We remember them. Western was out here. Eastern was back there ... Trans World Airlines. United, Northwest -- the old traditional airline environment.

Everybody thought it was safe. We all flew without thinking about it. But if we took the safety rate -- the accident rate per 100,000 departures or 100,000 miles or whatever you want to use-- and we transpose that rate to last year ... in other words the rate did not change, it stayed where it was, the rate per iterations of something. We would have experienced 242 major air carrier accidents last year -- 33 fatal. One every 10 days.

Now what has happened between 1960 and 1996 to cause that not to happen? That, in fact, we had fewer accidents and fatalities last year than we had in 1960.

We have the best of all worlds. ladies and gentlemen, in aviation safety. In 1960 we flew 53 million passengers. In 1995 we flew 550 million passengers. There was a fatal accident every 820 thousand departures in 1960. There was a fatal accident in 1995 every 1.85 million departures. You can't build better curves than those. That is to say we have more than tripled the number of people flying in the United States and we have cut by more than 50 percent the fatal flights per departure. Those are enormously important statistics and put into real perspective the situation for air travel in the United States today. Professor Barnett at MIT, who is a very noted operations professor says you would have to fly today 21,000 years to be assured specifically of being in a commercial aviation accident in the United States. And I can assure you there is not another mode of transportation that will give you those odds. In fact, if you really want to live a long life, you should get on a commercial airplane and not get off.

So when people tell you that the system isn't safe, they simply do not know the facts.

The facts are quite different. The facts are that it is, indeed, the safest form of transportation by any measure you want to make. It is safer today than it has ever been. More, importantly, it will be safer tomorrow and next year. And in five years we will look back and say why didn't we think about what we are doing today five years ago. And in 20 years ... the reason this is important ... in 20 years we are going to double the number of passengers in the United States. We will more than double the number of passengers around the world. Aviation is growing in China by 20 to 25 percent a year. China is trying to *hold growth* to 20 percent. Imagine that, doubling every five years.

Boeing and others have done studies which points out the fact that it isn't rates that are

important. It is public perception. So that even though we cut the accident rate by more than half, because we will more than double activity, it appears that flying is not safe because there are more accidents in the same timeframe. Boeing says in one of their studies that by 2015 or so if we keep today's very low accident rate, worldwide -- not just here in the United States but worldwide -- we will be losing an airplane every 8 to 10 days.

Now, is a major airline accident every 8 to 10 days in 2015 acceptable to society worldwide? Probably not. So just as the rate we had in 1960 would not be acceptable in 1995 or this year, what are we going to do to in the succeeding 20 years that we did in the preceding 20 or 30 years to keep that from happening?

Those are the kinds of things we spend a lot of time thinking about and investing a lot of money in. Not only by the United States but by all my counterpart organizations all over the world. All of the other civil aviation authorities worry about this a great deal, because commercial flying clearly has become the way of travel. It is now available to everybody.

In fact, here's another statistic. In 1946, you could fly on TWA or PanAmerican from New York to Paris for about $650 round-trip, in 1946, in a Constellation. You had to make two stops. It took something like 16 or 17 hours one way.

That airplane could not even be certificated under today's regulations. It would be deemed unsafe. You couldn't even build it today. You can go to Paris from New York, today ... we checked last week ... the cheapest ticket you can get round-trip on a number of carriers -- is about $550. We are now in 1996 ... 50 years later. The inflationary price, if we had direct relationships, of your ticket today, round-trip to Paris, would be $4,280 coach class from New York.

And yet, even at $550, it is actually less in dollar terms than it was in 1946. How did that happen?

The airplane is a hundred times safer. It flies at 80 percent of the speed of sound instead of 250 miles an hour. It takes six and a half or seven hours instead of 16 or 17 hours. How did that happen? How can we provide that kind of quality improvement for the flying public in that 50-year period.

Well, you all know the answer. It's a whole lot of things. It's technology. It's all the companies represented in this room, among others. It's people who have developed fuels which can be used optimally. I know there are people here in that business. Its airframe manufacturers, engine manufacturers, electronics manufacturers. And, yes, government -- the FAA, the CAA in Great Britain, our counterparts in Germany and France, Japan, and other places all have been contributors to this equation. It is a huge success story that is lost, I think, all too often, and one that needs to be told in a more forceful way. If we really don't understand where we have been and how we got here, we are going to make some mistakes trying to go forward.

Let me now address just two or three other issues, then I will be pleased to take your questions.

There are some things that are happening in Washington with the FAA that are very important. One of the things the President asked us to do was to think about how we would like to change our organization -- what we would like to do to become more effective. Los Angeles, like much of California is a high-tech environment. High technology, new technology, is very important. It is one of the principal drivers in that safety improvement from 1960 until 1996. Technology is crucial.

So what did I find when I first came to Washington? An FAA that was what I called bound in the molasses of process. I asked one day for someone to bring in the acquisition and procurement regulations that we have to follow at the FAA to buy a Hughes radar, or to buy something from one of the computer manufacturers here in Los Angeles. So they put them all down on my floor -- 17 feet of them. Can you imagine trying to buy something if you have to wade through 17 feet of regulations? First of all, I have at least 30 lawyers, full time, making sure I don't go to jail for violating some part of that 17 feet. Many of you here have been in government service and you know what I am talking about. I am dead serious.

We also had to follow personnel regulations, Title V, to hire or fire somebody. We wanted to hire what we call high-tech, very sophisticated people in specific areas -- icing, turbine blade design -- things of this nature that we are very interested in when we certify aircraft and engines. I go to the Office of Personnel Management. I know all those folks over there. They are nice people. But they have a book. They have regulations. They say to me, "We're sorry but you can't hire anybody. You've got your quota. And if you want to hire somebody there, you've got to get rid of somebody here." Well, that didn't seem to be very smart to me. And there are a whole host of other things. It takes five years to get rid of someone who is incompetent. And, like every organization we had people who were incompetent and who ought to be fired. We couldn't do it.

So we went to Congress and we said, "Look. here's another problem." Major telecommunications companies or new technology companies change their principal switching systems every five years. Their technical horizon is five years. Ours is 25 years. We can't live in this environment. We have a major disconnect. So, Congress, if you want us to be a contemporary organization and insert new technology quickly, then you are going to have to give us the tools to do it. Here is what we want -- three things.

We want to have our own personnel system, exempt from all government personnel rules and regulations.

We want to have our own acquisition system exempt from all government regulations.

And we want to have a stable, secure, permanent, and dependable source of funding -- money for the FAA.

I am pleased to tell you we have two of the three now. Earlier this year we got from Congress, by legislation signed by Chairman Mark Hatfield of Oregon, the Chairman of the Senate Appropriations Committee, ... we got our own personnel system and our own acquisition system.

We took 17 feet of regulations and collapsed it to 100 pages. We've done something similar with personnel. The morning this happened, at 7:30 am, I picked up the phone and asked them to hire the Director of Training from NASA who was interested in coming into the FAA to help us set up a new training regime. I didn't have to talk to anybody .. I did it just like you would. Pick up the phone and make it happen.

That's what's happening at the FAA now. And, guess what? Congress is already trying to reregulate us. The ink is not dry on this yet. I've already had two hearings, in front of the House and the Senate where they say, "We're not so sure you ought to have all this freedom out there, Son." Anybody calling me "Son", I really appreciate, especially since I am a grandfather of 4.9, soon to be 5 grandchildren. Anyway, we have been able to finesse this. We now have these changes. We are going to be able to keep them, and they are working very, very well. We have already gone through a couple of contract changes within days that would have taken months and months before. We are now able to hire and fire and to do the things that we should be able to do. And to reward our employees as well, because we have great employees.

This is a very important initiative by the Clinton Administration. I put it in that context, because I couldn't have done it without the Secretary or without the President's help ... without their willingness to lean on the Congress to say, "Don't you understand that your technical organization charged with safety in the United States can't function in today's environment and we need to change it." So we are having at it and we are going to change it.

That is one thing that is happening that is very, very important.

When the Congress comes back, they are going to debate "FAA reform." The House has passed a bill. The Senate has the McCain-Ford-Hollings bill sitting there. They are going to debate this bill, and they are going to say: "Is that what you really want."

Here's the problem. You stopped paying the 10 percent airline ticket tax. Jack stopped being able to collect the fuel tax. He can't collect waybill cargo tax, and the international departure tax is also gone.

As of December 31st, we had $5 billion in the Aviation Trust Fund, unobligated. That is unassigned -- not spent. We have been drawing that down at the rate of $500 million to $600 million a month. And without these taxes, the Trust Fund will be extinguished by this December. The FAA will have no trust funds. All the money to operate the agency

will have to come from the General Fund, and would have to be in competition with everything else.

If he hasn't done so already, the President will sign a bill this week, because the Congress has agreed to reimpose the taxes. So next week, all of you, when you travel, will be paying the taxes again. And that's good, even though it may cost you some more money, because we need the Trust Fund to be able to do what's necessary to fund all the things that we do. So financing for us is absolutely critical.

If you look at the FAA you will realize very quickly that, fundamentally, it is an information processing organization. We are a telecommunications organization. We have more telephone lines than anybody in the world. More than the Department of Defense, even. When we have issues of moving air traffic 24-hours a day, 7 days a week, 365 days a year, and we lose a trunk line of communication between Los Angeles and San Francisco or between Los Angeles and Salt Lake, we've got to be able to get those calls another way. We have all kinds of telephone lines leased in various different directions and a lot of automatic systems that can reroute the calls. So we are automatically and constantly in touch in the air traffic control environment.

Telecommunications and the information society are here. I know that you are all involved in this. It is probably the greatest revolution in our lifetime, as we transfer from an industrial society -- manufacturing -- into an information society. Do you realize that in the last 25 years the private sector has invested over a trillion dollars in information processing? One trillion dollars -- not government money -- private sector money. And all this is now beginning to bear fruit as it accelerates in its ability to manage the way we do business. And you are all changing the way you do business every day. We are too. We are going to see a lot of things happen for the better.

The FAA needs to be at the front of this revolution. We just finished certifying the Boeing 777. Before that we certified one of Mr. Hood's MD-90's and the MD-11. We do this all the time. The Triple 7, like the MD-11 has an enormous number of computers and software. In the cockpit alone on the Triple 7 there are 187 computer-types and seven and a half million lines of software code. Now as the certifiers, we (the FAA) have to know all about that. We have to have the skills that are equal to the manufacturer's so that we can say, "How do we know there is not a virus in that software?" "How do we keep from getting a virus introduced into that software while it is on the airplane?" Things you never think about. But the Triple-7 is all flown by computer. Four basic flight control systems, all driven by computers, with that very, very last sort of backup in manual flight to keep the airplane stable. All of these things in information processing are beginning to have a direct bearing on our acquisition reform so we can do what we need to do.

As we move through this, it is very clear that we are having to change the way the FAA works. We are changing everything we do. We are changing from the concept of repairing things with flashlights, screwdrivers, and black tape to one of sophisticated fault analysis and application of computer technology.

We are changing our radars from being analog to being digital. The ASR-9 radars that are being bought today are the absolute state of the art. They are the best in the world. And their maturity curve is exactly as we forecast it to be. It is right on schedule. After it has been out there for three years, it will be at 99+ percent reliability.

In fact, the whole national airspace system that you read so much about -- that famous vacuum tube that everybody holds up -- the national airspace system today is at an all time high in reliability: 99.4 percent. There are over 30,000 pieces of discrete electronic equipment in the national airspace system. And the total availability is in excess of 99.4 percent. In fact, if you go back 10 years, when nobody was even talking about this, it was under 97 percent. We work very hard to get these increments up toward 100 percent, and because that is unattainable, the closer we get the more difficult it becomes.

Fundamentally, the system is designed with five levels of backup, and it is fail safe. The air traffic control system does not fail "unsafe". When it fails, it fails safe. No engineer would design a system for air traffic control that failed unsafe. Think about it for a minute. Even a freshman engineering student knows better than that. So when somebody says this system is unsafe, or fails unsafe that is not true. That cannot be true. Nobody designs a system to fail unsafe. It fails safe. It slows traffic down and in some cases it stops traffic so that safety is maintained, but it is always safe.

So all these things are causing us to change our outlook and the way we hire people and pay them, and the way we take care of problems like here at Los Angeles, The master plan group at the airport will have a need for many things. And one of the things you are going to have that will help you a lot is GPS.-- the global positioning system -- satellite navigation. I think largely invented here in California, at Rockwell, as I recall.. Someone correct me if I am wrong. But I think this is where a lot of that came from.

For the students out there, we have 24 satellites circling the earth at 11,000 miles. We basically measure the time it takes the signal to travel at the speed of light. And we calculate that -- we can do the math in the computer -- and figure out where we are on the earth. We can also figure out how high we are off the ground. So we have latitude, longitude, and altitude.

This means that in the future Jack Driscoll won't need navigational aids at Los Angeles airport, theoretically,. He won't need instrument landing systems, or very high frequency omnidirectional range, or distance measuring equipment, or anything like that. He won't even need radar. GPS *can* do it all. I am not saying it *will* do it all because we still have to have back-up systems.

This is how good GPS is. You can taxi an airplane out when the weather is so bad the pilot cannot see outside: zero zero. Take off zero zero, fly zero zero, land zero zero, taxi into the gate zero zero, and the pilot never able to see beyond the windshield. All on GPS, dead accurate.

What we do now is, we take the signal of the GPS receiver in the airplane -- because it knows where it is. We send that up to a satellite. It sends the signal back down to air traffic control. We process that and put it on the radar scope and it looks ... viola!... just like a radar target. And how do we know this works? Because we are doing it today.

In the South Pacific today, United Airlines, Northwest Airlines, and Qantas Airlines are flying what we call the first international Future Air Navigation System. Their big airplanes flying between New Zealand, Australia, and the South Pacific, Hawaii, and the United States are all equipped with GPS. When they get more than 200 miles to sea, they lose radar coverage. So they begin to send the signal up to the satellite. It comes down to Oakland Oceanic Air Traffic Control, because the United States manages all the Pacific airspace out of Oakland. We go all the way out to other countries. The signal comes down to Oakland, and the controller sees it, on a scope, presented like a radar target.

Now why is that important? Because now we have real time information on where the airplane is. So instead of putting airplanes 100 miles behind each other, we can now put them 25 miles behind each other. Why is that important? Because the wind is always blowing. And when you fly an airplane 12 or 14 hours from Australia, if you can find a wind-favored route, you save 30 minutes ... an hour and a half. Now maybe that doesn't sound to important. But if you are flying this route every day, 365 days a year -- that is a lot of kerosene ... a lot of fuel. ... a lot of airplane time ... and a lot of passenger time.

And when you multiply that times all the other airlines out there, the figures become enormous. And for the youngsters here, think about this. One airline says that it would save $200 million a year just by using that system across the Pacific: $200 million. How much kerosene do you think $200 million would buy? A lot. A lot of big tankers, trains and trains of kerosene. That important. But what is really important is that we don't have to burn it. So we have the case of one airline, $200 million of kerosene that is not polluting the atmosphere. Right? Then we multiply that times 100 airplanes out there and we are talking $4 billion to $5 billion dollars annually. That's a huge number -- by being able to move traffic into the wind-favored routes. And that is all kerosene that does not pollute the atmosphere. So there are enormous benefits from GPS technology and the FAA is right in the middle of this development.

Last year, the International Civil Aviation Organization accepted the offer that I extended on behalf of the President to provide GPS to the rest of the world, free for the foreseeable future. The Russians have a system called GLONASS which does the same thing. So everybody is getting into the act. In the future all of our navigation will come from satellites.

You can see it now in rental cars in Los Angeles. If you get the right rental car at LAX, you've got a GPS receiver right in the car that will find all the streets for you in Los Angeles. And it is being used more and more ... by surveyors and others. It has

enormous application just about anywhere you look. In fact, in the end, aviation will be the smallest user.

So finally, let me conclude by saying that I could talk to you about a whole host of things that we are doing at the FAA. Government institutions change slowly -- they evolve slowly. The FAA has a wonderful track record. The FAA is the paragon and the reference for everybody in the world about aviation. Our technology, our skills, our resources exceed those of any other country in the world, in large amount.

Fortunately, we have great working relations with all civil aviation organizations. We have been working recently, as many of you know, with Europe to try to harmonize the certification standards for engines, airplanes and other things, so if its manufactured in the France, it is okay in the United States. If its manufactured in Long Beach, it is okay in Germany. If its manufactured in Tokyo it is okay in Miami. We are trying to make sure that the world's civil aviation groups get to a standard. This is very difficult, because everybody has their sovereignty, their own engineering groups, and they all have their different views.

We have been working on this for a long time. With Europe we have now harmonized helicopters and light airplanes. We have some issues but we will overcome that. We are now in the process of trying to harmonize what we call large transport aircraft certification. So that whether it is built here or there, it is automatically certified -- which saves money for anybody in this room that builds aircraft because you only have to certify it once, instead of 15 or 20 times. Many countries say "Whatever you bring in here, we have to certify." That's very expensive for manufacturers ... which drives up the cost of the airplane or the product ... which drives up your cost as a traveler.

Where do we go from here? We go back to Washington and get some money, I hope. We get a new financing scheme. We now have our own way of managing the agency. We are going to be even more responsive than we have in the past. We have brought in some very talented people into the FAA to help us cultivate a new way of doing business. I have some interesting relationships here in Los Angeles, not only with manufacturers but with Jack at the airport and others. We've solved most of our problems working together and I am confident we will continue to do so in the future.

Thank you very much for your courtesy and your hospitality. I will be happy to answer any questions you might have.

Introduction

- Good morning. It's a pleasure to meet with you today. I am grateful to see the Steering Committee partnership at work addressing head on the challenges the aviation community faces in implementing Free Flight, or dynamic air traffic management. This is a very important endeavor, and one that we enthusiastically support.

- As the airspace becomes more and more congested, air traffic controllers will need the most powerful tools we can give them. Changing how aircraft will be separated in the future requires careful examination to ensure that changes are safe, workloads for both controllers and pilots are manageable, and benefits can be realized.

- Dynamic air traffic management is a logical extension of the most advanced technology which is either already available or is being deployed. Our new flexibility in acquisition and personnel will help us realize the full promise of GPS and the array of new technologies that are available.

- The future air navigation system and dynamic air traffic management entail substantial investments from the airlines, manufacturers, and the providers of air traffic services. Finding the funds at a time of tight budgets will not be easy.

- We must complete the final steps of integrating the enabling technologies into a single, seamless system.

- We must learn about the human factors which will play a critical role in the successful transition from the old to the new system of dynamic air traffic management.

- We must develop all the procedures and protocols which must be in place before the transition can begin.

- Having said this, I'd like to take a minute to talk about where we are in this important evolutionary process and outline what challenges remain.

Commitment to Success

- Acceptance of the Free Flight Action Plan is an important step in the realization of Free Flight capabilities. There are several key challenges that will need to be addressed as the plan moves forward:

- <u>Transition strategy</u> - Transition to new technologies will require a stepwise benefit plan to incrementally justify airborne and ground equipage improvements.

- A benefit path and cost analysis must be fully defined to ensure that the economic transition toward dynamic air traffic management is achievable.

- Development and implementation of the technologies and procedures must be consistent and coordinated to meet the economic goals.

- <u>Funding commitment and stability</u> - The commitment to the Free Flight initiatives and the collaborative process used in their development should be demonstrated by all participants, through commitment of necessary resources and long term investments.

- Anticipated federal funding shortfalls threaten the ability of both the Government and industry to meet the timelines identified in the Action Plan.

Strategic Oversight of Critical Issues

- Critical decision and planning for research, development, and acquisition must take place now, even though they apply to programs with milestones in the mid- and long-term time frames.

- The Steering Committee has identified several key issues concerning strategic planning, funding, decisionmaking, and program management. The key issues are:

- Datalink decisions, implementation, and transition
- GPS sole means
- ADS-B
- Terminal and En route decision support systems (e.g. CTAS, AERA) implementation beyond prototype sites
- Common platforms/information architecture
- Digital communications transition

The Action Plan as the Free Flight Baseline

- The RTCA Task Force 3 effort is the foundation upon which the Action Plan was developed. The Action Plan, in turn, should serve as the baseline for reflecting the needs and requirements of the aviation community against which initiatives are tracked, prioritized and funded.

- Those initiatives that do not have sufficient resoúrces to be implemented should be identified. The Free Flight Steering Committee has the responsibility to help prioritize those needs and requirements.

Operational Concepts, Architecture and Interdependent Initiatives

- All of the Action Plan initiatives have been divided into separate partitions, each defined under a specific Task Force 3 recommendation. However, many of the operational concepts described in the Task Force 3 report are dependent on multiple recommendations.

- The relationships between the desired operational capabilities (e.g. dynamic route and altitude) and individual program components (e.g. conflict probe) must be understood so that the Steering Committee can ensure that appropriate initiatives receive proper attention and priority. This involves the following areas and will be lead collaboratively by the FAA and industry within the next twelve months:

- Definition of a unified gate-to-gate Air Traffic Management (ATM) operational concept to facilitate development of a more effective decision support system architecture.

- Validation of prior ATM cost benefit analyses and their refinement based on the unified ATM operational concept, allowing proper prioritization of all programs.

- Development of a new collaborative and stratégic national process to secure and allocate adequate funding as well as to establish program priorities, associated with all significant Government initiatives supporting the dynamic air traffic management concept.

- The management of program implementation with full recognition of their interdependencies, within the context of the new NAS Architecture.

- Development and implementation of new certification processes that reduce system development costs, thereby allowing an affordable and rapid transition to new technologies.

Industry Input to Action Plan   (Covered by Richard Taylor earlier in the morning)

- Steering committee members produced over 200 comments

- Most significant changes to near-term actions:

1)   Steering Committee must reach technical agreement on data link;

2)   Near-term application planned for data link using existing system (ACARS);

3) OASIS implementation added as an initiative

4) Need to develop business case for ADS-B in domestic non-radar areas.

Conclusion

- In closing I would like to thank you again for your efforts. The FAA will continue its collaborative efforts with the aviation community to find acceptable solutions to these challenging issues.

- This effort will require continuous involvement by the user community throughout the process.

- Dynamic air traffic management is a long term goal and a vision that will change over time. It must remain benefits driven and time-phased.

- The FAA and industry are committed to implementing an affordable infrastructure for dynamic air traffic management.

Thank you.

Remarks Prepared for FAA Administrator David Hinson
Air Line Pilots Association
Air Safety Forum Banquet
Washington, D.C.
August 21, 1996

Introduction

Good evening. Let me begin by thanking Randy Babbitt for that warm introduction and all of you for inviting me to take part, again, in your safety awards banquet.

The ALPA Safety Forum is one of the most important sources of information and ideas about what we can do, as an industry, to reduce the already low risk of air travel. The fact that 20 cents of every dollar that ALPA collects in membership dues is spent to advance aviation safety is strong evidence of your commitment.

I want to congratulate the winners of this year's awards. You are proof that however sophisticated and reliable our technology, it is human skill, intelligence, and courage which -- in the end -- count the most.

This profession shoulders a heavy responsibility, day after day. That is the reason that it is such a proud profession.

Like all of you here, I have been fortunate to make a career doing what I like to do best -- flying airplanes. I have been privileged to have seen this business from many different angles.

But the greatest privilege, by far, was being chosen by President Clinton to lead the world's foremost aviation agency. My time in Washington has given me a significant appreciation of the professionalism of the FAA and the overall excellence of American aviation.

It's been an eventful three years.

- The economy got better.

- Airlines made the turnaround from record losses to record profits.

- We began making the momentous shift from ground-based to space-based navigation.

- We got the air traffic control modernization program back on track.

- We reduced the FAA staff by over 5,000 and cut our budget by $600 million dollars. And, even as this was happening, we hired close to 200 more inspectors and increased our critical safety operations funding by more than one-half a billion dollars.

- We embraced a new, dynamic air traffic management concept called "free flight".

- It took an act of Congress, but the FAA finally got rid of its rule-bound acquisition and personnel system. For the first time since the FAA was established in 1958, we have the freedom to adopt best business practices and to make common sense choices. With the reforms we put in place in April, we have bettered our ability to deliver the important safety improvements that will carry aviation into the next century.

Safety: the FAA's highest priority

I came to the FAA three years ago with a clear mandate. That mandate was to provide travelers with the safest and most efficient air transportation system possible.

This has been the most pressing priority of my tenure at the FAA and the focus of my most urgent efforts from the moment I was sworn in.

We are attacking the problem on several fronts. Tonight I will talk about four of them.

- The first is air traffic improvements that target safety;

- The second is new regulations;

- The third is partnership for safety programs; and

- The fourth is new safety safeguards.

Air traffic improvements that target safety

Air travel remains the safest form of transportation and the safety record of U.S. aviation is unmatched in the world. It has been calculated that the likelihood of being a fatality on scheduled jet service in this country is one in seven million.[1]

But the loss of *one plane* has such tragic consequences that we can never rest on our record. We never have and we never will. We work together ... government, industry, and ALPA ... constantly seeking new ways, new procedures, and new technology to improve safety.

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[1] Technology Review, August/September 1996, p. 13

Safety through new technology

- We all know that two of the leading causes of accidents <u>are weather and runway incursions</u>.

- We just placed the 18th <u>Doppler weather radar</u> in operation at O'Hare airport. We're planning to put Doppler at 45 airports where the threat of undetected wind shears is the greatest.

- We began evaluating the <u>airport movement area safety system</u>-- at San Francisco International Airport in May, for eventual deployment at 34 airports around the country. AMASS is one of the industry's most-wanted safety initiatives to help prevent runway incursions. We are doing everything possible to get it installed as quickly as we can.

Global Positioning System

New technology only pays off when you put it to use.

Shortly after I arrived at the agency, we authorized the use of GPS for supplemental navigation in our domestic airspace, for primary navigation over the oceans, and for non-precision approach guidance.

Since then, 14 countries have followed suit and approval is pending in 6 others.

Future Air Navigation Systems (FANS)

Advances in air traffic control technology and safety have always been closely linked.

I was glad to see that you had a session yesterday on the Future Air Navigation System. The FANS technology is almost as much today's technology as it will be tomorrow's.

- About 60 Boeing 747-400's are already equipped with the FANS-1 package of avionics for satellite navigation, data link communications, and automation.

- Last Fall, controllers at the Oakland Center began offering <u>satellite-based data link communications</u> to flights operating over the southern sector of the Pacific Ocean. By the end of this year, Australia, New Zealand and the United States will set up dedicated routes in the South Pacific for flights equipped for GPS navigation and data link telecommunications.

Apart from the savings in time and fuel ... which are significant ... controllers and pilots can now communicate directly with each other over the oceans. I know that all of you who fly these routes appreciate the magnitude of this breakthrough.

The FAA has been at the forefront in developing the FANS concept. Now airlines -- and governments -- around the world are recognizing its benefits.

Dynamic Air Traffic Management (Free Flight)

The key elements of FANS -- GPS, data link, and automation are three of the main technologies we need to realize the full benefits of "free flight".

For those who may not be familiar with the term, let me define it. Free Flight is a new dynamic air traffic management concept that allows pilots to choose their own routes, speed, and altitudes in real time -- taking advantage of favorable winds, avoiding rough weather, saving fuel and flight time.

Free Flight is by no means a "free-for-all". Air traffic controllers will still keep watch to ensure safe separation, avoid overloading airports, and prevent intrusion into airspace reserved for special use. What Free Flight really means is a more flexible way of managing air traffic.

The first step toward "free flight" -- the National Route Program -- is now available everywhere in the United States from flight level 310 and above. By the end of the year, it will be available at flight level 290.

Eventually, we see "free flight" as part of a globally compatible and integrated system of air traffic management. From the start, the FAA has solicited participation from any interested country. Right now, we are working with the European Civil Aviation Conference, and our counterparts in Mexico, Canada, Australia, and New Zealand.

The full realization of the Free Flight concept is still some years away. The target date we have set for ourselves is 2010. But I am confident that it will become a reality.

Many of the principal gains in aviation safety in the past two decades are due to the adoption of new technologies which share a common characteristic -- providing new tools for pilot decision making. GPS, data link, TCAS, and on board automation all raise the level of information available. Free Flight is a logical extension of this trend.

Safety through regulation

The safety of U.S. aviation has been called one of the most remarkable achievements of the twentieth century. It is even more remarkable when you consider that from 1958 -- when the first jet airplanes began carrying passengers .. to the present -- the number of air travelers increased from 50 million to 550 million.

The two are linked. For safety is the one essential precondition to aviation growth.

One of the mainstays of aviation safety is <u>regulation</u>.

- Last year, the FAA took the decisive step to ensure that the millions of Americans flying on smaller, commuter aircraft would have the same level of safety as those flying on larger commercial airlines. <u>This "one level of safety"</u> initiative covers a broad variety of commuter airline functions, such as pilot training, dispatching, and cockpit resource management.

- We set limits on the duty time for flight attendants to ensure that they have adequate rest periods.

- We set new experience levels that pilots must have before they can be paired on the same flight.

- We have proposed that airlines upgrade the <u>flight data recorders</u> to aid in accident and incident investigations.

- We banned the use of certain booster seats, and harness and vest child restraints aboard all U.S. air carriers after our tests showed that they do not provide adequate protection for infants and toddlers.

- We provided new detailed procedures to help pilots detect and safely exit <u>icing</u> conditions.

- I have called for action to ban passenger aircraft from transporting certain materials that can fuel fires. I have requested an additional 130 inspectors to be devoted exclusively to inspection, outreach, and public education regarding hazardous materials in air transportation.

- To further improve safety, last Saturday the FAA implemented new wake vortex separation standards for all aircraft operating in the United States.

- And the Clinton Administration is the first ever to propose new rules to reduce the maximum number of consecutive hours that pilots can work.

Safety through partnership programs

- In January 1995 Secretary Peña and I called together over 1,000 aviation experts for a safety summit. Randy and John O'Brien were there, I believe, along with airline CEO's, chief pilots, machinists, and flight attendants.

  As a direct result of that meeting, the FAA is now speeding action on 173 separate initiatives aimed at reaching our ultimate goal of zero accidents.

- One of the changes that came from the summit was that the airlines voluntarily agreed to establish internal safety evaluation programs and to name top-level safety officials. At the time 46 airlines had safety evaluation programs in existence. The number has more than doubled to 95 out of a total of 138 airlines.

- But the most noteworthy achievement of the aviation safety conference, in my view, was the agreement by the participants on the critical importance of data sharing. Under an agreement reached at the conference, airlines will allow the FAA to analyze data they collect as part of their Flight Operations Quality Assurance programs. We, in turn, agreed not to use the data in enforcement actions.

  To keep driving down the accident rate, we must reorient our thinking to emphasize the search for potential causes of accidents rather than rely on the findings of post-accident investigations.

  Such a proactive strategy requires an unprecedented level of data sharing which depends, in turn, on a high level of trust and voluntary cooperation between the industry and the FAA.

- About two years ago, the FAA began **safety partnership programs** with American, USAir, and Alaska Airlines. These demonstrations programs encouraged employees to disclose certain safety information without fear of legal sanctions against the airlines or themselves. The programs have been so successful that we are now preparing guidance to make them available, nationwide, on a two-year demonstration basis.

Global Analysis and Information Network

A few weeks ago we invited discussions on a new proposal which, I believe would further broaden international cooperation in achieving higher levels of safety. We call this concept the global analysis and information network, or GAIN.

The goal is to produce an early warning system sensitive enough to spotlight problems.

Operations data would be continuously collected by world air carriers and reported in standard format. Data would then be analyzed at designated centers using advanced new analytic tools.

Airlines, aircraft manufacturers, and other aviation professionals could tap into the data base over a network something like the Internet.

The FAA is taking the initiative in offering this proposal because unless steps are taken now to further reduce the already low rate of accidents, the number of accidents and fatalities will escalate along with the growth of air traffic. This is a troubling prospect. But it is an outcome we can avoid if we act now to invest in an aggressive search for solutions.

New security safeguards

Shortly after the TWA explosion last month, President Clinton announced new measures to tighten security. The new measures include, among other things, more intensive screening of passengers on international flights, and more vigilant screening of carry-on bags.

The President also announced that Vice-President Gore is leading a commission on aviation security that is to report back to him within 45 days. The commission is to produce an action plan to deploy machines that can detect the most sophisticated explosives and other changes.

No one disputes that these are all necessary measures in a world where the most radical elements have ready access to the most dangerous technologies of destruction. Many warn that the threat of terrorism has now become a constant in our lives and will require constant vigilance.

I agree with this assessment. When the Congress returns from its August recess, I will urge the members, on behalf of America's air travelers, to strengthen the hand of our law enforcement agencies.

We have made remarkable progress in recent years in upgrading our air traffic control technology and in raising the standards of air safety. I have every confidence that our nation has both the will and the means to assure that our aviation system remains a secure and safe system.

With the help of organizations like ALPA and the people you are honoring here tonight, I know we will make it so.

Thank you very much.

TALKING POINTS
FAA ADMINISTRATOR
DAVID HINSON
VSCS DEDICATION
BOSTON ARTCC
AUGUST 22, 1996

- It's a real pleasure to celebrate here today with the men and women who control the airspace and maintain the equipment that supports air traffic in this busy travel corridor.

- It's especially great to be here for the dedication of the Voice Switching and Control System -- a cornerstone for our modernization of the National Airspace System.

- There áre two stories I want to talk about today. The first is the remarkable capability that VSCS gives us to handle the ever-increasing volume of air traffic. The second is how Harris Corporation worked with us to deliver a quality product incorporating a careful, step-by-step implementation program.

- I can't overemphasize how important new automated systems such as VSCS are to the NAS architecture. The numbers tell the story. Our air traffic control system handles an average of two flights per second, every minute, every hour, 365 days a year.

- Boston Center controls airspace over all of New England, parts of New York state and Canada, and handles transfer hand-offs to facilities in the Canadian provinces of Ontario and Quebec.

- FAA's latest forecasts for U.S. commercial air carriers predict overall growth of nearly four percent over the next 12 years. <u>800 million</u> passengers a year in less than a decade. Nearly <u>one billion</u> a year by 2010.

- Moving all those people and aircraft through the skies safely demands crisp, clear communications between controllers and pilots, and among controllers themselves. Safety can be compromised by garbled, choppy or incomplete messages.

- As a pilot for more than 40 years, I can tell you how important voice communications are -- and how confusing they can be sometimes.

- For too long, we've had to rely on 1950s-vintage electro-mechanical technology to perform our air traffic control functions. VSCS brings us up to date with state-of-the-art, digital technology that will go a long way toward reducing delays and benefiting the region's economy.

- The controllers who have worked with the system here, and in the other 12 centers that have gone operational are giving VSCS rave reviews. Incidentally, I understand our 14th system at Albuquerque is scheduled to go ORD this weekend.

- The beauty of VSCS is that it is a system for today <u>and</u> tomorrow. It helps us immediately by providing greater capacity and capabilities than the current system. It also is flexible enough to incorporate technology advances into the 21st century. We cannot forget that new technology is the lifeblood of competitiveness in our industry.

- But VSCS is more than just a technology success story. The entire VSCS team, both FAA and Harris employees, put in long hours to get us to where we are today. They've demonstrated the highest levels of dedication and professionalism.

- Boston Center, in collaboration with Harris and the VSCS program office, worked closely together to make sure VSCS met its milestones along the way.

- I'm confident that the government/industry team we have in place will continue to meet their schedule and cost timelines as efficiently as they've done so far.

- VSCS is not our only good news to report here in Nashua. August also marks the successful commissioning of the ARTCC Critical and Essential Power System (ACEPS) project -- a major modification and expansion of the Center's electrical power system.

- Boston Center employees are to be commended for receiving the nation's Air Traffic Facility of the Year Award. The award recognizes the highest degree of efficiency and dedication of air traffic personnel who work day in and day out to achieve an outstanding safety record -- as well as operational efficiencies. Congratulations to you all.

- Both technical and fiscal challenges lie ahead. But I believe that six months from now, in February, 1997, we'll have the entire VSCS system fully commissioned and serving the American traveling public. They expect -- and deserve -- the best and safest airspace system in the world.

- And that's exactly what the FAA delivers.

THE FUTURE OF AIR TRAFFIC CONTROL:
BRINGING FREE FLIGHT TO GLOBAL AVIATION

REMARKS PREPARED FOR DAVID R. HINSON
ADMINISTRATOR
FEDERAL AVIATION ADMINISTRATION
FINANCIAL TIMES WORLD AEROSPACE CONFERENCE
AUGUST 29, 1996

Introduction

Earlier this month, Sir Frank Whittle died at his home near Baltimore. As a young cadet at the Royal Air Force College, 75 years ago, he wrote a thesis on "Future Developments in Aircraft Design." A little more than a decade later, he ground-tested the first jet engine and helped to invent the future of modern aviation. Fortunately, Sir Frank was a dreamer.

My subject this afternoon concerns a future development in air traffic control that some might say is also a dream. It is the dynamic air traffic management concept often referred to as "Free Flight."

We know that Sir Frank's idea met with strong initial skepticism. It was hard to persuade officials to see possibilities beyond the piston engine. Free Flight also has its skeptics. It is hard to argue for an alternative to an air traffic technology that has served us all so well for so long. But I believe the argument is both credible and compelling. Free Flight may be one of the most important advances in aviation since Sir Frank's historic achievement.
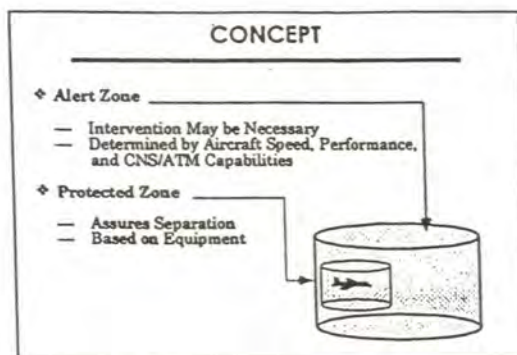
Today I will give you a progress report on the key enabling technologies for Free Flight. Then, I will review the conditions that must be met before Free Flight can become a reality. Finally, I will discuss the reasons why I believe that dynamic air traffic management is not only a possibility -- but an imperative -- in the coming decades.

Definition of Dynamic Air Traffic Management ("Free Flight")

For those who may be unfamiliar with the concept, let me first describe it briefly.

The ultimate goal of Free Flight is to allow pilots to choose their own routes, speed and altitudes in real time -- taking advantage of favorable winds and avoiding rough weather. Restrictions are imposed only to ensure safe separation, avoid overloading airports, and prevent intrusion into airspace reserved for special use.

Figure 1


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CONCEPT

✦ Alert Zone _____
    — Intervention May be Necessary
    — Determined by Aircraft Speed, Performance,
      and CNS/ATM Capabilities

✦ Protected Zone _____
    — Assures Separation
    — Based on Equipment
```
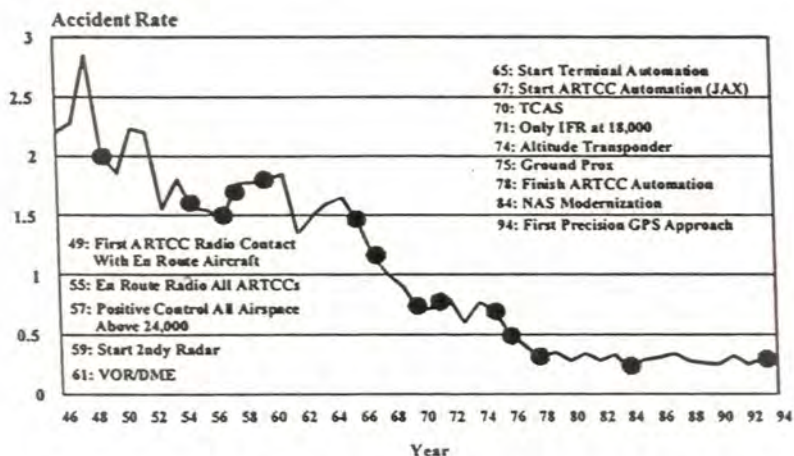
Free Flight is not a free-for-all.

Each plane would fly inside its own electronic bubble of protected airspace. One protected zone would never be allowed to touch another. Surrounding each bubble is a larger "alert zone," which would vary in size depending on factors such as speed. Whenever one plane's alert zone came in contact with another's, a computer would immediately advise either the controllers or the pilots on the best way to resolve the conflict.

The National Route Program

I want to emphasize that while Free Flight is a major step forward in the management of air traffic, it is a step in the same direction we have long been heading.

Figure 2

**Accident Rates Per 100,000 Departures
And Advances In ATC**
(1946 - 1994)


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65: Start Terminal Automation
67: Start ARTCC Automation (JAX)
70: TCAS
71: Only IFR at 18,000
74: Altitude Transponder
75: Ground Prox
78: Finish ARTCC Automation
84: NAS Modernization
94: First Precision GPS Approach

49: First ARTCC Radio Contact
    With En Route Aircraft
55: En Route Radio All ARTCCs
57: Positive Control All Airspace
    Above 24,000
59: Start 2ndy Radar
61: VOR/DME
```

Year

In this illustration we can see the chronology for the introduction of 15 milestones in air traffic control technology. The dateline is superimposed on a graph showing the declining accident rate over the past 15 years. Each innovation yielded knowledge essential to the next advance, and each step brought us closer to the safe, reliable system we have today.

Free Flight is a logical extension of existing technologies. In a limited sense, it already exists.

Three years ago, the FAA began offering users a choice of routing options while in the en route phase of flight. The National Route Program is now available everywhere in the United States from flight level 310 and above. By the end of the year, it will be available at flight level 290. On average, about one thousand flights a day are taking advantage of this option.

PHARE: a parallel effort

Eurocontrol has a parallel effort within its Program for Harmonized Air Traffic Management Research -- or PHARE.

The two approaches are complementary, with more similarity than difference. Under the PHARE project, an aircrew would request a flight path, which is then approved by ground controllers who continue to maintain positive control throughout the entire flight, from airport to airport.

Free Flight, in contrast, envisions an aircraft flying any trajectory with controller intervention only in cases of conflict. Eventually we expect the two approaches to be highly compatible, if not operationally equivalent.

Both the PHARE project and Free Flight depend on some of the same enabling technologies, and several of these are already in use throughout the world. They are the key elements in the global system of air traffic management that is rapidly evolving.

The mainmast of this global system is satellite technology.

Global Positioning System (GPS)

Since the Global Positioning-System became fully operational three years ago, it has rewritten the ancient history of navigation and created a thriving new industry. Fourteen countries have now approved GPS as a supplemental means of navigation in their airspace. Approval is pending in six other countries.

President Clinton's renewal of the U.S. commitment to keep GPS continuously available, without charge, should see us through to the point when we are ready to launch the next generation of navigation satellites -- ones designed specifically for civil aviation.

The Future Air Navigation System (FANS)

The future air navigation system, or FANS for short, is almost as much today's technology as it will be tomorrow's. There are now about 60 Boeing 747-400's operating in the Asia Pacific region that are equipped with the FANS 1 package of avionics for satellite navigation, data link communications, and automation.

Figure 3

**Original and Replanned Routes
(South Pacific)**
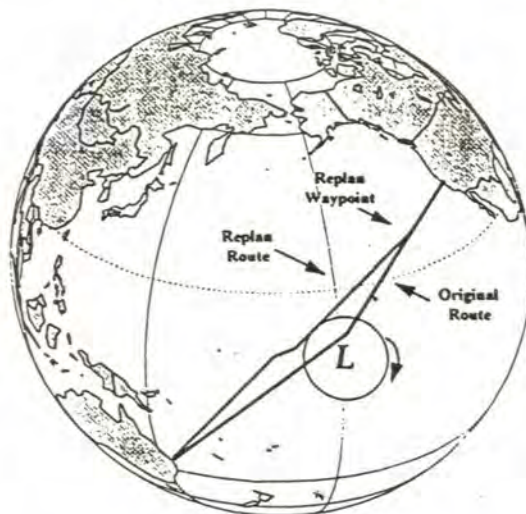
Last fall, controllers at the FAA's Oakland Center began offering satellite-based data link communications to flights operating over the southern sector of the Pacific Ocean. By the end of this year, FANS-equipped aircraft in flight between Sydney or Auckland and the United States will be able to use satellite data link for automated rerouting. Adverse wind and weather conditions can be circumvented, saving up to 20 minutes of flying time and about a thousand gallons of jet fuel per flight. [1]

The civil aviation authorities of the Pacific region are developing plans to reduce the oceanic separation minima by the end of the decade for aircraft having FANS capabilities. An initial step calls for reducing the lateral separation between tracks in the North Pacific to 50 nautical miles by the end of next year.

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[1]Boeing Commercial Airplane Group reports that average cruise fuel consumption for the Boeing-747 is 2,963 gallons per hour.

Collision Avoidance System (TCAS)

The collision avoidance system -- TCAS -- is another enabling technology for Free Flight that is becoming standard equipment on commercial aircraft worldwide

Since 1993, all commercial aircraft that carry more than 30 passengers must be equipped with TCAS in order to fly in U.S. airspace. That includes the more than 100 foreign carriers that operate scheduled passenger service to U.S. airports.

The FAA expects to have a modification ready by the end of this year that will make TCAS more compatible with the various air traffic control systems throughout the world.

Decision Support Tools

The interfacing and interlocking of technologies is one of the last remaining engineering tasks that must be completed before Free Flight can become a reality.

We are working on a portfolio of decision support tools to assist controllers in managing air traffic in a Free Flight environment. One of these tools, which we are now testing at Dallas/Fort Worth, sequences and spaces aircraft in their final approach. Another automated system is especially critical to Free Flight. It looks ahead to detect potential aircraft conflicts and helps the controller resolve them. A third decision tool allows air traffic managers to collaborate in real time with airline operating centers to develop optimum traffic flow management strategies.

Institutional barriers to Free Flight

I have tried to give you an overview of what has been achieved technically to bring us closer to the realization of Free Flight. The remaining tasks are formidable, but in many respects the highest barriers are institutional rather than technological.

Money is an enduring problem. We often must scale back our spending, stretch out our projects, and postpone the next phases of our plans. There is also the daunting prospect of developing an entirely new set of protocols and procedures. And the human factors involved in the transition to Free Flight may be far more difficult to deal with than the technological innovations.

Infrastructure requirements: airport expansion, harmonization of ATC

In addition to these institutional roadblocks, there are two infrastructure requirements that must be satisfied. First of all is the urgent need to build new airports and expand old ones.

One of the main justifications for Free Flight is the prospect that it will enable us to manage more efficiently the enormous growth in air travel which industry analysts are

forecasting. By 2015, perhaps sooner, the number of passengers and aircraft, worldwide, will more than double. It has been estimated that if the number of passengers actually doubles, as we expect, traffic through our airports, arriving and departing, will be equivalent to 90 percent of the present world population.[2]

Many of the world's largest airports are already operating at or near full capacity. According to some forecasts, nearly half of the international airports in Asia will soon be unable to cope with demand at the busiest times of the day. The United States and Europe face similar problems.

Free Flight and PHARE will add to the capacity of our airspace. But this expansion will mean little unless the major airports can handle more flights.

There is another infrastructure requirement that must be fulfilled if Free Flight is to become a reality. We must achieve a high level of compatibility in air traffic control technology and procedures around the globe and a harmonization of standards worldwide.

Free Flight will never succeed without close and continuing consultation among all civil aviation authorities and all sectors of the industry. The FAA has international representation on the industry-wide panel that is drawing up our detailed transition plan. One member is Val Eggers, the Danish Director General for Civil Aviation and President of the European Civil Aviation Conference. Canada and Australia are also represented on the panel. Similarly, Canada and the United States are associate members of the PHARE project team.

The international participation in planning Free Flight and the PHARE project demonstrates that all air traffic systems of the future must be globally compatible and integrated. No one country can introduce major innovations without careful coordination with other nations.

When all these contingencies are taken into account, it becomes clear that the full realization of the Free Flight concept is still some years away. The target date we have set for ourselves is 2010.

Three imperatives for Free Flight: safety, economics, the environment

We know there will be setbacks. In a project of this scale, there always are. But, I am confident that the necessity for Free Flight will become increasingly apparent as we enter the early decades of the next century. The determining factors will be safety, economics, and the environment.

Free Flight will contribute to improved safety in an increasingly congested airspace. Many of the principal gains in aviation safety in the past two decades have been due to

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[2] "Delays can be expected," *The Economist*, July 27, 1996, page 51.

the adoption of new technologies that share a common characteristic: they provide new tools for pilot decision-making. GPS, datalink, TCAS, and on board automation all raise the level of information available. Free Flight is a logical extension of this trend.

Throughout my time at the FAA, I have warned that we must not allow today's low rate of accidents to lull us into complacency. As aviation grows in the coming decades, so will the number of accidents -- unless we take decisive steps now to prevent this rise. Free Flight will enable us to handle a growing volume of air traffic with a higher level of safety.

The second determining factor is economics.

A study by NASA[3] estimated that airlines in the United States could save as much as 1.47 billion dollars a year by 2005 if Free Flight were fully implemented. That's about 20 percent of the total amount U.S. carriers spent on fuel in 1995.[4]

Free Flight will significantly reduce fuel consumption at a time when oil prices may be especially volatile. While the FAA forecast anticipates no great increase over the next decade, there are some who believe that global oil production may peak between 2007 and 2014.[5] As this time approaches, prices could rise -- substantially and perhaps permanently. Under such a scenario, fuel conservation would become more urgent than ever.

Finally, Free Flight will contribute to improved environmental quality. Currently airplanes account for only about three percent of the carbon dioxide produced by humans. A surge in air travel will push fuel consumption steeply higher. More planes in the air could lead to higher levels of emission and possible environmental degradation.[6]

Free Flight offers one of those rare instances when conservation is rewarded with a strong and immediate economic return.

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[3]Couluris, G.J. and S. Dorsky, *Advanced Air Transportation Technologies (AATT) Potential Benefits Analysis,* United States National Aeronautics and Space Administration (NASA) Ames Report, AATT-95-001, September 1995.

[4]Calculated from fuel cost/consumption data reported in *Aviation Daily,* May 9, 1996.

[5]James J. MacKenzie (World Resource Institute), "Heading off the permanent oil crisis," *Issues in Science and Technology,* Summer 1996.

[6]Robert Monastersky. "Ten thousand cloud makers: Is airplane exhaust altering Earth's climate?," *Science News,* July 6, 1996.

Conclusion: Free Flight and competitive strategies for the next century

Free Flight will become a reality because it increases the likelihood that we can preserve the aviation system as we know it today -- a system of mass global transportation that is both safe and efficient. In a period of rapid growth, Free Flight can help us keep air travel safe. In an era of rising costs, Free Flight can help keep down the price of a plane ticket.

Many of us can recall the days when air travel was a privilege of the few. The enormous growth of aviation in the past four decades was possible because of steadily declining air fares, both in real and relative terms. We cannot assume that this downward trend will continue.

Both government and industry confront a future of heavy investment. The cost of tightened security, airport expansion, new aircraft purchases, modernized air traffic control, and environmental compliance -- all of these could combine to make air travel less affordable.

Free Flight offers us an opportunity to lower our costs significantly.

In thinking about competitive strategies for the new century, clearly the factors most important to future growth -- increased safety, capacity, and fuel efficiency -- are those most dependent upon the success of dynamic air traffic management.

Will Free Flight ever become a reality?

Let me answer that with a story about early navigation. In the closing years of the 16th century, Philip III of Spain offered a prize and a lifetime pension to anyone who could discover a way to find longitude while at sea.[7] Galileo, hoping to win, suggested using the satellites of Jupiter. His idea was ignored by Philip, and a century later, the British Parliament upped the ante by offering a prize of 20,000 British Sterling -- which at the time was an enormous fortune.

Not far from here in Greenwich rests the solution to this challenge to navigation: the marine chronometer developed by John Harrison in the 18th century. Just as this earlier challenge was met for the seas, I am confident that free flight will become a fact for air travel in the years ahead.

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[7]Bunch, Bryan, and Hellemans, Alexander. The Timetables of Technology, Simon & Schuster, 1993