

AD-A237 117

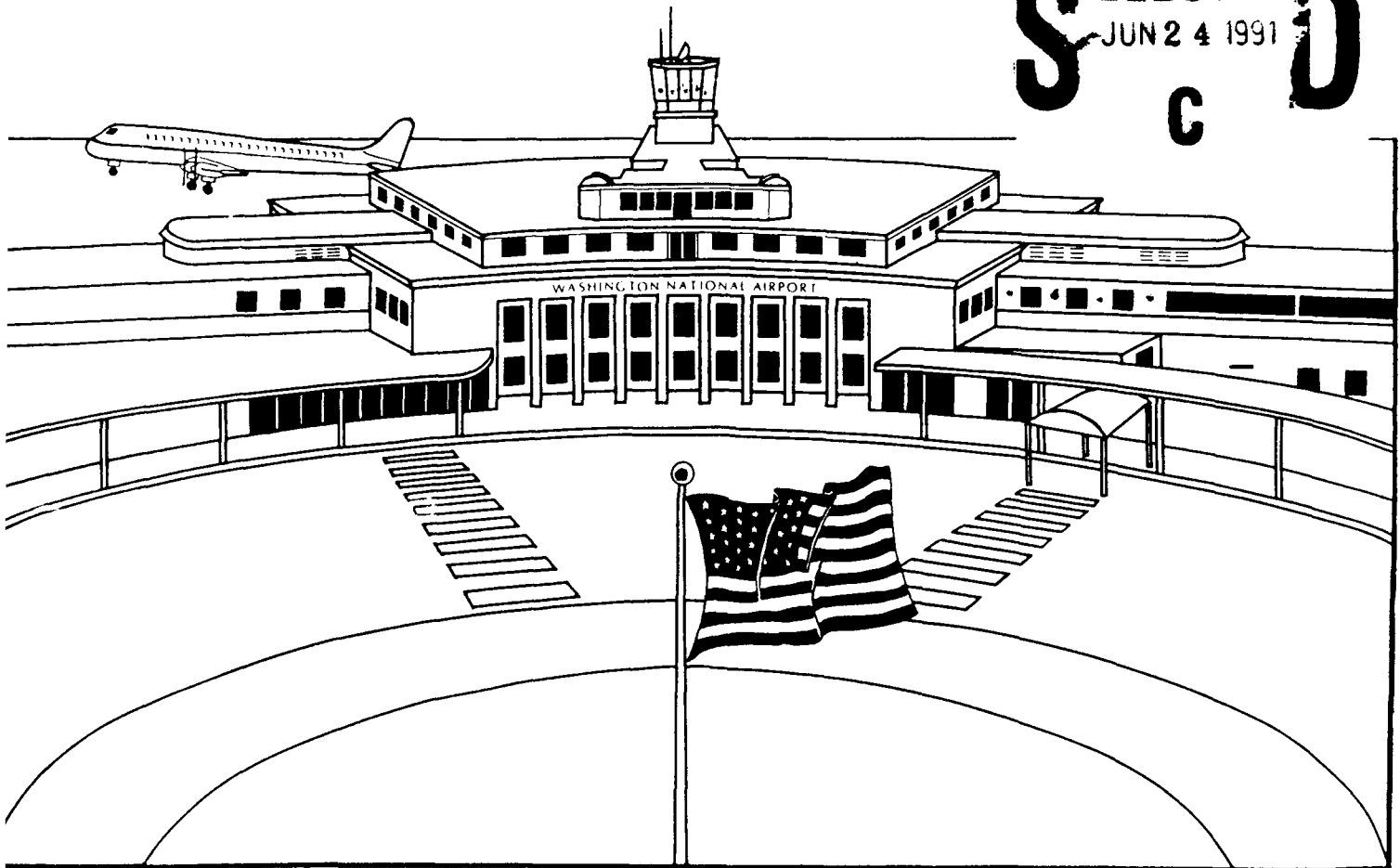


2

U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

# SIXTEENTH ANNUAL FAA AVIATION FORECAST CONFERENCE PROCEEDINGS

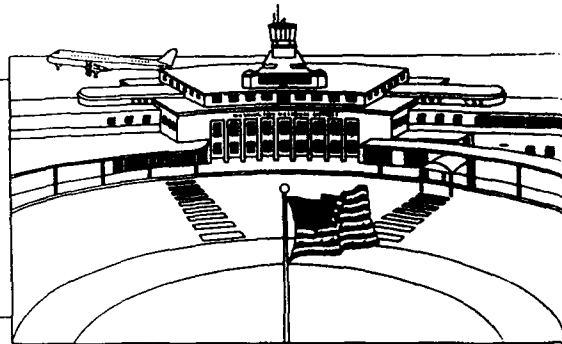
DTIC  
ELECTE  
JUN 24 1991  
S C D



FAA-APO 91-2  
FEBRUARY 1991

Office of Aviation Policy and Plans  
Washington, D.C. 20591

# Domestic Aviation: Future Challenges



February 22, 1991

Accession For	
NIC GRANT	<input checked="" type="checkbox"/>
SPIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Avail and/or	
Dist? Special	
A-1	



US Department of Transportation  
Federal Aviation Administration

91-02508



91 6 18 097

# Table of Contents

---

<b>Overview</b>	1
FAA Aviation Forecast Executive Summary	
<b>Keynote Address</b>	9
James B. Busey	
The Administrator Federal Aviation Administration	
<b>FAA Forecast Overview</b>	20
John M. Rodgers	
Director of Aviation Policy and Plans Federal Aviation Administration	
<b>Panel I -- The Outlook For Hubbing</b>	35
Gene Mercer	
Session Moderator Federal Aviation Administration	
Hub and Spoke Operations: Competition in the Foreseeable Future	36
James W. Callison	
Senior Vice President, Corporate and External Affairs, Delta Air Lines, Inc.	
Passengers and Profit	66
James D. Murphy	
Vice President, Planning, AMR Eagle	
The Optiminization of Hubbing	86
R. Lawrence Hughes	
Senior Vice President, DHL Airways, Inc.	

---

---

## **Luncheon Address**

- How Will the Domestic Airline Industry Fair in a Decade of Slow Growth 109  
Michael Evans  
President, Evans Economics

## **Panel II -- Long-Term Challenges**

- 123  
Thomas Henry  
Session Moderator  
Federal Aviation Administration

- Education and Training 124  
Kenneth L. Tallman  
Lt. Gen. USAF (Retired), President, Embry-Riddle Aeronautical University

- Noise and Capacity 130  
James P. Muldoon  
General Manager, Aviation Technical Services,  
Port Authority of New York and New Jersey

- The Jet Fuel Disease: A Winter Cold or Permanent Affliction? 140  
Scott Jones  
President, AUS Consultants

## **Panel III -- Financing The Future**

- 157  
Robert L. Bowles  
Session Moderator  
Federal Aviation Administration

- Financing the New Airport, Who Pays the Cost? 158  
Denise Kautzer  
Director of Finance, Minneapolis Airport Authority

- Aircraft Financing in the 1990's: Surviving the Siege 178  
Louis Valerio  
Senior Vice President, Finance, United Airlines, Inc.

## **Conferences Speakers and Registrants**

210

---

# OVERVIEW

---

## FAA Aviation Forecast Executive Summary



## EXECUTIVE SUMMARY

---

On August 2, 1990, Iraq invaded Kuwait. With the resultant U.S. military build-up, the Civil Reserve Air Fleet (CRAF) program activated approximately 50 U.S. air carrier aircraft on August 17 for the first time since the program was instituted in 1952. Also, as the world price of oil soared, the price U.S. air carriers paid for jet fuel doubled, from fifty-five cents in July to one dollar and eleven cents in October. The U.S. airlines were unable to increase their operating revenues to match the unanticipated jump in operating expenses. As a result, many airlines found themselves in financial difficulty. Continental Air Lines filed for bankruptcy on December 3rd, with Pan American filing on January 8th. (In fact, ATA estimates an industry loss of over \$2 billion in calendar 1990). Depending on the length and severity of the current crisis, the much discussed, steady consolidation of the industry could be accelerated.

In addition, there has been a slowing of the national economy. In this situation, the more successful U.S. air carriers that have been posting significant profits over the past few years seem better prepared to cope with slower traffic growth. Three carriers, American, Delta, and United, today carry approximately 50 percent of total industry traffic. They are also showing significant growth in international markets. As we enter the decade of the nineties, we will see continued change in the airline industry. Since the enactment of the Airline Deregulation Act of 1978, we have witnessed a number of structural and operational changes in the commercial aviation industry. There had been a proliferation of low fares which was partially responsible for the dramatic increase in passenger traffic. Many communities saw improved air service with increased frequencies through connecting hub airports to multiple destinations. The more successful air carriers had significant increases in their operating profits. However, with the industry now facing an economic downturn at the same time that operating costs are escalating, airline management faces a difficult challenge. With globalization of the commercial aviation industry proceeding at a rapid pace as new marketing agreements between U.S. and foreign flag carriers are being announced almost daily, international competition has become rigorous. The race among the world's air carriers is to put together the most effective global system. The outlook for the airline industry world-wide is for continued strong growth as we enter the nineties, continuing well into the twenty-first century. Which of the U.S. carriers will still be operating in ten years? Decisions being made today will determine the viability of the airline of tomorrow.

The regional/commuter airlines have also experienced unique challenges and changes since deregulation. The number of carriers increased from 210 in 1978 to 250 in 1981, then declined to 151 in 1990. In addition, the regional/commuter airlines have become increasingly integrated with the large, scheduled air carriers through code-sharing agreements and/or through acquisition in part or in total by their larger partners. Airlines have changed the structure of their routing systems from predominantly linear operations to a system of hub and spokes. The development of connecting hub airports has led to high levels of activity in peak

## EXECUTIVE SUMMARY

---

hours at major air carrier airports. Over the past three years, much of the growth in domestic traffic occurring in the regional/commuter portion of the industry resulted from the major carriers replacing large aircraft service with smaller aircraft operated by their regional/commuter partners in many of their hub markets. The U.S. experience with code-sharing agreements between the large air carriers and regional/commuter airlines suggests that the smaller carriers benefit from working relationships with the larger airlines. In future years, the same could hold true for competition in international markets.

The production and sale of general aviation aircraft, avionics, and other equipment, along with the provision of support services such as flight schools, fixed base operators, finance, and insurance make the general aviation industry an important contributor to the nation's economy. The single engine piston aircraft market is the base on which general aviation activity builds. New pilots are trained in single engine piston aircraft and work their way up through retractable landing gear and multi-engine piston to turbine aircraft. When the single engine piston market declines, it signals the slowing of expansion in the general aviation fleet and, consequently, a slowing in the rate of growth of activity at many FAA facilities.

Since 1978 there has been a dramatic decline in shipments of all types of general aviation aircraft. A number of reasons have been advanced for this, chief among them being rapid price increases, high interest rates, and expensive fuel throughout this period. A portion of the price increases can be attributed to massive awards assessed against manufacturers in product liability lawsuits. This triggered extreme increases in liability insurance premiums driving up manufacturer's costs. Recent data, however, suggest that the downturn of the past decade in aircraft shipments may have bottomed out. Also, with further congestion and delay developing at major air carrier airports as the commercial industry expands, the demand for business-general aviation seems to be expanding.

The FAA plans to meet forecast demands for the aviation system as reflected in this document. The FAA must do this in a way that provides safe and efficient transportation for all people who use and depend upon the National Airspace System.

### REVIEW OF 1990

In fiscal year 1990, the large U.S. air carriers increased their system capacity (seat miles) by 6.3 percent, while demand (revenue passenger miles) increased 5.8 percent. The net result was a decrease in the load factor to 62.8 percent, down from 63.0 percent in 1989.

The airlines, for a third consecutive year, have continued to expand in international markets faster than in their domestic markets. The airlines' international traffic increased 14.3 percent, while domestic traffic increased only 3.2 percent. The airlines were able to achieve, through effective yield management and the avoidance

## EXECUTIVE SUMMARY

---

of destructive fare wars, a 1.4 percent increase in average fares. However, the airlines' average fuel cost increased 19.9 percent during fiscal year 1990, while total operating expenses increased by 14.6 percent. Operating revenues increased by 9.7 percent. This resulted in the U.S. commercial airlines reporting a small operating profit of \$17 million for fiscal year 1990 compared to a profit of \$2.7 billion in fiscal year 1989.

Airline profits over the past several years have been concentrated among a relatively few carriers. The future viability of individual carriers, and possibly the entire industry, is highly dependent on the national economy. The current slowing of the U.S. economy and over-capacity in the industry may cause economically distressed carriers to engage in fare wars to generate cash. If this occurs, there will be few winners and many losers.

New commercial aircraft orders totaled 1,059 in fiscal year 1990, while 625 new aircraft were delivered. Narrowbody aircraft orders and deliveries continue to exceed the demand for widebody aircraft. This reflects the air carriers' continuing reliance on increased schedule frequency, rather than larger aircraft, to accommodate projected passenger demand.

The growth of the regional/commuter airline industry continued to exceed the growth of the larger commercial carriers in fiscal year 1990. Total revenue passenger enplanements increased by 15.6 percent to 37.1 million, while revenue passenger miles increased by 19.6 percent to 6.7 billion.

In fiscal year 1990, there were 1,276 general aviation aircraft shipments. This consisted of 711 single engine piston aircraft, 108 twin, and 457 turbine powered. Billings increased by 1.8 percent over 1989 to just over \$2 billion.

In fiscal year 1990, air carrier operations at FAA air traffic control towers increased by 3.2 percent. Air taxi/commuter and general aviation operations increased by 6.0 and 3.2 percent, respectively. As a result, total operations and instrument operations at FAA air traffic control towers and aircraft handled by the Air Route Traffic Control Centers achieved their forecast growth levels last year.

In summary, the impacts of deregulation continue to alter the commercial aviation industry. There has been some recovery of the general aviation industry, and activity at FAA facilities continues to exhibit moderate to strong growth.

## ECONOMIC FORECASTS

Following a brief two-quarter recession, 1991 and beyond should show moderate to strong recovery. Jet fuel prices, which have risen significantly since the Gulf crisis, should moderate in the second half of 1991 and decline somewhat in 1992. For the balance of the forecast period, the outlook is for plentiful and affordable fuel provided the Middle East conflict is resolved without any significant destruction of oil fields, refineries, and transportation facilities. With moderating oil



## EXECUTIVE SUMMARY

---

prices, inflation should remain moderate through the decade. The projected growth of aviation is consistent with the national long-term economic growth forecast. The table on page 7 is a summary of the key economic assumptions used in developing this forecast. It should be recognized that in any given year there may be some perturbation from the long-term trend, because none of the economic models is sufficiently precise to predict interim business cycles or unanticipated developments, like the Iraqi invasion of Kuwait.

### AVIATION ACTIVITY FORECASTS

Domestic air carrier revenue passenger miles are forecast to increase at an annual rate of 4.1 percent during 1990-2002. During the same time period, domestic enplanements are forecast to increase by 3.8 percent annually, a rate somewhat slower than revenue passenger mile growth due to longer average passenger trip lengths. Air carrier aircraft operations are forecast to increase at an annual rate of 2.4 percent over the forecast period. The high growth in revenue passenger miles and enplanements relative to operations assumes higher load factors, larger seating capacity for air carrier aircraft, and longer passenger trip lengths.

International air carrier revenue passenger miles are forecast to increase at an annual rate of 6.4 percent during 1990-2002. This high growth rate is being driven by the strong growth rates being projected for the Pacific Rim markets. During this same period, international enplanements are forecast to increase by 5.9 percent annually, a rate somewhat slower than passenger mile growth due to longer passenger trip lengths in the Pacific.

In 1991, the regional/commuter airlines are expected to enplane 39.7 million passengers, 8.7 percent of all passenger traffic in scheduled domestic air service. By the year 2002, these carriers are expected to carry 78.6 million passengers and to account for 10.7 percent of all domestic passenger enplanements. Regional/commuter airlines are expected to continue the trend toward purchase of small jet aircraft and larger, propeller-driven aircraft.

Increased business use of general aviation is reflected in the changing character of the fleet. The more expensive and sophisticated turbine-powered part of the fixed wing fleet is expected to grow much faster than the piston aircraft portion between 1990-2002. In 1990, there were 10,700 turbine-powered aircraft in the fixed wing general aviation fleet -- 5.2 percent of the total fixed wing fleet. By the year 2002, it is projected that there will be 15,200 turbine-powered aircraft -- 7.3 percent of the total fixed wing fleet. Similarly, in the helicopter fleet in 1990 there were 4,200 turbine-powered aircraft -- 56.8 percent of the total fleet. By the year 2002, it is projected that there will be 8,600 turbine-powered aircraft -- 76.8 percent of the total helicopter fleet.

The various FAA aviation traffic and activity forecasts are summarized numerically in the table on page 7.

## EXECUTIVE SUMMARY

---

### FAA WORKLOAD FORECASTS

The FAA forecasting process is a continuous one which involves FAA Forecast Branch's interaction with various FAA Offices and Services, other government agencies, and aviation industry groups, including individual discussions with most major carriers and manufacturers. In addition, the process uses various economic and aviation data bases, the outputs of several econometric models and equations, and other analytical techniques. The FAA workload measures, summarized numerically in the table on page 8, are the resultant forecasts of this process and are used annually by the agency for manpower and facility planning.

Aviation activity at FAA facilities is expected to continue the growth pattern that began in 1983. The demand for FAA operational services is anticipated to increase over the forecast period as a result of continued growth in aviation activity. Total aircraft operations at FAA towered airports are forecast to increase to 80.7 million in the year 2002, a 2.0 percent annual growth rate over the 63.5 million operations achieved in 1990.

The increased use of avionics by regional/commuter airlines and general aviation and the implementation of additional Airport Radar Service Areas will contribute to instrument operations at FAA towered airports growing faster than total aircraft operations. Instrument operations are forecast to increase from 46.8 million in 1990 to 61.4 million in the year 2002, a 2.3 percent annual growth rate.

The workload at the Air Route Traffic Control Centers is forecast to increase at an average annual rate of 2.2 percent between 1990-2002. The number of commuter/air taxi aircraft handled are expected to increase at a faster rate than the other user categories -- 58.8 percent from 5.6 million in 1990 to 8.3 million in fiscal year 2002.

In summary, aviation activity at FAA facilities is expected to continue to grow at about the same rate as the general economy. Aviation will continue to dominate all other transportation modes in the commercial intercity passenger market. Regional/commuter aircraft activity and the business use of general aviation are expected to experience greater growth than the larger, established airlines and personal use of general aviation.

## EXECUTIVE SUMMARY

**Table 1**  
**FAA FORECAST ECONOMIC ASSUMPTIONS**  
**FISCAL YEARS 1991 - 2002**

ECONOMIC VARIABLE	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1985	1989	1990	1991	1992	2002	85-90	89-90	90-91	91-92	90-2002
Gross National Product (Billions 1982\$)	3,559.7	4,099.2	4,152.2	4,130.7	4,229.6	5,548.9	3.1	1.3	(0.5)	2.4	2.4
Consumer Price Index (1982-84 = 100)	106.6	121.2	127.1	134.4	139.8	220.6	3.6	4.9	5.7	4.0	4.7
Oil & Gas Deflator (1982 = 100)	95.5	85.0	91.5	111.6	80.0	144.3	(1.6)	7.7	22.0	(28.3)	3.9

Source: 1991-96; Executive Office of the President, Office of Management and Budget

1997-2002; Consensus growth rate of Data Resources, Inc., Evans Economics, Inc., and The WEFA Group

**Table 2**  
**AVIATION ACTIVITY FORECASTS**  
**FISCAL YEARS 1991 - 2002**

AVIATION ACTIVITY	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1985	1989	1990	1991	1992	2002	85-90	89-90	90-91	91-92	90-2002
<b>AIR CARRIER</b>											
<b>Enplanements (Millions)</b>											
Domestic	350.4	415.6	424.0	419.3	434.9	666.9	3.9	2.0	(1.1)	3.7	3.8
International	24.6	36.8	41.2	43.3	46.8	81.8	10.9	12.0	5.1	8.1	5.9
System	375.0	452.4	465.2	462.6	481.7	748.7	4.4	2.8	(0.6)	4.1	4.0
<b>RPM's (Billions)</b>											
Domestic	265.8	328.4	339.1	335.4	348.8	551.5	5.0	3.3	(1.1)	4.0	4.1
International	64.8	100.6	115.1	121.0	132.5	242.8	12.2	14.4	5.1	9.5	6.4
System	330.6	429.0	454.2	456.4	481.3	794.3	6.6	5.9	0.5	5.5	4.8
<b>COMMUTERS/REGIONALS</b>											
Enplanements (Millions)	23.0	32.1	37.1	39.7	42.7	78.6	10.0	15.6	7.0	7.6	7.1
RPM's (Billions)	3.6	5.6	6.7	7.4	8.0	16.2	13.2	19.6	10.5	8.1	7.6
<b>FLEET</b>											
Air Carrier	2,938	3,870	4,017	4,079	4,272	5,508	6.5	3.8	1.5	4.7	2.7
Commuter	1,551	1,782	1,819	1,860	1,925	2,264	3.2	2.1	2.3	3.5	1.8
General Aviation (000)	220.9	210.3	219.7	223.9	225.8	231.5	(0.1)	4.5	1.9	0.9	0.4
<b>HOURS FLOWN (Millions)</b>											
Air Carrier	7.7	10.1	10.2	10.5	11.0	14.6	5.8	1.0	2.9	4.8	3.0
General Aviation	36.2	34.7	35.4	35.8	36.3	41.6	(0.4)	2.0	1.1	1.4	1.4

Source: 1985-90; RSPA, FAA DATA  
1991-2002; FAA Forecast

# EXECUTIVE SUMMARY

**Table 3**  
**FAA WORKLOAD MEASURES**  
**FISCAL YEARS 1991 - 2002**

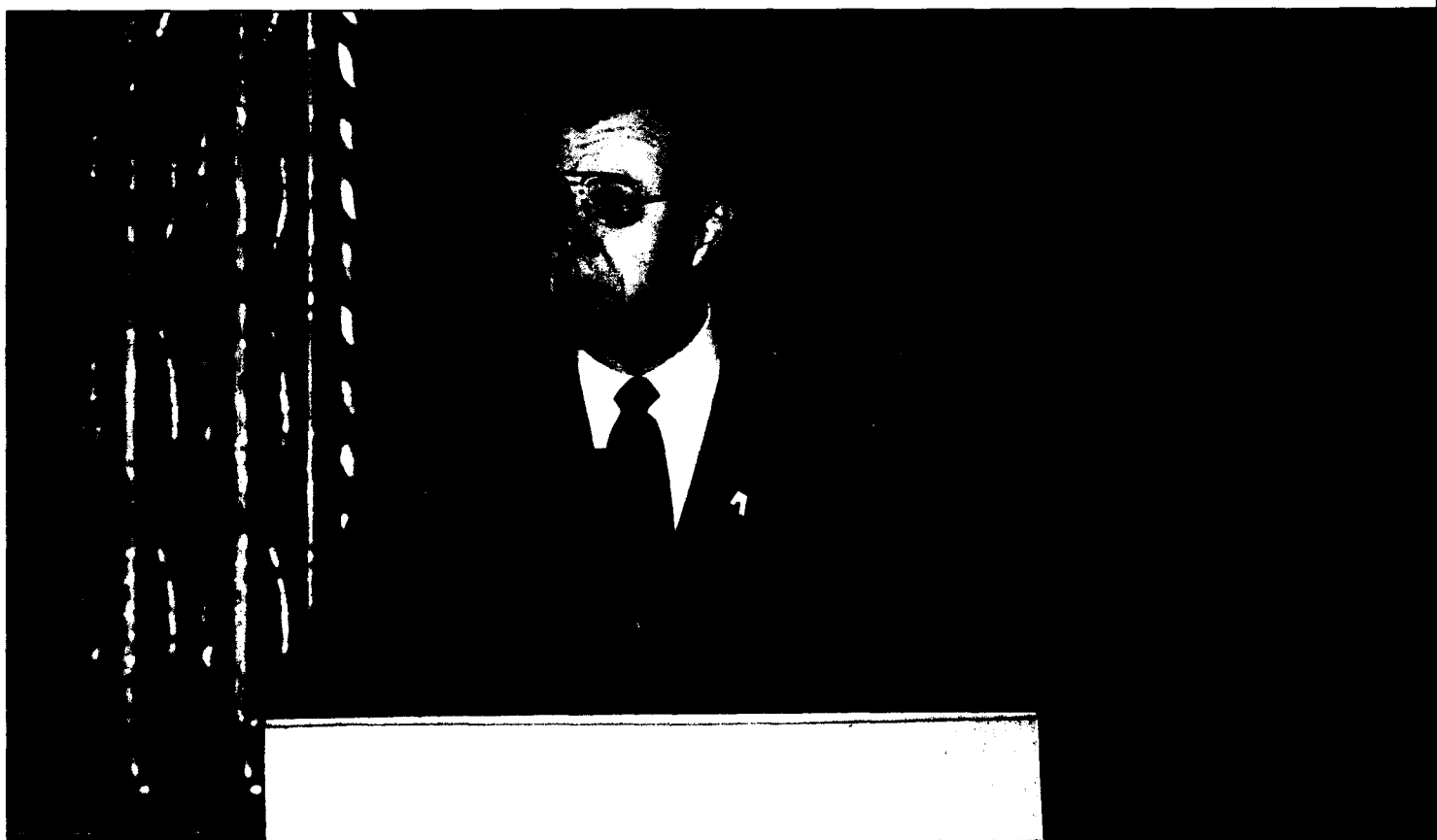
WORKLOAD MEASURES (IN MILLIONS)	HISTORICAL			FORECAST			PERCENT AVERAGE ANNUAL GROWTH				
	1985	1989	1990	1991	1992	2002	85-90	89-90	90-91	91-92	90-2002
<b>Aircraft Operations</b>											
Air Carrier	11.3	12.5	12.9	13.2	13.5	17.1	2.7	3.2	2.3	2.3	2.4
Air Taxi & Commuter	6.9	8.3	8.8	9.2	9.6	12.8	5.0	6.0	4.6	4.4	3.2
General Aviation	37.2	37.3	39.0	39.4	40.0	48.2	0.9	3.2	1.0	1.5	1.8
Military	<u>2.5</u>	<u>2.8</u>	<u>2.8</u>	<u>2.8</u>	<u>2.8</u>	<u>2.8</u>	<u>2.3</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
TOTAL	57.9	61.4	63.5	64.6	65.9	80.9	1.9	3.4	1.7	2.0	2.0
<b>Instrument Operations</b>											
Air Carrier	11.8	13.6	14.0	14.3	14.6	18.6	3.5	2.9	2.1	2.8	2.4
Air Taxi & Commuter	6.4	8.4	9.4	9.8	10.2	13.4	8.0	11.9	4.2	4.1	3.0
General Aviation	16.4	18.6	19.1	19.3	19.7	25.0	3.1	2.7	1.1	2.1	2.3
Military	<u>4.1</u>	<u>4.5</u>	<u>4.4</u>	<u>4.4</u>	<u>4.4</u>	<u>4.4</u>	<u>1.4</u>	<u>(2.2)</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
TOTAL	38.7	45.0	46.8	47.8	48.9	61.4	3.9	4.0	2.1	2.3	2.3
<b>IFR Aircraft Handled</b>											
Air Carrier	14.6	17.5	18.6	19.0	19.6	24.9	5.0	6.3	2.1	3.2	2.5
Air Taxi & Commuter	4.8	5.2	5.6	5.9	6.2	8.3	3.1	7.7	5.4	5.1	3.3
General Aviation	8.3	8.2	7.9	8.1	8.3	10.2	(1.0)	(3.7)	2.5	2.5	2.2
Military	<u>5.0</u>	<u>5.7</u>	<u>5.5</u>	<u>5.5</u>	<u>5.5</u>	<u>5.5</u>	<u>1.9</u>	<u>(3.5)</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
TOTAL	32.7	36.6	37.6	38.5	39.6	48.9	2.9	2.7	2.4	2.9	2.2
<b>Flight Services</b>											
Pilot Briefs	14.6	12.0	11.5	11.4	11.5	12.0	(4.9)	(4.2)	(0.9)	0.9	0.4
Flight Plans Originated	8.0	7.4	7.0	6.8	7.0	7.9	(2.7)	(5.4)	(2.9)	2.9	1.0
Aircraft Contacted	<u>7.7</u>	<u>6.2</u>	<u>6.0</u>	<u>5.9</u>	<u>5.8</u>	<u>6.0</u>	<u>(5.1)</u>	<u>(3.2)</u>	<u>(1.7)</u>	<u>(1.7)</u>	<u>0.0</u>
TOTAL	52.9	45.0	43.0	42.3	42.8	45.8	(4.2)	(4.4)	(1.6)	1.2	0.5

Source: FY 1985-90; FAA Data

FY 1991-2002; FAA Forecasts

# KEYNOTE ADDRESS

---



## KEYNOTE ADDRESS

---

# James B. Busey

## The Administrator Federal Aviation Administration



### Biographical Highlights

Retired Navy Adm. James B. Busey became administrator of the Federal Aviation Administration on July 11, 1989.

Prior to taking the FAA position, Mr. Busey served for two years as commander-in-chief of U.S. Naval Forces in Europe and commander-in-chief of Allied Forces in Southern Europe, a NATO Command.

A career naval aviator, Mr. Busey enlisted in the Navy in 1952 and was assigned to the Naval Aviation Cadet Program. He received his commission and Navy wings of Gold in August 1954.

Mr. Busey's 37-year career as a naval officer included tours in Vietnam in 1967-68, where he received the Navy Cross for combat action. Other key assignments included a tour in Washington, D.C., following his promotion to rear admiral in 1979, where he served successively as the auditor general of the Navy and deputy chief of Naval Material, Resource Management.

Following an operational flying assignment in California, he was promoted to vice admiral and returned to Washington in July 1983 as commander of the Naval Air Systems Command. In 1985, he was appointed vice chief of Naval Operations and promoted to full admiral.

Mr. Busey is a native of Urbana, Ill. He attended the University of Illinois in Urbana and the Naval Postgraduate School where he received a bachelor's degree in management.

## KEYNOTE ADDRESS

---

### Summary

Aviation is going to be even more important in the future than it is now -- it is going to serve our public and our economy and our nation even better than it does today.

Needed in the 21st Century is a National Airways System requiring that it be the safest in the world, that it have greatly increased capacity, be highly efficient, serve user needs, be receptive to the new and evolving technology that can help meet national aviation goals, and accommodate the full range of aircraft types -- from the single-engine general aviation plane to the complex commercial aircraft of today -- as well as the tiltrotor, the tiltwing, the supersonic business jet, and the hypersonic transport of tomorrow.

This model system of the 21st Century will transport millions more passengers with greater safety and efficiency, be the world leader in aviation technology, and fully support a strong and profitable air carrier industry and aerospace manufacturing industry.



## KEYNOTE ADDRESS

---

Thank you very much. It's good to be with you today.

America has the best air transport system in the world -- and we must keep it the best.

Aviation is vital to our national well-being. The strength of our economy, our ability to compete in world markets, our standard of living -- all depend upon efficient air transportation.

We are the world leaders in aviation -- and we must stay in the lead.

But that will take effort and vision. We need to know where we're going. We need to know what we've got to do to get there. And that's what I want to talk about today.

Let's start with this thought -- aviation is going to be even more important in the future than it is now -- it is going to serve our public and our economy and our nation even better than it does today.

What kind of a system will do that? What kind of system are we going to need in the 21st Century?

You don't need to be a prophet to answer those questions. We already have a clear picture of the kind of system we're going to need -- the system we must create in this decade.

Let's list the main requirements.

First, it's got to be the safest in the world -- no question about that.

Second, it's got to have greatly increased capacity. If our air commerce system is to do its job, it must be able to serve an increased demand for air services -- and do so without strain, without the delay and congestion that too often choke the flow of traffic today.

Third, it must be highly efficient, with no wasted resources, no wasted motion. America's air transport system must be truly cost-effective.

Fourth, the future system must serve user needs. It must be designed with those needs in mind. And when I say "user", I mean not only airline and air freight companies and pilots and technicians and all the rest -- I also mean millions of passengers and thousands of businesses who depend on safe, efficient air transportation.

Fifth, the system must be receptive to the new and evolving technology that can help us meet our national aviation goals.



## KEYNOTE ADDRESS

---

Sixth, our air system of the 21st Century must be truly international. Our technology, our systems, our operating procedures must be in harmony with those of other nations.

Indeed, we're already taking a lead role in moving toward the harmonization of our regulations with those of other aviation nations around the world.

Seventh, our system must accommodate the full range of aircraft types -- from the single-engine general aviation plane to the complex commercial aircraft of today -- as well as the tiltrotor, the tiltwing, the supersonic business jet, and the hypersonic transport of tomorrow.

So, in short, I envision an air system that will transport millions more passengers with greater safety and efficiency -- a system that is the world leader in aviation technology -- a system that fully supports a strong and profitable air carrier industry and a strong and profitable aerospace manufacturing industry -- in other words, a system that will serve all of America's needs in the 21st Century, one with the highest capacity, efficiency and safety in the world.

Now how are we going to get there? Well, it'll be a process of evolution, not revolution. We're going to build on what we already have.

Yes, we have problems. But we know the answers. And I'm sure we have both the will and the resources to do the job.

Certainly, one of our most important jobs is to increase system capacity. We need to reduce congestion and delay. Six major airports have more than 50,000 hours of delay a year, and 15 others have more than 20,000 hours.

With the anticipated long-term increase in air traffic, we could well find delay and congestion rising to unacceptable levels.

If we fail to take effective action, within ten years twice as many airports will be congested. The costs to air carriers and their passengers, already too high, would surely increase by billions of dollars a year.

So we must find ways to serve the growing demand that is already straining the system.

How are we going to do that? By taking action on two fronts.

First, we're going to create more airport capacity. We're going to work with local sponsors to build new airports. We're going to expand and improve the airports we already have. And we're going to speed up the flow of traffic through our major terminal areas.

## KEYNOTE ADDRESS

---

Secondly, we're going to complete our modernization of the air traffic control system -- give it the most advanced technology and thereby gain major increases in safety, capacity, and efficiency throughout the system.

Let's look at the airport side first.

Here we run into a couple of hurdles -- money and noise. We've got too little of one and too much of the other. And I'm sure you know which is which.

Getting enough money to do the job is always a problem. But two recent developments will help.

As you know, Congress recently gave an okay to the passenger facility charge which will help airports finance improvements and expansion. This is a landmark change. We think it will mean as much as a billion dollars a year in additional airport financing -- and that can buy a lot of new airport capacity.

The second development came in last year's FAA reauthorization bill, which supported increased airport grant levels approaching two billion dollars a year. Here, again, we'll be getting the increased funds that can lead directly to greater capacity.

The PFC and increased AIP, taken together with access to private-capital markets, give airport sponsors the financial resources they need to build for tomorrow's needs.

Aircraft noise, as we all know, has been a roadblock to airport improvement in many cities. But now Congress has given us the legislative go-ahead to develop a comprehensive aircraft noise policy that will safeguard the environment of airport neighbors.

We're working right now on rules covering local aircraft noise restrictions and the phase-out of older, noisier aircraft by the year 2000.

This will give us a double benefit. It'll mean noise relief for two-thirds of the people now affected by aircraft noise, and it will give us a more fuel efficient fleet.

So we are making progress on the airport front. But that's just the beginning.

To build that great system we want for the 21st century, we've got to do a lot more. But we can't do it in a haphazard manner. We need a plan. And that's why we've developed a comprehensive planning document, the Aviation System Capacity Plan, that will help us do the job.

## KEYNOTE ADDRESS

---

The plan covers both physical improvements, such as new runways, and technological ones, such as better radar systems.

Our system capacity plan is not blue sky, smoke and mirrors. It deals with specifics and practicalities -- proposals that can be done with today's resources and technology.

For example, the plan includes the good work being done by the capacity design teams that we are co-sponsoring with airport operators at 24 major airports. So far, these teams have developed more than 400 capacity-increasing projects, including a number that have already been completed at major airports.

The capacity plan identifies 60 new runways or runway extensions that are planned or proposed. There's no question that these will give us large capacity gains.

In addition to airport improvements, the plan also looks at the possibility of using existing airports better. It identifies many under-utilized airports with commercial air service that are reasonably close to larger congested airports. Some of that congestion might be relieved by shifting some traffic to the under-utilized airports.

Of course, the decision to do that is in the hands of the air carriers. It's a marketing decision.

In addition, our capacity plan also identifies more than two dozen potential new connecting hub airports that could be used to reduce traffic volumes at existing, congested hubs.

Of course, the capacity plan also covers the big payoffs in increased capacity that we're getting from new, advanced air traffic control technology, both in airport terminal areas and in the en route environment.

One of our major efforts in terminal areas is to increase the flow of traffic during bad weather. Currently, during bad weather we can't operate simultaneous approaches to parallel runways that are closer than 4300 feet.

The system capacity plan indicates that by developing ways to increase the landing rate on close parallel runways during bad weather we can improve capacity significantly at 47 large airports.

Right now, for example, we're evaluating two new precision runway monitor systems that will let us increase traffic by 40 percent at airports with runways that are as close as 2500 feet. And that will be done while maintaining or even increasing the level of safety.

## KEYNOTE ADDRESS

---

We think that many airports will take advantage of this new capability and increase their capacity by constructing new, closely-spaced parallel runways that conserve airport real estate.

We're also working on new automation technology that will allow safe and efficient traffic flows at airports with converging runways.

These new landing aids, coupled with the coming Microwave Landing System and the Traffic Alert and Collision Avoidance Systems on aircraft, will bring tremendous increases in both safety and capacity in our terminal areas.

The system capacity plan also details the capacity increases that will come from the planned automation of air traffic control, including the Advanced Traffic Management System and the airport surface traffic automation program.

I'm sure you know that the FAA has been working on a massive technological modernization program for a number of years. Our goal is to get the best technology available and use it to increase safety, efficiency, and capacity.

Here too we need a plan. And today we have a new one -- our just-released Capital Investment Plan, which includes the technological improvements I've just mentioned -- plus a lot more. It builds on a foundation set by its predecessor, the NAS Plan. However, in addition to new facilities, the new plan also includes provisions for training, support, maintenance and continuing growth.

I don't have time today to go into all of the details -- the Capital Investment Plan is much too comprehensive and complex for that. But I do want to give you a few ideas about the plan and how it will help us achieve our future goals.

The projects described in our new Capital Investment Plan will transform our air transport system. They will improve every operational area -- traffic control, surveillance, navigation, communications, and weather.

In the new system we're building:

- \* air traffic control will be highly automated;
- \* navigation, surveillance, communication will be satellite based;
- \* communications will use fast, accurate digital data transmissions;
- \* and faster, more accurate weather information will come from advanced radar technology.

## KEYNOTE ADDRESS

---

We'll have MLS, Mode S, Data Link, Loran C, ADS, TCAS -- the list goes on and on. Suffice it to say that the Capital Investment Plan will give us an air transport system that will serve the nation well in the next century.

Now the plan is primarily an FAA internal planning tool. It is not a simply public relations document that will be given wide distribution.

Since it is a planning document, it presents our best estimate of the technology we intend to use -- but the schedules and the programs are not set in concrete. It does not represent an absolute commitment to every project and program it describes.

Of course, we'll update the plan annually and use it as the basis for our budget submissions.

The plan covers a rolling fifteen-year period of time -- with the high fidelity part in the first five years -- and the more speculative part in the years beyond.

The remaining projects under the original NAS Plan are included in the new Capital Investment Plan, but those projects represent less than half of the total capital and funding needs that we anticipate over the next ten years. The new plan goes well beyond the original NAS Plan.

At one time, a lot of people thought that, once the NAS Plan was completed, we would have no need for further capital improvements. Far from it. Capital investment in aviation must remain a continuing process that responds to change and keeps pace with advancing technology.

On the money side, we're looking for a leveling of our needs for Facilities and Equipment investments over the next three to five years.

We're also looking for growth in R&D spending. Now, of course, we don't expect an instant major increase on R&D investment but we do want to move to higher levels within a reasonable period. And we'd like to begin that discussion during the fiscal 1993 reauthorization.

This growth in R&D is essential, if we are to take advantage of the new technology that will help us reach our goals.

Throughout our capital investment programs, we envision an evolutionary development, and not a revolutionary one.

For example, the notion that the new satellite technology will eliminate the need for many of the projects outlined in the Capital Investment Plan is wrong. Most of the new technology will fit well with the foundation we have now. And our strategy is to make that linkage and to evolve in a smooth, effective way.

## KEYNOTE ADDRESS

---

Now I want to say a few words about a current problem.

We all know this is a very difficult period for the nation's airlines. They are beset by higher fuel costs, lower demand due to the recession, heavy interest payments on long-term debt, and high labor costs. This resulted in the U.S. airline industry losing an estimated two billion dollars last year -- the greatest annual loss in history -- and in three carriers -- Eastern, Continental, and Pan Am -- filing for bankruptcy protection, with one -- Eastern -- going out of business.

However, I believe that the worst may be behind us. As you all know, fuel prices have fallen dramatically -- from a November peak around \$1.40 per gallon to the present level around 70-cent per gallon. Several economic forecasting services (not just our friends at the Office of Management and Budget) now foresee only a brief and shallow recession, followed by a strong period of economic recovery beginning the middle of this calendar year, if not sooner.

We might, in fact, be seeing the early reflections of this recovery and increased demand for air travel, if, as reported in the Washington Post last Wednesday, Hollis L. Harris, chairman of Continental Airlines, is right that advance bookings are showing signs of increasing again after a good President's Day weekend. Clearly, the outlook is positive. And as the economy regains its strength, passenger demand -- both business and pleasure -- will again grow and the financial well-being of the entire industry will improve markedly.

Nevertheless, until we are totally out of the woods -- until the recession is over, until the price and availability of oil clearly stabilize, and until airlines bring under control their debt and high labor costs -- tough times may continue for portions of our industry.

And in times of real economic distress, such as we have been experiencing, it may be tempting for some airlines not to keep their fleets in top shape -- a myopic approach to airline viability and an approach that I firmly believe most airlines do not accept or condone.

Fortunately, most airlines and the FAA recognize that safe operations are the key to financial success and must be our number one concern. Nothing comes ahead of safety either here in the FAA or in the board rooms of the airlines.

To ensure, however, that there is absolutely no deterioration of safety at any airline for as long as these difficult times continue, we in the FAA are going to step up our airline surveillance activities all across the country. I want the airlines to know that we're going to work with them to monitor maintenance and other aspects of airline operations that could affect safety.

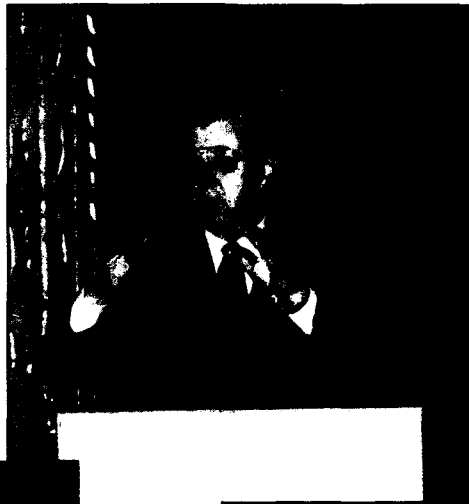
## KEYNOTE ADDRESS

---

Finally, I want to conclude with this thought. I believe every one of us must help build the air system America will need in the next century.

To do that, we must devote ourselves to improving what is already the world's greatest air system. I know we have the people, the talent, and the resources to do the job. And I hope all of you folks will join me in this effort, which is so essential for America's future.

Thank you.



# FAA FORECAST OVERVIEW

---

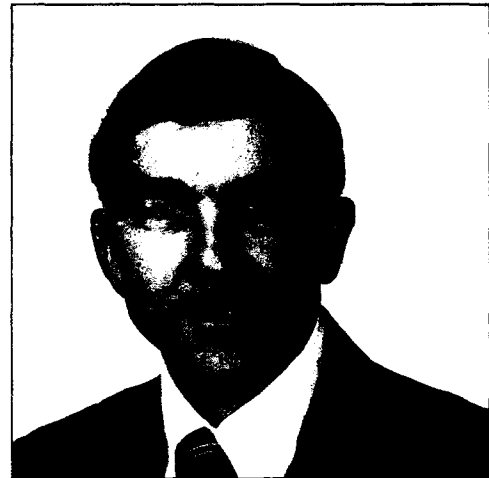


---



## John M. Rodgers

Director  
Office of Aviation Policy and Plans



### Biographical Highlights

John M. Rodgers, Director of Aviation Policy and Plans, has served with the Federal Aviation Administration (FAA) for 17 years. During his career with FAA, Mr. Rodgers has been extensively involved in policy development including Federal airport and airway system finances; airport environment, capacity and access; and FAA safety regulation. He was responsible for coordinating FAA proposals on the Airport and Airway Safety and Capacity Expansion Act of 1987 and the Aviation Safety and Capacity Act of 1990 and is now focusing on the implementation of the FAA strategic plan and rulemaking to implement the national aircraft noise policy. Prior to joining the FAA in 1973, Mr. Rodgers was a Vice President of Jack Faucett Associates, an economic consulting firm based in Chevy Chase, Maryland. Much of his seven-year consulting experience was devoted to transportation and energy industry problems and regional economic development. Mr. Rodgers started his career at Black and Decker Manufacturing Company in market research.

Mr. Rodgers graduated from the Wharton School of Finance and Commerce, University of Pennsylvania, and subsequently pursued graduate studies in economics at Vanderbilt University. He is a Certified Public Accountant (Maryland), a member of the American Economic Association, the Maryland Association of Certified Public Accountants, the American Arbitration Association, the Aero Club of Washington, and formerly was a member of the Transportation Research Board. Mr. Rodgers has written several books related to regional economic models.

### Summary

Forecasting is not a science. It is a reflection of economic and political assumptions with some math on the side. Though forecasting is a difficult process, it is manageable if economic and political uncertainties are narrow. This is a year of many uncertainties, hence the accuracy of the short-term forecasts may be subject to significant revisions. However, our industry has had a record of strong growth and our current forecasts reflect a brief down-turn followed by continuing strong growth through the decade of the nineties.

## FAA FORECAST OVERVIEW

---

Good morning ladies and gentlemen. I am John Rodgers. Welcome to the Sixteenth Annual FAA Aviation Forecast Conference. Because of the present international situation, we are all sensitive to threats of terrorism. A mathematician who traveled a lot on planes became concerned about bombs on board his aircraft. He calculated the probability of a bomb on his plane and found it was very low -- but not low enough. He now always travels with a bomb in his suitcase. He rationalizes that the probability of two bombs on his plane is infinitesimal.

Mathematics can provide comfort to us. Let me explain a mathematical phenomenon that helps forecasters.

John Paulos, in his book, Innumeracy -- Mathematical Illiteracy and Its Consequences, explains the tendency of random events to concentrate around an average. What this means is that an event that is very extreme or unusual is likely to be followed by a much more normal event. This principle has some very interesting applications and is relevant to our forecast of aviation.

Here is a true story that illustrates the principle. Tom, a flight instructor I know, always praised his students whenever they made an exceptionally good landing. He observed, however, that after his praise, the students' landings deteriorate. Tom also criticized students when they made a very bad landing. After criticism, he observed that the students' landings got better. Unfortunately, Tom drew the conclusion that performance was more likely to improve with criticism than praise. In fact, in both cases, student landings moved toward average performance.

You may find that interesting, but not quite relevant, so consider this advice. If you invest in the stock market, consider trying stocks that have recently been lackluster compared to their long-term average performance. This technique is sometimes called "bottom fishing." It is based on the tendency for random events to move toward an average. The idea is that stocks which are unusually low, but which are fundamentally sound, are likely to increase toward their average value. Stocks which are above their long-term average value, where there has been no fundamental change, are likely to decline.

Perhaps you now see my direction. Our industry has had a record of strong growth. Suddenly, we are confronted by very abnormal events which stopped growth. These events are:

- 1) An economic recession
- 2) The Kuwait invasion, and
- 3) A period of high oil prices.

Yet, there is still fundamental unmet demand for air travel. I, therefore, predict, based on these facts and mathematical principle, that the airline industry will soon be growing again. What we are experiencing has been an aberration. The worst is probably now over. While individual airlines will differ in their ability to weather the storm, aviation will emerge from the clouds and retain its reputation as a growth industry.

## FAA FORECAST OVERVIEW

---

The remainder of my remarks are divided into three topics. First, I'll summarize industry activity for 1990. Second, I'll speak to aviation's future. Finally, I'll discuss implications for FAA workload.

### Aviation in Fiscal Year 1990

In fiscal year 1990, domestic revenue passenger miles increased over 3 percent and passenger enplanements grew by 2 percent. The growth in passengers was considerably stronger than expected, given the sluggish U.S. economy. Real GNP was up only 1.3 percent.

Starting in June 1987, U.S. airlines instituted a series of fuel surcharges and across-the-board fare increases. At the same time, more restrictions were placed on the use of discount fares. The higher fares prevailed through most of 1988 and 1989, before moderating in 1990. Jet fuel price increases in 1990 led U.S. airlines to institute additional fuel surcharges. The result was a further increase in yields for the year. Even prior to the invasion of Kuwait and the run-up in fuel prices, a slow national economy was dampening aviation growth. Still, some U.S. air carriers were successful in posting profits and were coping with slower traffic. However, after the invasion, operating expenses increased faster than revenues and 1990 was not a very good year. ATA estimates an industry loss of over \$2 billion in FY 1990. Eastern Airlines is no longer operating and Continental and Pan American are bankrupt.

International traffic increased 14 percent in fiscal year 1990. This was a continuation of the strong growth experienced over the past four years. 1990 results reflect the success of U.S. airlines marketing in the international arena.

Growth by regional and commuter airlines exceeded that of the major carriers. Enplanements increased 16 percent to 37 million. Since 1984, the regional and commuter airline industry has changed. In 1985, there was dramatic growth in the number of code-sharing agreements. This was followed in 1986 by acquisition of equity in regional and commuter code-sharing partners. The result has been consolidation, concentration, and integration with the large commercial air carriers. From 250 carriers in 1981, the number of regionals has declined to 151.

General aviation is an important contributor to the nation's economy. Associated activities include the production of aircraft, avionics, and other equipment, and the provision of support services such as flight schools, fixed-base operators, finance, and insurance. In fiscal year 1990, almost 1,300 general aviation aircraft were shipped. This consisted of about 700 single-engine piston aircraft, 100 twins, and 450 turbine aircraft. Billings increased by 1.8 percent to just over \$2 billion.

In fiscal year 1990, air carrier operations at FAA airport traffic control towers increased by 3 percent. Air taxi, commuter and general aviation aircraft operations increased by 6 and 3 percent, respectively. As a result, operations at FAA control towers and centers achieved the levels we forecast last year.

## FAA FORECAST OVERVIEW

---

### Aviation in the Future

Following a brief two-quarter recession in 1991, we expect a moderate to strong recovery. Jet fuel prices, which rose significantly as a result of the Gulf crisis, have been easing. These should moderate even more in the second half of '91 and decline further in '92. For the balance of the forecast period, we expect *abundant and affordable fuel*. This assumes the Middle East conflict is resolved without any further destruction of oil fields, refineries, and transportation facilities. With moderating oil prices, inflation should remain in check during the decade. Our forecasts beyond 1991 assume a short and successful resolution of the Iraqi war and rapid economic recovery. As shown by this chart ([CHART 1](#)), U.S. gross national product will average 2.4 percent growth between today and 2002. Rates of growth for the rest of the world--Europe, Africa, the Middle East; Latin America; and the Pacific Rim nations will be stronger still, ranging up to 4.5 percent.

Based on this economic environment, the FAA forecasts an annual increase of almost 5 percent in RPM's through 2002 ([Chart 2](#)). That's the good news. For the curmudgeons in our audience, I admit that this is significantly slower than the 8 percent growth the industry experienced over the past twelve years.

International traffic has been stronger than domestic traffic in the past. It increased 10 percent per year between 1977-1990. After the present Middle East Crisis subsides, we predict foreign traffic will continue to outpace domestic growth through 2002.

In the short-term, domestic RPM's are projected to decline to 1 percent in 1991. The decline in traffic growth is due, in large part, to the downturn in the U.S. general economy and the large increases -- up 8.0 percent -- in air fares. In 1991 and 1992, domestic fares could rise further to accommodate the increased airline ticket tax and Passenger Facility Charges at major U.S. airports. However, airlines will experience lower fuel costs which may permit an offsetting ticket price reduction. In 1992, we expect RPMs to increase 4 percent. In summary, we think the worst is probably over, even as I speak.

Beginning in 1993, the forecast is for considerably stronger passenger demand. Projected capacity increases, implied by new aircraft orders, continue to be dominated by two-engine narrowbody aircraft. This reflects the continued reliance on schedule frequency, rather than larger aircraft, to accommodate passenger growth. As a result, I am afraid that the airport congestion and delay could continue through the decade of the nineties and beyond.

In the short-term, we are faced with a multitude of uncertainties--both in the economy, as a whole, and in the aviation industry in particular. We assume oil prices will average \$20-\$25 a barrel in the first quarter of calendar year 1991. Oil is \$18.50 today. In making this assumption, we side-stepped many important questions. For example, "What happens if we are faced with a long-term pros-

## FAA FORECAST OVERVIEW

---

pect of very expensive oil?," "What would be the effects of a more severe recession, of inflation rates intensifying, or of additional bank failures?" If we knew how the current Middle East crisis will be resolved, how the U.S. deficit will be settled in the long-run, how the banking and securities industries will perform over the next several years, and how and when the general economy will rebound, it would make forecasting easier. However, I believe in mathematics and today, it looks like our relatively optimistic assumptions will be valid.

Beyond the economic and political uncertainties, we face uncertainties about how the industry will react. For example, new aircraft deliveries in 1991 will provide a significant increase in potential capacity just when traffic is flat or even declining. The industry has various options on use of its fleet. What is appropriate for one airline may be totally inappropriate for another or the industry as a whole. Will the industry retire its Stage 2 aircraft earlier than previously planned? Probably. Will the industry try to delay delivery schedules? Some airlines will. Will the industry be able to live with reduced load factors? It may have to. With profits down, will the industry engage in destructive fare wars? They now seem tempted. The answers to these questions may change the structure of the industry over the next few years. In the United States, there are a number of financially weak airlines. They had difficulty in prior periods. In today's environment of rising costs and declining traffic, we see the strong and the weak experiencing losses. The difficulties today will, in my opinion, expedite the "globalization" of airlines.

Regional and commuter airlines are being integrated into the networks of the major and national airlines. They will continue to grow faster than the rest of the industry. As shown by this chart ([Chart 3](#)), enplanements will reach 79 million in 2002, more than double the 1990 enplanements. Regionals and commuters will board 11 percent of the domestic commercial passengers in 2002, compared to 8 percent today. From a fleet once composed predominantly of older general aviation aircraft, today's commuter fleet is state-of-the-art offering amenities found on large jets. Regional and commuter fleets are tailored to the specific markets they serve. Average seats per commuter aircraft will grow, reflecting the continued introduction of larger aircraft.

([Chart 4](#)) The number of active general aviation aircraft will remain almost constant over the next 12 years. Business use of general aviation will increase. Thus, the turbine-powered fleet will increase from about 11,000 aircraft today to over 15,000 in 2002. The change in character of the general aviation fleet to more expensive and sophisticated turbine-powered aircraft reflects increasing business use.

Increased concentration among air carriers and congestion at airports can stimulate growth of business aviation. Increased air carrier and commuter activity generates additional demand for commercial and airline transport pilots. This results in additional training requirements. Training the pilot is an important step in aviation growth quite apart from the demand generated for training aircraft. It is the source of future commercial, airline transport, and perhaps, military pilots.

## FAA FORECAST OVERVIEW

---

### Implications for FAA Workload

The FAA provides the aviation community with three distinct services. These are: first, terminal air traffic control, second, enroute traffic surveillance and aircraft separation, and third, flight planning and pilot briefings at Flight Service Stations. All four aviation system user groups--air carriers, commuters and air taxis, general aviation, and military--utilize FAA services to enhance aviation traffic safety.

Aircraft activity at our 404 towers totaled about 64 million operations in 1990, an increase of almost 4 percent over 1989. 1990 represents the eighth consecutive year of growth, a period during which aircraft activity at FAA towers increased by 25 percent. As you see by this chart ([Chart 5](#)), counts at FAA towered airports will surpass the pre-controller-strike level in 1991 and will exceed the 1979 peak in 1995. Over the 12-year forecast period, operations are projected to increase by 2 percent annually to a total of 81 million in 2002. Local general aviation operations, influenced greatly by increased pilot training, increased 6 percent in 1990.

Instrument operations at towers totaled 47 million last year, about 4 percent above 1989 levels. The increase since 1982 reflects the increase in commercial aircraft activity, including commuter code-sharing and schedule tie-in agreements with the larger commercial air carriers. An increase in the number of terminal control areas and terminal radar service areas in both 1991 and 1992 is also expected to increase instrument operations, faster than total operations at FAA towers. Over the entire 12-year forecast period, instrument operations are expected to increase at an average annual rate of over 2 percent to 61 million in 2002.

In fiscal year 1990, center traffic totaled 38 million, 3 percent higher than 1989. Much of the increase is growth in commercial aviation activity. The workload at FAA Centers is expected to grow throughout the forecast period, increasing by 2.2 percent to 49 million in 2002.

Demands of general aviation for flight services are being met through new system capabilities.

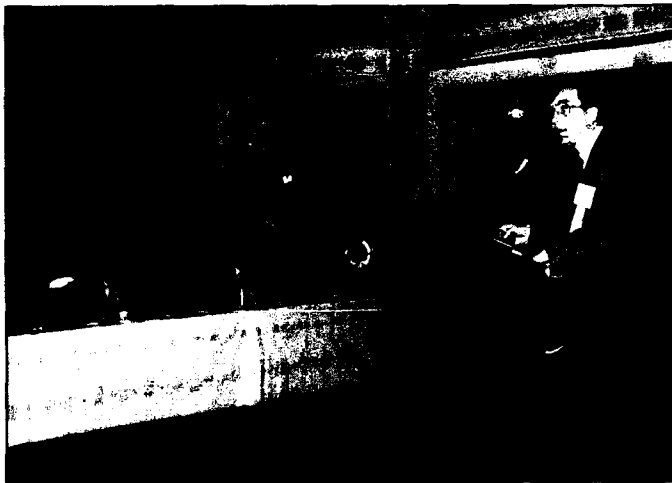
Pilots can now obtain weather briefings through the Telephone Information Briefing System. This system does not require contact with a flight service specialist, and is not included in the FSS pilot briefings count. Second, private weather briefing vendors can now also file flight plans for their customers without going through an FSS. Third, starting back in February 1990, the Direct User Access Terminal System--DUATS--became operational. Utilizing DUATS, pilots with a computer, modem and telephone can directly access a national weather data base. They receive weather briefings and flight plan filing without ever going through an FSS.

## FAA FORECAST OVERVIEW

---

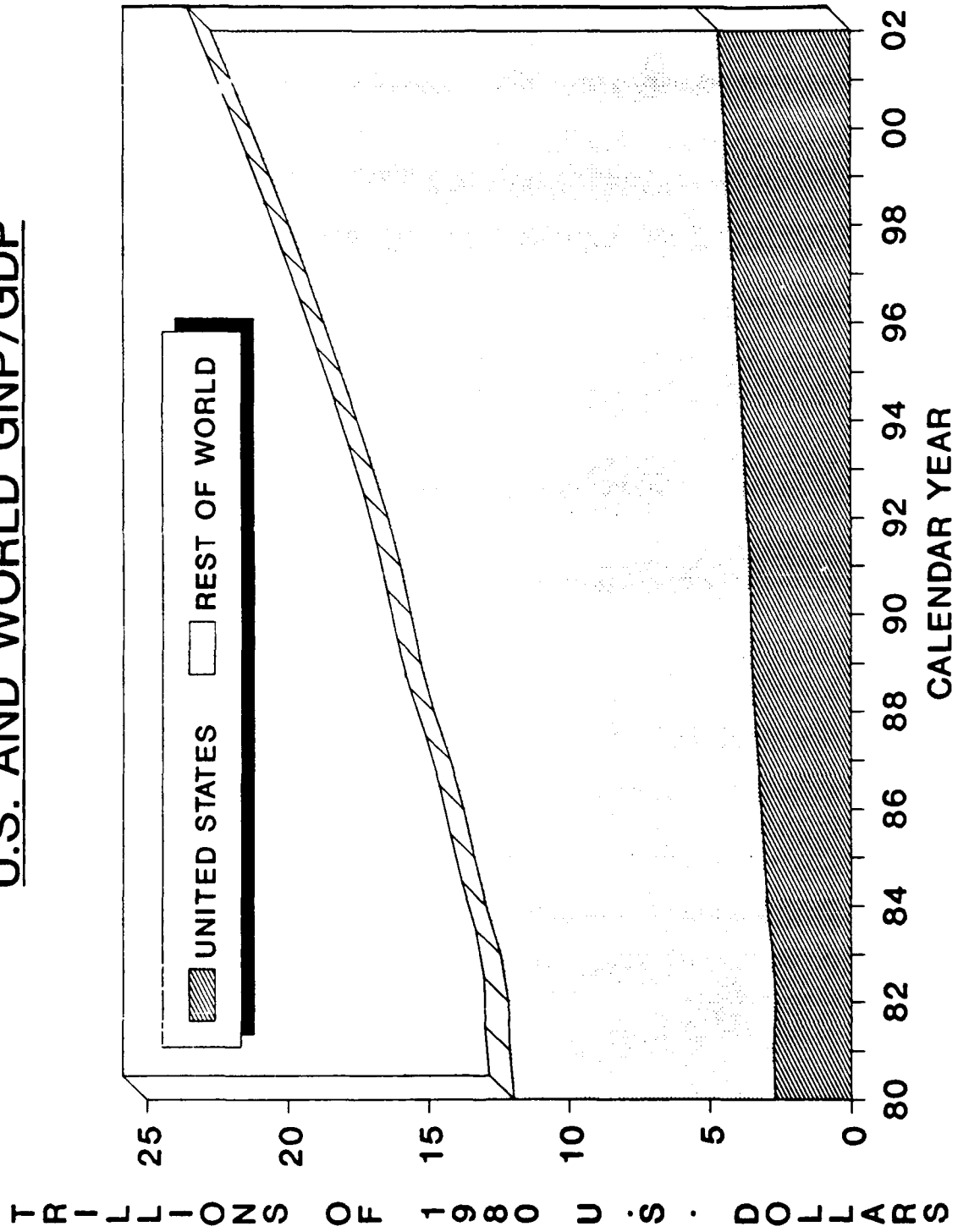
### Conclusions

In summary, aviation activity at FAA facilities is expected to continue to grow at about the same rate as the general economy. Expansion of both the U.S. economy and U.S. aviation will resume after a brief downturn in fiscal 1991 caused by economic recession and higher oil prices. Aviation will continue to dominate the commercial intercity passenger market. Regional and commuter aircraft activity and the business use of general aviation will grow faster than larger airlines and the personal use of general aviation.



# U.S. AND WORLD GNP/GDP

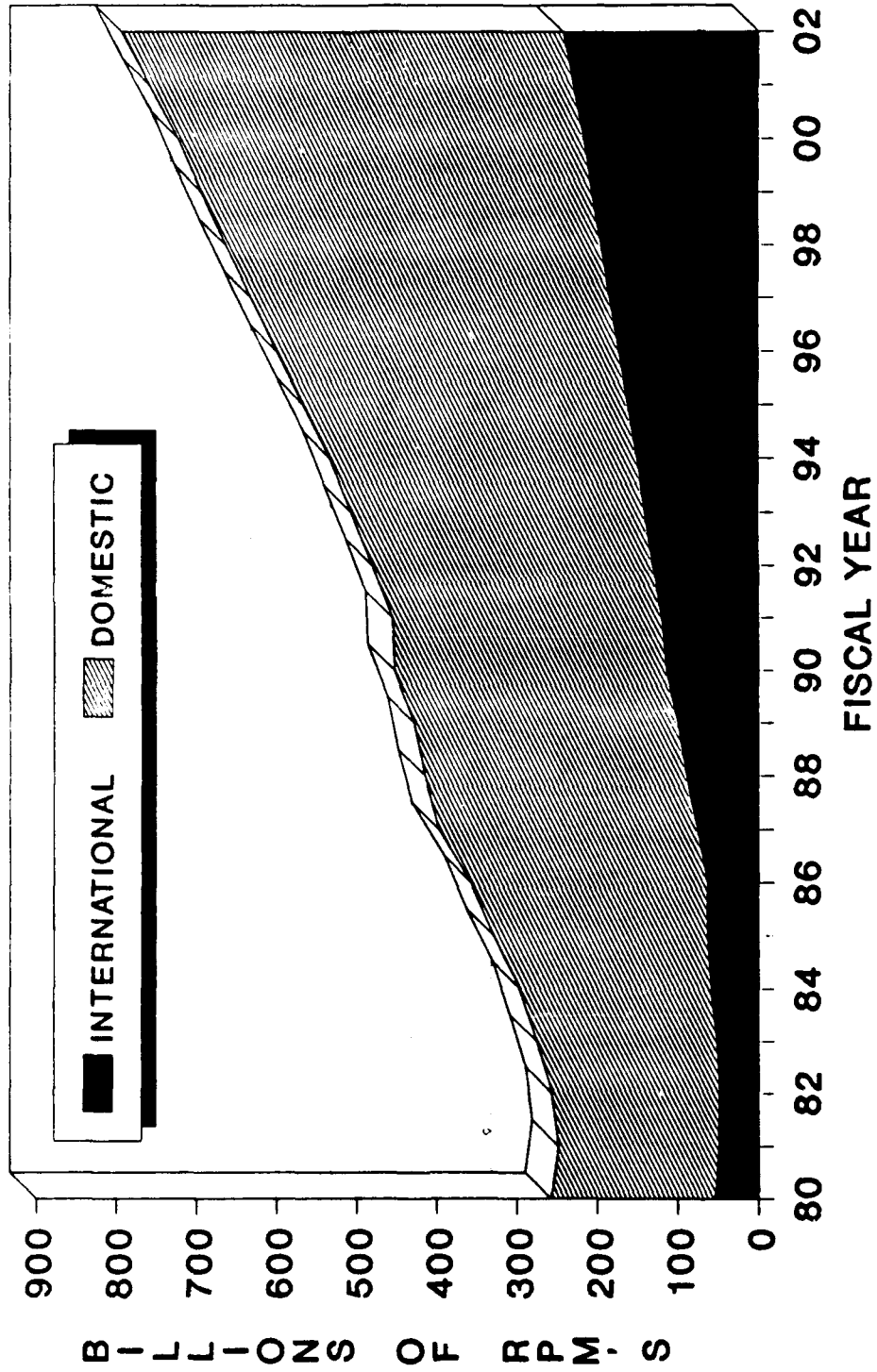
Chart 1





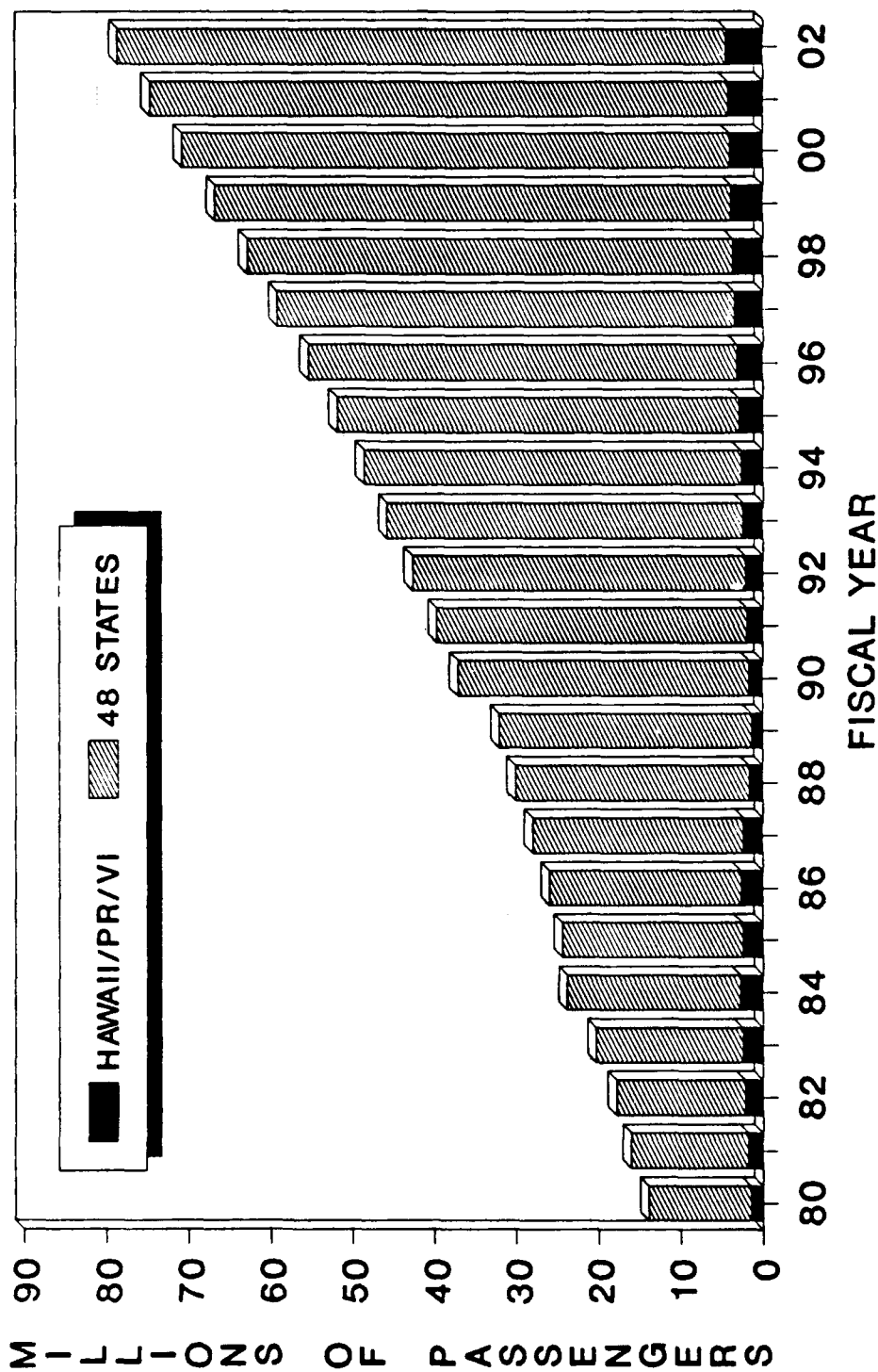
# U.S. COMMERCIAL AIR CARRIERS SCHEDULED REVENUE PASSENGER MILES

Chart 2



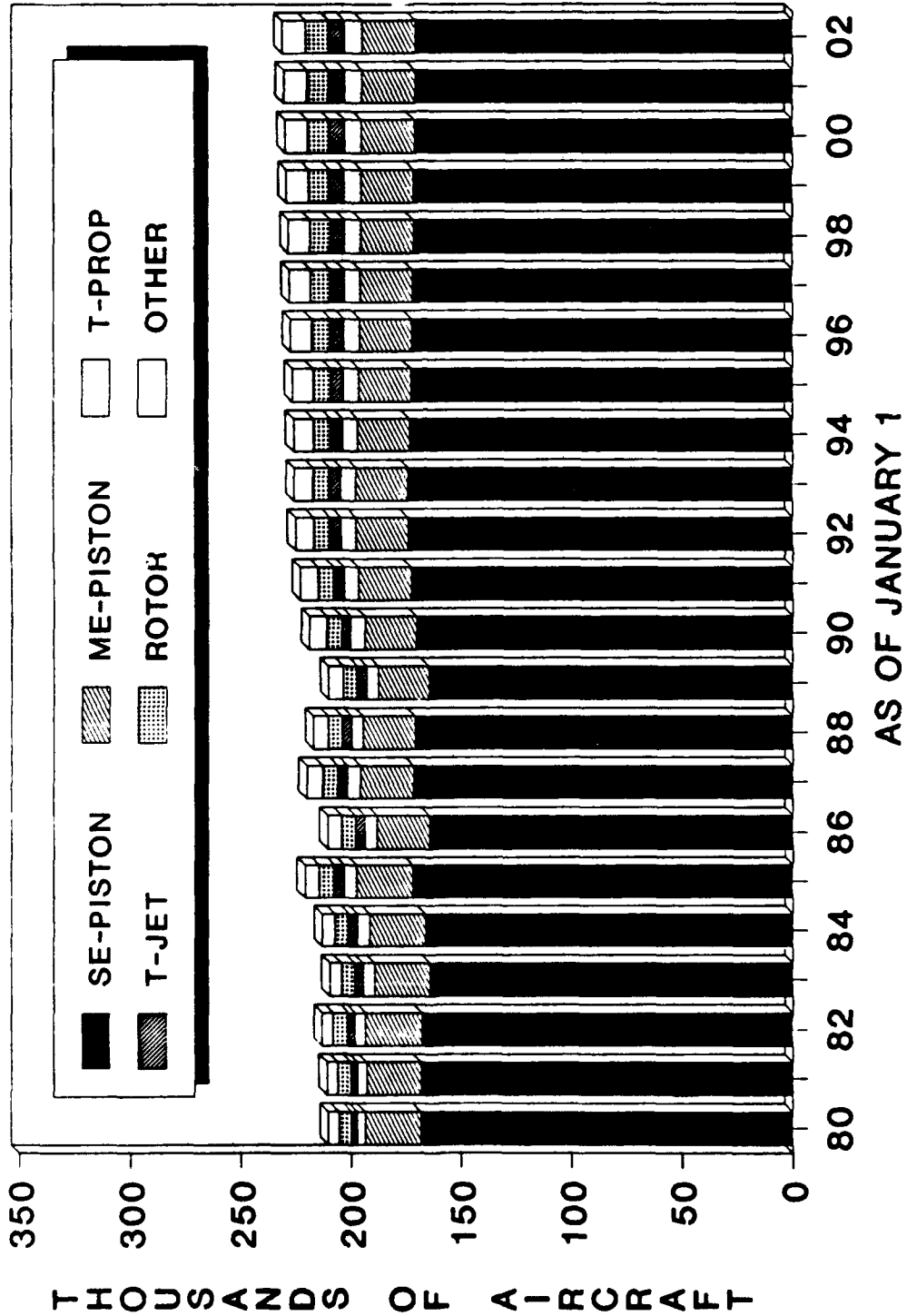
**U.S. REGIONALS/COMMUTERS**  
**SCHEDULED PASSENGER ENPLANEMENTS**

Chart 3



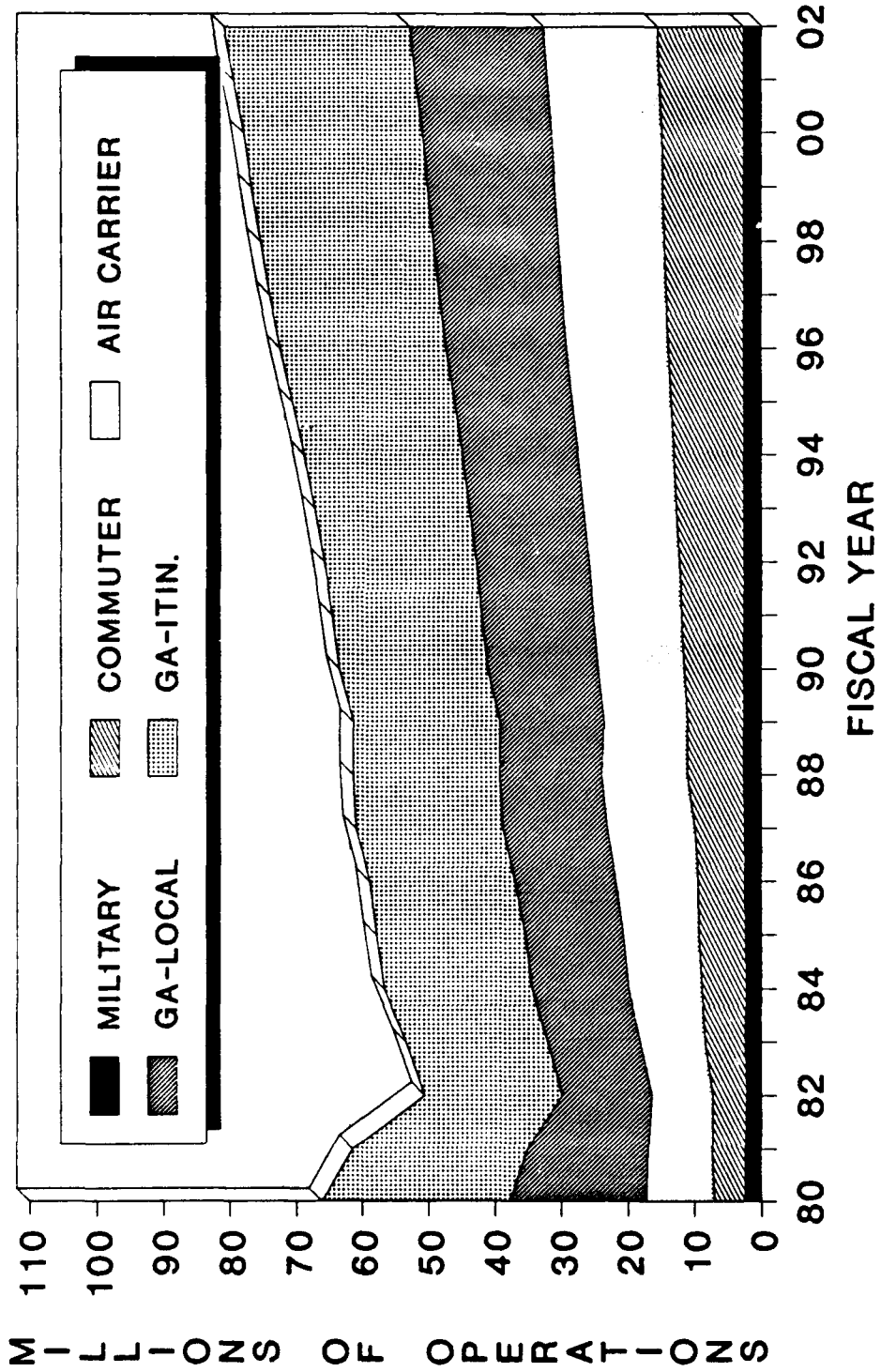
ACTIVE GENERAL AVIATION AIRCRAFT

Chart 4



**AIRCRAFT OPERATIONS AT AIRPORTS  
WITH FAA TRAFFIC CONTROL SERVICE**

Chart 5



# PANEL I

---

## The Outlook for Hubbing



**James W. Callison**  
**Senior Vice President**  
**Corporate and External Affairs**  
**Delta Air Lines, Inc.**



**Biographical Highlights**

Mr. Callison has been associated with Delta Air Lines' activities for over 37 years. Prior to joining the airline as Attorney in 1957, he represented Delta for nearly five years as an associate with the Washington, D.C. law firm of Pogue & Neal.

He has been promoted through various positions of increasing responsibility, and simultaneously held the positions of Senior Vice President-General Counsel and Corporate Secretary for many years, while also supervising various non-legal functions. In November, 1990, Mr. Callison was appointed head of Delta's newly-created Corporate and External Affairs Division.

Mr. Callison is responsible for Delta's government relations; stockholder relations; media and public relations; and other external representation of the corporation. He also supervises the Corporate Secretary function, and is a Trustee and Secretary of the Delta Air Lines Foundation.

**Summary**

Hub-and-spoke scheduling will remain the dominant form of U.S. air transport operations for the foreseeable future. Service to and from existing hubs will increase, but relatively few new hubs are expected to be created. There will be only a modest increase in point-to-point domestic service.

Hub-and-spoke service has been highly beneficial to both the public and the air transport industry. At the same time, the proliferation of such service over the past ten years has greatly intensified competition (service and price) between carriers and, equally important, between hubs and at spoke cities.

If hubbing should prove not to be the most efficient, productive way to serve the public, the beauty of economic deregulation is that the marketplace -- not the government -- can make that decision and replace the hub-and-spoke concept with a better way to do the job. But it is doubtful that will happen.

## **Intensely Competitive Hub-and-Spoke Operations Will Remain the Dominant Form of U.S. Air Transport for the Foreseeable Future**

It is a real pleasure to be here this morning, to discuss hub-and-spoke scheduling. As will become evident from my remarks, Delta has long been and will continue to be an enthusiastic advocate of the hub-and-spoke concept.

Two basic questions were posed for our group and I am going to answer them right up front:

One, there will be only a modest increase in point- to-point domestic air service in the foreseeable future. The hub-and-spoke pattern will remain dominant in U.S. air transport, even though relatively few additional hubs will be created.

Two, the proliferation of hub-and-spoke services during the past ten years has greatly intensified air transport competition in this country, certainly between carriers but, equally important, *between hub cities and at spoke cities.*

With my conclusions out of the way, let me turn to some basics. First, let me clarify the perspective from which I view this discussion. It is that of a representative of the inventor of the hub-and-spoke concept. Delta pioneered that type of operation in the late 1950's and early '60's to achieve two primary goals: To improve air service for the southeastern quadrant of the country, and to improve efficiencies and economies of operation.

In contrast to most large carriers, Delta adopted a policy after World War II of not abandoning service to medium and small communities. Incidentally, we still adhere to that philosophy. We did so then partly because our primary area of operation at the time was the Southeast, where small communities were still the norm -- communities to which we felt a strong, continuing obligation. The question was how best to connect them to the national air transportation system.

Although they were growing, these communities would not be able for many years, if ever, to support a significant amount of direct service to distant cities. So we focused on Atlanta as a distribution point. Atlanta itself was still of only modest size at that time, but it was in the geographical center of the area, with excellent airport facilities.

Soon, the original hub-and-spoke system was developed -- long before anyone ever dreamed of deregulation. The goal was then -- as it is now -- to improve and enhance public service. By using Atlanta as a cross-connecting point, we ex-

## PANEL I

---

panded service choices and frequencies for the smaller southeastern communities far beyond anything they could have supported with just point-to-point service. But we quickly learned that the concept also improved our traffic share in larger Atlanta markets, and increased our efficiency and productivity.

Tom Miller, then our Vice President of Traffic and Sales, explained it this way 30 year ago, at a 1961 ATA forum on airline scheduling. Tom cited Delta's 5:00 p.m. Washington departure to Atlanta, on which only a third of the load (on average) was local Washington to Atlanta business.

(Slide 1). As the slide shows, if the trip had been operated strictly on a point-to-point Washington-Atlanta basis, without regard for connections, the load factor would have been what Tom called "a miserable 38%". But in fact, the flight made 19 connections in Atlanta; two-thirds of the passengers were provided convenient on-line connections to 31 different cities in the Southeast; and the flight consistently operated with load factors in the 80's. Now, the primary reason I reviewed that history was to emphasize something often overlooked today -- that the driving force behind the hub-and-spoke concept is improved and expanded service for the traveling and shipping public, both at the hubs and at what has come to be known as spoke cities. That is as true today as it was when Delta invented the concept more than 30 years ago.

The hub-and-spoke concept played a major role in Delta's financial success in the regulated system. (Slide 2). As this slide shows, Delta's operating profit margin was two and one-half times the industry's over the ten years prior to deregulation. (Hubbing has, of course, continued to play a major role in Delta's profitability since deregulation.)

Why did other trunk carriers not utilize the hub-and-spoke concept as much as Delta in those days? Primarily because, as aircraft size and range increased, most other trunks sought and were granted authority to terminate operations at smaller communities. They emphasized point-to-point service between large communities, turning most of their small cities over to what were then called local service carriers. At the time of deregulation, other major carriers had less than 50% of their total domestic capacity devoted to hub flying. In Delta's case, that percentage was already 66%.

Deregulation brought with it the freedom to re-enter smaller communities, that is, to operate over what we now call spoke segments. American saw the opportunities coming, and moved their headquarters from New York to Dallas/Ft. Worth as soon as they knew they would have the freedoms of deregulation [November 1978], with the stated intent of duplicating in Texas Delta's successful Atlanta hub-and-spoke operation. Since deregulation, as you know, most large carriers have heavily emphasized the hub-and-spoke concept.



## PANEL I

---

I am now going to run quickly through a series of slides which make the basic point that the hub-and-spoke system is service driven. That is not to say that there are not concomitant operating benefits for the carriers--there are! Both the public and carrier benefits that these slides will outline are so strong that there is no likelihood that use of the hubbing concept will be replaced or even diminished in the United States within the foreseeable future by a significant re-emphasis on point-to-point service.

(Slide 3). The basic benefits of the hub-and-spoke method of competition are:

One: Scheduling efficient

Two: New market synergy;

Three: Greatly expanded opportunities for single-carrier service from origin to destination; and

Four: Increased public service options and increased carrier competition.

A major reason for hub-and-spoke scheduling is the more efficient use of aircraft resources which it provides. For example, if five airplanes are used only for point-to-point service (Slide 4), obviously only five markets can be served. This was the norm for other trunk carriers under the pre-1978 regulation. That regulation basically protected the carriers from competition so that they ran a minimal risk, if any, from limiting aircraft productivity.

However, if the same five airplanes are scheduled to stop at an intermediate "hub" before continuing to the same five destinations (Slide 5), the number of market pairs served immediately increases by a factor of 7 to a total of 35.

Moreover, adding only one new spoke city to a hub yields a minimum of six new markets. (Slide 6). This new market synergy greatly improves the potential success of each new spoke service in competition with any other carrier in the market; provides the spoke cities with many new service options and increased competition to a host of destinations; and enhances the ability of the hub in question to compete with other hubs. The example in the slide is limited because of the rigid directionality assumed. If the hub were omni-directional, as is true of Atlanta and Salt Lake City, for examples, the strength of the new service would be multiplied and the service opportunities greatly increased.

The increased scheduling efficiency and new market synergy from hubbing that we have just seen allows carriers to optimize the use of aircraft resources. A real life example is Delta's Greenville/Spartanburg service to and from our Atlanta hub (Slide 7). With five roundtrips in this market, Delta expends only 52.1 million available seat miles each year in the local market. Yet, the overall contribution to our system is 231 million annual revenue passenger miles in 114 markets reached through the Atlanta connecting banks.

## PANEL I

---

Now contrast the efficiency and productivity of the Greenville/Spartanburg operation to Delta's JFK-Ft. Lauderdale service. This is a point-to-point operation, where we offer two roundtrips. To do so we have to expend 316 million available seat-miles annually, to generate fewer rpm's than we realize from the Greenville/Spartanburg services. Such point-to-point operations are obviously far less efficient, even though they remain necessary in a few large markets where there is limited opportunity for on-line connections at either end.

Let me make the efficiency point another way, again using the Greenville/Spartanburg market as an example. Even today only the top five destinations from that community have sufficient traffic to support a daily DC-9 flight at a 50% load factor. Delta's five flights to the Atlanta hub, however, use the equivalent of only one aircraft, but we provide service to one hundred fourteen markets.

Not only is hubbing efficient and productive from the standpoint of resource utilization, but it also provides the public with greatly improved service. The major benefits are: (Slide 8):

First, by enhancing ability to match aircraft capacity to passenger demand, the hub-and-spoke system significantly facilitates the expansion of service to meet the public's needs. The competitive pressures loosed by deregulation in 1978 caused carriers to rapidly and aggressively expand the scope of their service in this manner not only to serve the public, but also to keep or achieve "critical mass."

Second, because the hub-and-spoke concept in effect "stretches" aircraft resources, more markets are served using the concept than would otherwise be possible and, third, frequencies and, therefore the public's options, are greatly increased as we saw illustrated a moment ago in the Greenville/Spartanburg examples;

Fourth, hub-and-spoke operations are built to achieve coordinated, convenient single-carrier service, a great improvement over the days of regulation when many trips entailed a two or three-carrier connection (today, interline connections have diminished to only 1% of Delta's enplanements); and

Fifth, since the hub system allows airlines to expand service geometrically, more carriers serve the same markets, leading to more competitive choices for passengers. But here I'm getting ahead of my story, and I'll come back to the competitive situation in a minute.

With benefits flowing to both the public and the carriers from the hub-and-spoke system, and with freedom under deregulation for carriers to adopt this system to the fullest extent necessary to meet market demands, it is hardly surprising that the hubbing concept has proliferated since 1978 (Slide 9). With hubs fueling their expansion, U.S. carriers increased the percentage of their domestic available seat

## PANEL I

---

miles associated with hubs from about 50% in 1978, as I mentioned earlier, to nearly 90% today. The hub system is truly the backbone of the U.S. air carriers' route system.

The significant degree to which carriers have expanded their hub services over the past few years is demonstrated on the next three slides. (Slide 10). Looking first at the four largest two-carrier hubs, there has been an increase in departures from them of over 1,000 flights -- a 103% increase -- in the past eight years. [At Atlanta, which was also a two-carrier hub until Eastern's recent cessation of service (and which has available terminal facilities to reassume two-carrier-hub status) departures increased by 197 during the same eight-year period.]

(Slide 11). The development and growth of single-carrier hubs has been equally dramatic. Carriers have learned that by establishing new hubs they can compete for traffic traditionally served by previously existing hubs, while avoiding the relative air space and facility congestion at those older hubs. Shown on this slide are seven hubs that were created and developed by a single carrier to compete directly with existing hubs. As you can see, there has been an increase of 814 daily flights at these hubs since 1983 -- a 301% increase. Delta's experience with this type of hub has been highly successful.

(Slide 12). The emphasis in recent years on the hub strategy has led to the establishment of thirty-eight hub airports across the country today. In Delta's view, there will be little need to establish additional major hubs in the future. Geography alone will limit the opportunities. Moreover, improvements in technology generally, and enhancement of the Air Traffic Control System in particular, will allow the existing hubs to handle increased traffic volumes. New spokes and other increases in service to and from those existing hubs will therefore occur, but there will be only limited demand for new service patterns based on additional hubs.

Not only does hubbing improve service to the public and benefit the carriers; in addition, I submit, it also optimizes the use of the air traffic control system. The huge expansion of passenger and shipper options that has occurred since 1978 could never have been provided without hubbing. Even assuming enough traffic to support what would have to have been an enormous increase in point-to-point service, the air traffic control system could never have coped with that number of additional nonstop flights. Despite its needs for continued upgrading and expansion, the air traffic control system has done a remarkable job of handling the tremendous explosion in service and traffic since deregulation -- thanks in significant part to the airlines' focus on use of the hub-and-spoke concept.

Hubbing has been so beneficial that the U. S. air transport industry is not about to abandon it, and the public would not tolerate the loss of service if we tried. Hubbing will remain the backbone of the national air transportation system and the number of passengers utilizing hub-and-spoke services will increase, not decrease.

## PANEL I

---

Well, you ask, could there still be more direct, point-to-point service in the future as an overlay on the present hub system? The answer in Delta's view is "not to any significant extent." Some coast-to-coast, border-to-border, and coastal services will continue on a point-to-point basis, and there will be point-to-point departures for overseas destinations. But beyond that there is little likelihood of a substantial increase in the relative volume of point-to-point services within the United States. Let me show you why.

With the understandable emphasis that has been placed on the hub concept (because of its ability to optimize aircraft utilization and support a wide spread of public service), the remaining traffic levels available are insufficient to sustain an appreciable amount of point-to-point service. (Slide 13). The graph on the screen depicts the actual origin and destination traffic base for the year ended June 1990 in the top 50 markets at Louisville; Columbus, Ohio; and Montgomery. At each of those cities, over 60% of the O&D traffic either originated or terminated in a hub city. And as we just saw, that basic pattern will remain.

Of the remaining traffic that was point-to-point, at least 10% from each city was bound for either LaGuardia or Washington National Airport. These two were by far the top point-to-point destinations.

Even the Columbus market, the largest traffic base of these three cities, had enough local traffic in only one other non-hub market -- Boston -- to support a single daily point-to-point service, and then only if all of the available traffic were to have flown on that one flight, disregarding all competitive connecting services. Because of passengers' differing travel time requirements, and the multiple competing frequencies available via other hubs, it is unrealistic to assume that a single daily nonstop would capture such an entire market. Hence, the possibilities for point-to-point service in this market, as in most non-hub markets, is very limited.

(Slide 14). Looking at this from the passenger demand standpoint, cities which have a significant demand for nonstop service have usually become hubs themselves. As a consequence, 85% of U.S. origin and destination traffic begins or ends in one of the nation's 38 large hubs. Allocation of any significant number of aircraft to point-to-point markets which, by definition, have only a small percentage of the residual traffic demand, would do a disservice to the traveling public by placing supply where demand is negligible.

For these and other reasons, there is virtually no likelihood, in Delta's opinion, of a significant increase in point-to-point service, or a significant decrease in the volume of hub-and-spoke service.

## PANEL I

---

Let me turn now to the impact of hubbing on competition. And let's look at the matter from two perspectives. First, with respect to connecting traffic -- traffic moving through the hubs to and from the spoke cities -- there has been a huge increase in competition as use of the hub concept has grown. Hubbing has intensified competition between both the carriers and the hubs themselves for this major portion of the traffic. Most spoke city passengers today have multiple frequencies available over a variety of hubs on a number of different carriers.

(Slide 15). Look at the Albany-Minneapolis market, as an example. In this market, the number of competitors has doubled since 1979. Using hub-and-spoke patterns, numerous carriers are able to expand their systems to serve the same O&D markets through different hubs, as American and United have done in this example through Chicago, USAir through Pittsburgh, and Northwest through its Detroit hub.

Let me give you another example. In 1978, at the time of deregulation, the Southeast benefited from a single hub -- that pre-deregulation, pioneer hub established by Delta at Atlanta. Today, there are eight hubs serving the South Atlantic region -- Atlanta, Orlando, Miami, Memphis, Charlotte, Nashville, Raleigh/Durham, and Washington-Dulles. A traveler going from Savannah, Georgia to Los Angeles, for example, has a daily choice today of eighteen different connecting services on five different airlines at four different hubs. To New York City, there are two one-stop single-plane services plus twenty-four connecting flights available each day with a choice of five airlines through five different hubs.

Looking at the competitive situation in the South Atlantic region from the perspective of the Atlanta hub, 93% of all the passengers who connect via the Atlanta International Airport have a choice of at least one other carrier via a different hub -- often several carriers via a number of hubs. And that situation remains essentially the same despite Eastern Air Lines' cessation of service.

(Slide 16). As this slide shows (based on a DOT Study in February 1990), the number of trips where the passenger had a choice of three or more carriers has significantly increased as hubbing has increased. In percentage terms, in 1979 only 28% of all passengers had a choice of three or more carriers on the route they desired to fly; in 1988 the figure was 55%.

So while the fact is often overlooked, hub-and-spoke service has significantly intensified competition at spoke cities (not just at and between hubs); it has given passengers traveling to and from spoke cities a greatly increased variety of service options; and smaller communities nationwide have better access to the air transportation system than they did prior to the hub phenomenon. Indeed (Slide 17), as this slide shows, the majority of cities in the U.S. received more frequent service in 1989 than in 1978. The convenience of multiple flight times and travel options is much greater than it was under the linear route patterns that predominated before deregulation.

## PANEL I

---

And there is healthy competition at the hubs themselves. Looking first at connecting traffic, there is direct competition at a number of hubs for such passengers. For example at Dallas/Ft. Worth Delta has mounted fierce competition for connecting as well as local traffic against American, the airport's largest carrier. Over the past several years, Delta has steadily gained against American in enplanements at Dallas/Ft. Worth, and now boards about 29% of the total market. Dallas/Ft. Worth is clearly a two-carrier hub. Chicago and Denver are other examples.

While critics of single-carrier hubs normally point to overall enplanement percentages, such as Delta's enplanement share at Salt Lake City of about 79% (Slide 18), most of this is connecting traffic. Indeed, at Salt Lake City, seven out of ten enplaning passengers are making connections, and many of these passengers had a choice of competing carriers through other hubs, as we just saw.

But competition for the LOCAL traffic at single-carrier (as well as two-carrier) hubs is also intense and, as a consequence, the hub carrier's share of that traffic is usually much lower than its share of total enplanements. For example, Delta's share of originating passengers at Salt Lake City is only about 58%, which means that roughly half of all Salt Lake City O&D passengers choose to take advantage of other available options. Indeed, Salt Lake City O&D passengers have the choice of eleven carriers, including service from eight of the eleven U.S. major airlines, and Delta has nonstop competition in six of the top ten Salt Lake City markets.

Hence, it is important to make a distinction between local and connecting passengers when measuring the level of a particular carrier's traffic at a hub, something which critics usually fail to do. They just complain about Delta's boarding nearly 80% of the enplanements at Salt Lake City, or TWA's 85% share at St. Louis, or Northwest's 80% at Minneapolis. What many of these critics fail to note is that only 30% to 40% of those passengers were local enplanements and that any one of the hub airlines serving these cities probably enplaned a significantly lesser share of the local market.

In addition to this increased competition through the hubs, and at the hubs, hubbing has produced market fragmentation which, in turn, has increased competition between many communities. Market fragmentation is basically the dispersion of traffic over many alternative routings made possible by hub development. While this tends to dilute the traffic potential of smaller O&D markets, leading to a decline in point-to-point flying in such markets, today's passenger is offered the choice of many more services at different times of day by more airlines than ever would have been available in the pre-hub environment.

(Slide 19). The Philadelphia-New Orleans market is a good example of this (among many). In the nine years between August of 1981 and August of 1990, as shown on the bottom two lines, this market saw the number of carriers serving it increase from four to ten, and the number of service options for the passenger

## PANEL I

---

increase from twenty-two to fifty-one.

As the last series of slides has demonstrated, the hub-and-spoke system has greatly intensified service competition at both large and small communities throughout the nation.

Although the questions posed for our group did not specifically address the impact, good or bad, that hubbing has had on pricing as distinguished from service competition, let me add that the impact has been equally favorable for the public in the pricing arena.

For example, the increased use of hubs to serve the public has not decreased the availability of discount fares. Quite the contrary. In December of 1990, Delta experienced an increase of 26.8% in the number of passengers traveling on its most deeply discounted fares over the same month in 1989. Further, Delta offered almost eight million seats, or 77%, of its total December 1990 capacity at deeply discounted, non-refundable fares.

The industry has had much the same experience. In 1976 less than 20% of all traffic used discounted fares compared with the 90% range that has existed for the past two years. The average discount in 1990 was approximately 65% off the full coach fare -- far more than 10 years ago -- according to a recent Air Transport Association Study.

With respect to the hubs themselves, contrary to conventional "wisdom," they also share fully in the discount fare programs. For example, during March and April of 1989 -- the two months most heavily impacted by the Eastern strike that ultimately led to its bankruptcy -- Delta did not implement any fare increases. In August of that year, while Eastern's service was still curtailed, Delta offered over 58.2% of its seats in Atlanta at deeply discounted, non-refundable fares, 67.8% at Cincinnati, 69.0% at Salt Lake City and 70.1% at Dallas/Ft. Worth.

In March 1990, Delta actually sold 36% of its seats departing Atlanta at the lowest published fare; and in April of 1990, Delta sold 38% at those low fares. In the peak summer month of July 1990, 44% of Delta's seats were sold at such fares. In all of these cases, the average discount off the unrestricted coach fare was in excess of 70%.

Well, you say, discounts are one thing -- but what about fare increases since hubs have become so dominant? Well, Delta for example implemented only two fare increases in all of calendar year 1989 -- a period during which Delta's major Atlanta competitor and then still a significant system competitor, was either totally or substantially shut down. The first increase was in September and dealt only with excursion fares, which were raised from \$10.00 to \$20.00. The second -- and last increase for that year -- was initiated in December with one-way fares increasing \$5.00, while roundtrip fares were raised from \$10.00 to \$20.00.

## PANEL I

---

During that year 1989, from March to November, Delta elected not to support industry-wide increases initiated by other airlines. Those increases would have resulted in fares being raised an average of \$20.00 to \$40.00 for every roundtrip ticket. Except for the recent increases in fares taken to offset the high cost of fuel due to the current Middle East situation, Delta took only three fare increases applicable to full coach fares from February, 1988 to the present (January 1991).

Delta consistently maintains the standard mileage base formula that it applies throughout its system -- regardless of route, size of the market, area of the country served, or type of equipment used on the route. This same formula is used whether or not the flight is scheduled to transit any of Delta's hubs.

Looking at the industry as a whole, a recent GAO study (GAO/RCED-91-13, dated November 1990) shows that over the period since 1979, as hubbing has become the backbone of the U.S. air transport system, fares per passenger mile (adjusted for inflation) have decreased 5% at airports serving large communities and have decreased 9% at airports serving small and medium sized communities.

In conclusion, the hub-and-spoke system is alive and growing; is serving the public exceedingly well; is not going to diminish in importance or in relative volume of the passenger enplanements which it serves, although few additional major U.S. hubs are anticipated; will remain by far the predominant service over point-to-point operations, which should increase little in relative terms in the future; and has resulted in a far more intensely competitive airline system in this country than existed prior to the proliferation of the hubbing concept.

And one final note: If I am wrong about hubbing as the most efficient, productive way to serve the public and design the domestic airline system, the beauty of economic deregulation is that the marketplace -- not the government -- can make that decision and replace the hubbing concept with a better way of doing the job. But I doubt that will happen.





**Slide 1**

**“The Point Of Real Significance Is That This Flight,  
Which Departed At The Magic 5:00 P.M. Hour, Obtained  
Only One-Third Of Its Load From Purely Local Business . . .  
Without Scheduling For Connections Its Load Factor Would  
Have Been A Miserable 38%.”**

**Thomas M. Miller  
Vice President - Traffic And Sales  
Delta Air Lines, Inc.  
April 21, 1961**

Slide 2

**DELTA VS. U.S. SCHEDULED INDUSTRY  
OPERATING PROFIT MARGIN**

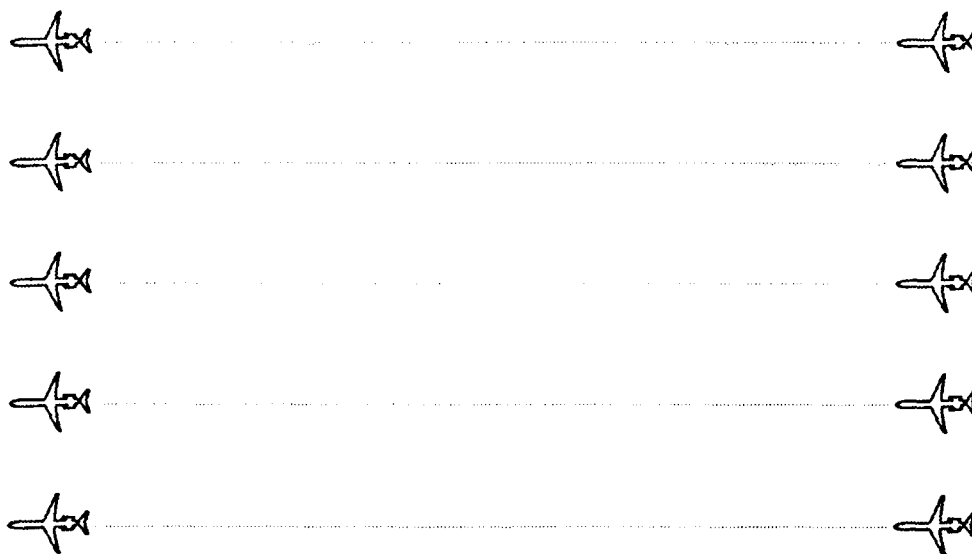
1968 - 1977

	<u>Total Industry</u>	<u>Delta</u>
1968	6.5%	15.9%
1969	4.4	15.9
1970	0.5	14.9
1971	3.3	8.0
1972	5.2	7.6
1973	4.7	11.5
1974	4.9	12.8
1975	0.8	6.9
1976	4.1	7.7
1977	<u>4.6</u>	<u>8.2</u>
<b>Weighted Average</b>	<b>3.9%</b>	<b>9.9%</b>

## **REASONS FOR HUB AND SPOKE**

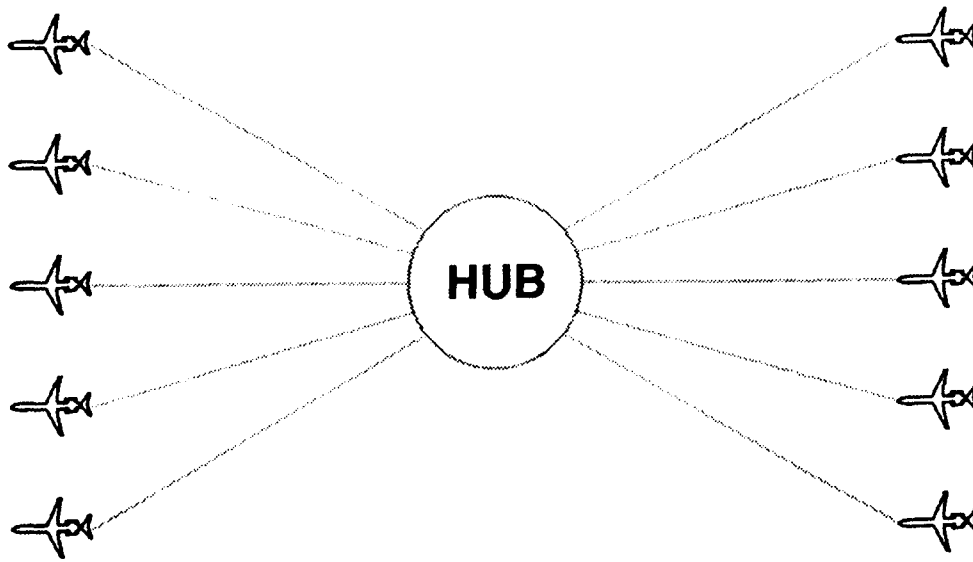
- **Scheduling Efficiency**
- **New Market Synergy**
- **Greatly Expanded Opportunities  
For Single-Carrier Service  
From Origin To Destination**
- **Increased Public Service  
Options And Increased Carrier  
Competition**

**MARKET OPPORTUNITIES BEFORE THE  
DEVELOPMENT OF THE HUB AND SPOKE SYSTEM**



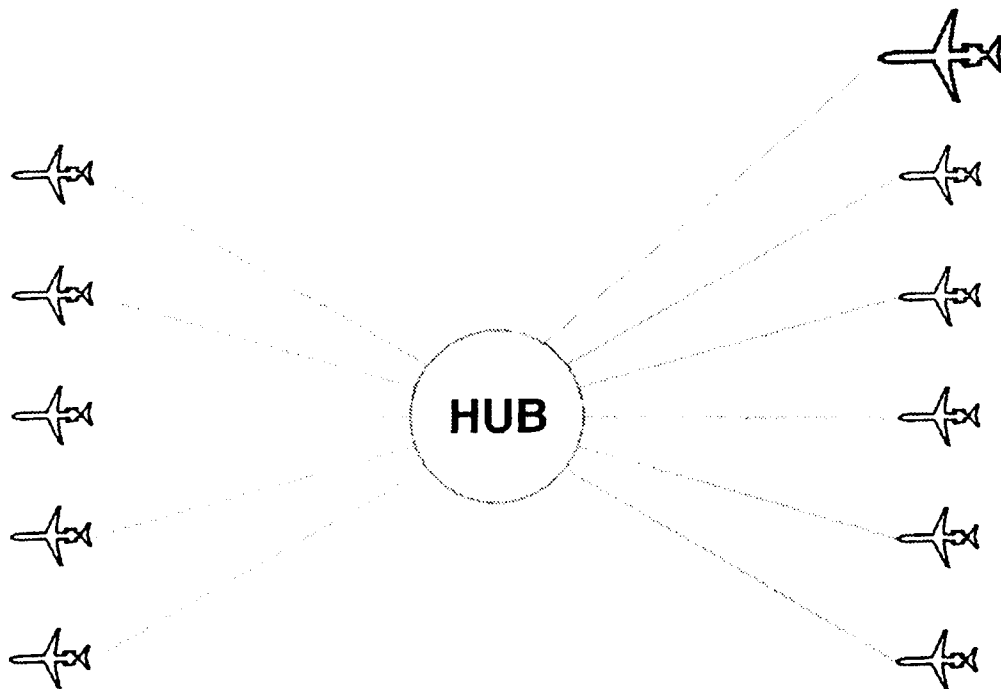
**POINT TO POINT SERVICE  
5 MARKETS SERVED**

**HUB AND SPOKE SYSTEM  
INCREASES MARKET OPPORTUNITIES**



**35 MARKETS SERVED**

**THE ADDITION OF 1 NEW SPOKE  
ADDS 6 NEW MARKETS**



## OPTIMIZATION OF AIRCRAFT RESOURCES

12 Months Ended Nov. 1990

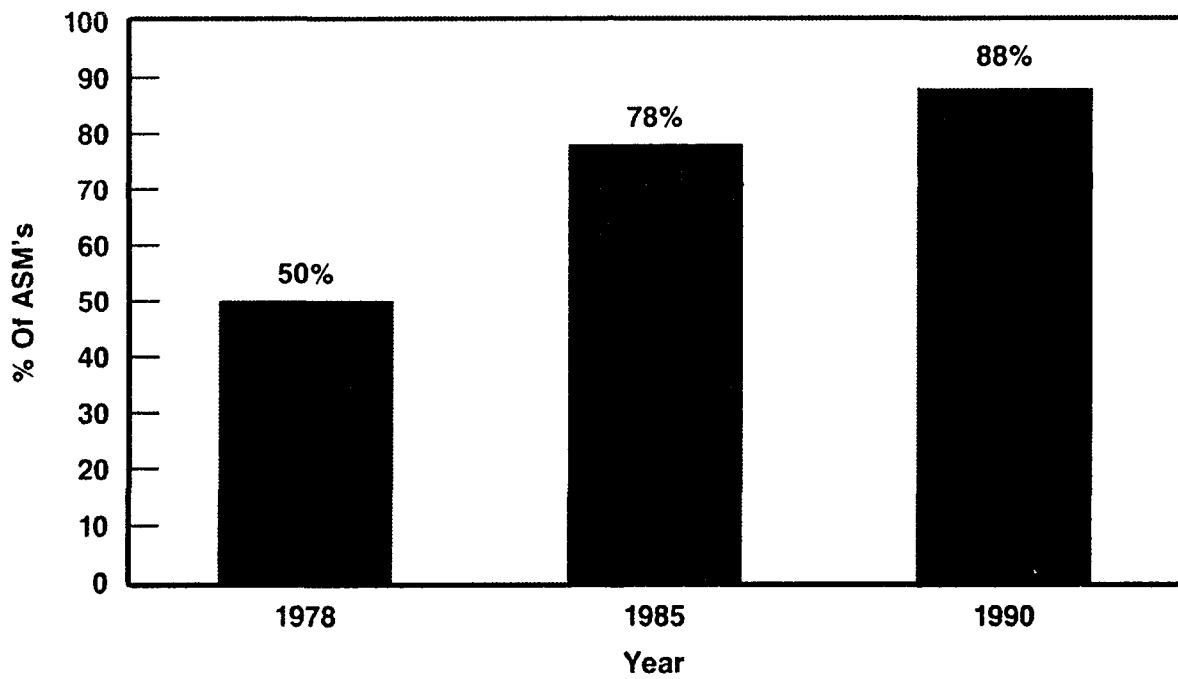
		<u>ASM</u> <u>(000)</u>	<u>RPM</u> <u>(000)</u>	<u>Markets</u> <u>Served</u>
5 RTs	ATL - GSP	52,058	230,881	114
2 RTs	JFK - FLL	316,324	220,237	2

## **PASSENGER BENEFITS FROM HUB SYSTEMS**

- **More Capacity Supplied To Meet  
The Public's Demand**
- **More Markets Served**
- **More Frequencies Available**
- **More Coordinated Single-Carrier  
Service**
- **More Competitive Choices**



**% OF DOMESTIC CAPACITY RELATED TO HUBS**  
**U.S. Major Carriers**



Slide 10

**HUB DEVELOPMENT OVER PAST EIGHT YEARS**  
**Large Two Carrier Hubs**

	<u>Average Daily Departures - Hub Carrier</u>		
	<u>January</u>	<u>January</u>	<u>Increase</u>
	<u>1983</u>	<u>1991</u>	
Chicago (AA, UA)	331	690	+ 359
Dallas (AA, DL)	331	676	+ 345
Denver (CO, UA)	314	333	+ 19
Phoenix (WN, HP)	<u>13</u>	<u>307</u>	<u>+ 294</u>
Total	989	2,006	+ 1,017

Total Increase Of 103%

## HUB DEVELOPMENT OVER PAST EIGHT YEARS

### Large Single Carrier Hubs

	<u>Average Daily Departures</u>		
	<u>January 1983</u>	<u>January 1991</u>	<u>Increase</u>
Cincinnati (DL)	62	151	+ 89
Nashville (AA)	13	87	+ 74
Raleigh/Durham (AA)	-	101	+ 101
Dulles (UA)	7	114	+ 107
Charlotte (US)	99	320	+ 221
Baltimore (US)	6	152	+ 146
Salt Lake City (DL)	<u>83</u>	<u>159</u>	<u>+ 76</u>
Total	270	1,084	+ 814

Total Increase Of 301%

PANEL I

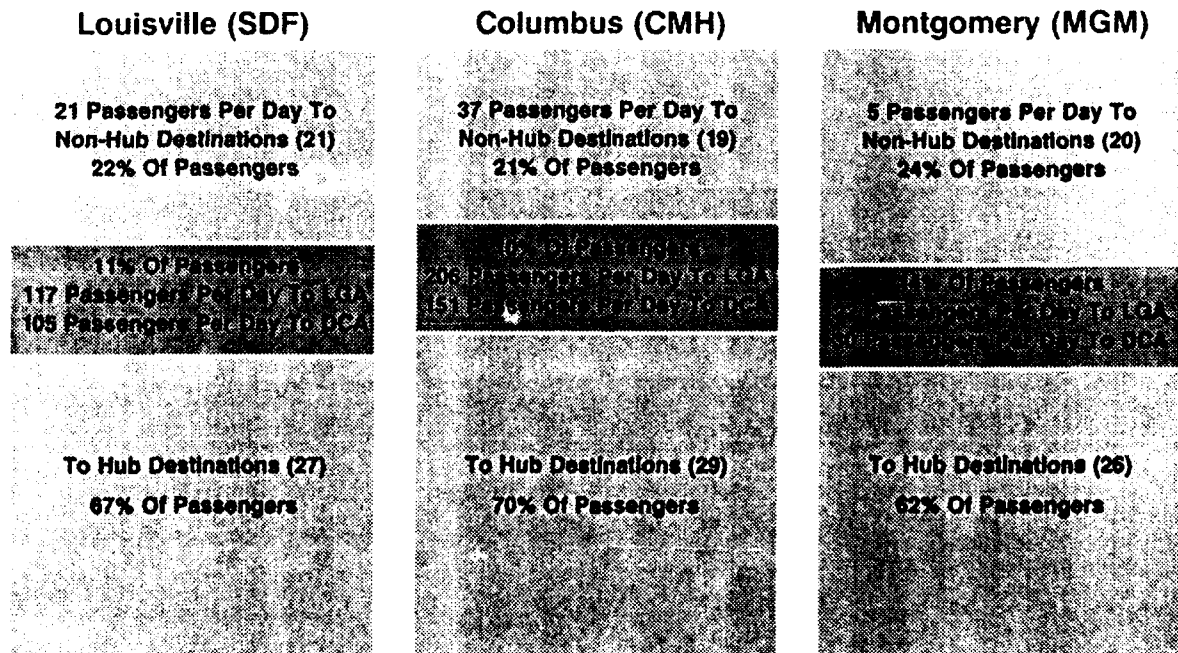
---

Slide 12

## AIR TRAFFIC HUBS



**PASSENGER PER DAY IN POINT TO POINT MARKETS**  
**Top 50 O&D Markets, YE June 1990**



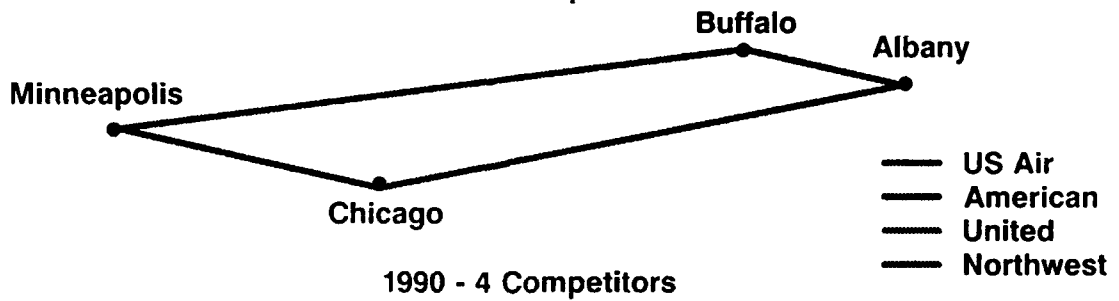
**POINT TO POINT SERVICE FAILS TO SERVE  
THE MAJORITY OF PASSENGER O & D DEMAND**

**For The Twelve Months Ending June 1990,  
Over 256 Million, Or 85%, Of The 302 Million  
U.S. Passenger Trips, Originated Or Terminated  
In One Of The 38 Largest U.S. Hubs.**

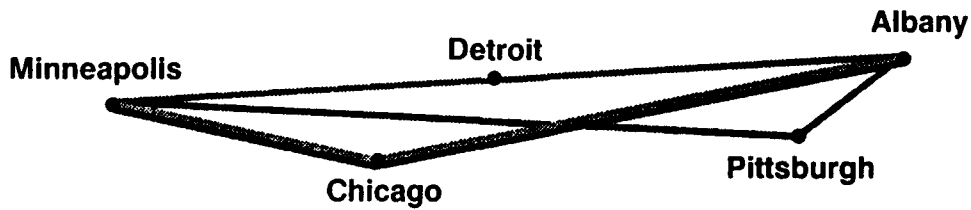
# PASSENGER FLOWS OVER CONNECTING HUBS

## Albany - Minneapolis Market

1979 - 2 Competitors

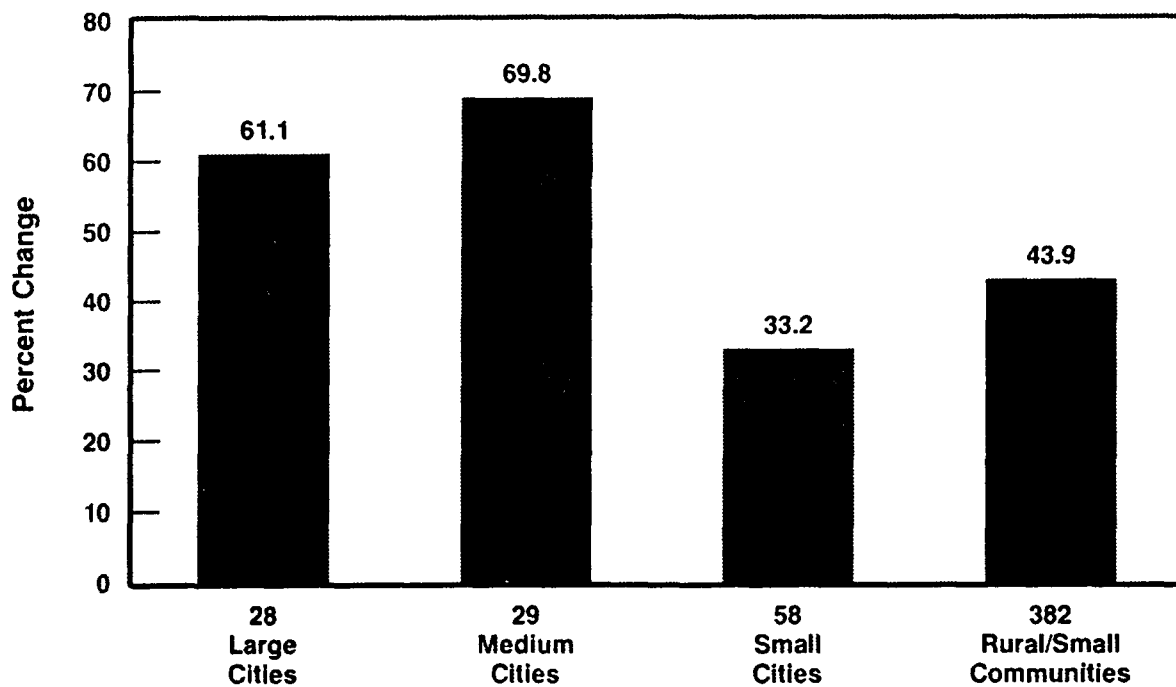


1990 - 4 Competitors



Slide 16

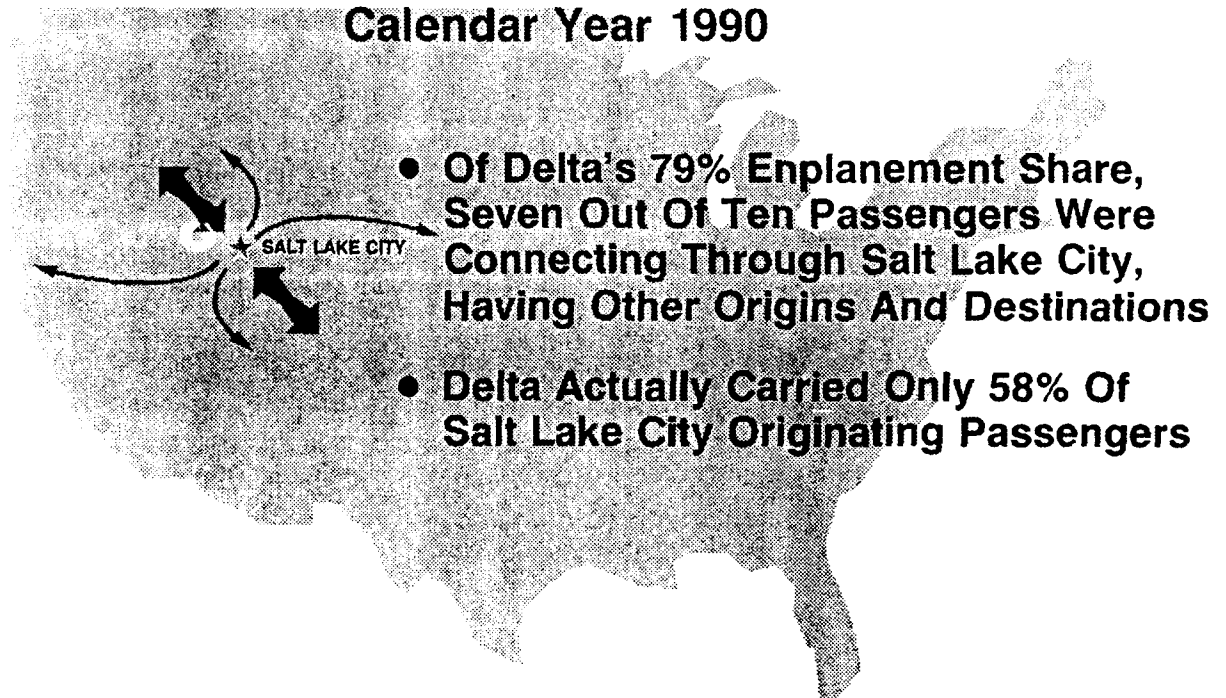
**GROWTH IN WEEKLY FLIGHTS  
1978 - 1989**



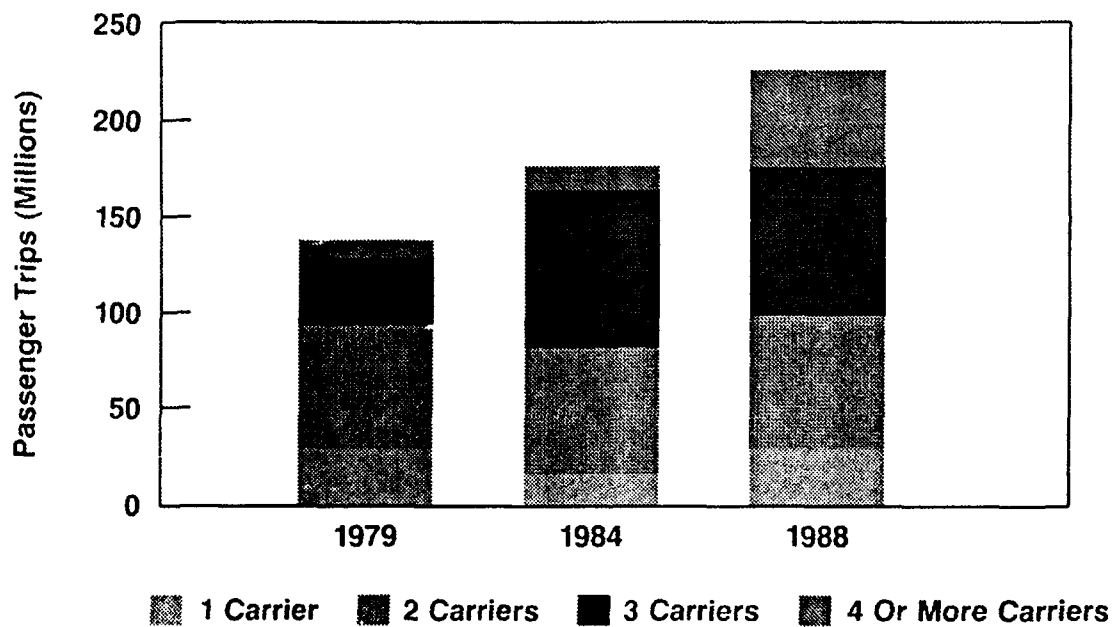


## DELTA'S PASSENGER ENPLANEMENTS AT SALT LAKE CITY

Calendar Year 1990



### PASSENGER TRIPS BY COMPETITIVE STATUS



**INCREASING COMPETITION DUE  
TO MARKET FRAGMENTATION**

Philadelphia - New Orleans

<u>Nonstops</u>	<u>August '81</u>	<u>August '90</u>
# Of Carriers	2	1
# Of Roundtrips	2	1
<u>One-stops</u>		
# Of Carriers	2	2
# Of Roundtrips	2	2
<u>Connections</u>		
# Of Carriers	4	10
# Of Roundtrips	18	48
<u>Total</u>		
# Of Carriers	4	10
# Of Roundtrips	22	51

## James D. Murphy

Vice President  
Planning  
AMR Eagle



### Biographical Highlights

James D. Murphy is Vice President of Planning for AMR Eagle, Inc., the commuter affiliate of American Airlines.

Mr. Murphy began his commercial aviation career in 1955. His background included piloting twin engine props and six engine jets in the United States Air Force. He has served in a variety of schedule and fleet planning assignments with Eastern Airlines, TWA, and American.

Now a Texan, Mr. Murphy received his Bachelor Degree from Holy Cross College in Worcester, Massachusetts and pursued graduate studies in economics at New York University.

### Summary

General economics and airline economics have generated the emphasis on "hubbing". It is the natural result of passengers wanting the capability of planning and completing their travel/communication venture as simply and efficiently as possible. Where nonstop/direct service is economically justified, it is operated today and will increase in the future. At the same time, there is an infinity of smaller markets waiting to be added to the air transportation network expanding the demand for "hubbing". Our challenge will be to provide today's passenger a reliable air transportation network resulting in sufficient profits for operators to generate the immense funds required for future investment.

## The Outlook For "Hubbing"

Good morning, Ladies and Gentlemen!

When Gene Mercer mailed out our assignments for this conference, he enclosed some guidelines and questions and asked that we pick a short title. One suggested question for us to answer was: would we see a continued growth of "Hubbing" or would the future envision trends toward more direct service. A second question was what impact has hubbing had on competition. I will argue that "Passengers and Profits" will answer the questions regarding hubbing and competition.

In preparing notes, I glanced through the registrants at last year's conference and was reminded of the variety and breadth of interest involved in this industry meeting. You know who you are but let me just ramble through what I consider to be an abbreviated list. There are media, airlines, engine manufacturers, aviation data services, computer services, universities, aircraft manufacturers, financial analysts, banks, aircraft leasing companies, the OAG, the department of transportation, insurance consultants, systems companies, the AOPA, airport executives, oil companies, IBM, Associations of Flight Attendants, The Chamber of Commerce, travel agencies, airline associations, construction companies, foreign embassies, pilot associations, propeller manufacturers, and of course our host members of the FAA.

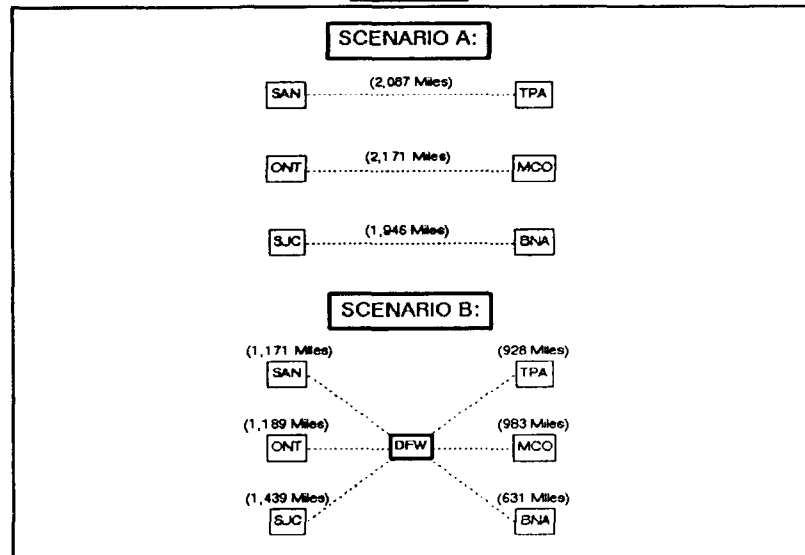
All of you are our partners in providing air transportation service and many of you, and hopefully most of you, are from time to time American Airlines and American Eagle customers. So let me begin by saying "thank you for flying American". And as both partners and airline customers, American hopes that you join us in thanking the FAA for sponsoring these meetings and making us focus on the commitments envisioned by their forecast.

### HUBBING

Now to hubbing. In my view, hubbing is a natural evolution and is the most efficient mode of providing air service for a multiple of individuals to and from a multitude of destinations. Hubs are efficient and improve air transportation for the traveling public. Exhibit 1 illustrates the benefits of hubs.

PANEL I

EXHIBIT 1



	Scenario A	Scenario B	% Change
Markets Served	3	15	500
Passengers	129	1,502	1,164
Avg Pax per Market	43	250	581
Aircraft Miles	6,204	6,341	2
Ground Crews	6	9	50
Air Crews per Aircraft	3	3	--

In brief, hubs provide a quadratic growth in markets and passengers served at a small increase in operating costs.

The telephone industry also has this problem of providing individuals with a personal mode of communication. Their solutions are explained by John Pierce and Michael Noll in a book published in 1990 called "Signals" and it provides an outsider's view of the lowest cost method of providing personal communication between large groups of individuals. Their thoughts: "...connecting each telephone directly to every other telephone of 200 million people in the United States would be ridiculously expensive. It is far more efficient to connect each telephone to a central office by individual wires and make the connections between the individual wires at the central office." They go on to say that only high technology combined with economies of scale in research, design, manufacture, and opera-

## PANEL I

---

tion can keep the cost of telephoning down as service expands. Further they go on to wonder about what degree of common ownership is optimal, and they wonder if servicewere to be provided by a host of local and truly independent companies, would that mean few customers could afford it. The book is basically aimed at describing the technical aspects of telephonic development but its section on "Cost and Value" and "switching" are directly parallel with the hubbing developments being discussed here today. They raise another familiar economic paradox... the value of having a telephone rises with the number of people you can talk to, the number of people who have phones. So, also, we, in the airline industry, find as the number of communities served by the "hub" increases, the demand for that service increases. Certainly it is no surprise that the job of American Eagle is to provide the most cost effective mode of bringing the smaller communities into the travel network...allowing individual passengers access into the air network which would otherwise not be economically feasible with the operation of large jets.

Large hubs benefit small communities. It is critical to individuals, passengers, in smaller communities to be able to reach larger communities and likewise it is critical that passengers in larger communities be able to reach smaller communities. The hub provides the critical "switch" to allow this interaction.

In July of 1990, Mr Melvin A. Brenner formerly Vice President of Planning for TWA and American and known to most of you, prepared a document for American Airlines with particular emphasis on the issue of "hubbing" and their resulting benefits. We have placed a number of copies in the back of the room and I would encourage you to take a copy and read and ponder its conclusions. It addresses the major issues confronting our industry today and it helps in understanding and explaining to basics of the airline marketplace.

In regard to why hubbing, Mr. Brenner explains: There are almost 50,000 city pairs in the domestic air travel system, but less than 2% of them generate enough local traffic to support nonstop service with modern jet aircraft.

The top 350 city pairs run from almost 4,000 passengers per day each way down to 160, and then the next 350 drop from 160 to about 75; or about the lowest level in which nonstops might be considered. Deducting the top 700 from almost 50,000 leaves 49,300 city pairs to be served, but which cannot support non-stop jet service. These 49,000+ city pairs can most effectively be served via hubs where hundreds of smaller markets can be consolidated.

Another important factor for the passenger is where he or she wants to go. As you may have guessed, the passengers in the smaller cities want to go to the larger cities. A review of the top 700 city pairs, wherein there could be as many as 1400 cities, shows only 102. It confirms the concept that the American Eagle passenger in Paducah wants to go to New York, Chicago, Dallas, etc. just as you would expect. The hub acts as the switching system allowing traffic consolidation from a multiple of smaller cities using smaller aircraft into larger aircraft destined to major metroplexes.

## PANEL I

---

A profile of American Eagle passengers using our morning flight out of Paducah to the Nashville hub is shown in Exhibit 2 and demonstrates this demand.

EXHIBIT 2  
PASSENGER DESTINATION DEMAND

<u>City-Pair</u>	<u>Destination</u>	<u>Passengers</u>	<u>Cumulative % of Total</u>
<u>PAH-BNA</u>	DFW	25	13.9%
	EWR/LGA	16	22.8
	MIA	12	29.5
	CHI	11	35.6
	PHL	10	41.2
	DCA	8	45.6
	BWI	8	50.0
	MCO	6	53.3
	BOS	5	56.1
	Top 10 AA Destinations		101
Other Major AA Destinations		53	85.6
OA Connections/Local		26	100.0
Total		132	100.0%

The top ten major cities account for 56.1% of the total traffic using flight 4,530 during the month of December, and combined with other major city AA destinations accounted for 85% of passenger demand.

As destinations are added to a hub like Nashville, there will be additional air travel demand, in turn, for Paducah. That is how operations at cities like Paducah can be sustained.

Now some comments to accentuate these benefits to small communities ... American Eagle serves more unique cities in the United States than American Airlines ... 85 to 60 as of Dec 31, 1990. Passengers in 85 smaller communities were able to reach American's largest metroplexes. American Airlines serves 5,500 city pairs but combined with American Eagle, we serve over 10,000. And we give the same personal service...in 1991, Sabre will answer 126,000,000 phone calls to permit this intermixing of service.

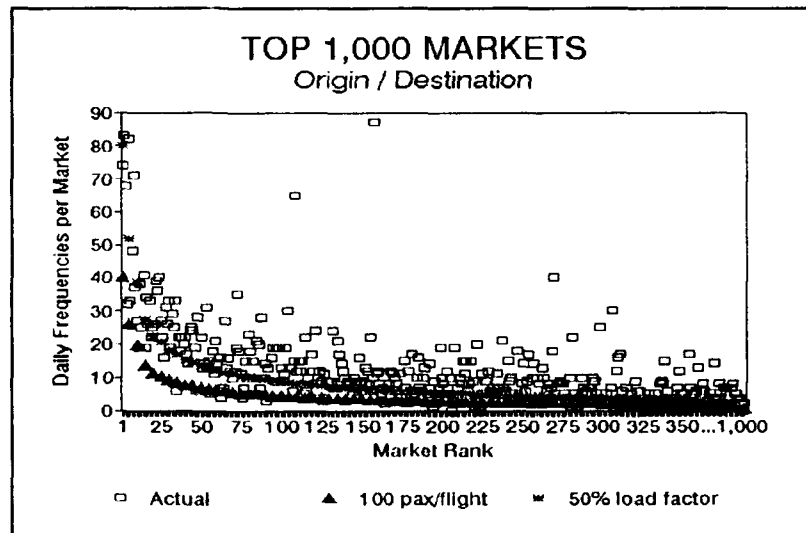


PANEL I

**Impact of Hubbing on Nonstop Service**

A public perception that is perplexing to me is that there seems to be a belief that, due to hub development, numerous city pairs that would otherwise receive significant nonstop service don't. This is not true. City pairs with high density traffic receive significant nonstop service. We tabulated the nonstops for the top city pairs for February 1991 as they appear in the reservation systems and constructed a graph (Exhibit 3) which demonstrates that in fact the large passenger demand city-pairs do have a high degree of frequency. The graph plots the number of daily frequencies on the Y axis. On the X axis are the top 1,000 city-pairs in descending order of daily demand running from the left corner. In order to provide a comparison of actual to what would likely occur based on city-pair O&D demand, we created frequency lines based on: 1) daily passenger demand divided by 100 or the number of frequencies that would occur if each trip operated with 100 passengers and 2) that same algorithm, but divided by 50%, or the same frequency demand at a 50% load factor. A glance at the chart demonstrates that there is a significantly higher number of nonstops actually operated than could be justified by local demand and also demonstrates that there are one heck of a lot of nonstops in the major markets.

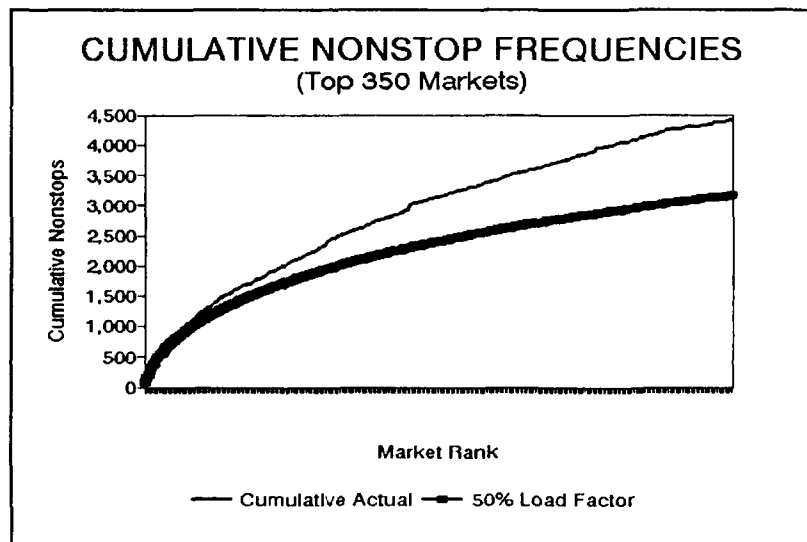
EXHIBIT 3



PANEL I

Another demonstration of the large number of nonstops being offered in the major markets versus the number they would receive if they were planned based on the local market demand is in Exhibit 4. This graph simply plots the cumulative number of nonstops offered in the top 350 markets versus that 50% load factor demand line. Rising from the bottom left, the lines are similar, but at about the 75th market the "actual" begins to rise far more rapidly than the "demand" line. At the 350th market, there are cumulatively about 1500 more nonstops than the individual city-pair passenger demands would require . . . or a little more than 4 frequencies per market.

EXHIBIT 4



PANEL I

The hub cities themselves are a natural evolution of a high demand for non-stop air service either because of their unique demographic and market dynamics or because of their geographical position. Listed in Exhibit 5 in descending order are the cities and the number of times the city appears as either an origin or a destination in the top 700 city pairs. The cities commonly called the "hub" cities are marked with an asterisk.

**EXHIBIT 5**  
**CITIES IN TOP 700 CITY-PAIRS**

NYC*	70	PHX*	41	SAN	25	SJC*	15	AUS	11
CHI*	64	SFO*	40	CLE*	23	SLC*	15	OAK	10
DFW*	53	PHL*	37	PIT*	23	SAT	15	BUF	10
WAS*	52	DTW*	34	BWI*	21	ONT	13	ELP	10
LAX*	50	MCO*	33	MCI*	21	CVG*	13	OKC	10
ATL*	48	SEA	29	MSY	20	SMF	12	CMH	9
DEN*	45	STL*	28	BDL	19	MKE*	12	SNA	9
BOS	43	MSP*	27	IND	17	ABQ	11	CLT*	8
IAH*	43	TPA	27	PDX	16	BNA*	11	RNO	8
LAS*	42	MIA*	26	FLL	16	PBI	11	BUR	8
TUL	8	ROC	5	CHS	3	LGB	1	DAB	1
TUS	7	SYR*	5	HRL	3	GRR	1	GSP	1
FMY	7	ORF	5	LBB	3	GJT	1	COS	1
RDU*	7	PVD	5	SAV	2	MRY	1	MLB	1
JAX	6	LIT	4	CRP	2	GEG	1	BTR	1
MEM*	6	SRQ	4	RIC	2	MFE	1	JAN	1
OMA	6	MAF	4	CAE	2	FAT	1	BOI	1
SDF	6	GSO	4	AMA	2	SBA	1	PSP	1
BHM	6	DAY	4	TLH	2	EUG	1	HSV	1
ALB	5	PWM	3	DSM	2	ISP	1	MDT	1

9 of the top 10 cities are hubs, 8 of the next 10 cities are hubs -- or 85% of the top 20 cities are hub cities. The major cities are naturally both major origins or destinations as well as being hubs.

We need to deal with the traffic demands for the major metroplexes. For example, listed in Exhibit 6 are the cities and daily frequencies scheduled in New York area (EWR, LGA, JFK) for February 1991.

PANEL I

EXHIBIT 6  
NONSTOP FREQUENCIES - NEW YORK AREA  
FEBRUARY 1991

WAS	83	BWI	30	TPA	22	ORF	16	MDT	10
BOS	74	MCO	27	BUF	22	STL	15	AVP	10
CHI	68	DTW	27	MHT	21	MSP	14	RIC	10
MIA	48	DFW	26	CLT	20	YUL	13	LHR	9
ATL	41	PIT	26	RDU	19	CMH	13	IND	9
FLL	33	PBI	25	SJU	19	PWM	12	BNA	9
LAX	32	CLE	25	SFO	19	BTW	11	MDW	9
ALB	32	SYR	24	YYZ	18	CVG	11	BGM	9
PVD	30	IAH	22	BDL	18	GSO	11	RSW	9
PHL	30	DEN	22	ROC	18	ORH	10	ACY	8
ITH	8	JAX	5	BDA	4	BRU	3	GON	3
ELM	8	ORY	5	MKE	3	LGW	3	POP	3
DAY	8	ABE	5	LEB	3	CAE	3	FCO	2
MSY	7	BDR	5	SDQ	3	STT	3	MAD	2
ISP	6	LAS	4	SWF	3	ARN	3	HYA	2
MCI	6	GSP	4	NRT	3	MEX	3	MXP	2
PHX	6	YTZ	4	SAN	3	MBJ	3	SDF	2
HVN	6	CDG	4	FRA	3	SXM	3	CUN	2
MEM	6	BGR	4	DAB	3	NAS	3	AUA	2
SRQ	5	SEA	4	ACK	3	MVY	3	BUD	2
SLC	2	PAP	1	OSA	1				
MLB	2	TXL	1	CCS	1				
POU	2	OMA	1	LGA	1				
ZRH	2	VIE	1	BGI	1	89	cities		
CPH	2	MUC	1	PSE	1	549	frequencies		
GIG	2	CHS	1	HEL	1				
LIS	1	SVO	1	NCE	1				
GRU	1	WAW	1	AMS	1				
QMX	1	HDN	1	AMM	1				
FBU	1	YOW	1						

I have purposely listed these cities and frequencies in their entirety in order to provide perspective as to the immensity of service in the New York area. New York currently has scheduled nonstop service to 89 cities with 548 frequencies or an average of 6 departures per city. In terms of departures plus arrivals that equals 1096 or one operation per minute in an 18 hour day. Two points: (1) can you imagine what the New York "operations" demand would be without hubs acting as consolidation points for the smaller cities; and (2) certainly, just looking at the listing, it is hard to conceive that New York is missing nonstop service that it might have had if it were not for hubs.

## PANEL I

---

In Dallas, the industry schedules 996 daily nonstop departures to 128 cities -- that equals almost 2,000 daily operations or 2 operations per minute in an 18-hour day. Dallas, because it is both a major destination and a geographically convenient "switching" point is almost twice the size of New York.

Both New York and Dallas are examples of cities which naturally evolved to be hub cities because of their unique demographic and market dynamics and Dallas adds its central geographic position.

Both are examples of cities needing added investment to improve their air network operational capability.

### **Competition**

There are probably many ways to discuss the issue of competition and market dominance. One focus is on the availability of alternative air service for you, today, at whatever city you are in and to where you are going. Another focus is on an individual airlines ability to procure the tools required to operate in the global market place. This latter focus is on the competitive capability to acquire aircraft, advanced technology, an educated-committed work force, energy, real estate and airport facilities, and to be able to negotiate favorable contracts with many of the companies represented in this room today - - G.E., Shell and Texaco, GM, United Technologies, McDonnell Douglas and Boeing.

Focusing first on inter-airline competition today, we did a sample of the alternative services available in mid-February 1991, and I need mention, this is after Eastern's shutdown. We took a look at the top 1,000 passenger markets and noted the number of carriers and frequencies offered. To keep the process manageable, we sampled every 5th market through the first 50 and then every 10th through 100 and then every 100th through the 1,000th market. This sample is shown in Exhibit 7. There are 25 markets with 357 nonstop services and 1,402 services when adding the on-line connections.

PANEL I

EXHIBIT 7  
25 MARKET SAMPLE OF  
TOP 1000 MARKETS

SERVICE FEBRUARY 1991 (EXCL. EAL)

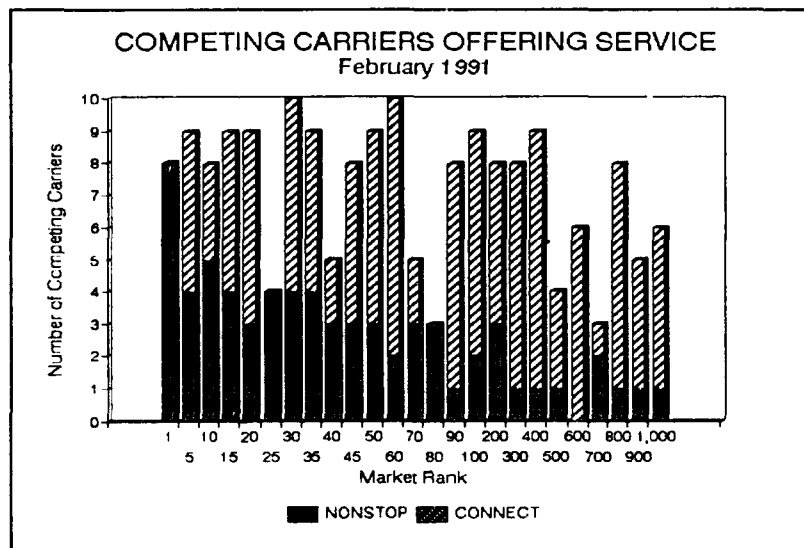
Pax Rank	Market	Number of Carriers Operating Nonstop or Connect Service		Daily One Way Service Offered		Total
		Nstp	Conn	Nstp	Conn	
1	NYC BOS	8	8	90	0	90
6	NYC FLL	4	9	25	51	76
11	NYC SFO	5	8	14	94	108
16	BOS WAS	4	9	25	70	95
21	NYC DFW	3	9	25	73	98
26	NYC BUF	4	4	21	17	38
31	PHX ORD	4	10	17	52	69
36	NYC DEN	4	9	18	64	82
41	LAS SAN	3	5	16	12	28
46	ORD PHL	3	8	20	52	72
51	ORD LAS	3	9	10	55	65
61	NYC PHX	2	10	5	86	91
71	PHX SFO	3	5	13	29	42
81	NYC ROC	3	3	17	2	19
91	NYC SAN	1	8	1	63	64
101	NYC FMY	2	9	9	53	62
201	DFW DTW	3	8	11	47	58
301	MSP MCO	1	8	3	38	41
401	MCI SAN	1	9	1	37	38
501	BWI FLL	1	4	3	24	27
601	BUF TPA	0	6	0	30	30
701	OAK PDX	2	3	5	10	15
801	BDL MSP	1	8	2	2	31
901	CLT IAH	1	5	4	25	29
1,000	IAH SNA	1	6	2	32	34

Number of Markets	25
Nonstop Services	357
Total Services	1,402

PANEL I

The intensity of competition is shown graphically in Exhibit 8. Looking from left to right or from the largest markets to the smaller markets, there is a logical decline in the number of carriers offering nonstop service - - from 8 in the largest, down to about 3 or 4 out to the 200th market and then down to 1 or 2 beyond that point. But the number of carriers participating in these markets via connecting hubs hardly declines at all with some 8 to 10 carriers competing through the top 400 markets and then dropping to 4 to 7 carriers competing out through the 1,000th market.

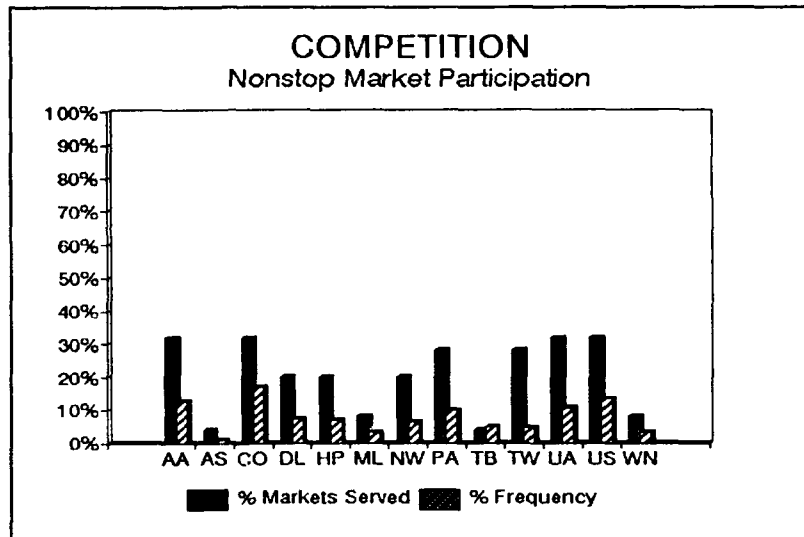
EXHIBIT 8



PANEL I

Exhibit 9 shows that no single carrier dominates the nonstop market place. Four carriers, American, Continental, United and USAir each participated in 32% of the markets. In terms of share of nonstop frequency, Continental led with almost 17% but there is no singular carrier dominance.

EXHIBIT 9

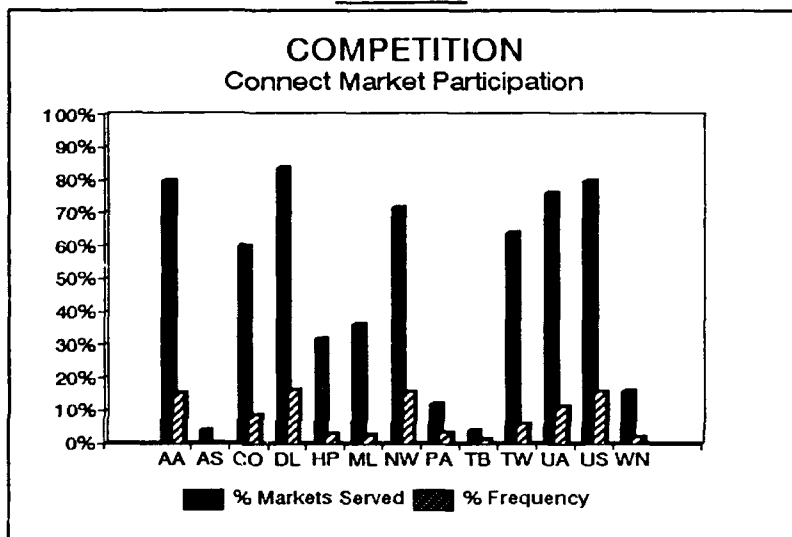




PANEL I

Exhibit 10 shows there is no singular dominating carrier in the "connecting" market place either. Delta is the largest competing in 84% of the markets, American and USAir are second competing in 80% of the markets. Further, no single carrier has a dominant frequency share of the connections -- Delta is first with 16.3%, USAir and Northwest were tied for second with 15.5% each. This suggests that hubbing is inherently competitive.

EXHIBIT 10



At the opposite end of the competitive spectrum are the cities served by just one carrier. We looked through the December OAG pocket Guide and found 89 cities and they are shown in Exhibit 11. A brief review of these cities indicates that they are the smaller cities of today and they probably cannot economically justify service by more than one carrier. Looking toward the future, however, American Eagle views these cities as potential customers to add to our hubs and I have personal knowledge that many of these cities look forward to our arrival -- but certainly there is nothing anti-competitive just because they are served by one carrier today.

PANEL I

---

EXHIBIT 11  
CITIES WITH ONE AIRLINE

Kotzebue	Augusta	Blue Bell
Anniston	Escanaba	Bradford
Gadsden	Hancock	Du Bois
Prescott	Pellston	Franklin
Sedona	Brainerd	Johnstown
Chico	Duluth	Lancaster
Concord	Grand Rapids MN	Latrobe
El Centro/Imperial	Hibbing	Reading
Lake Tahoe	International Falls	Williamsport
Merced	Thief River Falls	Aberdeen
Visalia	Winona	Watertown
Cortez	Cape Girardeau	Jackson
Fort Collins	Columbia	Saint George
Vero Beach	Greenville	Whitehorse
Athens	Rocky Mount	Moses Lake
Valdosta	North Platte	Oak Harbor
Kamuela	Williston	Port Angeles
Princeville	Scottsbluff	Pullman
Fort Dodge	Trenton	Walla Walla
Iowa City	Las Cruces	Greenbrier
Mason City	Los Alamos	Eau Claire
Marion	Roswell	Rhineland
Mattoon	Santa Fe	Beckley
Quincy	Elko	Bluefield
Lafayette	East Hampton	Clarksburg
Terre Haute	Jamestown	Mogantown
Topeka	Saranac Lake	Laramie
Martha's Vineyard	NorthBend	Rivertown
Hagerstown	Pendleton	Rock Springs
Salisbury	Altoona	

## PANEL I

---

In my opinion, this brief review of service competition in February of 1991 revalidates comments from the Secretary's Task Force on competition released one year ago in February of 1990.

In spite of recent increases in concentration at the national level and at a significant number of hub airports, the changes in airline service patterns over the past decade appear to be overwhelmingly positive. Consumer choice, in terms of frequency, timing and routing of flights has been significantly increased. More city-pair markets and more passengers enjoy competitive service with more competing carriers than they ever had before.

The frequency of service at the majority of points is up, and 3 out of 4 points large enough to support 40 seat aircraft have had service improvements.

In city-pair markets, which are widely considered the most relevant markets for competitive analysis, concentration has declined and competitive service has increased significantly. More than half the passengers traveled in markets with 3 or more competitive carriers in 1988 compared with only one quarter of the passengers in 1979.

The increase in competitive service in the city-pair markets in the face of increased carrier concentration in the national market and at many hubs is explained by the dramatic increase in the number of points served nationwide by the major carriers which are now interconnected through well-developed hub and spoke networks.

Looking toward the future I would like to diverge somewhat from the competitive activities among the airlines and ask that you consider a broader perspective of competition. For example one of American Eagle's major competitors is the private automobile and the rental car. I was reading an article in the paper a few weeks ago and it told the story of a Mr. McMillan who was stopped by the police on his way to Washington to take part in an organized protest rally. He was traveling 900 miles on a weekend and was quoted "Here I am doing what's cheaper and easier for me". It seems to me that the only way that Mr. McMillan is afforded this opportunity is that the funds set aside from the tax on gasoline for highway funding are spent on highway funding. The air transportation network needs to invest its funds set aside from the tax on air travel in a similar manner ... if we are to be competitive.

Another aspect of competition is often described by the single word "Dominance", and there appears to be a Gorbachevian dichotomy which suggests that each and every commercial enterprise in the United States should seek "Dominance" except Airlines. Most major companies outside the airline industry make a point of the importance of "Dominance." Mr Welch of General Electric is said to have a policy that GE will not remain in any business that they do not dominate.

## PANEL I

---

Why should "Dominance" usually be used in a negative manner concerning airlines when it is more likely a result of providing an exceptional level of service and performance that makes the carrier the passengers preferred choice.

A hub operation must be large if it is to provide service to all. The creation of a hub normally evolves from joining together large long distance markets, and at a certain size, service to small and medium cities can be profitably added. The true beneficiaries of large hubs are residents and businesses in small cities. In order to have a successful hub, it is necessary to have a mix of small, medium and large aircraft serving small, medium and large cities.

American Eagle and American Airlines are investing in hub development and the aircraft necessary to make them work.

At the end of 1990, American had firm commitments for 215 aircraft for delivery through 1994. American Eagle took delivery of 36 new turboprop aircraft in 1990 and at the end of the year had an additional 120 new aircraft on firm order. American and American Eagle are investing not just to be large or to dominate but to be quiet and safe and technically superior and efficient.

In my opinion, what it takes to dominate is to "care". It requires an intense investment of personal energy on the part of everyone associated with an organization....it takes a shared individual commitment to leadership...and it takes the courage to invest in the future in the face of financial and legal uncertainties. That is what the organization of American Airlines and American Eagle is all about...and I suspect it is also true of every successful commercial enterprise. Those other enterprises are represented here in this room today and most of you are doing very well indeed. (Exhibit 12)

### EXHIBIT 12 REVENUES AND PROFITS - PARTNERS

	<u>1990</u>	
	<u>Revenue</u>	<u>Profits</u>
	<u>\$ Bil</u>	<u>\$ Mil</u>
IBM	69.0	6000
MOBIL	64.2	1930
GENERAL ELECTRIC	58.4	4300
TEXACO	41.8	1450
AT&T	37.3	2730
BOEING	27.6	1385
UNITED TECHNOLOGIES	21.8	751
AMR CORPORATION	11.7	- 40
DELTA	8.7	-154
USAIR	6.5	-454

## PANEL I

---

The point of Exhibit 12 is to convey the message that American and Delta who share this podium today not only compete with each other but also need to deal and negotiate with the principal vendors in the air passenger service business. I have sat across the table from individuals in GE and Pratt Whitney, and I can assure their management you fellows gave nothing away ... so congratulations to you, and your companies for achieving "profits", and being "dominant".

### CONCLUSION

When Boeing released their 1990 results, they included some notes regarding their aircraft sales for 1990 (Exhibit 13):

**EXHIBIT 13**  
**BOEING'S AIRCRAFT SALES**

	No. Aircraft	Sales Rev \$Bil	Price Per Aircraft \$Mil
747 Jumbo Jets	172	\$26.2	\$152.3
Other Jets/Props	<u>371</u>	<u>\$21.5</u>	<u>\$ 54.4</u>
Total	543	\$47.7	\$ 83.8

The reason for showing The Boeing aircraft sales numbers and the relative revenue and profits for your companies is to emphasize the vast size and complexity of the industry in which we operate. Imagine considering starting an airline when the average aircraft price is over \$80.0 million each -- imagine continuing in the airline business when you know these types of investments are required to succeed -- and then imagine exerting all your efforts and summing up all your courage to proceed and have someone say -- nope, you are too big.

In order for the airline industry to proceed, we the airlines, and you, our partners, need to provide the public a credible message regarding the requirements for the United States Airline networks growth. Part of that message needs to include the imperative requirement for airline profits and a legal environment which rewards excellence and competitive effort.

Further, we need to be taking all steps to ensure that hubs can grow and operate without constraints. We need to adjust the ATC System to compensate for the increased demand created by new and larger banks of flights. If not, then it will be the small cities, those with limited air services, which will lose out. To suggest carriers move operations to non-peak times defeats the very purpose of hubs. We need to take a look at existing restraints, such as the high density rule and eliminate the economic limitations contained in it.

PANEL I

---

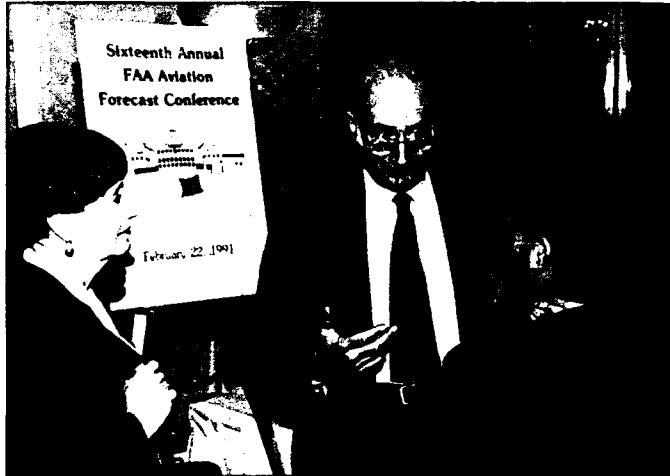
Forecasting the future accurately and creating the credibility required for attracting the energy and investment to carry out those forecasts is, I believe, why we are here today. But today we are experiencing some disturbing trends. Incentive to invest and to compete are being diminished by reactivation of regulatory restrictions or the threat of regulatory restrictions. Profits are not sufficient to sustain the growth experienced in the past and now forecast for the future. The passenger is experiencing discomfort due to strains in the air transportation network.

We need to work together to change these trends and, if we do, in my opinion, we will meet or exceed the FAA aviation forecast just released for fiscal years 1991-2002.



PANEL I

---



## **R. Lawrence Hughes**

**Senior Vice President  
DHL Airways**



### **Biographical Highlights**

R. Lawrence Hughes has spent over twenty years in the airline industry starting his career with Eastern Airlines in New York after completing his MBA at the University of Chicago in 1968. Mr. Hughes later served in planning and marketing roles at Pan American, Continental, Midway and Braniff Airways until 1989 when he joined DHL as Senior Vice President, Airline Operations, and member of the board of directors.

At DHL, Mr. Hughes is responsible for all centralized sort processing and hub functions as well as all airline operations for DHL, a certified air carrier based in Cincinnati, Ohio. In addition, he is responsible for overseeing DHL's Canadian, Mexican and Latin American airline operations.

Mr. Hughes, born and raised on Maui in Hawaii, is an active skier and instrument-rated private pilot. He has spent over twenty years in the airline industry starting his career with Eastern Airlines in New York after completing his MBA at the University of Chicago in 1968. Mr. Hughes later served in planning and marketing roles at Pan American, Continental, Midway and Braniff Airways until 1989 when he joined DHL as Senior Vice President, Airline Operations, and member of the board of directors.

### **Summary**

Over the years since deregulation took effect, hubbing by airlines has permeated the industry. The air express industry utilizes hubbing systems as fundamental elements to meet high service expectations and are critical to its success. DHL, a world-wide express operator, operates numerous hubs around the world to serve its customers. These range from large extensive operations in Cincinnati and Brussels to small ones in Harare, Zimbabwe or Sidney, Australia. Because of their crucial role, hubs must be optimized to effectively contribute to the extensive network of an air express operator.



## The Optiminization of Hubbing

Thank you for the opportunity to address you as the first express carrier to participate in your Aviation Forecast Conference. Most of you are quite familiar with the operations of both passenger and all-cargo airlines. However, you may not realize the demanding nature of overnight express delivery services and how hubs are absolutely critical to their success.

Question. Have any of you ordered computer software or equipment and had the choice of paying the extra \$2 or \$3 for overnight delivery? The price may be nominal, but much goes into making that happen -- overnight that is.

Question. Have any of you needed to get an original of a contract signed in Jakarta and sent back within a limited time frame? Well, neither have I. But, if you did want to do so, the express industry provides the infrastructure for accomplishing these tasks, whether they be for overnight domestic shipments or international document transfers.

Having spent most of my career in the passenger airline business, joining DHL was a new venture. Little did I know of the challenge -- in its broadest definition -- of what that would entail.

When I first started at DHL, a number of my friends commented that it must be nice not to have to deal with passengers or their travel agents anymore. What with their demands, complaints, unreasonable expectations in response to cancelled flights for accommodations, meal vouchers, or actually expecting baggage to be on the same plane to accompany them on their travels and the like.

What could be better than to still be associated with the airline industry, to feel the fire in the veins, the kerosene in the blood, and the excitement of streams of never-ending changes and not have to deal with those passenger problems?

Needless to say, the reality has proven to be quite the opposite.

Passengers generally travel out and then return and do so mostly on the same airline. Documents or packages usually go only one way. We certainly hope they do not return to their origin, which means that there are twice as many people involved in the movement of materials.

The volume of a typical Boeing 727, such as those we fly, carries upwards of 40,000 pounds or approximately 8,000 pieces. That translates into potentially that many customers who are looking for their deliveries at 10:30 the next day, or noon, or whenever we said we were going to get them there.

Express customers have come to expect a high standard of service. Essential to our industry's ability to meet those service expectations is our ability to carefully

## PANEL I

---

manage our hub operations, aircraft schedules and ground movement. And we must do it in such a way that we maximize the efficiency of the flow of materials in a very tight time frame.

One fundamental difference between overnight express hub operations and traditional passenger hub and spoke systems is that there is but one time of day that it all takes place. At night. Not in banks throughout the day. Once, at night.

One departure from a city or town, whether by truck or plane. There is no option of alternative departures during the day. This critical factor drives all decisions concerning the express operation.

Why?

Because it is the definition of the service that is being offered. For domestic overnight service, customers demand that their documents or packages be picked up late in the day, the later the better. And they want them delivered to the destination the next morning, noon or afternoon, depending upon the expected service level.

In the international domain, customers want deliveries within the next day, where that is feasible, as from London or Frankfurt to the United States, or in two to three or more days, however long you tell them it will take from one origin to a destination. A package which DHL picks up in Seattle, for example, will be delivered in Johannesburg on the third day.

What are characteristics of hubs in the express business that impact their contribution to the service we offer?

Location, for both time and distance and population

Weather

Infrastructure or the potential for expansion

Facilitation, the ease of processing, either through Customs or other handling requirements

Unlike a passenger carrier, the magnitude of local originating business is irrelevant for determining the location for an air express hub.

So what does happen? How does it happen? When? Who does it?

What are the tradeoffs? What are the inevitable compromises necessary to make a system work?

How do we manage or even optimize a hub in this business?

### **A Little History**

As we address these questions, let me also provide some flavor of DHL and how the company has managed to become the largest carrier in the international express business.

DHL started in Honolulu in 1969 as an overnight courier service between Honolulu and San Francisco. Three guys named Dalsey, Hillbloom and Lynn were the founders of the company and they pulled together a rag-tag group of people who were drawn to the challenge of building something from nothing.

They went around, taking a bunch of envelopes, labels and pouches to see if customers wanted to quickly move materials from one location to another.

When they couldn't get a friend or an acquaintance to take the material either to or from the Islands as part of their baggage, they would have to resort to buying a ticket and jumping on an airplane themselves. They worked deals with airlines for discount rates in order to keep the costs down.

Realizing modest success, they expanded operations throughout the Pacific basin, using various international carriers that then provided service throughout the region.

The use of in-flight couriers was a primary element in making the service work. In order to obtain couriers, employees, their families, their friends, and their friends of friends were pressed into service and would have tickets purchased for them to travel and take the documents as checked baggage.

The business grew. Volume into country's entry points expanded, creating gateways and the beginning of hubs. These grew into broader networks, each serving a surrounding region or geographical area. The spider-like network continued to expand, with sub-networks being created.

By the late 1970's, DHL concluded that San Francisco seemed to be a better choice for managing this increasingly complex business, so headquarters were moved there.

Throughout the years, including the period after DHL started its own airline operations, the company has always relied primarily upon commercial passenger aircraft to provide the essential capacity for express document and package freight. Only in those areas where sufficient volumes warranted it aircraft had this more expensive option been pursued, or where there is not adequate commercial space available to meet the demand.

## PANEL I

---

DHL personnel met the aircraft to pick up or deliver material for distribution.

Service centers, located on or near airports, sorted the material into delivery lots that ground couriers then disperse to customers. Pickups are the reverse process. DHL basically does the same today.

When it finally seemed necessary to provide its own capacity, DHL started its first airline, DHL Cargo, during the time the company was focussed in Hawaii. It plied the Islands with materials that then connected with the Mainland flights.

With the increasing focus in San Francisco, coupled with local competitive pressures, the Hawaii-based DHL Cargo was finally disbanded.

With deregulation of the airline industry, DHL began an airline operation in Seattle to move material up and down the West Coast.

Then in 1983, DHL created a hub in Salt Lake City, everyone's favorite good weather location, and one in Cincinnati with the first Boeing-727 aircraft linking the east and west coasts, with these cities being relatively small hubs.

### **The Hub**

Why Cincinnati for a hub?

If Airborne was in Wilmington, Ohio, just north of Cincinnati, and Emery was in Dayton, and Federal was in Memphis and UPS was building Louisville and Tigers was in Columbus and Burlington Northern was in the area, then why not Cincinnati?

The criteria for a hub? Let's look back to the list of factors that warrant consideration.

#### **Location:**

Actually, one characteristic about all of these places is their geographical desirability. They are relatively close to the major population centers of the east and yet are far enough west that the long flight times and distances to the west coast are manageable from a service viewpoint. And reasonably balanced, north and south. Good locations.

#### **Weather:**

Generally moderate. No place is perfect and, in fact, Cincinnati has produced more complete shutdowns due to zero-zero conditions in the past year than in all the previous years DHL has been there. However, Minot, North Dakota, while a lovely town, poses greater weather challenges.

## PANEL I

---

### **Facilitation:**

Cincinnati maintains extensive Customs facilities and with an expanding network of direct international services, the location provides the ability for alternative material routings as volumes or conditions dictate.

### **Infrastructure:**

Plenty of real estate and a positive governmental outlook for support for local businesses to expand the physical resources.

Key points in the effectiveness of a hub.

Let's go back to DHL, to bring us quickly up to today. By 1987, volumes required that DHL consolidate and produce a broader network of services. The Salt Lake City hub was closed because the need for it was superseded by Cincinnati.

Today, DHL owns and operates four airline operating groups around the world to supplement the commercial lift for the now \$2 billion worldwide organization.

First, there is DHL Airways, a US airline, with principle operations at the hub location in Cincinnati. The fleet is comprised of Boeing 727s, Fairchild Expeditors and some forty or so chartered planes, ranging from jet equipment to small propeller planes operating around the country.

DHL owns European Air Transport, which is a Belgian certificated air carrier, headquartered and operating from the hub in Brussels with 727's, Convairs and other chartered equipment.

In the Middle-east, DHL owns SNAS, which is based in a hub operation in Bahrain, a location you may have become more familiar with over the past six months or so.

Fairchild Metro III's operate there and are currently being supplemented to meet high demand by two Convairs that have been assigned from the Brussels group. DHL is the only express group providing service in the region.

The Latin American division, comprising various DHL owned or partially owned airlines in the Caribbean and Central America, operates out of a hub based in Panama.

Latin America and Bogota, in particular, provides its own challenges for resourcefulness and customer service, given the potential of carrying white powder, which is not talcum powder, around in packages by intent customers.

DHL serves 185 countries, from American Samoa to Zimbabwe, on all continents. How does DHL make this world-wide international network work? What happens? How does it happen?

## PANEL I

---

Hubs. Dozens of hubs. Large hubs that process thousands of pieces each day. Small hubs that process hundreds of pieces a day.

The large ones - Cincinnati, Brussels, the major focal points in the network, processing hundreds of thousands of shipments each day.

Smaller ones like Tokyo for the Far East, Singapore for Southeast Asia, Bahrain for the middle-east, London for the UK and Africa.

These are airline hubs. There are trucking hubs, such as this one for the Northeast that transfers material throughout the region.

When does this all take place?

Each day, primarily at night for the major hubs. During the late afternoon or early evening for the pickup cycle. During the early morning hours for the delivery cycle.

The essential ingredient for all of these hubs, large or small, is the short and tight window to process the material. Ground couriers pick up and deliver to and from the sort facility, either by motorcycle, truck, van, automobile or even bicycle.

They meet arriving or departing flights to receive or send DHL material, transporting it between the airport and the service facility.

Here, as quickly as possible, it is sorted, bagged, coded, scanned, manifested, and reloaded into containers, trucks or whatever other vehicles are used for on-forwarding.

The station sends pre-alerts to the next station or central hub notifying them of materials that will be enroute so that Customs officials can be prepared where required.

What are the tradeoffs in this process?

What are the inevitable compromises necessary to make a system work?

Timing represents the most critical factor that must be balanced between the need for the latest customer pickup time that can be offered, the earliest delivery time in the day that can be served and the amount of time that is required to move the material, once in our hands, through the system from origin, to the hubs and on to destination.

A perfect equation to make everyone happy? Not likely.

## PANEL I

---

Naturally, the sales people want the latest pickups and earliest deliveries. The couriers want plenty of time to process, scan, manifest, consolidate. The airline wants realistic flight schedules. The hub wants sufficient time to flow the material through the labyrinth from coming in -- to sending out.

The optimal process balances all these elements to provide the best customer service, given the requirement to move material through the system as quickly and efficiently as possible.

The tradeoffs occur all along the way. At the local level. At the hub facility. In the flying times and routings.

The central hub represents the core of the effort of the company to meet these challenges. Managing the hub is an intense proposition, involving many tradeoffs and compromises to meet the conflicting needs.

The hub is a living, flexible organ, not a cold building with conveyors, slides, belts, docks, scanners or dark passageways.

Hub management closely selects the number of people required in the various *processing points* by day of week in a facility, whether it be the airport station in Budapest or the Kennedy gateway. The start times are coordinated for arrival and departures. The speed of material flow is monitored to maximize the time available to process given volumes. And the physical layout is modified over time to respond to the changing mix, product sizes and number of shipments.

Customers are demanding more and more from the express services they select. They now want step-by-step tracing for all their material. They want to know flight numbers for their shipments. This we do not provide for security reasons, as you can imagine.

Multi-national companies want world-wide consolidated statements, when individual airbills are generated in lira or yen or cruzeiros.

The technology is not available to accomplish many of the communications functions we recognize that we want to offer our customers.

Some day, though, the tools will be there.

DHL's success, or the success of any of our fine competitors, for that matter, is heavily dependent on how well all of these factors are integrated in a dynamic, ever-changing mosaic.

Yes, it is true that I don't have to face the unruly, disgruntled Las Vegas traveler who blames the airline for all his losses as he waits for a delayed flight home.

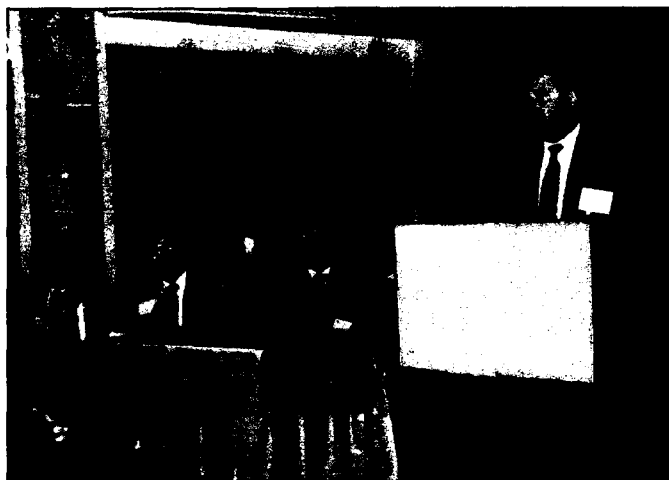
## PANEL I

---

But, you know, I do feel it every time I see a damaged box that looks like it just came out of a losing bout with a road grader.

It happens -- and someone won't be happy.

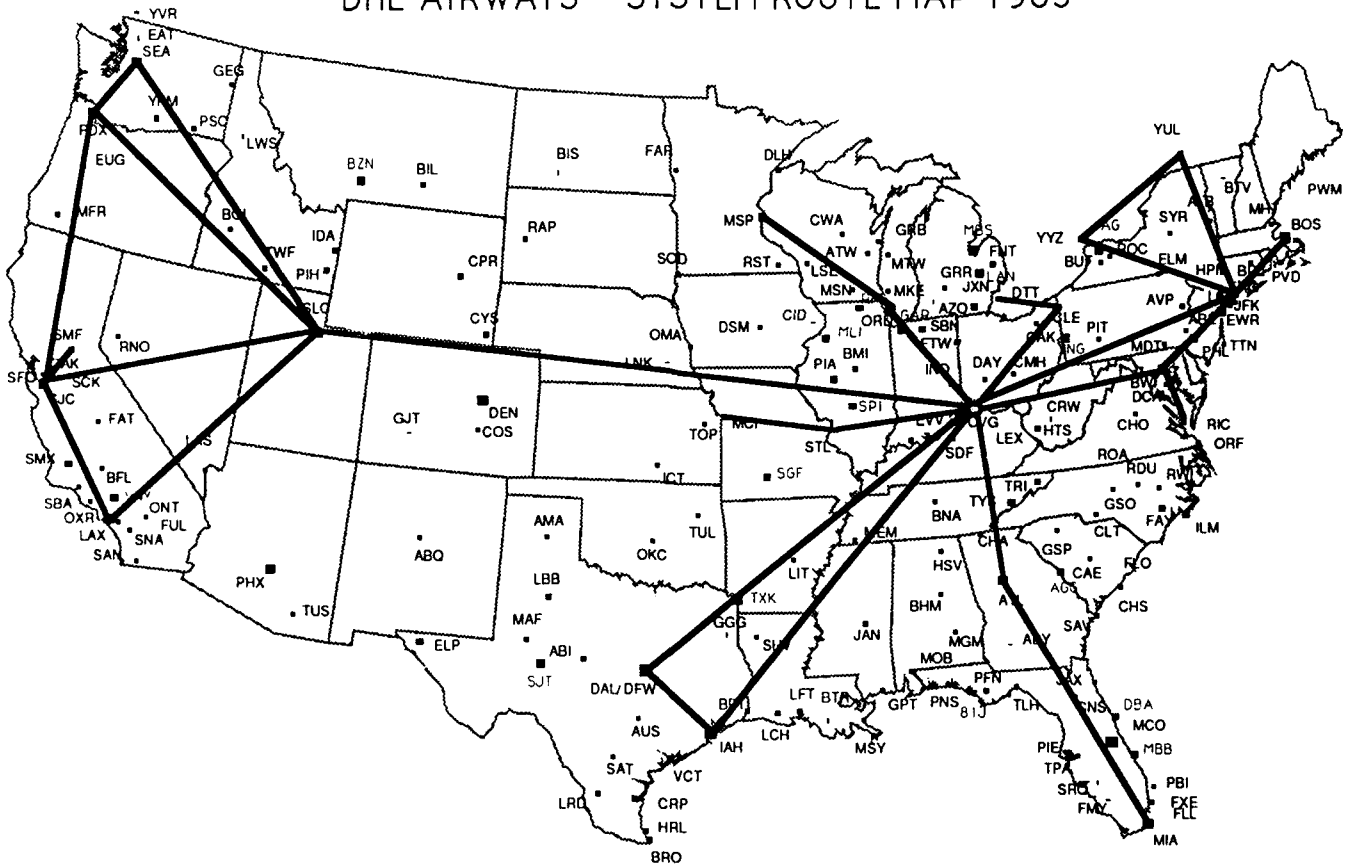
But we will be back tomorrow to figure out how we can make for a gentler, kinder material handling process.



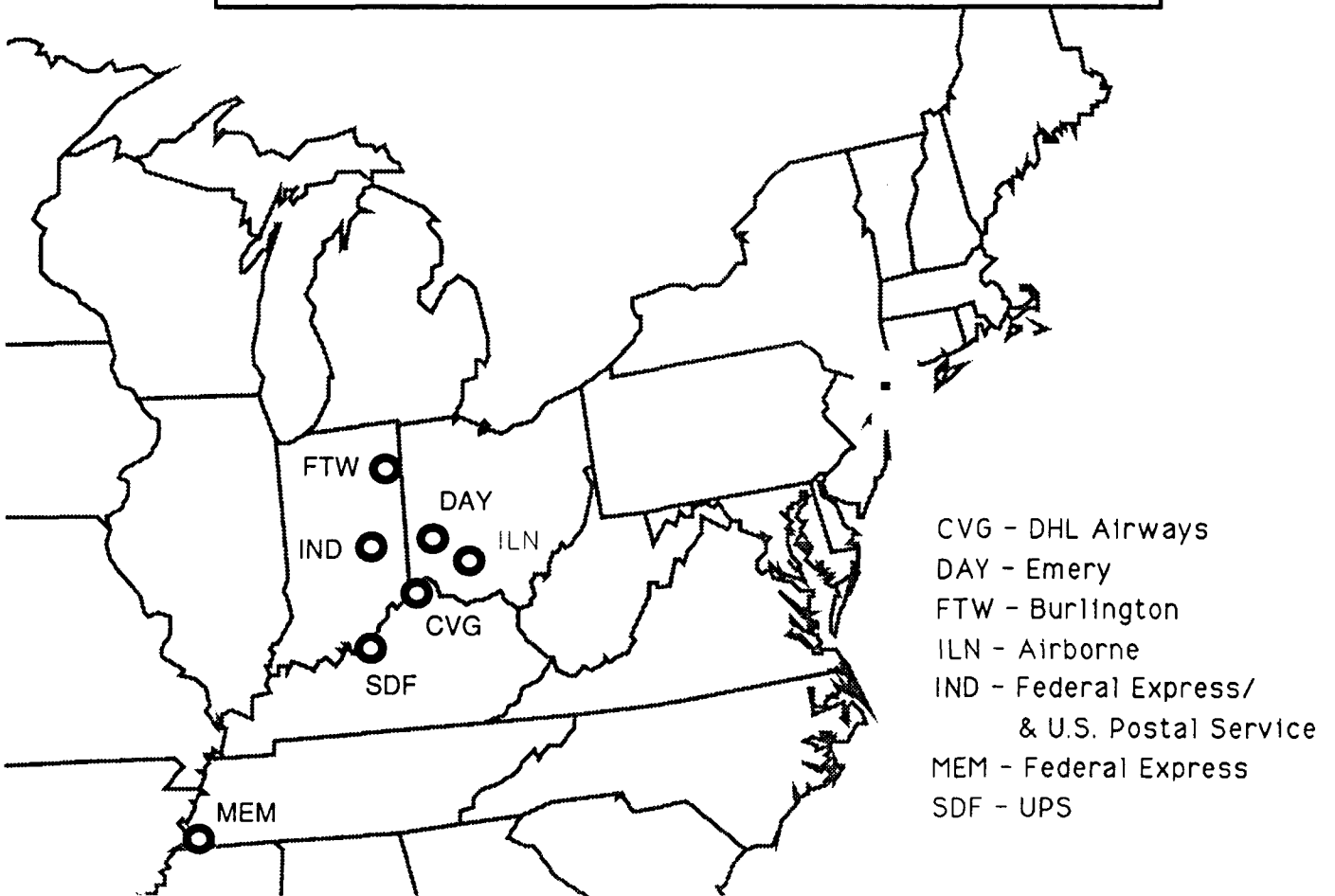


PANEL I

DHL AIRWAYS - SYSTEM ROUTE MAP 1983



DHL Airways Competitor Hub's

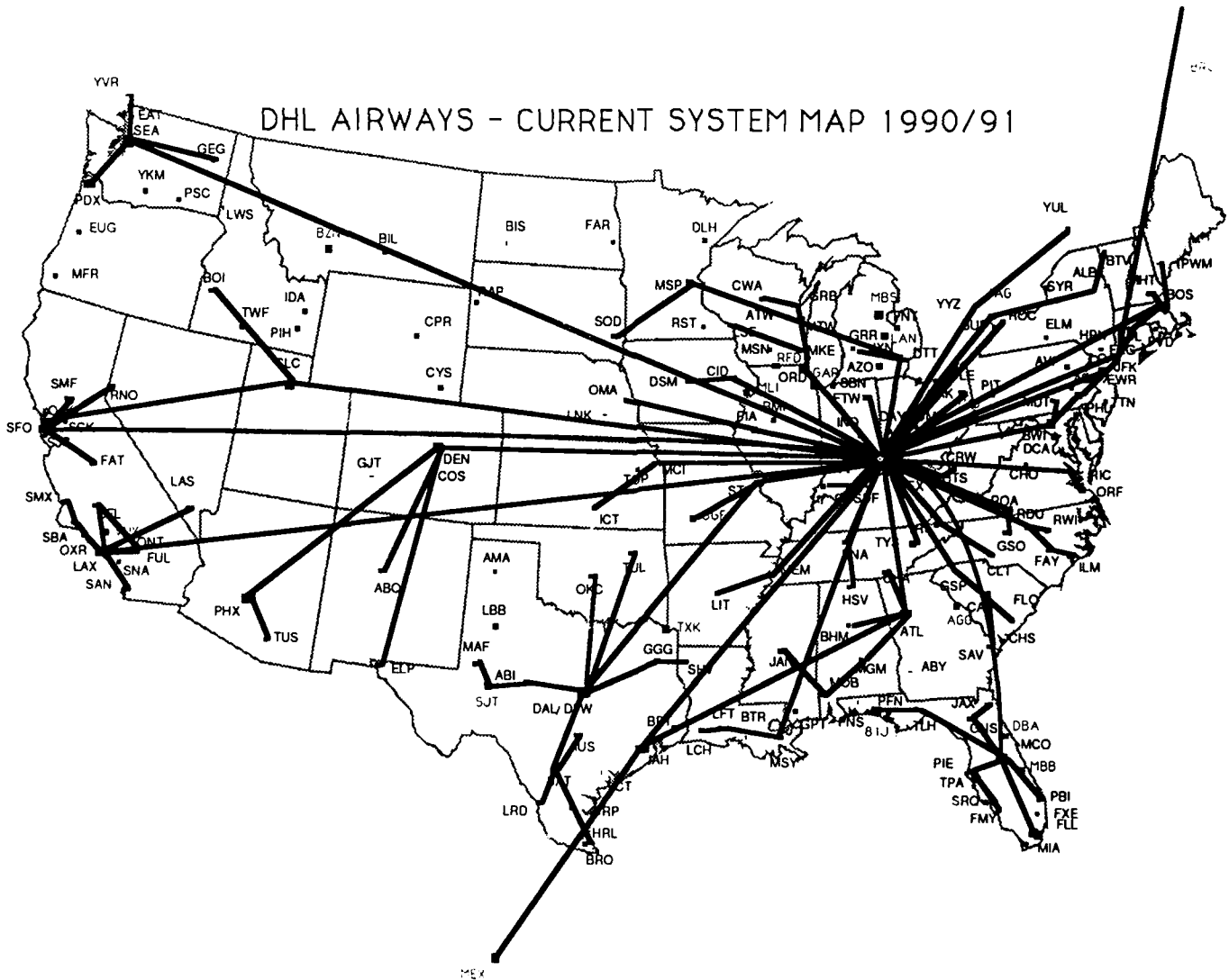


PANEL I

DHL AIRWAYS - SYSTEM ROUTE MAP 1987

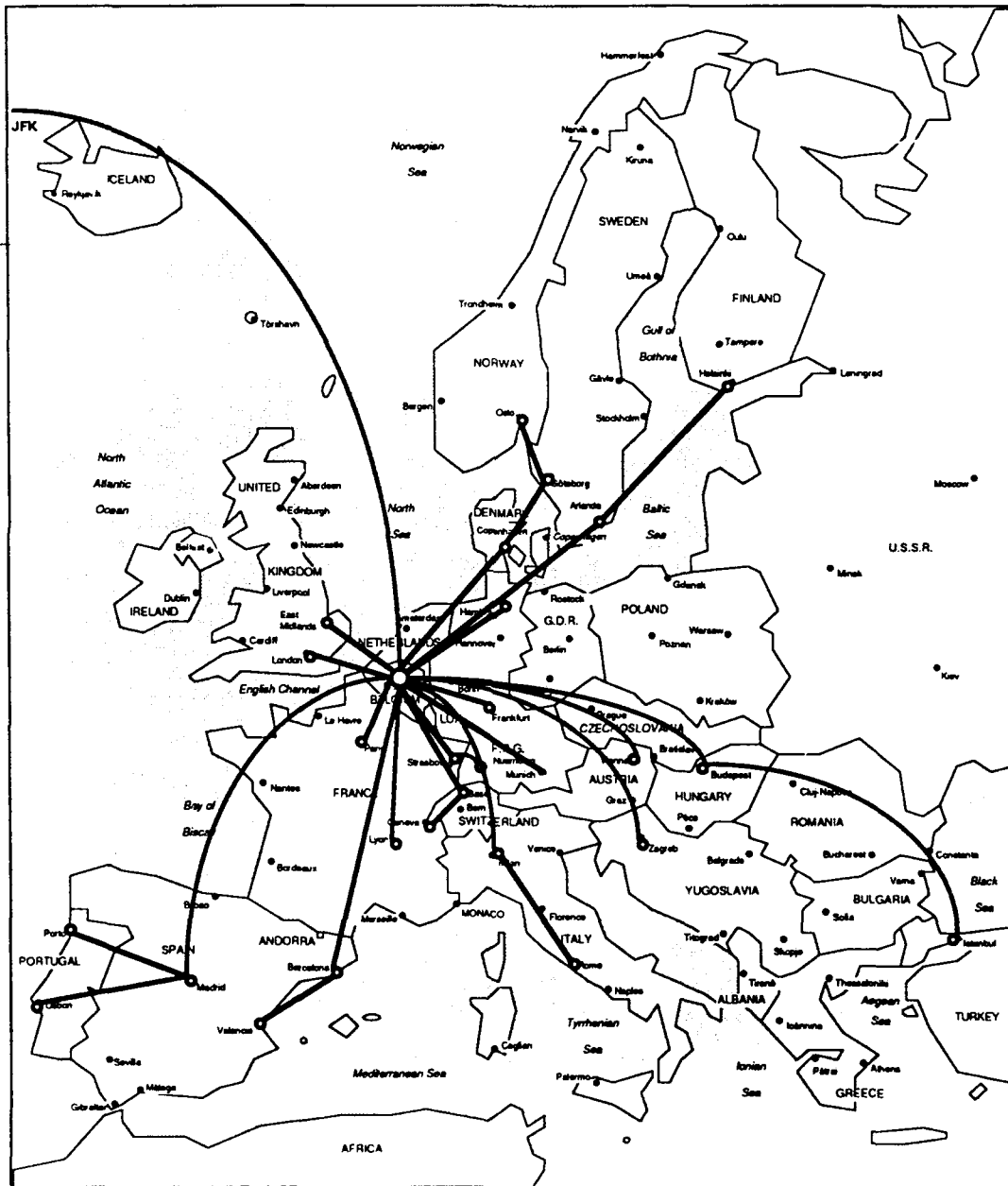


PANEL I



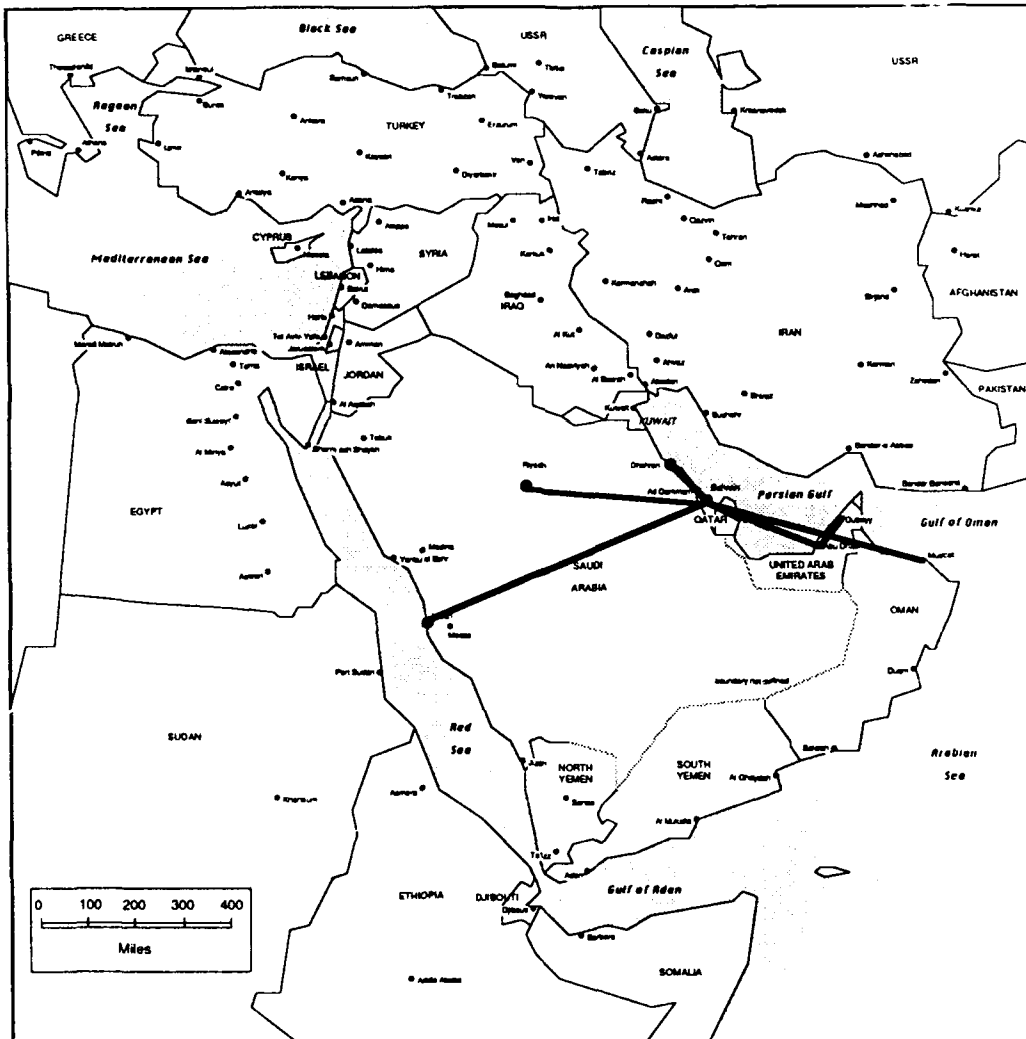
PANEL I

DHL Airways European System Route Map 1991



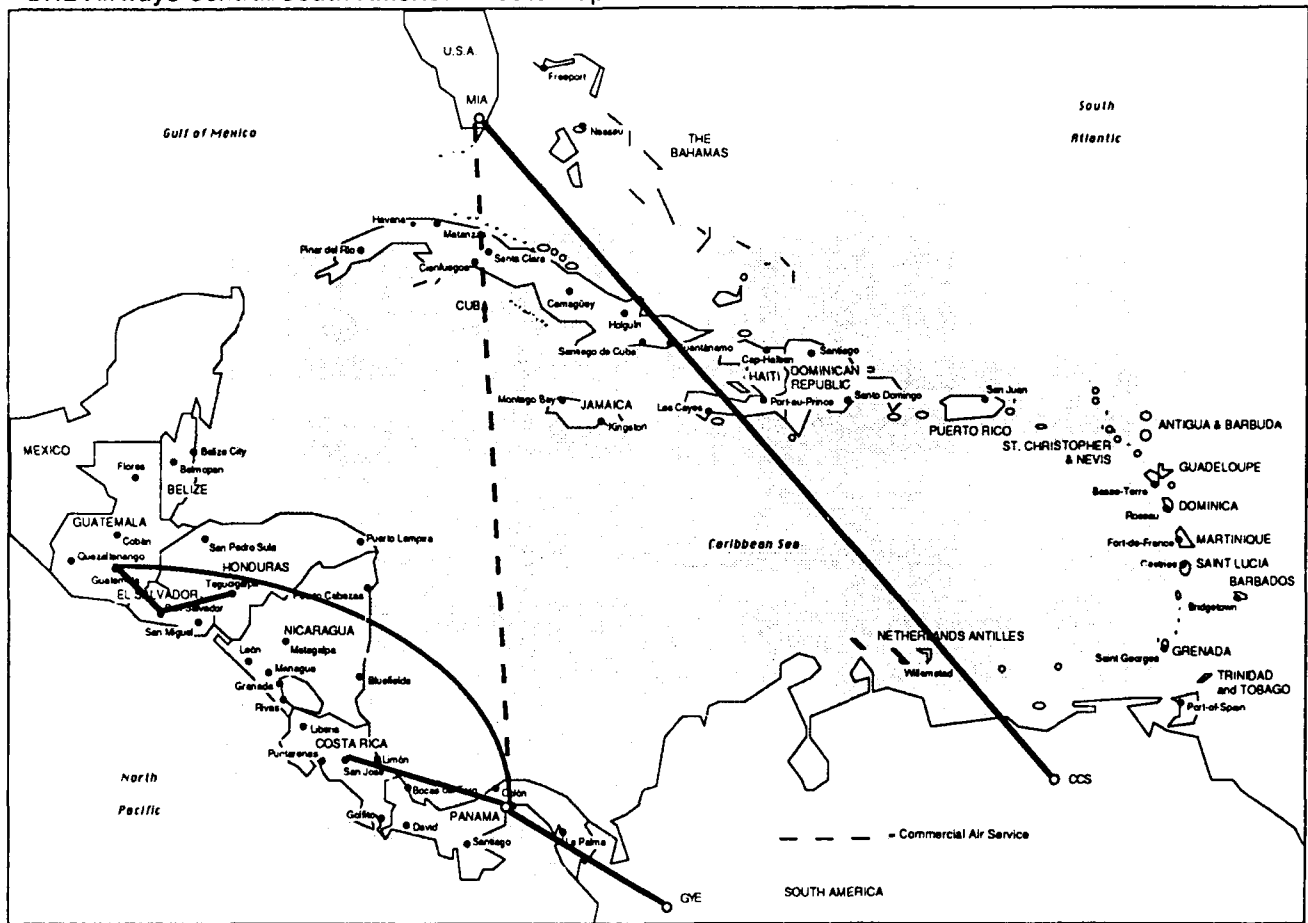
PANEL I

DHL Airways Middle East Route Map 1990

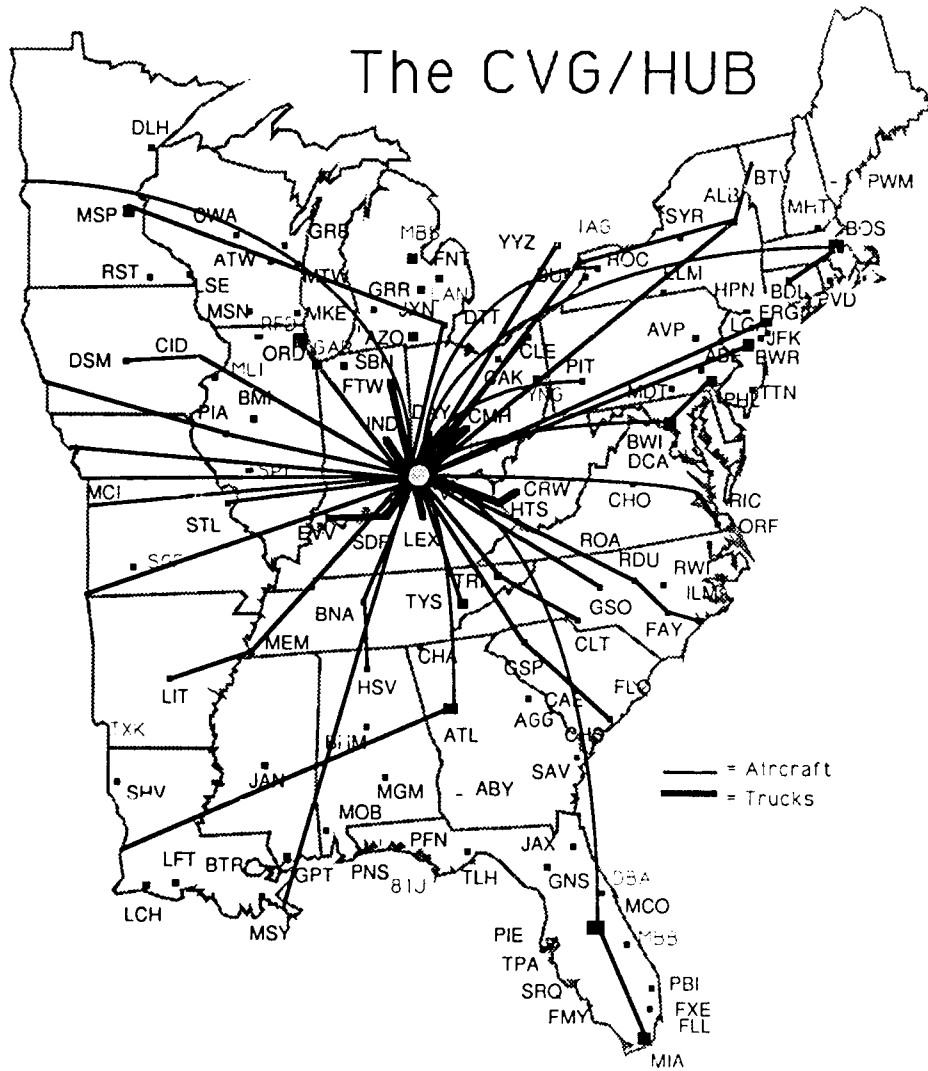


# PANEL I

## DHL Airways Central/South American Route Map 1991



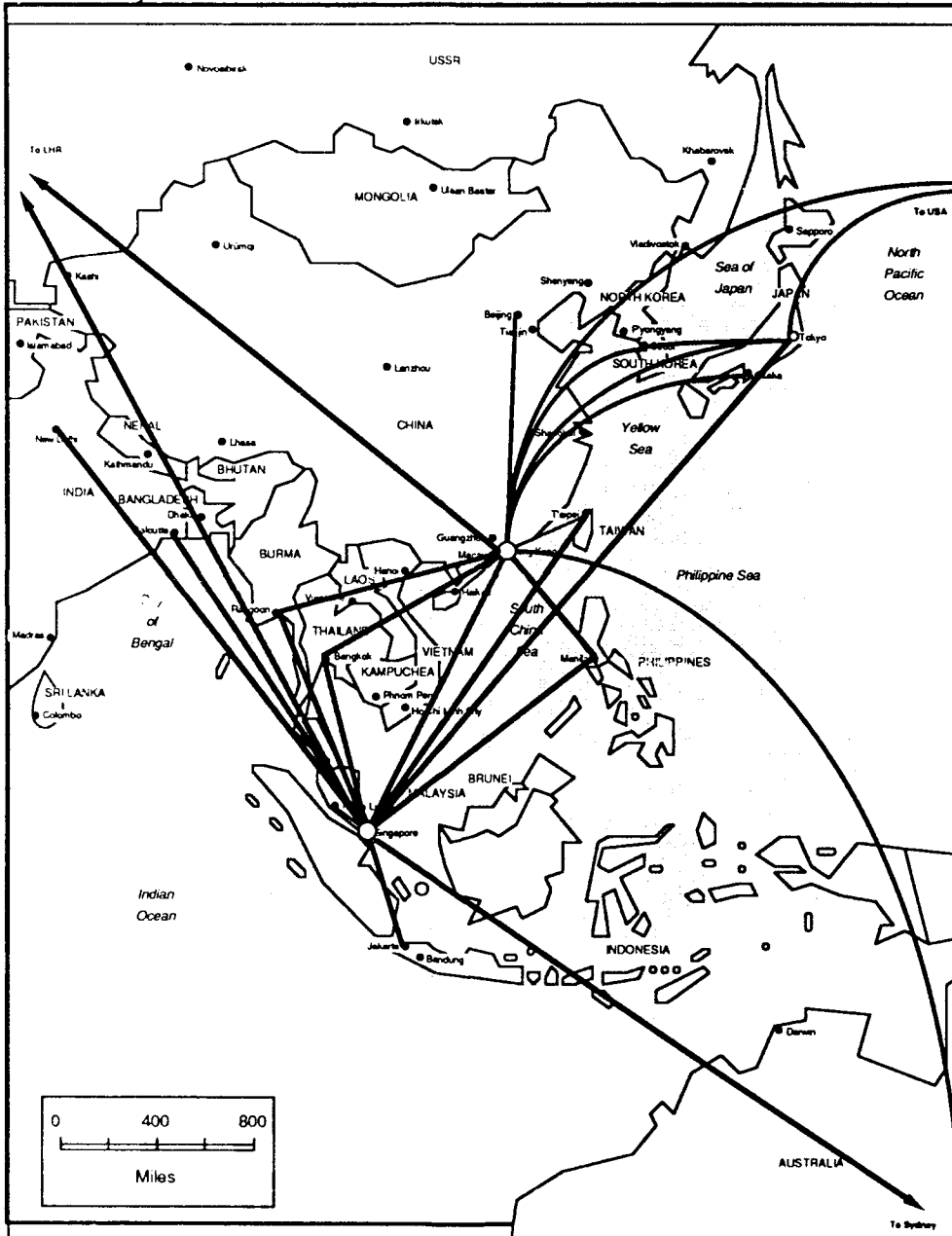
PANEL I



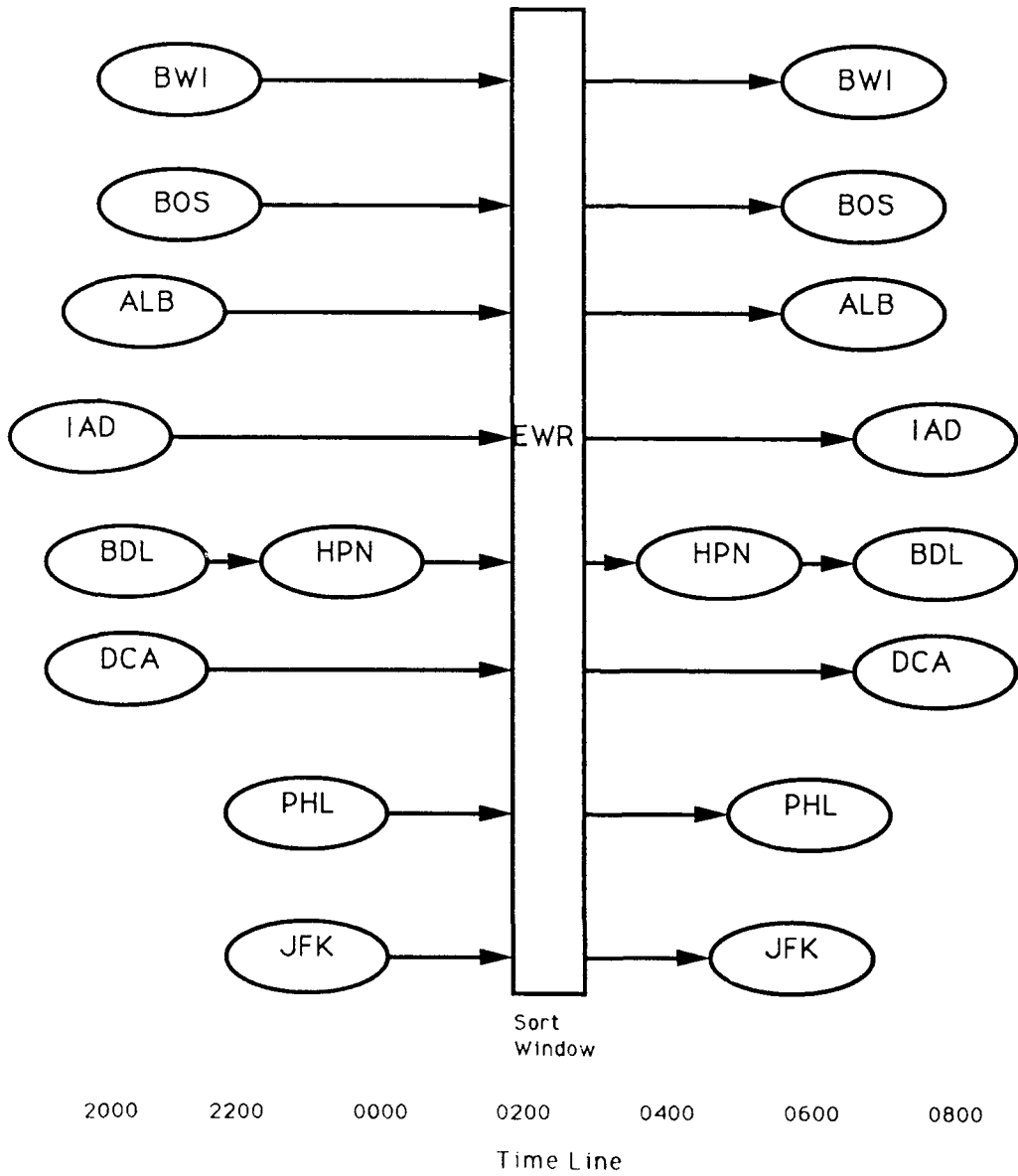


PANEL I

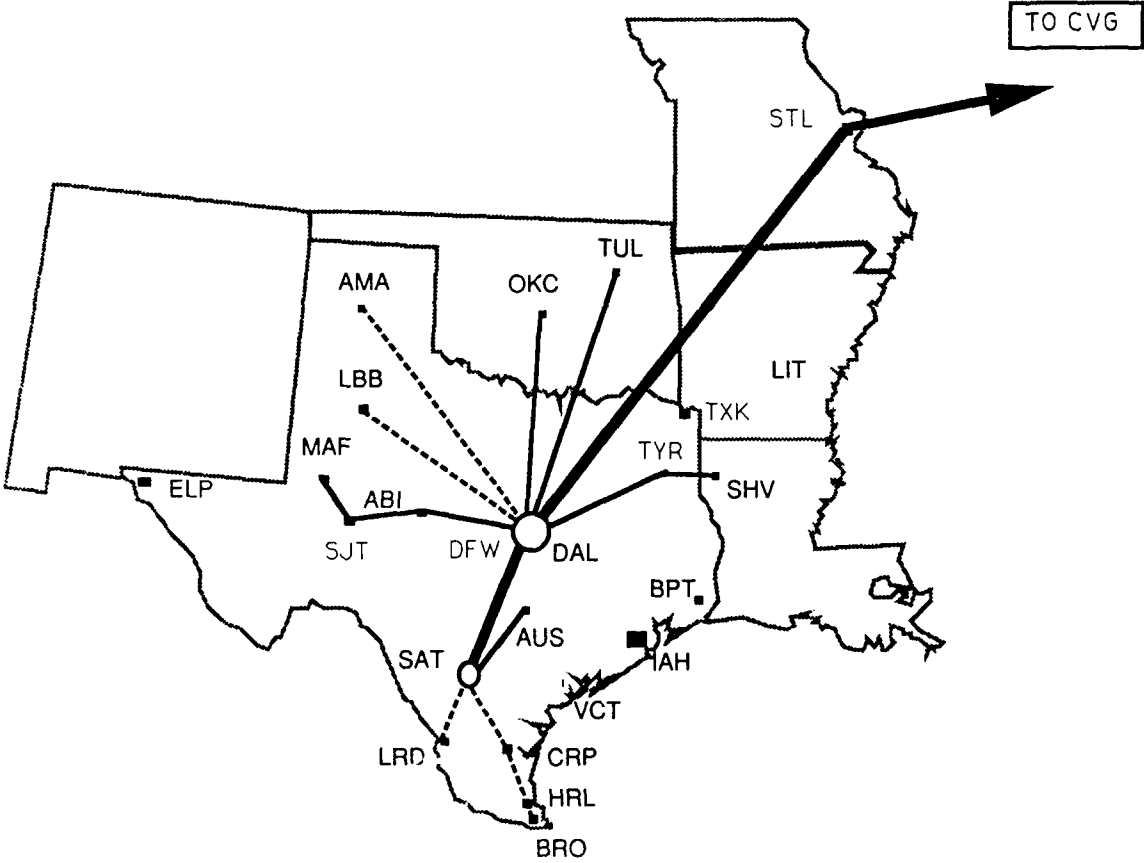
DHL Airways Pacific Rim Commercial Air Service

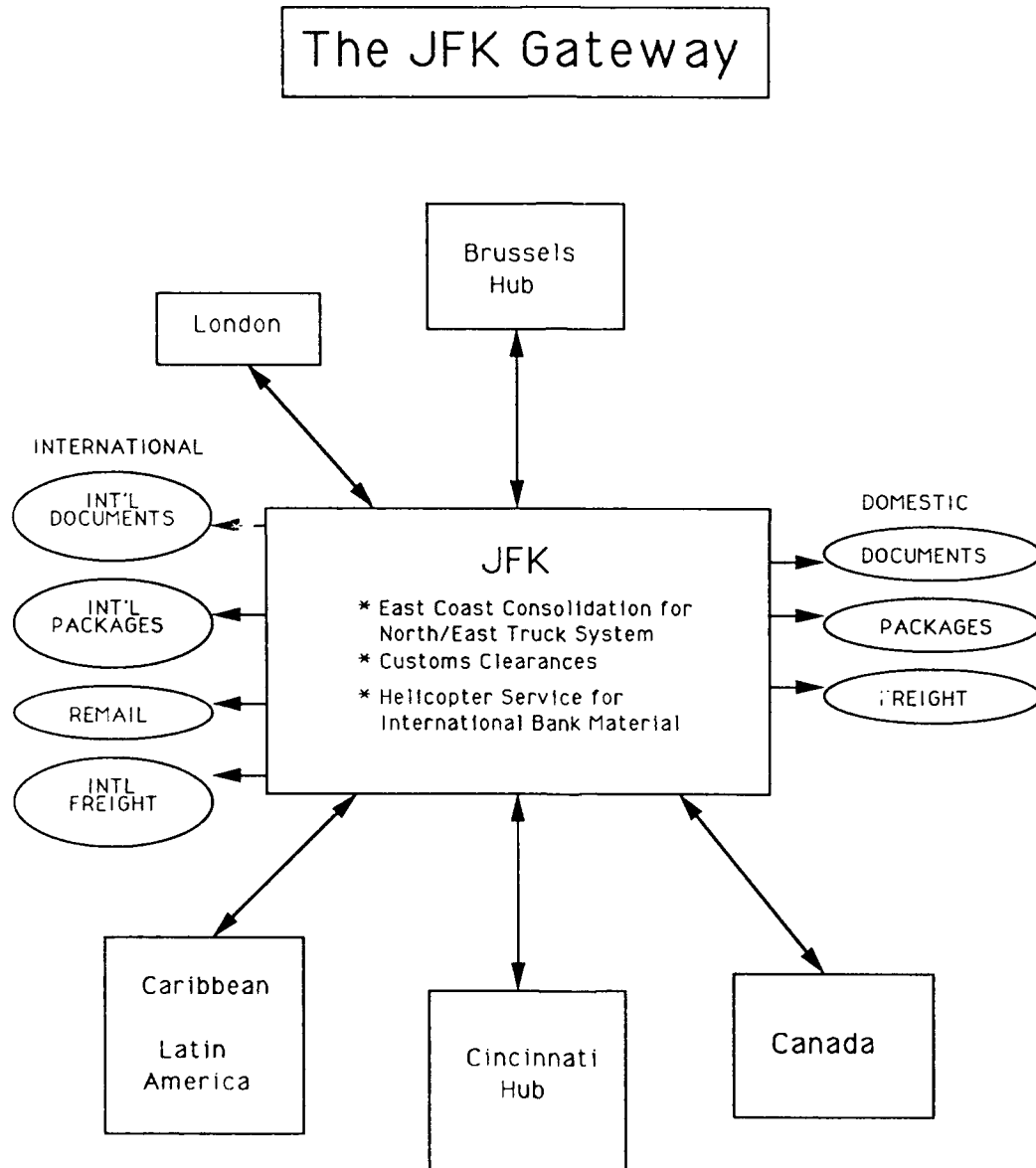


EWR Regional Sort Center



# The Dallas Mini-Hub





PANEL I

---



# LUNCHEON ADDRESS



---

## Michael Evans

President  
Evans Economics



### Biographical Highlights

Michael K. Evans is Chairman and President of Evans Economics, Inc., an economic consulting and forecasting firm he founded in 1979, and Evans Investment Advisors, Inc., which he founded in 1984.

Dr. Evans writes columns for Industry Week, GQ Magazine, Fidelity Investments' Investment Vision, and Standard & Poor's Credit Forum among others, and appears on network news programs such as The Today Show, The Nightly Business Report, and Nightline. He is author of over 50 articles and five books. His latest book, How to Make Your (Shrinking) Salary Support You in Style for the Rest of Your Life, will be published by Random House in Spring 1991.

He has served as a consultant to the U.S. Congress, Department of Agriculture, the Treasury and NASA. In the international sphere, he has constructed economic models of the French and Israeli economies.

A native of Cleveland, Dr. Evans completed his undergraduate and graduate work at Brown University, receiving an A.B. in mathematical economics in 1960 and a Ph.D. in economics in 1963.

### Summary

The primary reason for the current recession is the rise in oil prices due to the Gulf War. Recovery will begin in April or May and the recession will not be deep. Oil prices will drop within six months and the current glut of oil will drive prices down, helping consumers to spend more on other things.

The "credit crunch" or lack of availability of funds by the banking system and other financial institutions, will keep the recovery from being as robust as usual.

Although travel patterns will more or less return to normal after the war, the problems that the airline industry will face are that worldwide growth in the 1990s will not be as strong as it was in the 1980s.

## How Will the Domestic Airline Industry Fair in a Decade of Slow Growth?

Before I get started, I thought I would just remind you of a story of Albert Einstein when he went to heaven. He appeared at the Pearly Gates, and St. Peter said, "I'm sorry, I think we have a slight housing shortage at the moment. I'll have to put you in a room with three other people." And Einstein said, "What? The leading intellect of the 20th century, and you are going to put me in a room with three ordinary people?"

And St. Peter says, "Calm down; we'll put you in with the three brightest people we have up here." So Einstein wanders in and he looks at the first guy, and he says, "Hi, I'm Albert Einstein. What's your IQ?" And the guy says, "180." And Einstein says, "Great." They have this long, involved conversation about quarks and black holes and all these other terms in physics.

And then he turns to the second guy. And he says, "What's your IQ?" The guy says, "175." And Einstein says, "Great." And they have this involved conversation about Goedelesch or Bach, and music, and so forth. And then he turns to the third guy. And he says, "What's your IQ?" The guys says, "Uh -- 60." And Einstein says, "Sixty! Tell me, what do you think about the economy?"

So here I am, and I'll give you a few thoughts. What I thought I would do first is to discuss the short-term outlook and then move into a more detailed discussion of where the economy is likely to head in the 1990s, and of course, what it means to the airline industry.

As far as the short-term outlook, just before I came over here, I checked the matter on the screen to see if we were in the peace or war mode, and actually I don't know. Bush gave a speech at approximately 11:15, in which he said the Iraqis had until Saturday at high noon to withdraw.

He also said he didn't think that was going to happen, because apparently Saddam was busy bombing out the remains of Kuwait. He's ruining all their oil refineries and bombing out their export docks, and so forth. And Bush said that doesn't seem like the moves of a guy who is planning to go into a peaceful settlement the next day. So who knows what will happen over there?

But I will say this much. It really doesn't affect my forecast very much. If there is peace tomorrow, somehow, obviously the economy will rebound as consumer attitudes improve, oil prices go down, so forth and so on. If we go into a land war, my own perception is that it won't last very long. It will be over quickly, and the economy will recover anyhow.

So what I'm saying is that my outlook really in large part is independent of precisely how the Persian Gulf theater ends up. I think that, one way or another, Iraqi forces will be out of Kuwait in the near future.



## LUNCHEON ADDRESS

---

Now leaving that aside and looking at the rest of the economy: it's always been my contention that the primary reason that the recession started -- I suppose in August, although the national bureau hasn't certified any particular month, yet -- is because oil prices went up. The economy -- sure, it was weak before, but as I read the statistics, the economy had come very close to a recession in late '89 and early '90.

It was actually beginning to improve when the Iraqis invaded Kuwait, and that caused a modest downturn, which I think will be brief. In my view, the recovery will start some time in the second quarter, probably in April or May, which is literally around the corner, so we're not looking at a very deep recession. The other issue, of course, is the so-called "credit crunch", the lack of availability of funds by the banking system and other financial institutions. And my argument there is essentially that it will keep the recovery from being as robust as usual, but it won't keep it from starting.

Let me go back and talk a little bit more about oil prices, which are obviously of interest here, as well as in a more general frame. Oil prices -- this is benchmark crude, now -- crossed below \$18 a barrel this morning, so it's back to where it was before the invasion took place. Also, gasoline prices -- the latest figure on a national average basis were 113.3 cents a gallon.

If you subtract the nickel excise tax that went into effect December 1st, that's 108.3 cents a gallon, and that compares to the figure in July of 107.9 cents a gallon, so in gasoline, we're right back where we were. So at least from an economic point of view, the impact of higher oil prices and energy prices generally, has been completely wiped out by now, and I think consumers will shortly start to respond to that.

As far as the movement of oil prices in the near future, by that I mean the next six months or so, it seems almost inevitable that prices will head down further. And many people have said that they will head down to about \$12 a barrel. That includes heads of major oil companies, that includes former Sheik Jamani, and to others in the Middle East.

So just because all the experts agree it's going to happen, doesn't necessarily make it so. Economists have learned that lesson often enough. But nonetheless, it does look as though prices are heading lower. We do have a tremendous glut. There's approximately 3 million barrels a day extra of oil being produced, relative to consumption, compared to about 63 million barrels a day for total world production, and a 5 percent difference in the oil industry is a huge difference.

Now I think eventually the Saudis and other OPEC nations that have increased their productions will cut back to normal levels, and oil prices will head back toward the \$21 benchmark that was established at the OPEC meeting in June. In fact, it was the inability or unwillingness of the Kuwaitis to adhere to those quotas that was one of the reasons Saddam gave for invading Kuwait when he did.

## LUNCHEON ADDRESS

---

I don't think any other Arab nation wants to take that risk, so we're assuming that oil prices will head back to the benchmark for a while. But first, OPEC production has to be cut back. And even if they decide, after the war is over, to cut back, there's usually a six to eight week lag between the time that OPEC production changes and it shows up in prices in world markets.

So in that interim, there will be a tremendous amount of excess oil floating on the seas, trying to be unloaded in various ports, and that will drive the price down. That, of course, will benefit consumer spending and help the economy to pick up.

The other item which has clearly hurt the economy is the credit crunch, or the lack of availability of funds by banks. I think this situation is serious, and I'm not suggesting it's going to go away. In fact, my outlook for housing starts this year would be about 1.07 million, down from 1.22 million last year. And this will be the fifth year in a row the housing starts have declined, which is an all-time record.

So I don't see any turnaround in new housing starts. And as far as commercial construction goes, I look for that to be down about 25 percent this year. That would have happened even if there hadn't been a lack of credit at the banks, because of the overbuilding, the tremendously high rates, your rates and so forth.

But obviously, very few construction projects are going to be started this year, even if they have adequate cash flow, unless the place is 85 percent-leased before it's even started. So new construction remains a disaster zone for this year.

And that is a very unusual development in the beginning of recoveries, because it's always been the case, in every single upturn, that the recovery has been led by consumer durables and by housing. Housing is simply not going to participate in the rally at all.

On the other hand, I think we will see a substantial increase in sales of already-built homes, new homes and existing homes. In fact, I'll make a bold prediction that the housing market has bottomed out. You should all go call up your real estate broker today and sign up for the house you've been looking at, before the prices go up tomorrow.

Obviously that doesn't hold in every section of the country, but I do think that the slide in housing prices has come to an end. We've got mortgage rates down to 9 percent on a nationwide basis. That's probably as low as they're going to get, and I know that a lot of people are going to refinance at those lower rates and in many cases use some of the extra money for other consumer purchases.

So the fed action in lowering interest rates has had some positive effect, even though it's not showing up in the traditional place, as a boost in new construction. It is helping existing home sales, with all the spin-offs that that has. I also think it will help purchases of consumer durables, because a lot of these firms that sell these durables have captive finance arms.

## LUNCHEON ADDRESS

---

And if, long-term, the charge or interest rates have come down so much they can offer better deals, one way or another. So I think consumer durables, car sales in particular, will pick up this spring. That's a pretty safe prediction, because in late January, domestic new car sales fell to 5.3 million annual rate, which is the lowest that they have been since the trough of the '82 recession.

So if I say they are going to go up to 7 million, it sounds like a big increase -- it's still below normal levels. As I say, it's probably a safe prediction. But there is that positive momentum occurring in at least half of the equation, which says that durables and housing rise in the beginning stages of the recovery will still come to pass.

Other factors which will help the economy turn around in the short run: obviously, defense is one of them. We don't know exactly how much defense spending will be up this quarter, because we don't know exactly what's going to happen over in the Persian Gulf.

It seems to me fairly obvious that during the year, a lot of the missiles and airplanes and other parts and ordnance that were used in the Persian Gulf are going to be replaced. I don't say absolutely every last tank, and so forth, but there will be a large number of them replaced. So at least for the rest of this year, defense spending will be a plus for the economy.

Exports remain strong. Exports continue to grow at about a 7 to 8 percent rate. Now in this case, we have two off-setting factors. Growth in the world economy is clearly slowing down. Canada is in a recession. The U.K. is in a recession. Growth rates in continental Europe will be down about 1 to 1-1/2 percent this year, as they will be in Japan.

So our market isn't growing as fast, but the dollar has declined 23 percent from its peak in mid-'89 to recent levels. I think, in terms of forecasting the dollar, it's just about bottomed out, here, and I expect it to rise about 10 percent in the second half of the year. But there is a lag in these things, and the 23 percent decline that we have had in the dollar over the last year and a half will clearly keep export growth rising at about a 7 or 8 percent rate this year.

So if you put these all together, looking at next quarter, you have the strength in defense, you have a pickup in exports, you have consumer durables turning around, and you have at least existing home sales picking up. You have lower oil prices, lower interest rates. I mean, that's enough factors, in my opinion, to determine beyond a shadow of a doubt that we will have an upturn beginning next quarter.

The stock market, of course, told us this when it rose in January. The stock market is not a perfect predictor of anything, but it is the case that in each of the last six recoveries, the stock market has always turned up four months ahead of time, plus or minus one month. I know of no other forecasting rule that has worked that well. If I knew of any others, I'd use them, but I haven't found them.

## LUNCHEON ADDRESS

---

But that appears to be something, that at least the stock market perceives that the recovery is here. And recently, this attitude, this perception, was joined by the bond markets, which also believe that the recovery is around the corner. And there won't be any further easing by the feds, so that the bond prices declined last week, even though oil prices went down.

Now just because both the bond and the stock markets think the recovery is coming, doesn't necessarily mean it's so, of course. But on the other hand, these have been reliable indicators in the past, and they make sense. And they're supported by a large body of data that I think is about to change.

You don't see it in the coincident indicators, yet. You obviously don't see it in employment or unemployment, or retail sales, or production, but you will see it, starting this month, and certainly starting next month. So that's my short-term outlook.

Now if we go out a little bit further, in the first four quarters of recovery: in the past it's usually been the case that real GNP rises 5 to 6 percent in those first four quarters. I see nothing of the sort. In fact, I think it's likely that over the next four quarters GNP will rise about 3 percent, or about half the rate that is usually associated with the beginning of recovery.

So that suggests quite strongly that some of the problems aren't going to go away. The major problem that won't go away, of course, is the new housing and construction, particularly commercial construction. Those sectors remain flat; they will not rebound.

If we look out to '92, the increase in defense spending, which has boosted the economy this year, has brought the recession to an early end, will start to wind down, so on balance, in terms of short-term GNP, that will be a negative. The increase in the dollar in the second half of the year, about 10 percent, will result in a much slower growth rate in exports next year.

The growth in consumer spending, which is obviously the key, will also be hampered. Now this year, I think consumer spending will rebound, because the rate of inflation is only going to be about 3-1/2 percent. That 3-1/2 percent consists of what is usually called the core rate, which will be up about 4-1/2 percent, minus a 1 percent decline, due to lower oil prices, so 3-1/2 percent.

That means that the real wage will rise at least 1 percent this year, and that would, in fact, be the largest rise in a decade. So even if employment increases slowly, the increase in the real wage will provide additional purchasing power for consumers.

If you look at next year, however, you don't get the same picture. Next year I would expect the core rate of inflation to rise from 4-1/2 back to 5 percent, for reasons I'll discuss a little later, and I don't expect any change in oil prices. So inflation goes back to 5 percent, and the decline -- rather the increase in the real wage turns into a decline.

## LUNCHEON ADDRESS

---

So consumer spending will help get the recovery started, but it won't sustain it at a very robust level. Did this ever happen before? Did we ever have a recovery in which real GNP only grew 2-1/2 to 3 percent? Yes, we did once. In fact, it was 1971.

In 1971, the economy rebounded after a long, 67-day strike at General Motors, but then after that, it just sort of sat there. And as you probably recall, Nixon got more and more fidgety about this, and finally, on October 17th, he announced his new economic plan, where he stimulated the economy by cutting taxes, increasing spending, and devaluing the dollar, but in order to keep prices under control until the election, he imposed wage and price controls.

Well, of course, that experiment turned out to be a disaster by the time we got to 1974, but it worked well in '72. I think we can assume that won't happen. Obviously, Congress is not going to cut taxes. In fact, the budget -- new budget law -- explicitly prohibits them from cutting taxes on balance. In other words, if they cut it somewhere, they have to raise it somewhere else -- or increasing spending without paying for it.

In other words, you simply can't do that anymore. And of course the authority for wage and price controls was banished a decade ago. So anyway, we can't see a repeat of that. And what I'm saying is, that without stimulative fiscal policy, we're not going to see much of a recovery. We'll see the same sluggish type of growth that we would have seen two decades ago, had it not been for the Nixon plan. Underlying this slow growth, of course, is the major problem which has been facing the U.S. economy for several years, and that is the lack of growth of productivity.

The productivity numbers are very odd, in the sense that manufacturing productivity during the '80s grew quite rapidly, 3 to 3-1/2 percent, depending on exactly which year you use for your benchmarks, which was equal to the long-term average growth in this economy, and also equal to the growth in manufacturing productivity in most other mature economies around the world, in other words, Europe and Japan. We're not talking here about Korea or Thailand.

That's not so unusual. However, nonmanufacturing productivity actually declined during the 1980s. When I used to teach economics, we used to tell our students, productivity can't decline. In other words, technology is always advancing. Maybe it doesn't advance very fast, but you don't go back to doing things worse than you used to do them. Well, that just happens when you teach economics, and don't go apply it to the real world.

But in any case, the productivity numbers show that in the nonmanufacturing sector, it has declined. Some people don't like these numbers. They say, since the theory can't be wrong, there must be the data that are at fault. I don't think that's a very good argument, by the way. It seems to me that, in fact, in many sectors of the economy, productivity has declined.

## LUNCHEON ADDRESS

---

And you can pin this on a number of factors. One is, I think, fairly obvious: the ratio of capital spending to GNP has fallen over the past decade from 12 percent to 9 percent, a huge decline, unprecedented during an era of general prosperity. And we're not talking peanuts, here. If you think about it, GNP right now is slightly over 5.3, so that obviously means 1 percent of GNP is 50 billion.

If that's the case, then a 3 percent decline in the investment ratio means that we're spending 150 billion dollars less each year on capital spending than we would have if the ratio had remained at the levels of the '70s and the early '80s. That's a tremendous amount of money, but we're not spending on improving our capital structure and improving productivity.

And where did this money go? Well, that's an easy one. It went to pay the interest on the government debt. And that's certainly not going to change either. The government deficit this year will be \$330-340 billion. Now, that's not a permanent figure, in the sense that a lot of that is due to the RTC bulge, and the Desert Storm-Desert Shield expenditures, which, by the way, we're going to bear.

I think there's no truth in the rumors that the allies are going to bail us out. That was just something they told us to make us happy. But you've got maybe \$50 billion for defense and \$100 billion for RTC. If you take \$150 billion off of that, then the real quote, unquote, "deficit" -- come in probably about \$180, 190 billion, which is not as large, but it's not zero, either.

And furthermore, that number will continue -- the real deficit, now, I'm talking about -- will continue to grow over time, roughly in proportion with GNP. I see no evidence at all that any of the new legislation in fact addresses the issue of shrinking the deficit. All it does is say the deficit can't really grow as a percent of GNP, but it doesn't tell how to cut it.

So the problems we had about taking the funds away from capital spending, putting them toward paying back government debt will continue, and as a result, I don't see any reason to expect productivity growth to increase during the '90s, over the levels of the late '80s, which was -- I'd say, was about 1 percent for the total economy, and less than 0 for nonmanufacturing.

If that's the case, it reasonably follows that real disposable income cannot grow very fast. If productivity is not advancing, the real wage will not advance, and so the only gain you get in income is through growth in employment and population. But that's also slowing down. So on a longer term basis, I see very sluggish growth for the U.S. economy, averaging between 2 and 2-1/2 percent a year.

The other major long-term item, as far as airline travel is concerned, has to do with oil prices. Well, before the Kuwait invasion, I said something of the sort that I thought oil prices would be generally well-behaved. They would rise slightly faster than the rate of inflation, but not by a great deal, up until about 1995. At that point, I argued, the increase in demand would catch up with the excess supply that OPEC had, and we'd have another energy crisis.

## LUNCHEON ADDRESS

---

Well, that just shows what happens to the best-laid, long-term forecasts. What has happened, of course, is that with the spike in oil prices, there's been at least a temporary move toward reduction of demand, both in the U.S. and around the world, and as a result, as I mentioned earlier, we've had this 3 million barrel-a-day glut, about half of which is due to lower demand.

I would think, however, that it's likely that once oil prices get back to normal, people will forget about this energy shock, just as they eventually forgot, in large extent, about the previous two energy crises, and so the worldwide demand for oil will continue on its previous paths of increasing roughly about 1 million barrels a day, which is only about 1-1/2 percent.

So I'm not talking a huge growth rate, but if OPEC excess capacity is 5 million barrels a day, and it's not growing, and worldwide demand is increasing by 1 million barrels a day, after five years you run out of oil. That was the basis on which I had mentally circled 1995 as the year in which we'd have another energy crisis.

Well, as I say, this timing is a little bit off, here, and there have been some adjustments made. But I still stick with my basic scenario, that toward the end of the decade, we will see substantial gains in the real price of oil. For the next couple of years, we aren't going to have any increase, as all this mess gets sorted out.

And one way or another, after the war is over we can certainly expect Iraq and Kuwait, after their facilities are rebuilt, to produce as much oil as they can, in order to try and pay for the damage that has been inflicted. In fact, one recent estimate suggests that it will cost \$100 billion for the Kuwaitis to rebuild their country.

And in one of the more interesting twists of the war, the Kuwaitis said essentially that they would award the contracts based on who helped them out in the war, which means the U.S. is in line to get the lion's share of that \$100 billion, so maybe something works out. And the Germans and Japanese, who said they were going to help but never got around to it, should be shut out of this. We will see about that. But at least that's what the Kuwaitis said. Just a sidelight.

But getting back to my oil scenario, here. We are looking at stable oil prices for the next couple of years, and then a gradual increase after that, until later in the decade, when they start to skyrocket again, as we start to run out of oil.

Now in terms of airline behavior -- demand and so forth -- it's hard for me to be overly optimistic. That doesn't mean I'm overly pessimistic. I think that some of the scare stories we've heard, probably as recently as this morning, that we're only going to have three domestic airlines left -- I don't buy that at all. I think that's silly.

Now the airlines have just come through the worst possible case that they could have, in which the cost of fuel skyrocketed and demand, especially for longer flights, fell off the map because people were scared of terrorists. In other words,

## LUNCHEON ADDRESS

---

it's obvious that the decline in air travel recently has been much more than can be explained by higher fares and lower income.

Now this, too, shall pass, as the sage said, and I assume that once the war is over, travel patterns will more or less return to normal. So we're looking past the valley of death, here, and trying to make some long-term forecasts about the industry. But it seems to me that the problems that the industry will face are that worldwide growth in the 1990s will not be as strong as it was in the 1980s.

Now we have really seen some signs of this. The U.S. economy, after coming out of a deep recession, grew rapidly in '83, '84, and '85. Then it started to slow down. Most people don't even see the blip on the charts, but during 1986, for the latter three quarters of the year, GNP hardly grew at all. The reason people don't remember it is because the unemployment rate didn't change. We had essentially zero growth, there. And then, as you may recall, the Plaza Accord, September 23rd, 1985, when all the nations of the G7 got together in the Plaza Hotel, hence the name, and decided that they ought to move together to lower the value of the dollar and to lower interest rates. Well, that took a while to take some effect, because obviously, there are lives involved.

But by the end of '86, the beginning of '87, the aftermath of the Plaza Accord, in terms of lower interest rates, not only in the U.S., but on a worldwide basis, caused this stimulation of growth around the globe, and led to tremendous years in '87 and '88 in the U.S., in Europe, and in Asia.

Now that was kind of a one-time stimulus that was derived, number one, from a determination to lower interest rates to help out the U.S.; and number two, from that 50 percent decline in oil prices in '86. That was OPEC coming off of their \$30 oil, going back to \$15 a barrel oil, which permitted interest rates to decline, without being highly inflationary.

So what I'm saying is, that the growth that we had in the latter '80s was kind of a one-shot affair and cannot reasonably be expected to be recreated again in the 1990s. So as a result, we have lower growth not only here, but in Europe, and even to a certain extent in Asia as well. Obviously, that will cut down to a certain extent on discretionary international airline travel.

As far as costs go, again, most of the big declines in costs have already been worked out of the system. Obviously deregulation resulted in lower labor costs. Now you can make a reasonable argument that there are even more labor costs that can be cut, and I'm not disputing that, but I am saying that the biggest cuts have already taken place.

We had, in very broad terms, a cut in oil prices from \$30 to \$15 a barrel over the '80s. Obviously, you're not going to get that again. Oil prices will keep up with inflation. Maybe they'll lag behind for a couple of years, but over the next decade, speaking in very long-range terms, here, oil prices are going to rise faster than inflation. So you're reversing the pattern of the '80s, when oil prices went down.



## LUNCHEON ADDRESS

---

Well, if labor costs, let's say keep track -- keep equal to inflation, and if fuel prices rise faster than inflation, it's going to be very difficult for the airline industry to cut costs. And we've always found, as I'm sure most people in this room have, that there is a very substantial price elasticity to airline travel for discretionary purposes. And this is certainly not going to change. Indeed, with slow growth in income, people are going to pinch their pennies even more.

Ten years ago I made a speech -- it wasn't this group, in fact it was to the retailers. But I said, during the 1980s the rich would get richer, and the poor would get poorer. Well, essentially that's what happens. In the 1990s the line has changed a little. I said, the rich will get poorer, and the poor will also get poorer.

The standard of living will not increase very much, and your taxes will increase. I mean, if there's -- one of the few forecasts I can make without fear of contradiction, which is a luxury I don't get very often, it's that tax rates will rise during the 1990s. I don't necessarily say at the federal level, although I think that will happen too, but certainly at the state and local level. The overall tax burden will go up as a proportion of your income.

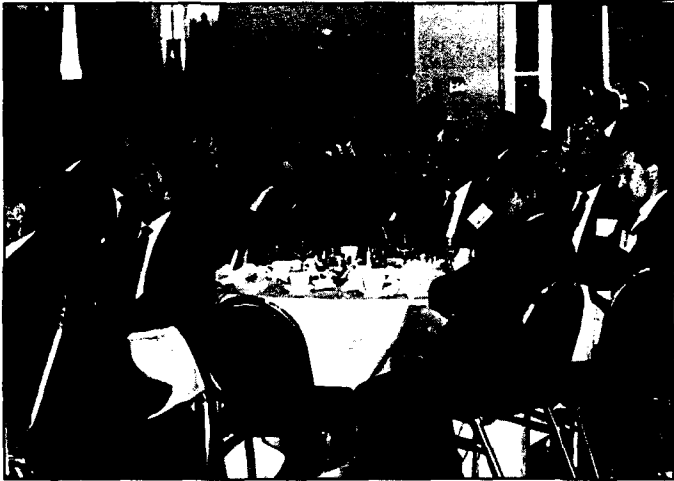
And if you have stagnant productivity and higher taxes, I defy anybody to tell me how you're going to get an increase in the standard of living out of that. I'm not saying that these trends are irreversible. As economists, we know what to do about this, but as politicians, we don't. So that's really my outlook, then, the short- and long-term outlook for the '90s.

As far as the recession, it's almost history. It will be over in a couple of months, and the rest of the year will by and large be a pleasant surprise. However, the recovery will not have the lags -- I guess in this group I should say that wings -- that recoveries usually have, and 1992 will be kind of a disappointment, because growth will be constrained to the 2 to 3 percent range, instead of rising 5 to 6 percent, as it usually does early in recovery.

And further out in the decade, growth will remain sluggish on both a domestic and a worldwide basis. So with those encouraging remarks, I'm going to thank you all very much.

LUNCHEON ADDRESS

---





## Kenneth L. Tallman

**Lt. Gen. USAF (Retired), President  
Embry-Riddle  
Aeronautical University**



### Biographical Highlights

Kenneth L. Tallman is the president of Embry-Riddle Aeronautical University. He has had a distinguished career in the U.S. Air Force where he rose to the rank of Lt. General and he was superintendent of the Air Force Academy.

He has logged over 6,000 hours as a pilot in many types of aircraft ranging from P-51 Mustangs to F-4 Phantom jets. He is still an active general aviation pilot.

As president of Embry-Riddle, General Tallman has initiated many projects responsive to the needs of the aviation community including the development of the Aviation Applied Research Center, the Airway Science Simulation Lab, and the FAA Center for Management Development.

General Tallman is a graduate of West Point. He holds a masters degree from George Washington University, and an honorary doctor of law from the University of Wyoming.

### Summary

As we look to the future, we know that aviation will continue to be an exciting and dynamic field, and one that requires people with vision and smarts -- people who are "cut above average;" and that's where aviation higher education comes in.

I suggest the formation of an aviation education Triad to deal with the work force challenges that lie ahead: a Triad comprised of industry, the FAA and academia, with each element dedicated to interacting closely with the other two in initiating or supporting actions to enhance the education and training of the aviation human resource. This approach may require significant rethinking, perhaps a re-ordering of priorities, and certainly a results-oriented mentality.

## Education and Training

First of all, I would like to thank you for the opportunity to participate in this important conference. I believe the future for air transportation services is extremely bright. . . and extremely challenging. In my view, the single most important factor in meeting the challenges and exploiting the full potential of the opportunities will depend on how effective we are in developing our human resources, which is the subject of my comments this afternoon. You're lucky today that I am not going to forecast, or attempt to predict, the future manpower requirements. . .the number of pilots, technicians and managers that we will need. There are just too many political and economic factors involved in that. Rather, I intend to focus on how to acquire the quality of technical and managerial leadership that will be required.

Over the next 10-20 years, the jobs in aviation will evolve from a preponderance of direct interface with operational equipment to an interface characterized by sophisticated automated controls and diagnostic devices. Certainly there is some question, or concern, regarding the adaptability of our workers to this increasingly technical and automated environment. Additionally, we know the pilot of today - - and tomorrow - - is not just flying an airplane. He or she is now, and will continue to be, part of a team that is managing a system. . .a very dynamic system! Judgment, decision-making and problem-solving permeate every level of aviation operations. This factor, too, has a major impact on how we train, and educate, the human resource in aviation.

The bottom line is that aviation will continue to be an exciting and dynamic field; and one that requires people with vision and smarts -- people who are a "cut above average;" and that's where aviation higher education comes in.

But in order for aviation higher education to be effective, there has to be a closer relationship between the industry, academia and government -- specifically, the FAA. We need that partnership that was suggested by the FAA Administrator more than two years ago -- that integrated, interactive, cooperative alliance that will enable us to build the aviation work force of the future.

This is not an easy task, and it will not be accomplished overnight. It will require significant rethinking on the part of academia, the corporations, and the FAA.

I recognize there have been some efforts to achieve a closer relationship between the FAA and colleges/universities, and some efforts to involve industry representation in planning future work force requirements. But these efforts fall far short of what we really need.

Too often we get something started and reach a consensus on a new idea or initiative, only to have it rejected or abandoned. What we really need is a results-oriented process involving a continuing relationship among the three entities. We should measure progress by accomplishment rather than the amount of effort expended.

## PANEL II

---

I would like to accomplish something here today by suggesting the formation of an aviation education Triad to deal with the work force challenges that lie ahead; a Triad comprised of industry, the FAA, and academia -- with each element dedicated to interacting closely with the other two in initiating or supporting actions designed to enhance the education and training of the aviation human resource.

Each element, or leg, of the Triad has a major contribution to make in pursuit of the goal. As I said, it might require significant rethinking and perhaps a re-ordering of priorities, and certainly a results-oriented mentality.

Allow me to address each leg of the Triad, starting with academia. My comments will be pointed toward things that might be done to strengthen the connections between the three legs, thus strengthening the entire structure and its effectiveness. I think that's called synergism.

Academia needs to become more involved in current aviation issues. . . more solution oriented in its research. . . more "hands-on," if you will. Universities need to take education to the client, become more flexible in educational delivery systems that are compatible with the lifestyle of working adults. Universities need to develop programs that respond to specific industry needs . . . programs that repackage information and knowledge for specific groups. . . programs that inject the state-of-the-art concepts into traditional undergraduate, graduate and professional programs. We need to develop programs that prepare females and minorities as well for productive aviation careers. . . programs that are current, relevant and focus on immediate productivity in the work place.

I am not suggesting that we abandon the basics; I am suggesting that we apply them. I am not suggesting that we abandon general education requirements; I am suggesting that we go beyond the general education requirements. We need to integrate applied, solution-oriented research into our undergraduate curriculum, institutionalize faculty exchange programs, student co-ops/internship programs and faculty summer jobs. . . in order to maintain our focus on current relevant issues, and to build better communication links with the aviation industry.

But academia cannot change itself unless the environment in which it operates accommodates the changes. Industry, too, must change!

Corporations must take a longer range, more strategic view and institutionalize and budget for university relationships. . . including faculty exchange, faculty summer work jobs, student co-op and internships, and faculty/student grants for research. Neither the faculty nor the students nor the universities can fund these activities. Properly managed, these initiatives can be extremely productive to the corporations involved; however, if they are not budgeted for. . . they won't happen! Senior management must take the initiative.

## PANEL II

---

Where possible, corporations should use the universities to conduct their professional training and provide tuition reimbursement programs for job related academic programs. Using academia in this capacity provides the industry with professional education and training and also builds linkages between the universities and industries that ultimately reflect relevancy and currency in our undergraduate and graduate curriculum.

Corporate continuing education programs can incorporate job related research and joint research projects can be developed using matching funds. Creatively managed, corporations can effectively increase their internal research funds by "matching" university grant funds.

Industries might establish "forgivable loan programs" for high potential students. . .including female and minority high potential students. Corporate managers could volunteer as mentors for some of these young people. The list of potential industry initiatives is almost endless.

And, finally. . .what can the FAA do? How must it change?

The first thing is to recognize that colleges and universities are not "for-profit corporations." We dance to a different drum, we have a different criteria for productivity measurement, we have a different role and contribution to make to society. . .and, in this case, to the aviation community. We do not want to compete with industry for contracts. If our role of preparing the next generation of aviation leadership and the future aviation work force is to be maximized, we need to build the environment (laboratories, training facilities, equipment, and relevant projects) in which this development can take place.

The FAA needs to continue to expand its Airway Science Grants Program. This program has served very successfully as a catalyst to bring focus, interest and resources to colleges and universities that are committed to aviation programs. The recent Research and Centers of Excellence legislation represent another step in the right direction; but it needs to be fostered, funded and institutionalized.

The newly formulated National Plan for Aviation Human Factors establishes meaningful and worthwhile objectives for helping to develop the human resource in aviation. Colleges and universities can make a significant contribution toward achieving these objectives and, more importantly, they can institutionalize the transfer of the knowledge/technology to the next generation of work force.

The FAA might also develop a program of matching grants to encourage industry/university joint projects and linkages; grants that provide equipment and encourage applied, solution-oriented research.

These are just a few suggestions for strengthening the Aviation Education Triad. I am sure there are many more good ideas. Since technology can only be implemented and effectively utilized by a work force that understands it, the implementation of the

## PANEL II

---

Advanced Automation System and, indeed, the future updates of the system are inherently tied to the education and training process. I emphasize the word process because the upgrading of a dynamic, on-line operational system, without compromise to its efficiency and safety, must be effected through a process . . . , not an "event" that takes place every 20 years as technology advances make the current system obsolete; and the way to insure that process, is through education.

In August of last year, Admiral Busey published the FAA Strategic Plan. The single most frequently used word in the Executive Summary of this planning document is: Leadership.

Leadership is people leading people toward a common goal.

By strengthening the Triad of Industry, Academia and Government, we can help assure an educated, well-trained work force -- both technical and managerial -- and thus provide the leadership to meet the needs of an expanded, safe, efficient international air transportation system.

We are here today to forecast the future of aviation -- certainly the appropriate forum to focus on the need for a well-educated work force. Toward that end, we at Embry-Riddle Aeronautical University, and I'm sure I can speak for my colleagues at other colleges and universities with aviation related programs, stand ready to help strengthen our leg of the Triad.

Furthermore, on this 22nd day of February, 1991, I hereby issue a challenge to the other two legs of the Triad, Industry and the FAA; "What are each of you going to do to contribute toward development of our people resource--now, and in the years ahead?"

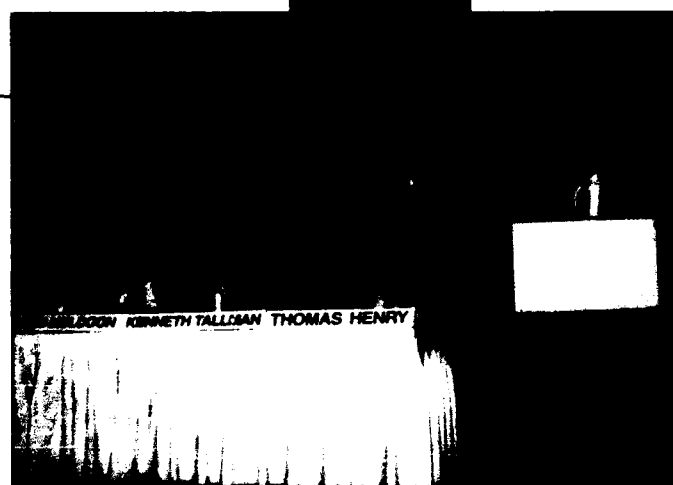
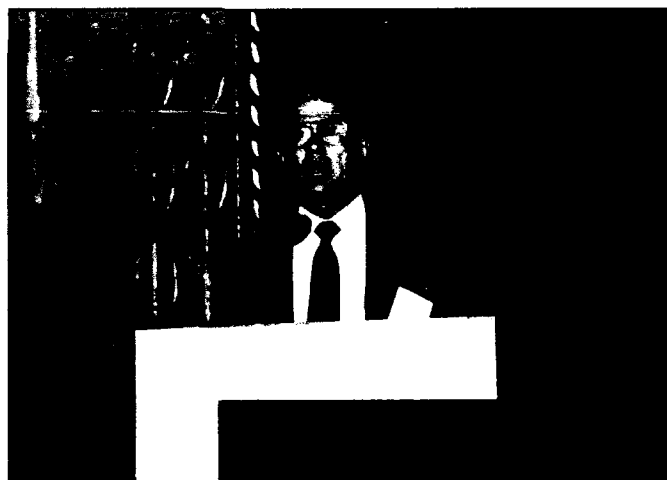
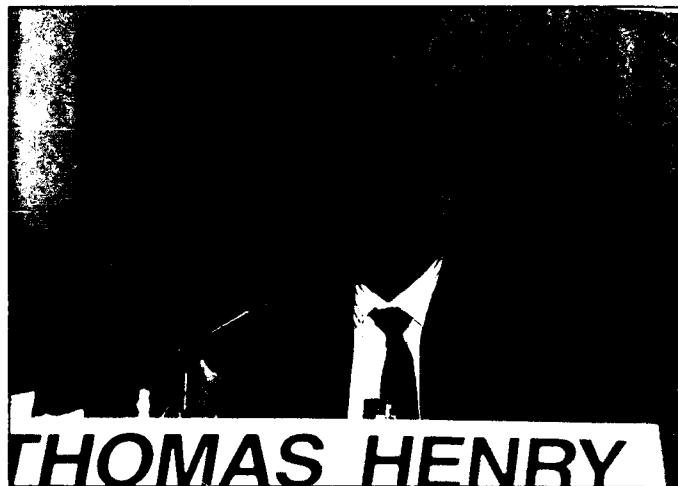
Thank you for this opportunity to share my thoughts on this vital subject.





PANEL II

---



## **James P. Muldoon**

**General Manager  
Aviation Technical Services  
Port Authority of New York  
and New Jersey**



### **Biographical Highlights**

James P. Muldoon, General Manager, Aviation Technical Services Division, The Port Authority of New York and New Jersey, has been actively involved in civil aviation and airport development for over thirty years.

Early in his career with the Federal Aviation Administration, he was engaged in the Navigational Aid Program and in the management of the Federal Aid to Airports Program. Over the last twenty years, he has been employed by the Port Authority managing aeronautical and airfield planning and development activities. In his present post, his major responsibilities include the management of the Authority's capacity enhancement and aircraft noise abatement progress.

Mr. Muldoon is a licensed professional engineer in the States of New York and New Jersey and is an active participant in a number of international organizations and committees concerned with aeronautical capacity and aircraft noise abatement issues.

### **Summary**

The Port Authority of New York and New Jersey operates the three major airports serving the New York/New Jersey metropolitan area. During 1990, Kennedy International, LaGuardia, and Newark International Airports handled about 75 million passengers and recorded over one million aircraft operations. The three airport system is also a major generator of economic activity in the region. However, the magnitude of the aircraft noise problem generated by the three airports is equally impressive.

The Port Authority, working with airlines and FAA, has been a leader in developing innovative flight procedures which minimize the number of people exposed to serious noise impacts, however, it is estimated that existing noise abatement restrictions account for about a one-third reduction in the maximum capacity of the three-airport system. Because of heightened sensitivity to the issue of aircraft noise it is doubtful that further changes can be effectively pursued at this time.

## Noise and Capacity

This paper offers comments on the relationship between aircraft noise and airport capacity from the perspective of a major airport operator with a significant aircraft noise problem.

The Port Authority of New York and New Jersey operates the three major airports serving the New York/New Jersey metropolitan area. During 1990, Kennedy International, LaGuardia, and Newark International Airports handled about 75 million passengers and recorded over one million aircraft operations. This slide (Slide 1) depicts the radar flight tracks for several hours of operations at the three airports. Although the 1990 passenger volume reflects somewhat of a decline from our peak year of 1986, when almost 79 million passengers were handled, our current forecast calls for accommodating approximately 110 million passengers at the three airports shortly after the turn of the century. Our current activity levels represent approximately six percent of the total domestic and 29 percent of the total United States overseas traffic. Our airports are served by over 100 United States and foreign-flag carriers providing service to 150 cities with a total of over 15,000 non-stop flights per week. The three-airport system is also a major generator of economic activity in the region representing 3.2 percent of the gross regional product or 522.2 billion annually in economic activity and accounting for 244,000 jobs.

The magnitude of the aircraft noise problem around our three airports is, unfortunately, also impressive. An analysis conducted by the FAA in the late 1970s indicated that noise generated by aircraft operations at the three airports affected over two million people, which was roughly one-third of the total population noise impacted in the United States at that time. With the elimination of the noisiest non-certified Stage 1 aircraft, the number of people currently living within noise-impact contours has dropped significantly from the 1970s. Today, approximately 630,000 people live within the Ldn 65 contours associated with our three airports. We would, however, estimate that these residents still represent about one-third of the total noise-impacted population of the United States.

The Port Authority, working with the airlines and the FAA through the Aviation Development Council, a unique local mechanism established to address common industry problems, such as aircraft noise, has been a leader in developing innovative flight procedures which minimize the number of people exposed to serious noise impacts. This slide (SLIDE 2) illustrates the current noise contours for the three Port Authority airports. The contour methodology, as you may know, is based upon an energy average of the annual average day's operation and, therefore, reflects virtually all significant flight activity at each of the airports. You will note that there is almost no symmetry between the contours at the opposite ends of the major runways and that very few of the impact contours are lined up with runway centerlines. This is because the contours depict a system which, to the extent practical, requires aircraft to turn away from populated areas not only during takeoff operations, but also in several cases during the final phases of landing. In addition, preferential runway systems at

## PANEL II

---

each airport significantly affect the distribution of landing and takeoff traffic to and from the various runways. The use of runways having less noise exposure is favored and operations on runways with greater noise impacts are discouraged.

As aeronautical demand has increased, the negative effect of these long established noise abatement procedures on the capacity of the three-airport system has become more apparent. At this point, we would estimate that existing noise abatement restrictions account for about a one-third reduction in the maximum capacity of the three-airport system. In the balance of this paper, we will look at examples of these limitations at each of the airports.

### Newark International Airport (Slide 3)

The parallel northeast/southwest runways at Newark Airport, which have historically accommodated approximately 90% of the airport's aircraft movements, are separated by 950 feet. Based upon applicable FAA standards, this separation would permit independent approaches and departures to be conducted on the runways under visual operating conditions as is standard practice at a number of airports in the United States, including Los Angeles and San Francisco International. Independent operations, however, are not conducted at Newark because of noise abatement restrictions that require the more or less exclusive use of Runways 4R and 22L for landings and the more or less exclusive use of Runways 4L and 22R for takeoffs. In addition, all takeoffs in both directions must turn to the east immediately after liftoff so that initial climbouts are performed, to the extent possible, over industrial and unpopulated marshland areas. This results in a single in-trail departure stream of aircraft to a point approximately seven miles from the airport. As a result, the maximum capacity of these runways is significantly reduced. We estimate that the best movement rate on the two-runway combination would increase by at least 25% if these noise abatement procedures were not in place.

### John F. Kennedy International Airport (Slide 4)

The hourly distribution of Kennedy International Airport's air traffic is dominated by transatlantic service patterns which result in a very pronounced arrival peak beginning at about 2 P.M. and ending at about 6 P.M. This is immediately followed by an equally pronounced departure peak running from 6 P.M. until about 10 P.M.. In order to accommodate these traffic demands, every effort is made to provide two independent landing runways during the arrival peak with a single departure runway and then, later in the day, two independent departure runways and a single arrival runway to handle the departure peak. The best departure configuration calls for takeoffs from Runways 13L and 13R, which are 6,000 feet apart, and are operated independently regardless of weather conditions. With the use of this combination, as many as 66 departures per hour can be handled. When wind and weather dictate that these runways be used in the opposite direction, that is, takeoffs on Runways 31L and 31R, a long-standing noise abatement procedure requires takeoffs from both runways to execute an immediate left

## PANEL II

---

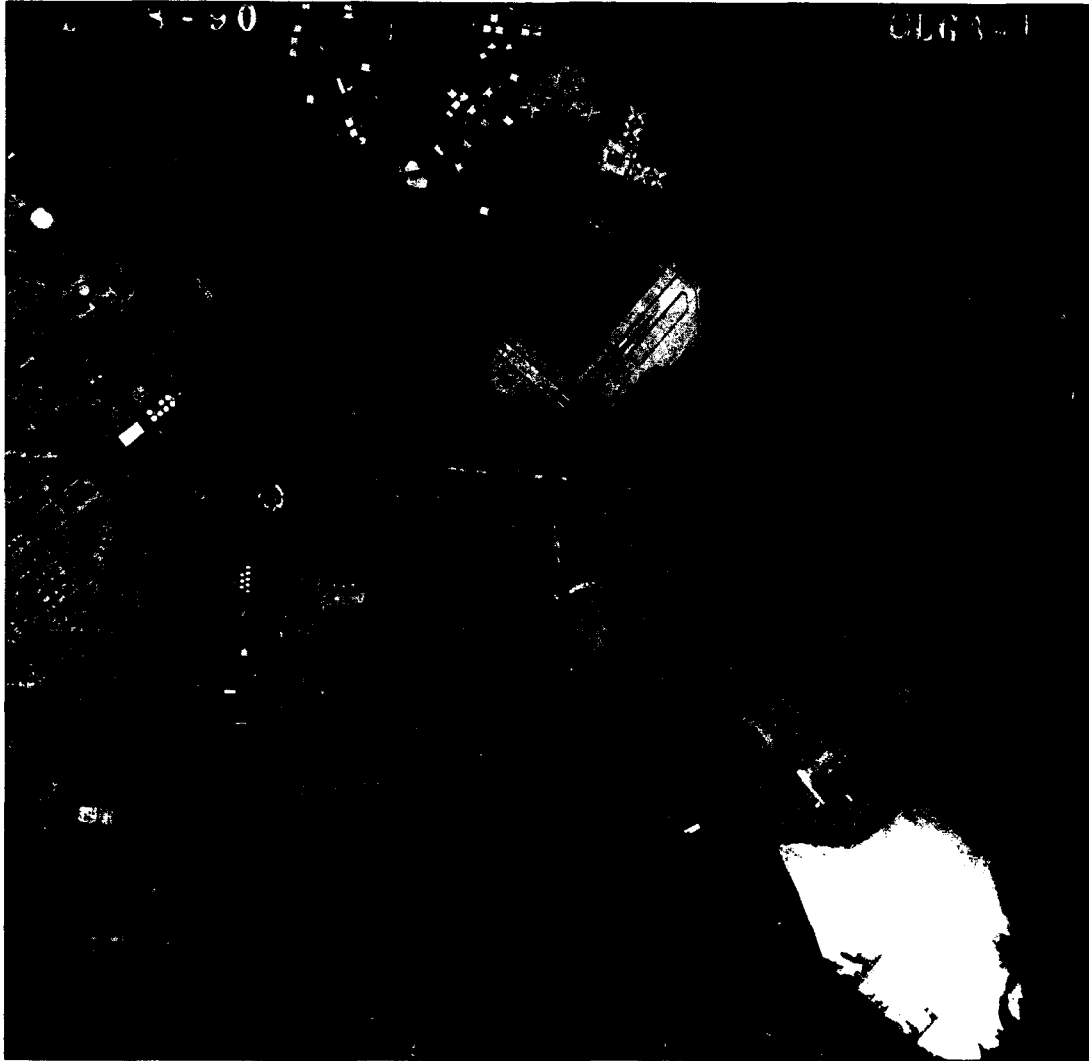
abatement procedure requires takeoffs from both runways to execute an immediate left turn and to head towards a common navigational aid, the Canarsie VOR. This, in effect, reduces the departure capacity to the equivalent of a single runway and our observations indicate that, under the best conditions, only approximately 40 takeoffs can be handled in that operating mode, a reduction of more than 40%.

### LaGuardia Airport (SLIDE 5)

In order to avoid directly overflying the densely populated areas of Flushing and other residential communities, situated along a straight-out departure corridor from Runway 13 at LaGuardia Airport, an immediate left turn to a heading of 175 degrees is prescribed. This turn, which has been required for all Runway 13 departures over the past 25 years, routes departing aircraft over Flushing Meadows Park, Shea Stadium and the U.S. Open Tennis facility. At an altitude of 1,500 feet, these takeoffs are then turned to the appropriate Standard Instrument Departures. In addition to generating additional flight-track distance, these circuitous routes create an interaction with various JFK traffic patterns, one of which prevents the use of Runway 13L at JFK for landings under instrument operating conditions. This long-standing LGA noise abatement procedure, while not reducing runway capacity at LGA per se, does in fact significantly impact the flexibility of operations at JFK and reduces the operating capacity in several operating configurations.

A number of capacity studies, conducted with FAA support under the Airport Task Force Program and by outside consultants under contract with the Port Authority, have identified the potential for increasing capacity and reducing delay by reducing the severity of noise abatement restrictions. If, in specific instances, the quietest and best performing aircraft of the Stage 3 fleet were allowed to fly procedures denied to other aircraft, substantial gains could be made at all three Port Authority airports. Prior to the implementation of the FAA's Expanded East Coast Plan in February 1987, which realigned many of the transitional air routes in the New York/New Jersey, metropolitan area, the Port Authority and the airlines, again working through the Aviation Development Council, began to pursue such changes by meeting directly with affected communities and their elected officials. We were, in fact, actively working with the communities west of Newark Airport that would be affected by an increase in the use of Runway 11 for landings in advance of the installation of an instrument landing system for this runway. With the implementation of the Expanded East Coast Plan and the attendant public reaction in the State of New Jersey, sensitivity to the issue of aircraft noise has been greatly heightened and we are, at this point, doubtful that further changes such as this can be effectively pursued.

Slide 1



PANEL II

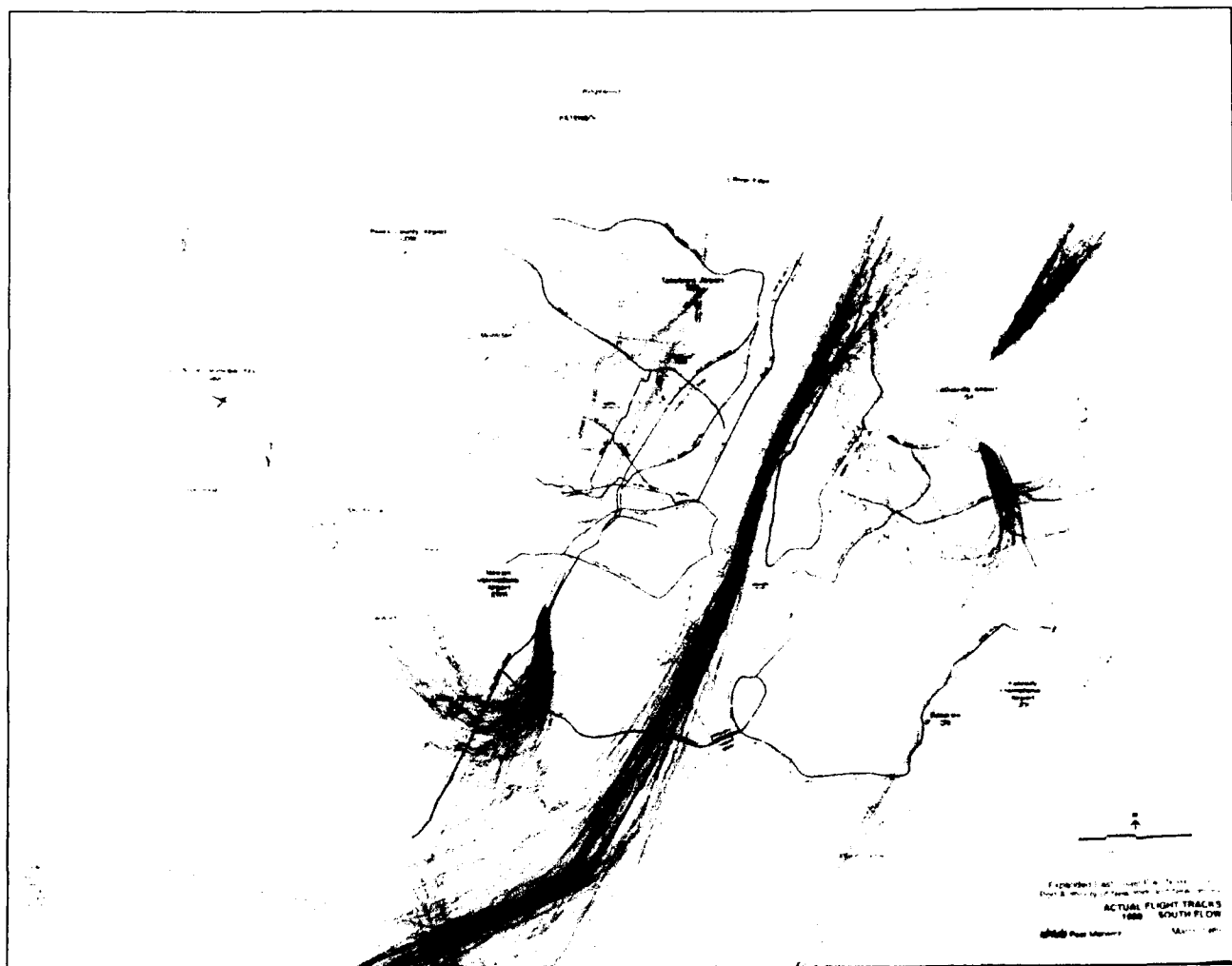
---

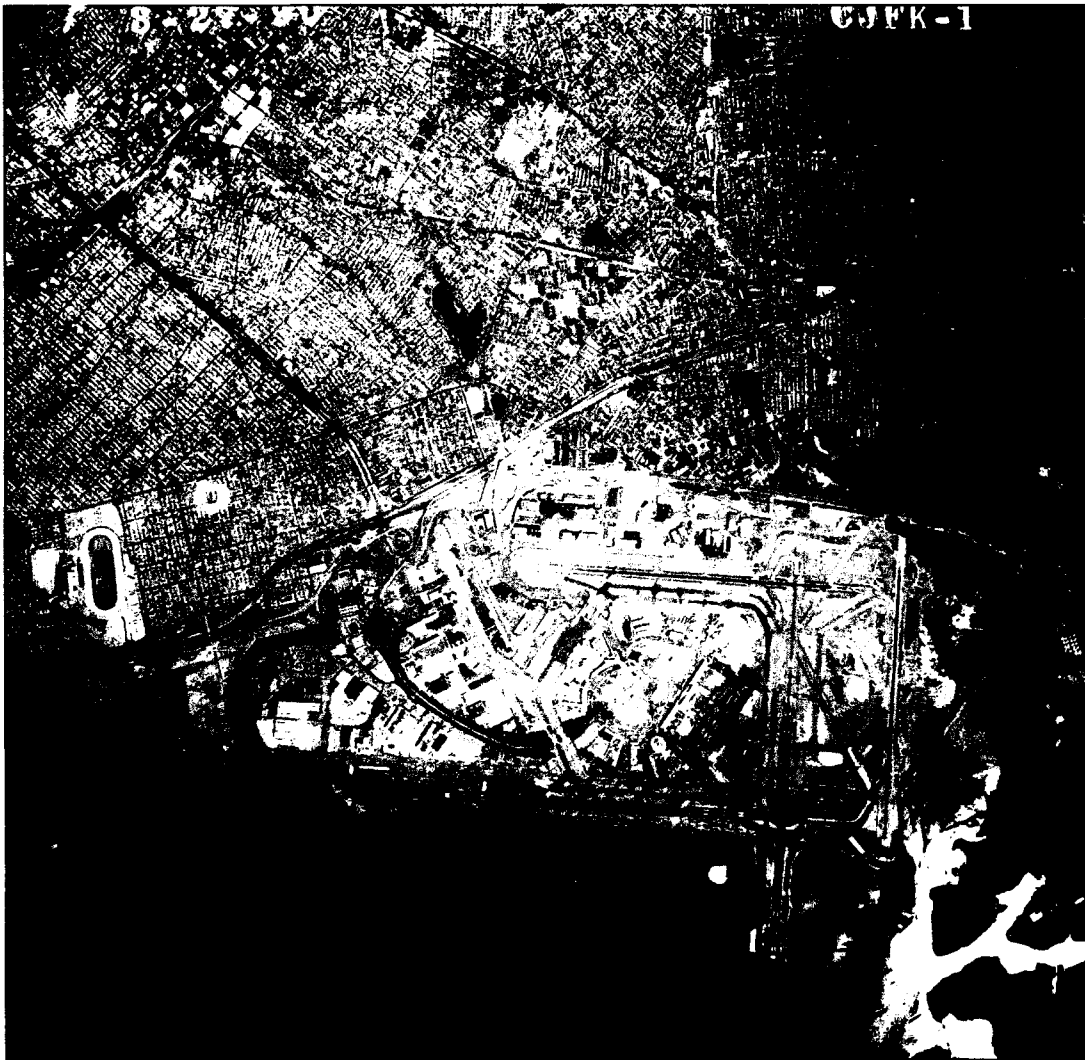
Slide 2











PANEL II

---



## Scott Jones

President  
AUS Consultants



### Biographical Highlights

Scott T. Jones is President, AUS Consultants, Industry Analysis Group. His company is an industry-focused, management consulting firm that specializes in market studies. During its 24 year history, AUS has helped some of America's largest industrial corporations assess the state of competition and opportunities in their markets, here and abroad. Among Mr. Jones's clients are numerous oil and gas companies, utilities, plus transportation and travel organizations.

For almost 20 years, Mr. Jones has been recognized for his views on fuels and utility markets. His appearances and publications are regularly quoted in the press. His corporate experience includes stints with ARCO, General Motors and Anaconda Metals. Mr. Jones holds a Bachelor and Masters degree from the University of Texas and a Ph.D from Virginia Tech.

### Summary

Jet fuel prices during 1990 will be remembered for a long time. Within 60 days, jet fuel prices doubled on the heels of the Iraqi invasion of Kuwait and the build-up of a fuel-hungry Air Force in the Middle East. Added to that is the worsening recession that has helped to reduce air traffic and the number of airlines.

The economic outlook is grim, at least for the next 90 days. Then depending on the outcome of the Middle East hostilities, and several other equally important factors, things could get much brighter, very quickly.

Kero-jet supplies are, currently, in oversupply. But that oversupply could be quickly worked off if the economy improves or the war heats up. However, the outlook for the near future is for price softness, barring changes in the generally moribund heating oil market. Longer term, kero-jet prices should settle into a very comfortable range for the airlines. While price volatility can not be ruled out, oil markets appear to be poised for a period of ample supplies with steady to falling prices.

## **The Jet Fuel Disease: A Winter Cold or Permanent Affliction?**

Between July and October, jet fuel prices doubled as 4.0 MMBD of crude oil was embargoed and a fuel-hungry airforce deployed to the Middle East. The airline industry lost billions of dollars. Continental Airlines and Pan Am filed for bankruptcy. Others are balanced precariously, awaiting a market environment that will spell recovery.

This paper focuses on the market for jet fuel for the rest of 1991 and then a longer view to the middle of the decade. An important part of this analysis rests on an economic forecast that is presented in some detail. Further, the results are based on a view of how the Persian Gulf war draws to a close. The important factors have melded into three scenarios for jet fuel markets to 1995.

### **THE CRUDE OIL MARKET**

During 1990, the OPEC production averaged 23 MMBD. The range in output was from September's war-induced low of 20.1 MMBD to last April's price crushing 23.8 MMBD. Similarly, oil prices averaged \$24.50/Bbl during 1990, from a low of \$16.85 to a high of \$35.90 for the months of June and October, respectively.

Based on this evidence, the rational individual might think any number of things. First, that oil prices are extremely sensitive to small variations in output since the percentage change between the highest and lowest price was 115% versus the 18% differential on output. Secondly, the market-clearing, long run price for a barrel of oil must be nearer to \$20/Bbl (1990 dollars) since the year's output averaged a number very near the highest monthly figure.

If forecasting oil prices were a simple task, rules of thumb like those above would be all anyone would need. But, both observations are simultaneously enlightening and misleading.

- o Oil prices are only extremely sensitive to small variations in output if output has been excessive in the recent past.
- o Oil prices are only extremely sensitive to small variations in output if something unusual heightens speculative pressures.
- o Long-run oil prices, adjusted for inflation, are likely to remain near \$20/Bbl in this decade, give or take a couple of dollars. That is a price sufficient to choke off significant penetration by competing fuels and still keep the global oil industry at levels of activity that retain its preeminence among the world's corporate entities.

## PANEL II

---

o For oil prices to average \$20 or more per barrel in this decade, one of two things must occur. First, oil price stability is maintained, increasing the demand for oil world-wide 2-3%. Alternatively, a series of market shaking events, not unlike the Middle East war, keeps the supply of oil in doubt. This would produce a volatile price trend with big price increases followed by big price declines that average \$20/Bbl or more.

Obviously, of the points listed above, the more "comfortable" series for both consumers and producers is balanced output and price stability. Our recent analyses suggest that the demand for OPEC crude oil by the year 2000 would be upwards of 40 MMBD if price stability at any level between \$16 and \$25/Bbl were to be maintained.

Similarly, oil supply/oil price volatility may produce an average oil price over the decade in excess of \$20/Bbl, but the demand for OPEC crude oil by the end of the century would be only marginally greater than it is today. This option might pay off for an oil producing region that is short on the resource. However, given that conservative estimates of the amount of recoverable oil in the Middle East alone are well in excess of one-half billion barrels (the entire world's demand for nearly ten years), this seems like an imprudent path to take.

### THE GLOBAL ECONOMIC OUTLOOK

Forget what some economists, particularly those in the U.S. government, are still calling a growth pause or economic slowdown and call it what it is: a world-wide recession. There is now little doubt that the entire global economy will become mired in the U.S. induced recession that began in the Fall of 1990. Reports of continued strength in the EC and Asia are giving way to reports of growing redundancies, inventories and consumer malaise. The end-of-year data out of the U.K. and Western Europe show the first clear signs of a recession that is likely to spread quickly to the rest of the Continent.

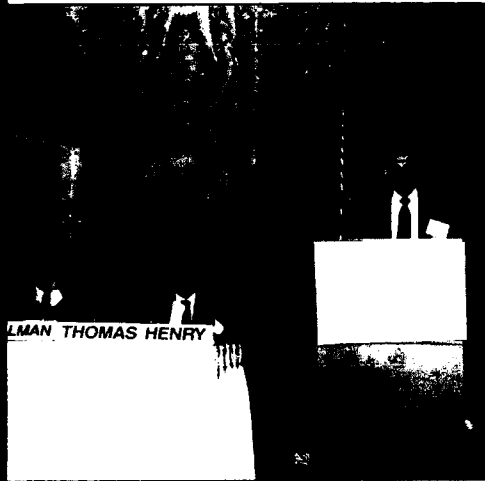
The economic indicators pictured in the Figures 1 through 4 show the extent of the recession and how it is likely to evolve. Surely, there are some bright spots. For example, the European Community as a whole is likely to weather this recession showing pockets of real economic strength (i.e., Germany/Austria). That implies that the impact of the recession will be felt mostly in the vulnerable economies: U.K., France, the Lowlands and the Iberian nations. On balance, the EC will experience a reduction in its growth from near four percent per annum to about two and one-half percent. Similar trends are expected for Japan and the Asian tigers. The Canadian economy is also likely to get through 1991 without recording a negative growth rate.

## PANEL II

---

Bright spots in the U.S. economy exist, too.

- o The post-1991 recovery is expected to be robust. The growth rate will build to more than three percent per annum.
- o Inflation is not an issue for some time to come. Despite the burst in energy-induced inflation during 1990, the outlook for inflation is a return to the two to three percent range (GNP deflator).
- o Unemployment will grow as it usually does during a recession, but the prospect of seven percent or more unemployment is not in the cards. The large unemployment rates of the late 1970s and early 1980s were built, in part, on the transitory nature of an inexperienced U.S. work force. Today, the "baby-boom" generation is fully trained and experienced on the job.
- o Steel production and other metals industries, once the bane of any economic downturn, will benefit from their new lean and mean organizations. The historical declines in output should not materialize.



The biggest impact of a global recession will be felt in debt-laden economies of the Western Hemisphere. This group, including the U.S., has little else to throw on the fire to stimulate the economy. The result will be negative growth in 1991 for the U.S. and, probably, a number of its Latin American neighbors. Particularly hard-hit in this country will be the auto and construction industries.

As bad as this is, the real trouble spots in the world today are in the Soviet Union and the Eastern European nations. By western standards, these economies are going into a depression. After a year that has seen food lines and reports of civil unrest along with negative economic growth in the USSR and Eastern Europe (see Figure 4), 1991 and 1992 are forecast to bring more of the same. From an economist's standpoint, the social and political changes that are trying to take place will receive little help from the Soviet economy. The next two years are going to be trying times for these people.

### THE OIL PRICE OUTLOOK

The forecast for oil prices in the very short term (the next four months) is built around the war more than the economy. This forecast generally expects the war to end in March, followed by a period where the Saudi's either quickly reign in output or fail to do so while the first oil from Iraq and, possibly, Kuwait begins to flow. The data in Figure 6 show the outcome of both possibilities, along with the record for the last fourteen months for prices, output and demand for OPEC crude oil.

The message from Figure 6 is clear. Past overproduction on the part of the cartel, November through January, still effects the market. Should the cartel fail to match the fundamental demand for its crude oil, the global market will quickly reject higher

## PANEL II

prices in favor of lower prices. If, however, the war continues to restrict some potential production and the Saudis match output to market demand, then prices in the vicinity of \$22/Bbl could prevail for the period January to June, 1991.

The "penalty" for not matching what the world needs in terms of crude oil is severe. The revenue differential for OPEC between the extremes of the range shown for the first half of the year is \$9 billion. For U.S. consumers, however, the lower prices would translate into a \$11 billion injection of additional disposable income. Since this estimate does not account for the multipliers on economic activity, the actual impact is hard to gauge. However, the combined effect would roughly equal the effect of a ten percent reduction in the average family's income tax. Since the benefit to consumers would be realized over time (just like a lowering in the amount of tax withheld from a week's pay), the stimulus to the economy might be insignificant. Hence, those prognosticators that suggest lower oil prices could pull the country out of recession might be overstating the case.

### OIL PRICES IN THE LONG RUN

How can oil prices stay near \$20 or \$25/Bbl over a ten year period? Isn't oil a finite resource and destined for higher prices as supplies inevitably run out? Why aren't prices well below \$20/Bbl, say near the recovery cost of \$8/Bbl equally plausible for the long run? This is a complicated issue and deserving of considerable discussion, but a long-term look at oil prices must account for the following.

- o The U.S., and to a lesser extent the North Sea, represent the marginal producing areas against which exploration decisions are weighed by oil companies from around the world. The big oil companies always look at "opportunities" at home first, then decide whether to pursue foreign prospects. Hence, a certain floor, provided by the incremental barrel in the domestic market (currently about \$12 to \$18/Bbl), underpins global oil prices.
- o Until "confidence" in the vast oil producing regions of the Middle East can be established, the above will hold.
- o Substantially higher prices, i.e., \$25 +, run into the current limits of technology that either produce, transform or distribute alternate energy sources in large quantities. This acts to cap oil prices. Based on these simple assumptions, the long-term oil price outlook is shown as Figure 5. Import Dependency Growing U.S. oil import dependency may become a major political issue in the next two or three years. Figure 7 depicts the situation in America. Since 1975, when total oil imports were less than seven million barrels per day or 35 percent of consumption, U.S. dependency on imported oil has decreased to a low of 28 percent in 1985, only to rise again to 44% this year. By 1995, we are forecasting that dependency level at 58% or some ten million barrels per day.





## PANEL II

---

These numbers are huge for a nation that consumes as much oil as the United States. But the most pressing aspect of the oil import picture is the growing concentration of the source of that oil in the hands of a very few producers. Unlike Japan, who has practiced a sort of portfolio approach to its energy acquisitions since WWII, the United States is increasingly coming to rely on OPEC. As shown in Figure 7, the cartels role in U.S. oil supply has changed completely from the 1985 era when these nations provided less than half of the nation's oil. By 1995, the members of the cartel will supply about 80% of U.S. oil imports and a large block of OPEC oil will come from the Middle East. In 1985, with overall oil imports down from ten years before and representing only about one barrel in eight consumed, America purchased oil in the global marketplace much like Japan does today. A list of sources of U.S. oil suppliers was long and the largest single suppliers were our neighbors in the Western Hemisphere. About one half of all the oil imported came from Canada, Mexico and Venezuela. In fact, the volumes of OPEC oil would have been almost negligible (7.5%) if the U.S. had not chosen to import from Venezuela, a member of OPEC but also a neighbor in Latin America. That is not true today. By 1988, less than 40% of the oil imported originated in the Western Hemisphere. More than 27% came from the Middle East, with 12.5% from Saudi Arabia alone. In fact, 45% of oil imports originated in OPEC nations in 1988. The ratio has since slipped to more than 50%.

### **THE JET FUEL PRICE OUTLOOK: THE REST OF THE YEAR**

There are two important assumptions that formed our analysis of jet fuel prices for the rest of 1991.

1. The intense fighting in the Persian Gulf War will end with a land battle some time in March. The Iraqi army will be driven out of Kuwait and the Hussein administration replaced by a more moderate faction. Oil production and exports to the West will begin shortly thereafter from both nations. Initially, production will be modest, but quickly build toward a combined output level of 1.5-2.0 MMBD by the fourth quarter of this year. America is expected to maintain a military presence in the region for years to come.
2. The current recession will bottom-out sometime during the second quarter of 1991. Recovery will be quick, stimulated by improved consumer confidence and lower interest rates. Concerns about inflation will persist as the Administration shifts its focus to the deficit, social programs, getting re-elected and financing the war. Low crude oil prices will be a significant part of achieving all of the above. The jet fuel price outlook is contained in Figure 8 for our base case scenario. Note that we expect kero-jet to average about fifty cents a gallon (spot, U.S. Gulf) from May through August and about 60 cents per gallon for the year. Note, too, that prices are fairly steady. This should stimulate demand as the economic recovery progresses and memories of the Persian Gulf War fade for most Americans.

### JET FUEL PRICES: THE NEXT FOUR YEARS

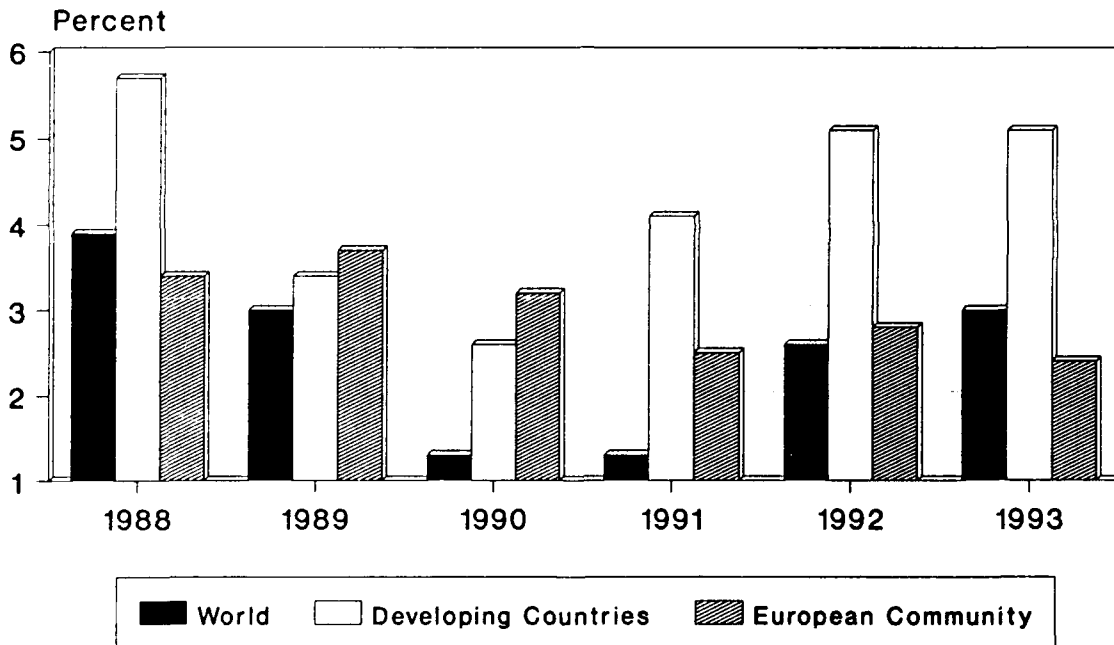
Long-term views of the jet fuel market should contain scenarios. That is what appears in Figure 9. The base case is formed around economic recovery during 1991 and 1992, then steady economic growth that was depicted earlier. As a result, the increase in fuel prices over the period 1989 through 1995 is 3.7%, or slightly less than the anticipated rate of inflation. Our first alternative scenario, "oil glut," provides even lower jet fuel prices for the industry. Equally attractive, because the glut is caused by overproduction by OPEC and not by a sluggish economy, passenger traffic builds quickly, too. The key assumption to this scenario is that when Iraq and Kuwait resume production, building toward a combined 3.5 to 4.0 MMBD in 1992, Saudi production remains near 6.0 MMBD, rather than the 5.0 MMBD level needed to keep oil prices near \$21/Bbl. As a result, oil prices collapse in late 1991 and 1992 in a fashion not unlike 1986. Our second alternative scenario, "extended war," is as uncomfortable for the airline industry as it is for the soldiers on the ground. Under this scenario, a partial pull-out of Iraq from positions in southern Kuwait to positions in northern Kuwait, allows Hussein to hold onto the oil fields. The embargo is maintained, but the fighting continues into 1992 with losses on both sides. Oil prices average \$25-30/Bbl and jet fuel prices stay near 70 cents per gallon until mid-1992 when the war grinds toward a close. The range on weekly prices averages during the period is forecast at 55 to 95 cents, with periods of softness due to the economy and overproduction, followed by periods of tightness due to the hostilities and a growing spectra of war-induced inflation. In the backwash of the war, two things occur to cause jet fuel prices to collapse. The economy enters another period of economic softness (post-war) and crude oil overproduction occurs throughout the Middle East as war-torn nations rush to generate cash-flows.

While no analyst can minimize the damage that a doubling of jet fuel prices did to the airline industry in 1990, the end is at hand. Jet fuel prices are much more likely to spend the next few years advance steadily and at a rate that just matches or rests just below inflation. Our analysis shows that the supply of jet fuel over the next several months and years should be adequate to produce a period of relative price stability. However, uncertainty about the outcome of the war and the state of economy could create a volatile near-term market.



Figure 1

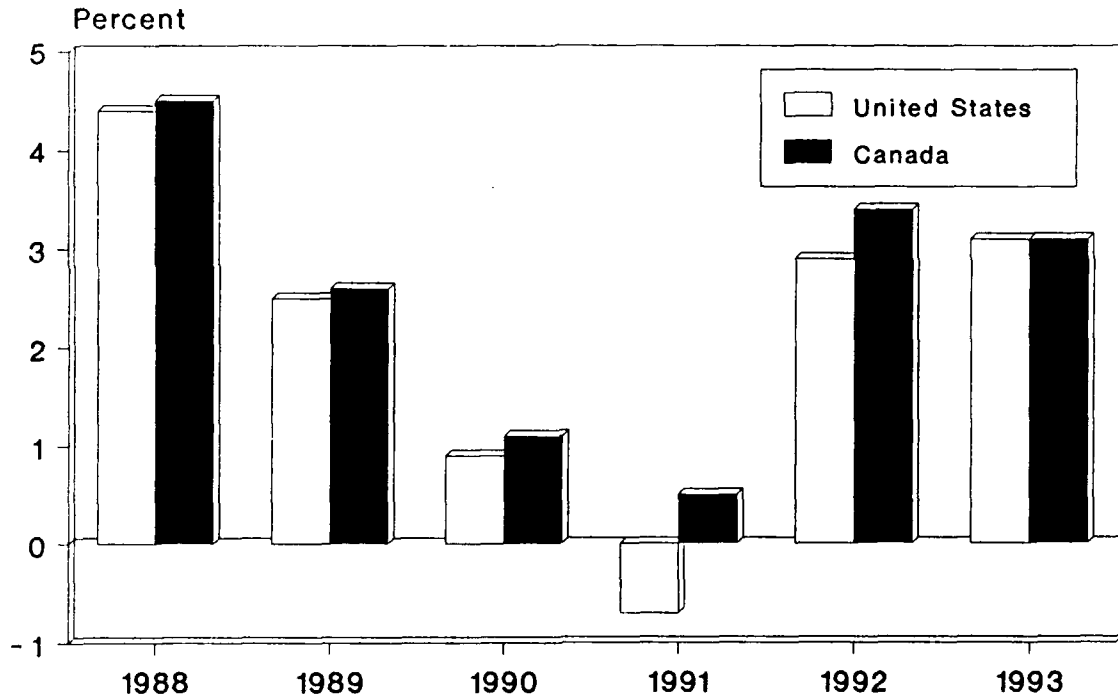
FIGURE 1: WORLD ECONOMIC OUTLOOK  
World, European Community and Developing  
Countries Real GNP Growth



Source: AUS Consultants; Project LINK,  
University of Pennsylvania

Figure 2

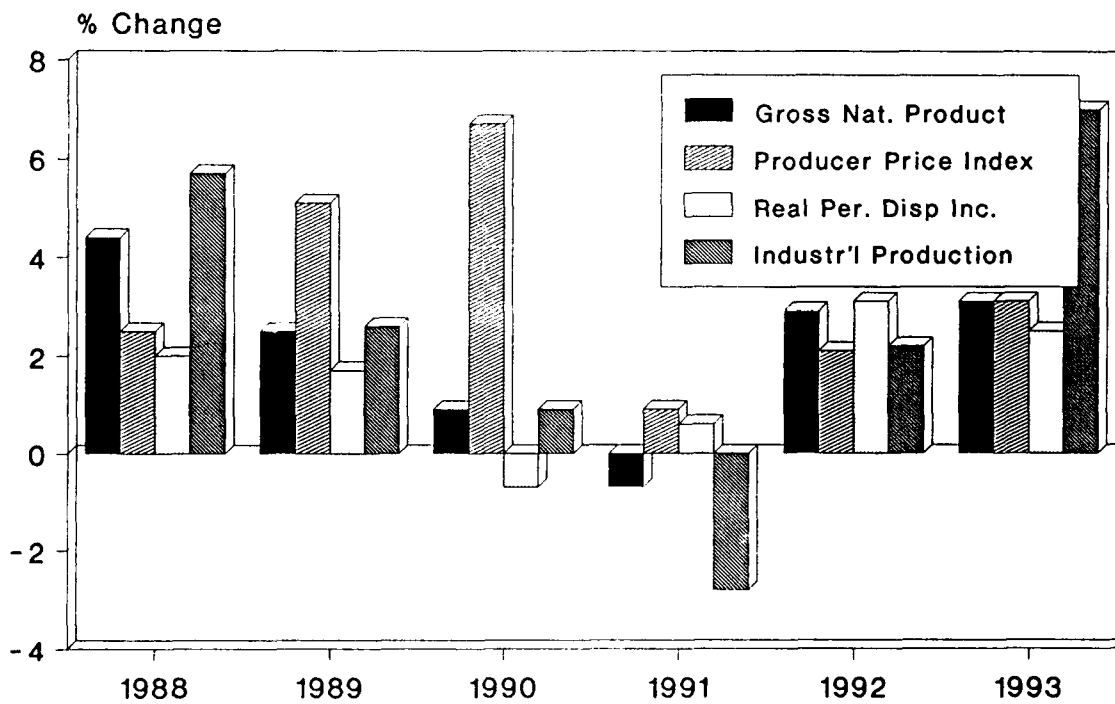
FIGURE 2: WORLD ECONOMIC OUTLOOK  
United States and Canada Real GNP Growth



Source: AUS Consultants; Project LINK,  
U. of Pennsylvania, Laurence Meyers, Inc

Figure 3

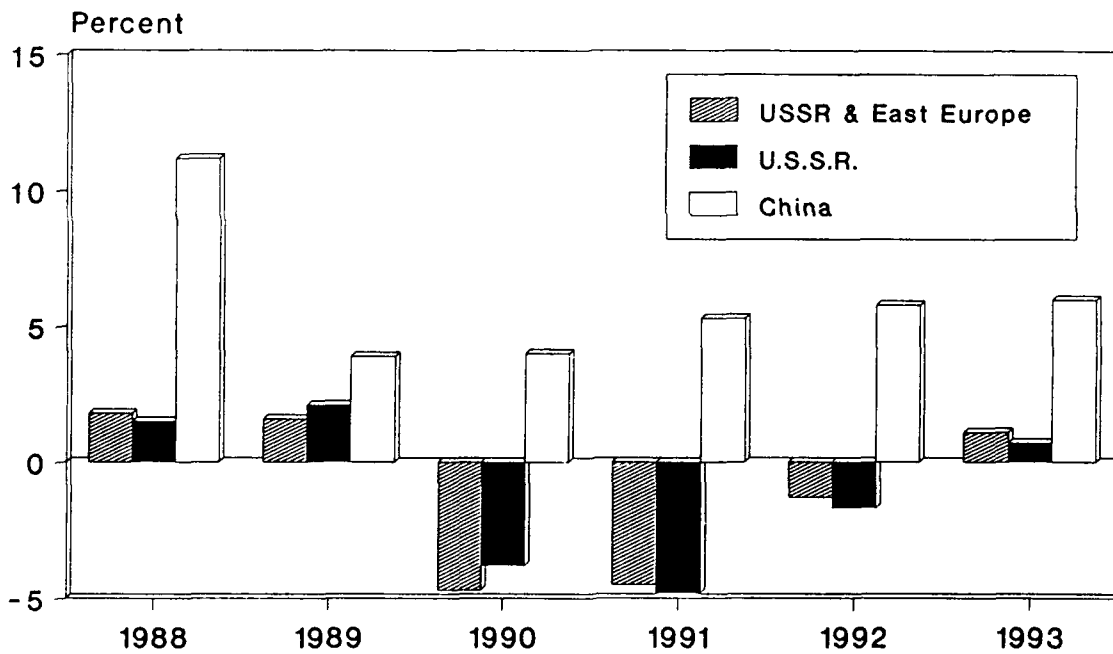
FIGURE 3  
UNITED STATES MACROECONOMIC OUTLOOK



Source: AUS Consultants; Laurence Meyers, Inc.

Figure 4

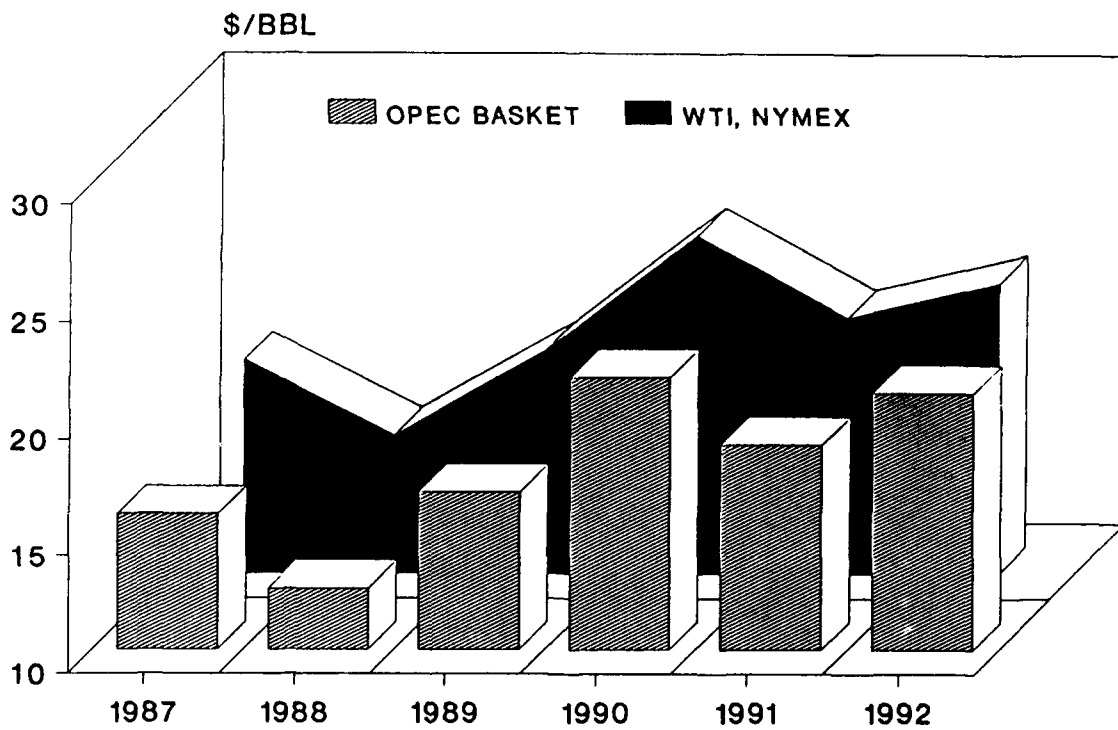
FIGURE 4: WORLD ECONOMIC OUTLOOK  
Centrally Planned Economies  
Real GNP Growth



Source: AUS Consultants; Project LINK,  
University of Pennsylvania

Figure 5

FIGURE 5  
CRUDE PRICE OUTLOOK



Source: AUS Consultants, EIA, PMI

Figure 6

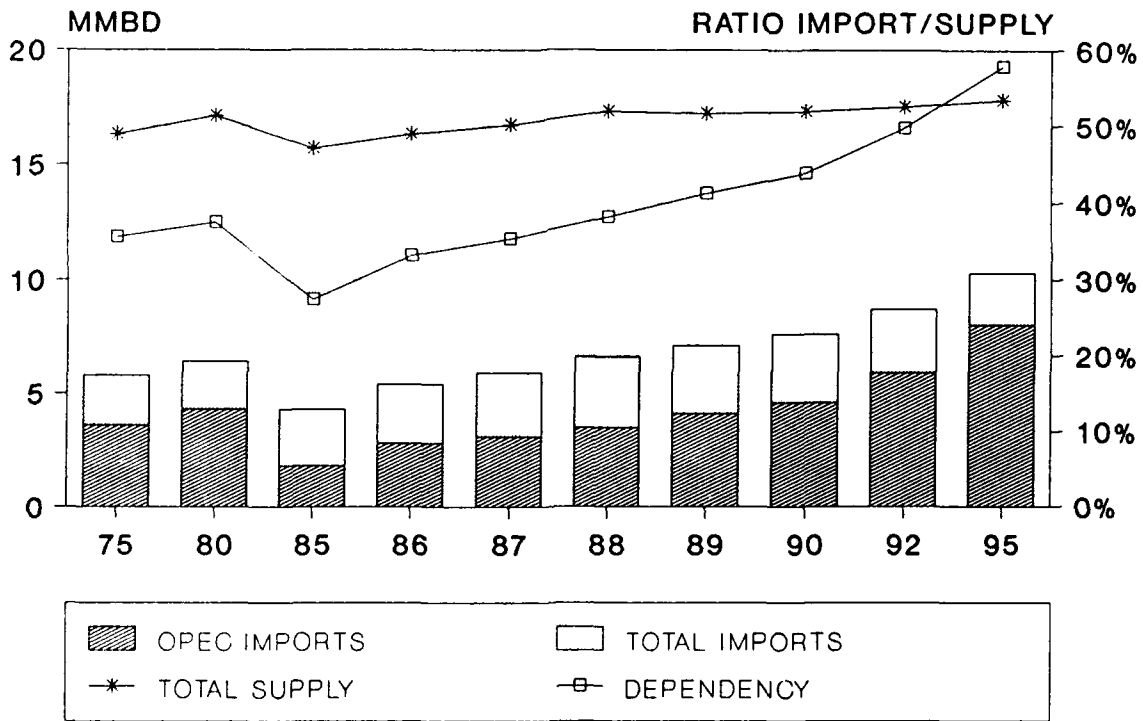
FIGURE 6  
OPEC OUTPUT AND OIL PRICES

	Monthly Average Price (\$/Bbl,WTI)	OPEC Crude Oil Output (MMBD)	Call On OPEC OIL (MMBD)
1990			
JUL	18.65	23.3	21.5
AUG	27.15	23.6	22.9
SEPT	33.7	20.1	23.0
OCT	35.9	22.4	23.0
NOV	32.3	23.0	23.0
DEC	27.2	23.6	23.0
Year	24.5	23.0	22.6
1991			
JAN	24.15	23.0	23.3
FEB	22.0	22.7	22.5
MAR	19.0-24.0	22.2-22.5	22.5
APR	16.0-20.0	21.0-23.0	20.5
MAY	14.0-19.0	21.0-24.0	21.0
JUN	16.0-21.0	22.0-23.5	22.0
6-Mo. Avg.	18.5-21.7	22.0-23.1	22.0



Figure 7

FIGURE 7  
U.S. IMPORT DEPENDENCY



Source: AUS Consultants, API

**Figure 8**

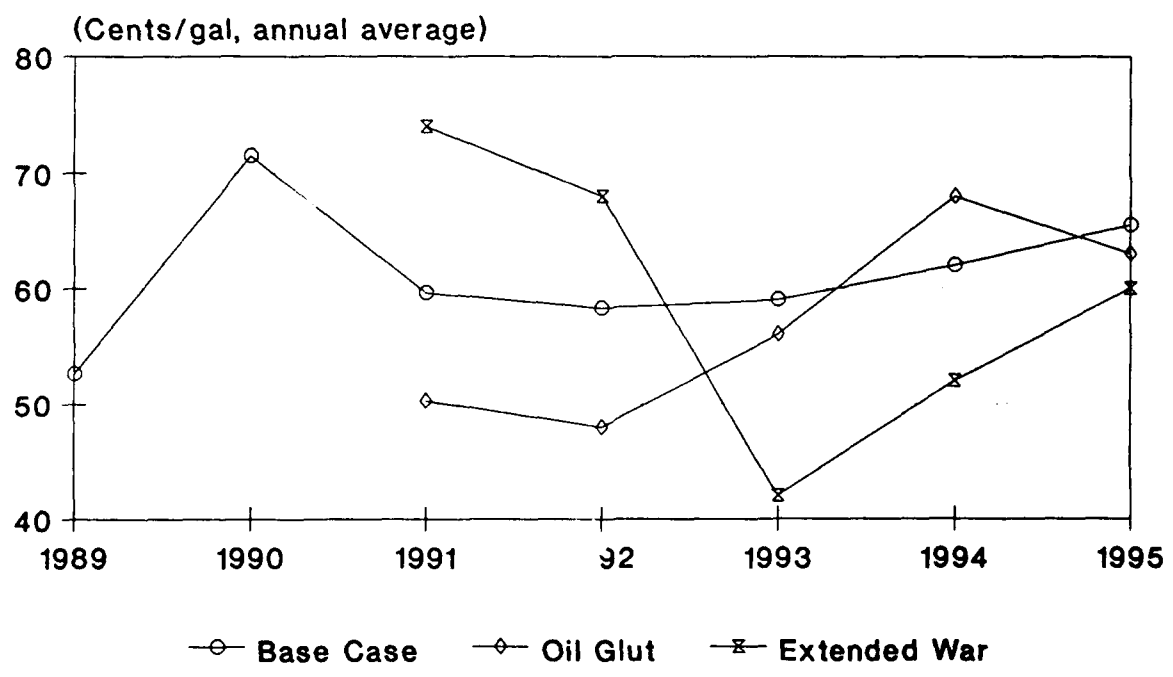
**FIGURE 8**  
**JET FUEL PRICES: THE REST OF THE YEAR**  
(Spot, U.S. Gulf Coast)

(Cents/gal, first of month)

	<u>1989</u>	<u>1990</u>	<u>1991</u>
JAN		67.7	82.1
FEB		80.9	71.5
MAR	51.5	58.1	70.4
APR	53.0	55.3	59.7
MAY	53.5	53.6	52.2
JUN	45.5	51.0	47.8
JUL	48.8	99.2	49.5
AUG	50.8	52.4	51.0
SEPT	51.8	77.7	56.5
OCT	56.9	91.8	59.5
NOV	60.7	121.9	55.2
DEC	58.8	97.8	60.0

Figure 9

FIGURE 9  
JET FUEL PRICES: THE NEXT FOUR YEARS  
(Spot, U.S. Gulf Coast)



## PANEL III

---

### Financing the Future



## **Denise Kautzer**

**Director of Finance  
Minneapolis Airport Authority**



### **Biographical Highlights**

Denise Kautzer began her career in airport financing 14 years ago when she joined the staff of the Minneapolis-St. Paul Metropolitan Airports Commission as an accountant. Currently, she is the Director of Finance. Ms. Kautzer holds a Bachelors degree from Hamline University and a Masters in Business Administration degree from the College of St. Thomas. She is a certified public accountant. Ms. Kautzer is active in the Minnesota Chapter of the Government Finance Officers Association. She is currently chairperson for the Budget Awards Committee, but also served as chairperson of the Program Committee.

### **Summary**

As aviation needs continue to grow throughout the country, an increasing number of communities will be faced with the decision of whether or not to construct a new airport. The State of Minnesota is currently involved in a process to evaluate how to meet future aviation demands. This process will result in a decision to either expand current facilities or build a new airport. The costs of constructing a new airport are tremendous and as a result requires the use of multiple sources of funding.

Failure to provide facilities to meet future aviation needs could result in lost economic opportunities, delays at the existing facilities, and continuation of the existing noise problem. In Minnesota, we are planning for the future in order to avoid these costs.

## Financing the New Airport, Who Pays the Cost?

As aviation needs continue to grow throughout the country, an increasing number of communities will be faced with the decision of whether or not to construct a new airport. The State of Minnesota has recognized that we will be making a serious mistake if we do not face the potential need for new facilities to meet this demand. As a result, we are currently involved in a process that will conclude in a decision to either expand current facilities or build a new airport.

The cost of constructing a new airport is tremendous. Because of this, there is no single source of funding. New airport financing requires multiple resources be tapped. In my presentation today, I will be discussing issues facing the Minneapolis-St. Paul Metropolitan Airports Commission (MAC) as we look to the future and face the possibility of constructing a new airport.

### Background

In 1989, the Minnesota State Legislature changed the course of the Minneapolis-St. Paul International Airport. That year, they passed the Metropolitan Airport Planning Act, the purpose of which was to address the need of the Twin Cities region for more airport capacity in the future.

This legislation set into place a "dual track" airport planning process. One track focuses on possible ways to improve the capacity of the existing airport through the year 2020. The other track focuses on evaluating the potential of a replacement airport to meet future aviation needs.

Recently, three candidate search areas were identified as potential areas in which a new airport could be located. One area is north of the cities and two are to the south. Each area is approximately 100 square miles.

The location of the three search areas was met with mixed emotion by the public. Groups, who favor relocation of the existing airport, supported the selection of the three search areas. There are others, however, who felt that the search areas were just too far from downtown St. Paul and Minneapolis. Based on traffic estimates for the year 2010, driving time during the rush hour would range from 35-55 minutes for the southern search areas and 70 minutes to the northern site. This is an increase from the current commuting time of 15-20 minutes.

In December of 1991, the final search area will be selected and comprehensive planning for a new airport will begin. The MAC will then locate a specific site within the search area. This entire process will culminate in 1996, when the Metropolitan Airports Commission (MAC) and the Metropolitan Council, a regional planning agency, make a recommendation to the legislature as to how future aviation demands can best be met.

### Cost of a New Airport

Before we can even address how to finance a new airport, we need to know the specific dollar cost. For the MAC, projecting this figure has not been an easy task. The location is unclear, timing is uncertain and the facilities are not well defined.

To address these uncertainties, we have done two things. The first is to add contingencies to the cost ranging from 20-50%. Second, we have presented the four elements of the project in ranges due to uncertainties related to the potential choice of site. These items where ranges have been used are site acquisition, site preparation, surface access and parking.

With the help of consultants, we have projected the cost of a new airport, in current dollars, to be \$3.7 - \$4.1 billion. I would like to point out that the costs include \$955 million for the construction of support facilities. This includes the relocation of an airline maintenance base and military base that exist at the current airport.

The cost of the new airport is expressed in current dollars. Once we take inflation into consideration, the costs increase considerably as shown below:

Rate of Inflation	"Low Cost" Estimates (in millions)	"High Cost" Estimates (in millions)
0%	\$3,735	\$4,128
2%	4,363	4,815
4%	5,082	5,599

Inflation will obviously not be 0% between now and the time we could potentially construct a new airport. The rate of inflation is, however, an uncertainty we need to address.

One final comment on the cost of a new airport is that we have probably erred on the side of caution. Considering the uncertainties involved, we have been generous in estimating costs. In the next phase of the study, it is likely that we will be able to refine the costs a great deal more.

## **Financing the Future**

The strategy we will use in financing a new airport is not unique. It is really no different than our current approach to funding capital improvements.

Briefly, the strategy is as follows:

1. Seek to optimize all external sources of funding.
2. Utilize internally generated funds.
3. Sell the existing site.
4. Issue bonds.

Funding a new airport will require that we use a combination of all these sources.

What external sources of funds are available?

The first source is Federal Grants-in-Aid. In recent years, the FAA has created a procedure by which an airport authority can request a Letter of Intent (LOI) from the FAA. An LOI is a formal indication of the level of funding that the FAA intends to commit to the airport authority in the form of federal grants over a number of future fiscal years. It does not, however, constitute a binding appropriation or commitment of funds by the FAA.

During 1990, the City and County of Denver received an LOI for \$351 million of federal funding over a nine year period for the new Denver airport project. When coupled with grants received in the two previous years, it brought the total aid on the project to \$501 million, about 20% of the estimated \$2.5 billion cost of the project.

In 1988, the City of Austin received an LOI for \$87 million for its new airport project. That coupled with an additional discretionary grant and future entitlement moneys brings the total federal commitment to about 20% of the estimated cost of the original project. Austin has since delayed the new airport project in order to consider the redevelopment of Bergstrom Air Force Base.

What this means from the perspective of the Metropolitan Airports Commission is that we would reasonably anticipate receiving federal funding for a portion of the total cost of a new airport. This expectation is based upon recent LOI commitments made to Denver and Austin and assumes there will be no major changes made in the AIP over the next decade. We do, however, recognize that as more communities move forward with new airport development, the FAA's ability to commit large sums of money to these projects will be limited.



## PANEL III

---

Another external source of funding was approved by Congress in October of 1990, it is the Passenger Facility Charge (PFC). PFC's are fees imposed on enplaned passengers by airport authorities for the purposes of generating revenues for airport projects that increase capacity, increase safety, or mitigate noise impacts. According to the new law, airport sponsors can apply to the Secretary of Transportation for the right to levy a PFC in the amount of \$1.00, \$2.00, or \$3.00 per enplaning originating and connecting passenger.

PFC's will provide the Commission with a significant source of revenue for airport development purposes. Assuming today's traffic levels at the existing airport, a \$3.00 PFC could generate approximately \$25 million a year. That could generate \$250-\$300 million over the next ten years. PFC funds could provide capital for much of the front-end planning and land acquisition costs associated with new airport development. They could also be used to leverage debt. For example, \$25 million of PFC income could support \$250 million of bonds issued for new airport development. If we do assess PFC's, however, we will have to forego up to 50% of our Federal entitlement funds which are apportioned annually based on the number of enplaned passengers.

Another source of external funds is tenant financing. I mentioned before that the estimated new airport cost includes the relocation of airline maintenance and military bases. Although they have been included in the cost, we have not even begun to hold discussions as to who should pay these expenses. We are likely to suggest that the benefiting parties, specifically the airlines and the military should bear these costs. They are, however, likely to disagree.

The last source of external funding I will discuss can be categorized as public investment. A public investment occurs when state and local governments make direct financial contributions toward the cost of an airport project. Typically, this is done in recognition of the future benefits, such as job creation and additional tax revenues brought by the economic development that would follow a new airport. An example of this was in the late 1960s, when the Cities of Dallas and Fort Worth provided \$57 million of funding for land acquisition for the Dallas/Fort Worth Regional Airport, which represented the "equity" contribution of the Cities to the project. To date, neither the State of Minnesota nor the Cities of Minneapolis or St. Paul have offered to make such a contribution. Should the Legislature decide to proceed with a new airport, we would certainly seek some form of public investment in the new facilities.

The second point in our strategy to finance a new airport is to utilize internally generated funds. The Metropolitan Airports Commission uses primarily a compensatory methodology for calculating rates and charges at the existing airport which enables us to generate and retain profits from concession activities at the airport. In 1990, we were able to generate approximately \$15,000,000 in discretionary cash flow that will be applied to meet the on-going capital improvement needs of the airport system.

## PANEL III

---

If, in 1997, the Legislature decides to proceed with new airport development, it is likely that a moratorium will be placed on future capital development at Minneapolis-St. Paul International. This will allow us to divert some internally generated funds from the existing airport to new airport development. This money, in addition to the Passenger Facility Charges, will then be available to fund front-end costs such as environmental assessment and preliminary design, as well as land acquisitions costs.

The third point under the strategy for financing a new airport will be to sell the existing site. The first challenge we will face in that area is to determine how much property can be sold.

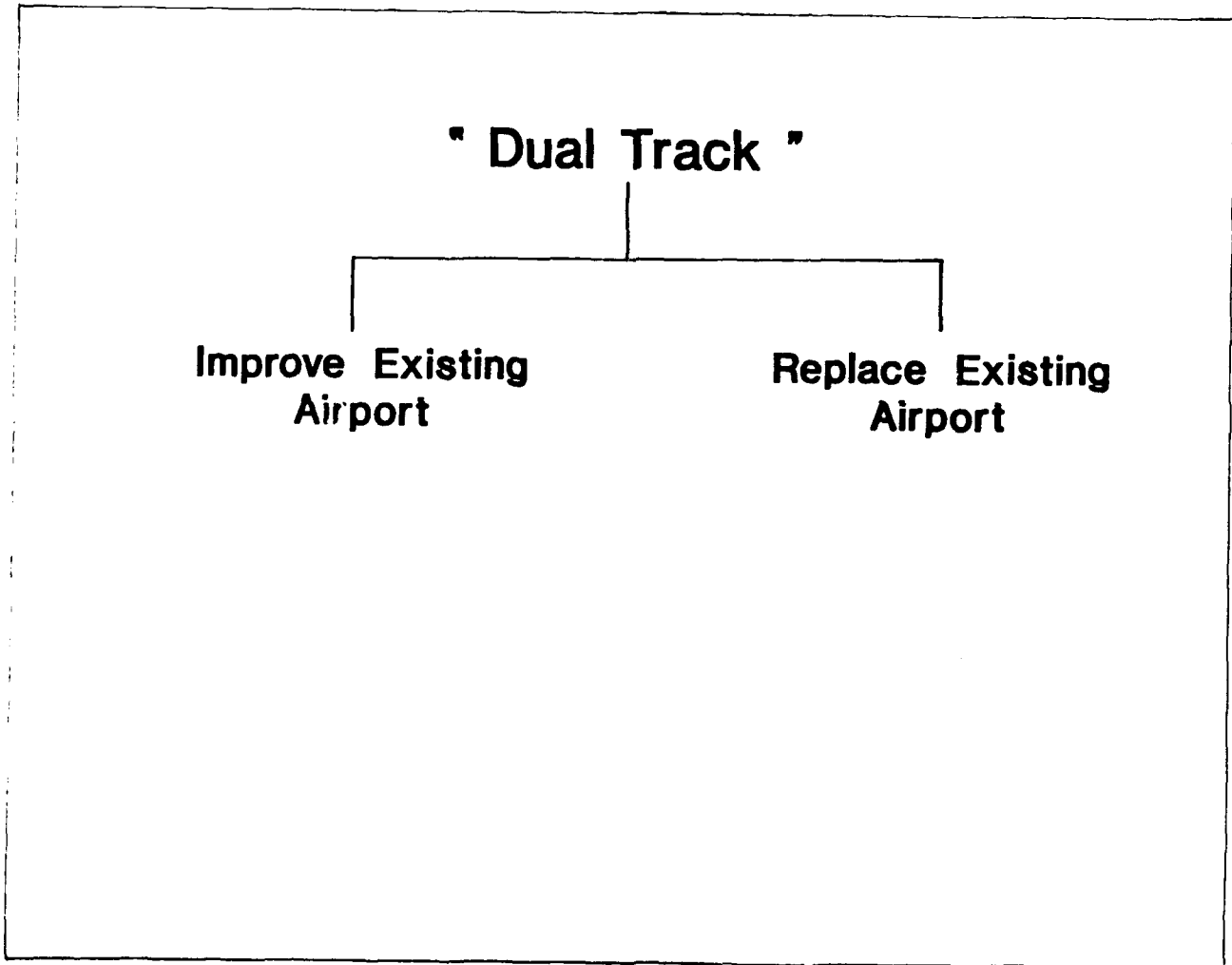
Minneapolis-St. Paul International sits on property that was acquired or donated by a variety of sources, including a park board, the military, the cities of St. Paul and Minneapolis, and private owners. Airport law currently requires that airport land owned by either the city of St. Paul or Minneapolis that is no longer used for airport purposes reverts back to the cities. As a result, special legislation will be required in order to sell these portions of the site and use the funds for new airport development. Once we have determined how much property can be sold, we will need to devise a strategy to capture as much equity of the existing site as possible and still have funds available for new airport construction. Because the airport involves a relatively large land area, it is in fact nine times the size of downtown Minneapolis, attempts to sell the entire parcel at one time could flood the real estate market and result insignificantly lower overall return. As a result, disposition may have to be accomplished over a long period of time in order to permit market absorption and to realize fair market value of the property. Disposition of the existing site will probably extend beyond the period of construction for a new airport, making only a portion of the funds available to pay for the new airport development.

The last point under the strategy for financing a new airport is to issue debt. Considering the projected cost of a new airport, this will be the largest source of funds used for new airport development. It is the most expensive source to the Commission, and because of this, will be used only after we have made attempts to maximize all other sources of funding. At a minimum, we would be issuing bonds for 50% of the total project cost.

### **Conclusion**

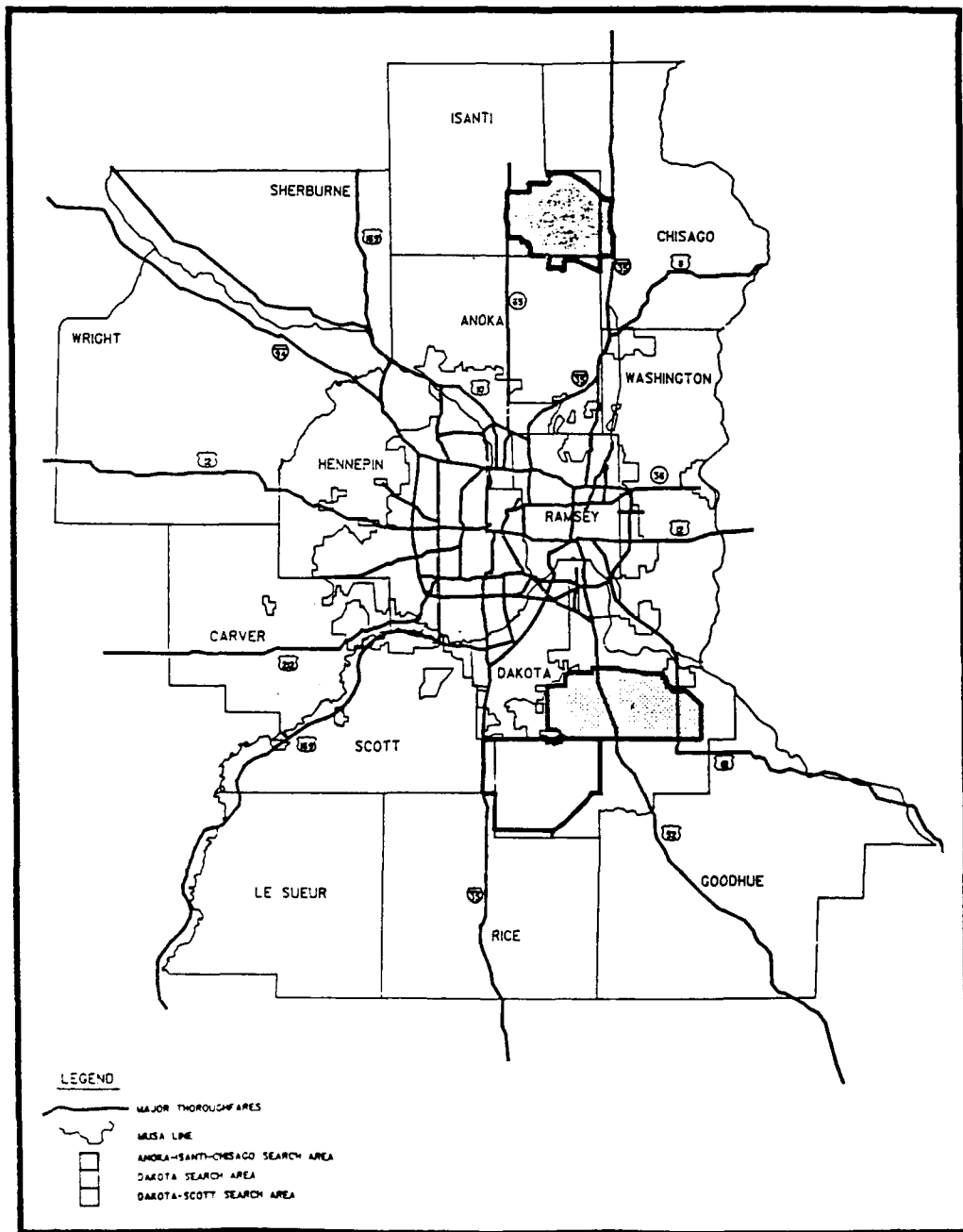
The costs and complexity of financing a new airport are tremendous. There are, however, costs associated with not being prepared to meet future aviation demand. Failure to plan will result in lost economic opportunities within the state, delays at the current facilities, and continuation of the existing noise problem.

Whether or not a new airport is built in Minnesota remains to be seen. We do know, however, that the price of not being prepared to meet future aviation demand is one we are unwilling to pay.



PANEL III

CANDIDATE SEARCH AREAS



*" This boonies airport idea  
really is just too far out "*

## PROCESS

- 1991 Final search area selected.
- 1996 Recommendation to the legislature.

## **DEALING WITH UNCERTAINTY**

- **Add contingencies.**
- **Present cost as a range.**

## PROJECT COST

<b>Rate of Inflation</b> -----	<b>"Low Cost" Estimate (in millions)</b> -----	<b>"High Cost" Estimate (in millions)</b> -----
<b>0%</b>	<b>\$3,735</b>	<b>\$4,128</b>
<b>2%</b>	<b>\$4,363</b>	<b>\$4,815</b>
<b>4%</b>	<b>\$5,082</b>	<b>\$5,599</b>



## **STRATEGY**

- 1. Seek to optimize all external sources of funding.**
- 2. Utilize internally generated funds.**
- 3. Sell the existing site.**
- 4. Issue bonds.**

**1. Optimize all external sources of funding**

**Federal Grants-in-Aid**

- . Letter of Intent ( LOI )
- . Denver & Austin Examples

## **External Sources of Funding**

### **Passenger Facility Charge ( PFC )**

- . \$250 - \$300 million over 10 years**
- . Leverage debt**

## **External Sources of Funding**

- . Tenant Financing**
- . Public Investment**

**2. Utilize internally generated funds.**

- . **Construction moratorium at the existing airport.**
- . **Use to fund front-end costs.**

### **3. Sell the Existing Site.**

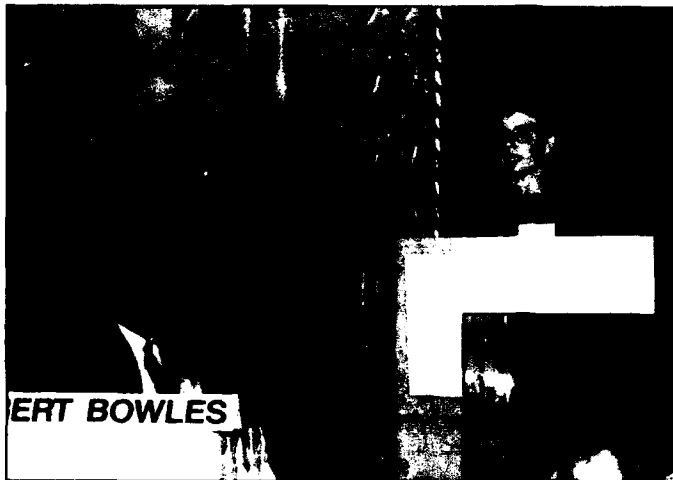
- . How much can be sold?**
- . Strategy to capture equity.**

**4. Issue bonds.**

**Lots & lots & lots**

PANEL III

---





## **Louis Valerio**

**Senior Vice President, Finance  
United Airlines, Inc.**



### **Biographical Highlights**

Louis J. Valerio is senior vice president - finance for United Airlines and is responsible for the controller's function, treasury, audits and security, tax, financial planning and analysis, and purchasing.

Prior to joining United in 1988, Mr. Valerio served as assistant vice president - financial planning and analysis for American Airlines and before that was employed by the U.S. Railway Association in Washington, D.C.

Mr. Valerio holds a master's degree in business administration from State University of New York and a bachelor's degree from Ithica College. He is a certified public accountant licensed in several states.

He and his wife reside in Long Grove, Ill., with their two children.

### **Summary**

The airlines are under siege by three forces which make it difficult to raise the necessary capital. The first force is the turbulence in the world's capital markets. Second is the economy and the inherent cyclicity of the airline business. The third force making it difficult to raise capital is a series of changes in government regulations and tax law.

U.S. airlines are faced with massive capital requirements to replace aging aircraft and grow existing fleets. If U.S. carriers are going to effectively compete for our share of world traffic and renew our aging fleets, then government policies which stimulate and promote capital formation are essential.

## **Aircraft Financing in the 1990's: Surviving the Seige**

Good afternoon and thank you for inviting me here to talk about the airline industry.

Recently, the airlines have been rocked by high fuel prices, the recession, and the Persian Gulf war which has intensified the focus on financial problems in the industry. Reading the newspaper this weekend, I was reminded that, in addition to United, Chicago is the hometown to at least one other solvent carrier.

Running an airline is a complicated business. Today, the challenges are greater than ever. One of the most pressing challenges we face is raising capital in today's market place.

In the title to my speech, I refer to aircraft financing in the 1990s as surviving a siege. A siege is defined as "the surrounding of a position with the effect of cutting off supplies". For airlines, the supply of capital is critical. Today, airlines find themselves surrounded by three forces which make it difficult to raise the necessary capital.

The first is the crunch in the world's capital markets which has made it difficult for even the most credit worthy airlines to fund their capital programs. I'm convinced the next major field of competition for airlines is accessing capital markets.

The second force is the economy. The airline industry is highly vulnerable to economic cycles and the present economic downturn, coupled with the fuel price shock, has taken its toll on both U.S. and international aviation.

The third force making it difficult to raise capital is a series of changes in government regulations and tax laws. For example, local, state and federal environmental regulations have accelerated airline requirements to replace older fleets.

Recent tax law changes have limited the viability of many types of financing. And at the same time, federal bankruptcy court action eliminating lessor Section 1110 protection has cut into capital supply lines.

These three forces are creating a capital crisis for the airlines at a time when we are in the midst of growing and replacing aging fleets. A key to airlines surviving this siege is government policies which stimulate capital formation. It is imperative that the airline industry, which is of vital national interest, remains healthy and globally competitive.

### **A. Turbulence in the capital markets**

Let me discuss in more detail the first of these forces, the turbulence in the capital markets.

Currently, there is an imbalance between the supply and demand for aircraft financing. This imbalance is caused by several extraordinary events.

## PANEL III

---

The overall demand for capital continues to increase due to events such as the rebuilding of Eastern Europe, funding the war in the Persian Gulf, and normal economic growth.

The U.S. airlines face large needs for capital over the next several years to replace aging aircraft and to grow existing fleets to meet growing demand. Almost \$11 billion of aircraft will need to be financed by domestic carriers in 1991 alone. The worldwide total is estimated at \$39.4 billion.

The Boeing Company forecasts over 1,700 aircraft in the world's fleet will be retired by 1995. All these units need to be replaced. In addition, worldwide traffic growth is expected to increase at a 5 to 6% annual rate throughout the next decade driving the need for growth aircraft above and beyond the replacement aircraft. Much of this growth is in the Pacific, where demand for travel is expected to increase at approximately a 10% annual rate.

Instability in the world financial markets has sharply reduced the available capital. The Japanese market has experienced the most turbulence of the three major capital markets - Japan, the United States and Europe. The Japanese banks' capital bases are under pressure due to substantial declines in stock prices and real estate values. The Ministry of Finance and the Bank of Japan have requested all Japanese banks to decrease their overall lending. The banks are also under pressure to meet the Bank of International Settlements capital adequacy requirements. These factors have resulted in a slowdown in Japanese lending. Last week, I was in Japan, meeting with many of the major Japanese banks, trading companies and leasing companies. The story I heard was consistent.

The Japanese lending industry is contracting and loans to even the most credit-worthy companies are in short supply. The near term outlook offers little hope for change.

The United States is experiencing many of the same problems. The recession, declining real estate prices, the S&L debacle and the collapse of the junk bond market have all contributed to a credit crunch. With the recent bankruptcy filings of Pan Am and Continental and the liquidation of Eastern Airlines, even those carriers with strong route networks and balance sheets are finding it difficult to access capital markets.

While the European Market is in better shape, investments in Eastern Europe will consume much of the available capital. The demand for European capital is increasing as the Japanese and U.S. Markets are squeezed.

### **B. The Economy**

Let me focus on the second force creating the capital crisis -- the economy and the inherent cyclicity of the airline business.

## PANEL III

---

For the past decade the airline industry has been in constant turmoil.

We began the 1980s with newfound freedoms of deregulation -- we could fly wherever we chose and were free to price our product without government approval. Many new airlines were started with low labor costs and began to compete against the established, high cost carriers. That competition often took the form of lower fares.

The early years of deregulation were characterized by over capacity, fare wars, and resulting industry losses.

The established carriers reacted to the new environment by developing and strengthening hub and spoke networks and focusing on internal growth and expansion through consolidation as weak carriers were absorbed by stronger ones. More recently, buoyed by a sustained period of economic prosperity, the industry began to stabilize and balance sheets began to strengthen. Then Iraq invaded Kuwait.

Since the August invasion of Kuwait, increased fuel prices have cost U. S. Airlines in excess of \$2.4 billion. Carriers with weak balance sheets watched their cash reserves quickly disappear and have attempted to lower fares to generate cash. A soft economy with weakened demand for air travel and the doubling of fuel prices produced fourth quarter losses greater than the industry has ever experienced. While the U.S. carriers are now seeing some relief in the form of fuel prices, the bottom line forecasts for 1991 are discouraging.

The resulting losses have forced several carriers to seek the protection of bankruptcy filing, which has put further pressure on the rest of the industry. While bankrupt carriers are exempt from paying debt, they have the freedom to discount fares to generate cash, further adding to industry losses. The balance sheets of even the strongest carriers have been severely impacted. As a result, airlines are perceived as riskier credits and the cost of funds has increased for the entire industry.

### **C. Government actions**

The third force impacting our efforts to raise capital is our government.

As I think everyone recognizes, our air transportation system is a vital national asset, one that is integral to a healthy, competitive economy. Today, more than ever, the industry needs government policies which stimulate capital formation and ensure that U. S. Airlines remain viable and globally competitive. Yet, we have witnessed recent actions by the government which, while having other positive public policy impact, disadvantage the airlines.

An example is the stage 2 aircraft noise deadline which forces retirement of aircraft from the U. S. Fleets. This law, which was enacted last year, basically bans the operation of stage 2 aircraft in the U.S. By the year 2000. Last year, 53% of all aircraft operated by U. S. Airlines were at stage 2. Since these aircraft have to be retired in

## PANEL III

---

the next nine years, airline capital requirements are driven up and the prices the airlines can realize from selling these aircraft are driven down. While this may be a valid national environmental policy, someone will have to bear the extra cost.

In addition there have been numerous government actions during the past several years which have discouraged domestic capital formation. Let me describe three of them.

The first came about as part of the tax reform act of 1986. There were several items in that act which hampered capital formation. However, one of the most damaging was the change of Internal Revenue Code Section 861(e). Prior to this change, lessors of aircraft to U.S. air carriers were treated as having 100% domestic source income and loss. This rule was changed in 1986 and now a lessor's income is based upon the percent usage of the aircraft within and without the United States.

The result has been to significantly reduce the number of lessors who can own and lease aircraft used predominantly on international routes. Thus, airlines must pay a premium to own and operate aircraft such as long range B747s, B767-300s and MD-11s.

Given the globalization of the industry and the significant additions of these types of aircraft, it is possible that there will not be enough lessors to finance, at any price, all of these aircraft which are being delivered.

A second example of adverse governmental action is the public utility normalization regulations presently under review by the U. S. Treasury. If enacted, these rules would curtail an increasingly important source of equity capital for aircraft financings. The proposed regulations would deprive public utilities of the ability to retain the tax benefits of leasing, causing many to reduce or eliminate their role as aircraft lessors.

Third, as I am sure many of you know, the Judge in the Continental bankruptcy proceedings recently abrogated the Section 1110 protection for lessors on sale and leaseback transactions. The purpose of Section 1110 is to provide lessors and lenders with the ability to take control of the assets securing their lease or loan 60 days after the bankruptcy filing if the bankrupt company does not intend to continue lease payments. If this ruling stands, bankrupt carriers could continue to use these aircraft for extended periods without paying rent. This will have a profound effect on the cost of financing aircraft and the willingness of institutions to invest in aircraft assets.

## PANEL III

---

While I am not going to discuss the following in detail, let me list a few other tax legislative items that have adversely affected the airline industry and capital investments:

- o the repeal of the investment tax credit.  
(Tra 86)
- o unfavorable changes in tax depreciation lives and methods from acrs to macrs. (Tra 86 and tamra 88)
- o extension of the alternative minimum tax (amt) to corporations and subsequent increase in the rate from 15% to 20%.
- o stringent limitations on the amount of tax exempt industrial development bonds that could be issued to finance private facilities.  
(Tra 86)
- o the increase of transportation excise tax rates on passengers and property by 25%. (Rra 90)
- o the increase in the international departure head tax from \$3.00 to \$6.00.  
(Obra 89)

and the list goes on.

There are two other areas where the government's policy can be changed to better aid the airlines and our transportation system. The first is increased government support in investing in the air transportation infrastructure. Simply put, airports and related facilities and systems have not grown with the increase in demand for air travel. The air traffic control system lacks enough controllers and has been dangerously slow to modernize equipment. The \$7.5 billion of uncommitted funds in the airport and airway trust fund was collected expressly for these purposes and the money should be released for the purposes it was collected.

The benefits of improving the airline infrastructure would flow directly to the consumer in the form of fewer and shorter delays, improved facilities, safer transportation, and even lower fares as airlines become more efficient.

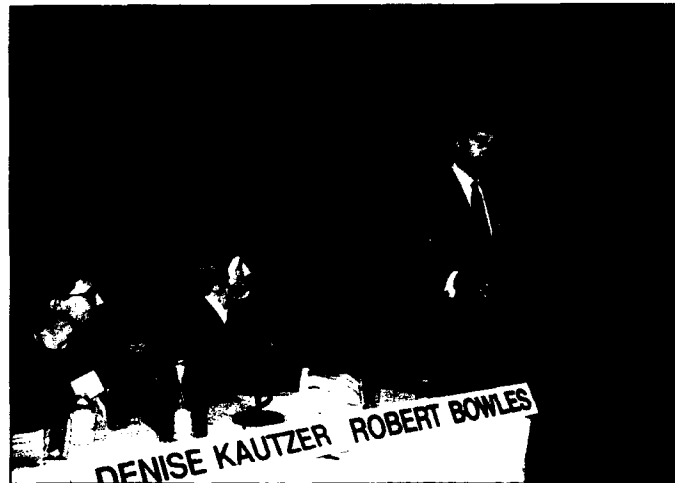
The second area where government policy should be reexamined is the recently enacted legislation allowing airports to collect head taxes or passenger facility charges. Only a certain percent of the GNP will be spent on air transportation, and this tax takes money which would rightly go to the airlines and gives it to local airport authorities.

Unfortunately, while the law requires that these funds be used to maintain and operate airports, the local authorities do not always act in the best interest of the airlines.

## PANEL III

---

The U. S. Airline industry today is in a fragile condition and faces unprecedented challenges. The crisis will continue at least until the war in the Middle East is behind us and the economy strengthens. However, even after these problems disappear, U. S. airlines are faced with massive capital requirements. If U. S. carriers are going to effectively compete for our share of world traffic and replace our aging fleets, then government policies which stimulate and promote capital formation are essential.



**AIRCRAFT FINANCING  
IN THE 1990's:  
SURVIVING THE SIEGE**



PANEL III

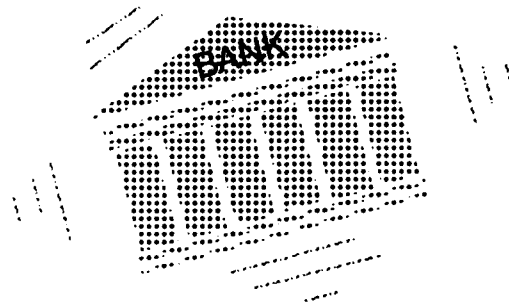


**Doug Marlette**  
New York Newsday  
Creators Syndicate

## **AIRLINES UNDER SIEGE**

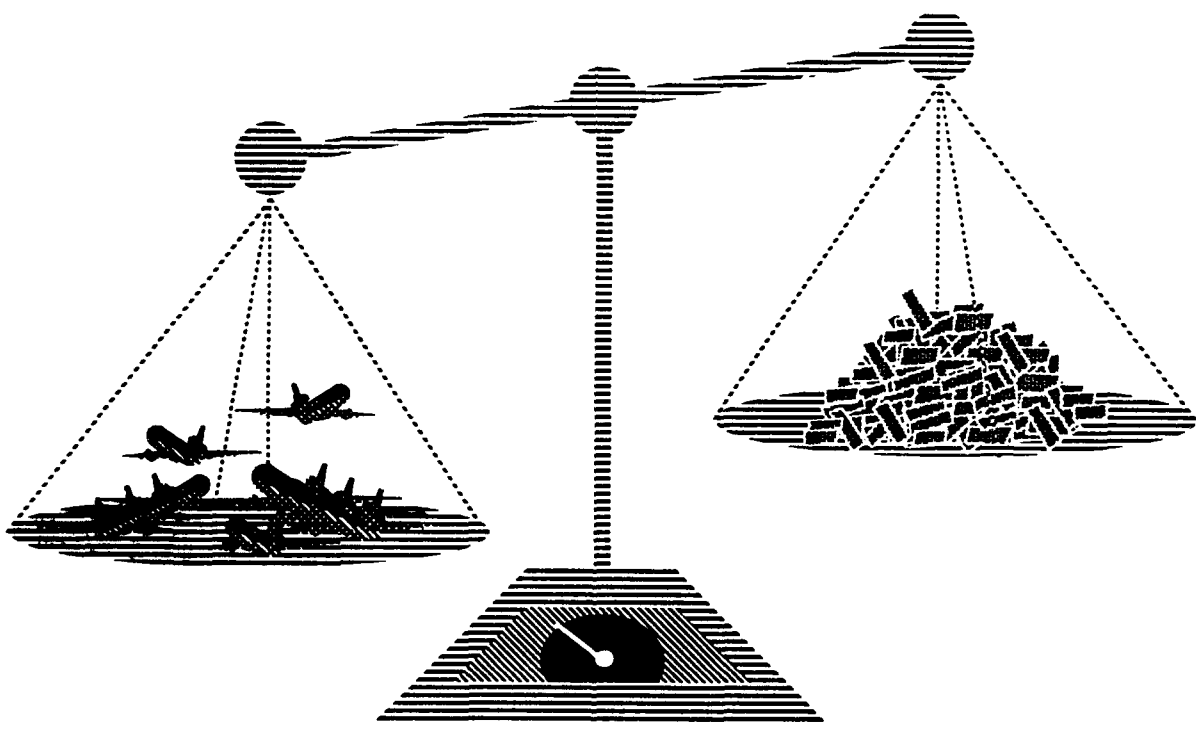
- Capital Market Turbulence
- The Economy
- Government Actions

# CAPITAL MARKET TURBULENCE

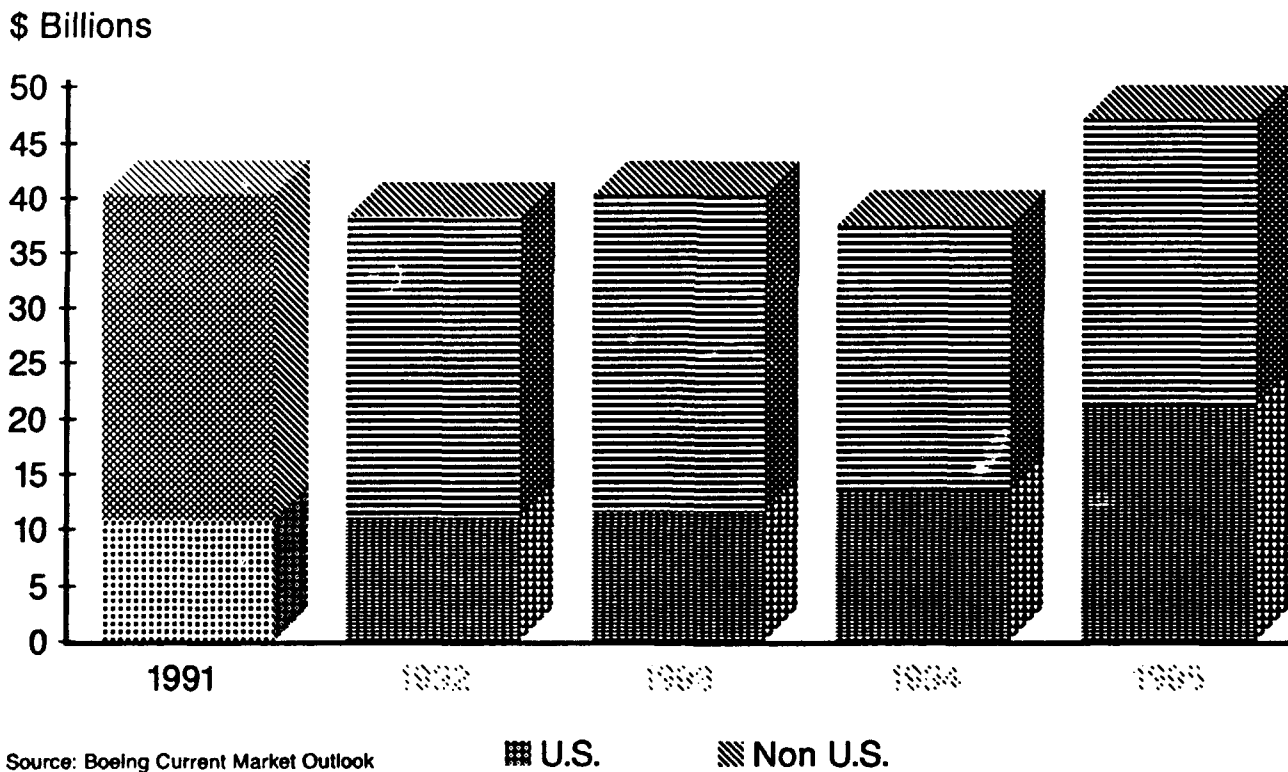


PANEL III

---

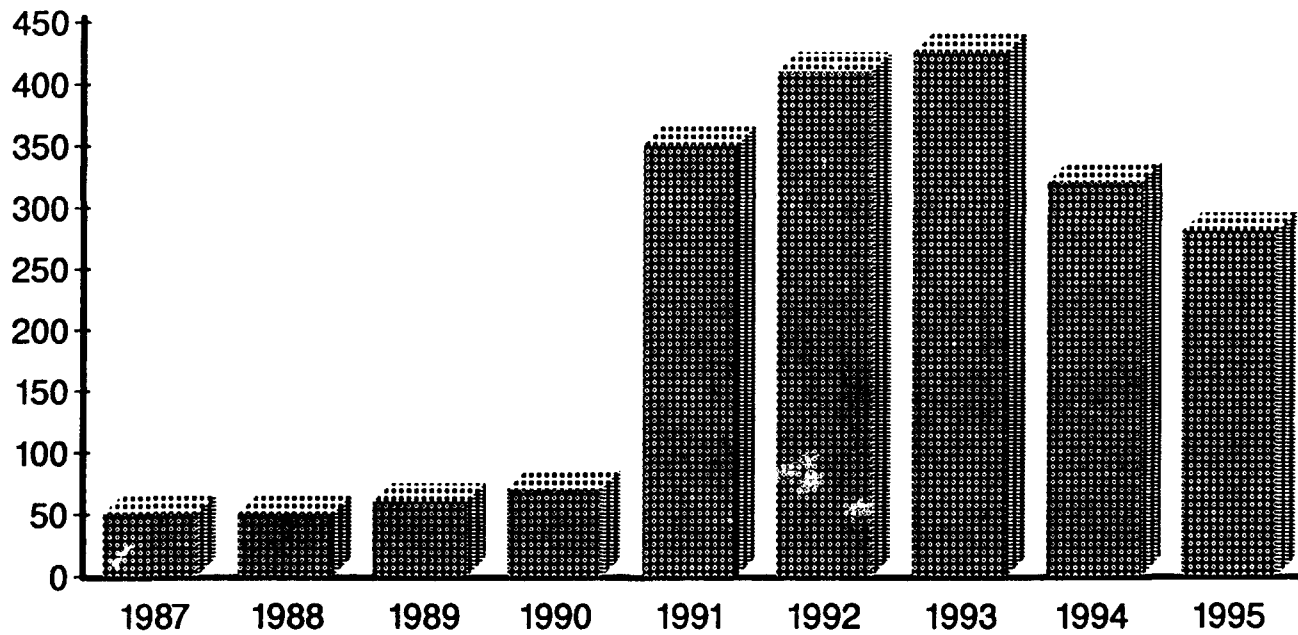


## DEMAND FOR AIRCRAFT FINANCING



## WORLDWIDE RETIREMENT FORECAST

Number of Aircraft Retired

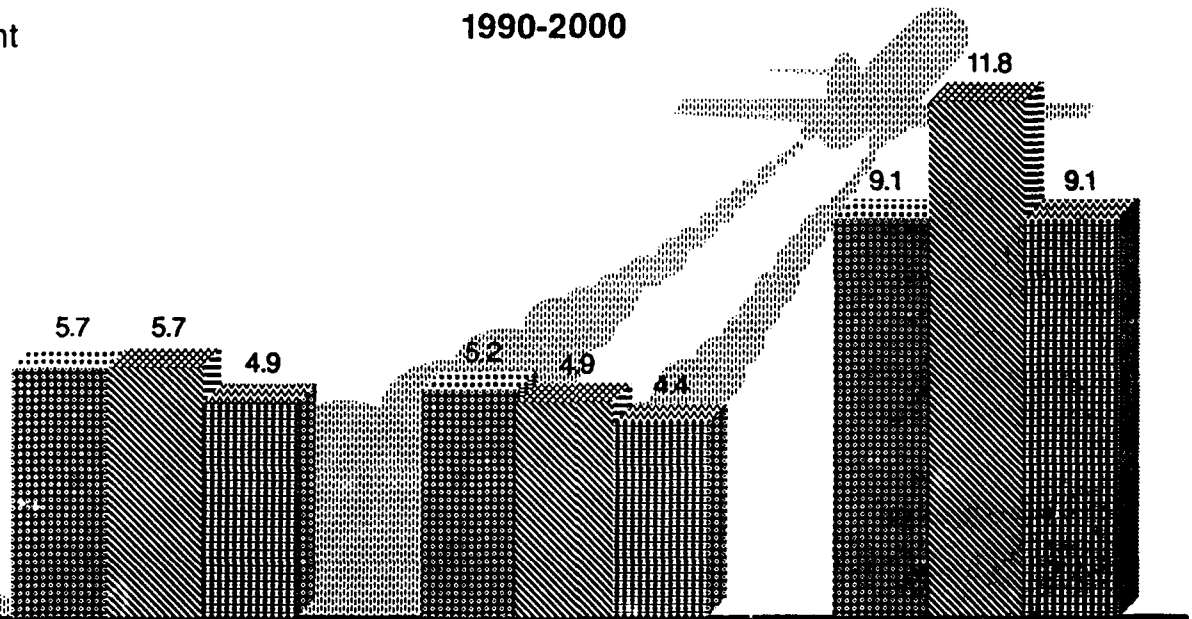
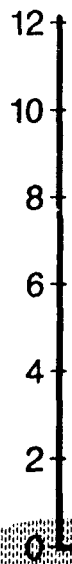


Source: Boeing Current Market Outlook

# TRAFFIC PROJECTION ANNUAL RPM GROWTH RATE

1990-2000

Percent



WORLD

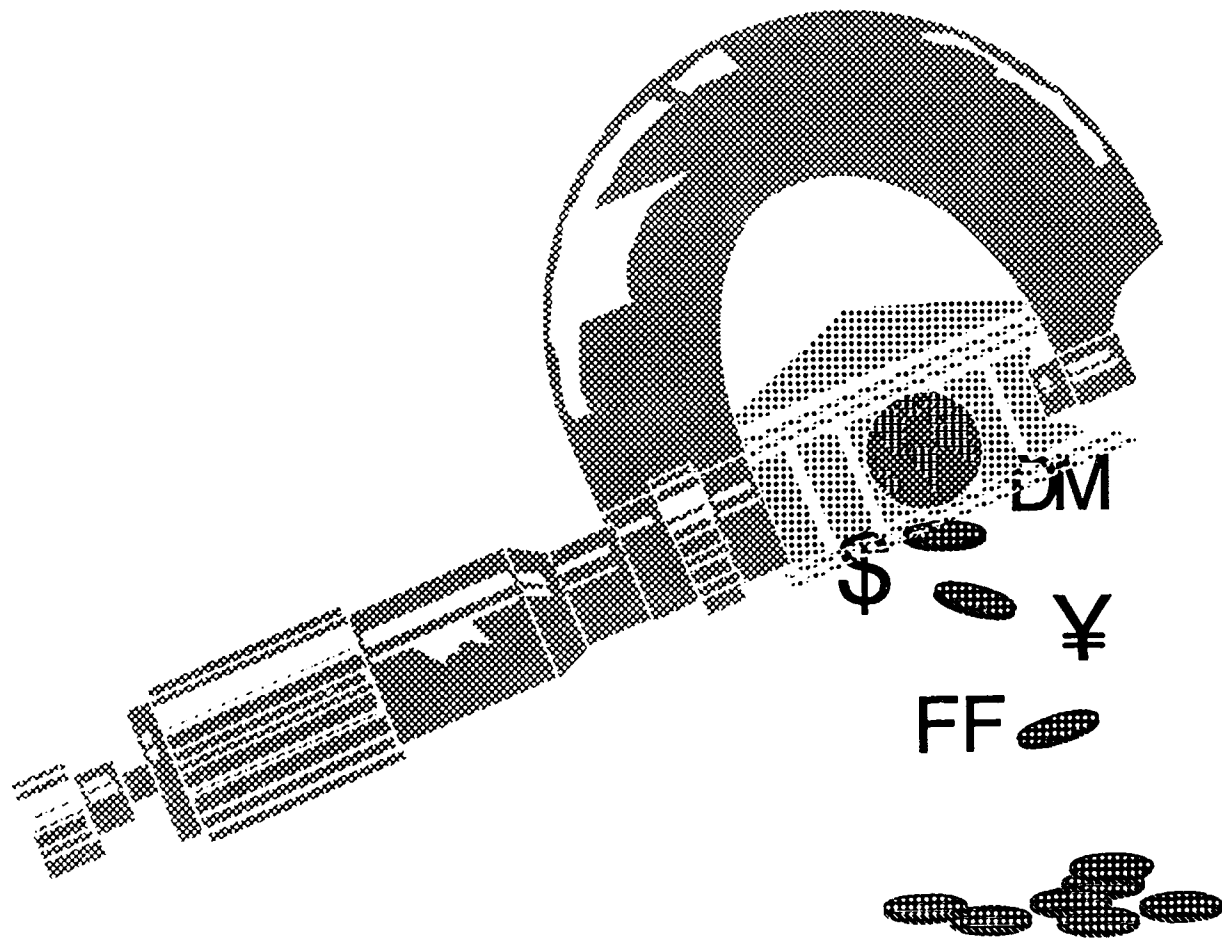
DOMESTIC

PACIFIC

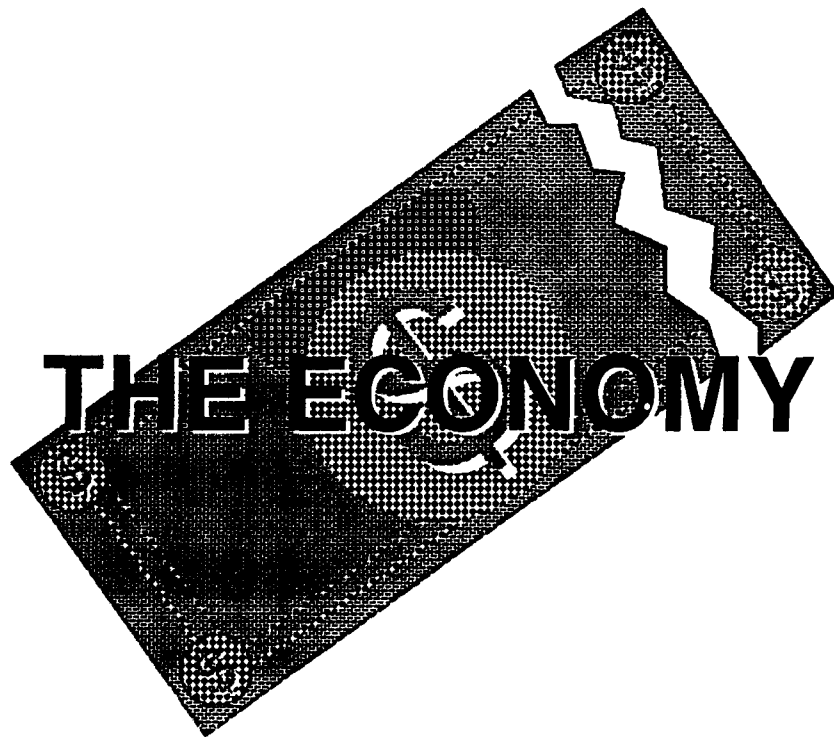
Boeing

McDonnell Douglas

FAA







## DEREGULATION

- ⊕ Early Turmoil
  - New entrant carriers
  - Excess capacity
  - Fare wars



- ⊕ Stabilization
  - Consolidation
  - Rationalization of capacity
  - Economic prosperity

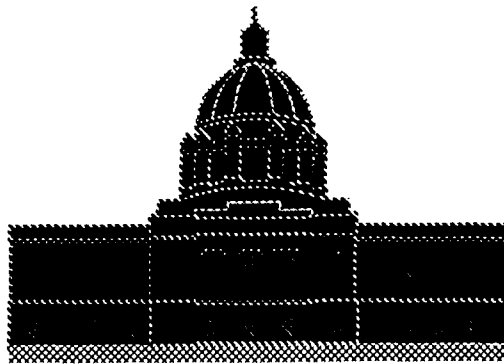


## CURRENT SITUATION

- Persian Gulf Invasion
- Fuel Price Jump
- Recession
- Weakening Traffic
- Record \$2.0 Billion Industry Losses
- Bankruptcies



# GOVERNMENT ACTIONS



## **STAGE II NOISE DEADLINE**

- Forces Early Retirement of Stage II Aircraft
- Reduces Asset Values of These Aircraft

# **IMPEDIMENTS TO AIRCRAFT FINANCING**

⊕ Foreign Source Rules Under Section 861(e)

## **IMPEDIMENTS TO AIRCRAFT FINANCING**

- Foreign Source Rules Under Section 861(e)
- Public Utility Normalization Regulations

## **IMPEDIMENTS TO AIRCRAFT FINANCING**

- Foreign Source Rules Under Section 861(e)
- Public Utility Normalization Regulations
- Continental Bankruptcy Decision on Sec. 1110



## **OTHER TAX LEGISLATIVE ITEMS**

- Investment Tax Credit
- Tax Depreciation Guidelines
- Alternative Minimum Tax
- Tax Exempt Bond Limitations
- Passenger Excise Taxes
- International Departure Head Tax

## **AIRPORT AND AIRWAY TRUST FUND**

- \$7.5 Billion in Uncommitted Funds
- Rebuild Air Transportation Infrastructure

## **PASSENGER FACILITY CHARGE**

- Head Tax Charged by Airports
- Increases Effective Ticket Price
  - Redirects passenger revenue away from airlines

PANEL III

---



**AIRCRAFT FINANCING  
IN THE 1990's:  
SURVIVING THE SIEGE**

PANEL III



# CONFERENCE SPEAKERS & REGISTRANTS

---



## CONFERENCE SPEAKERS

James B. Busey  
FAA-Administrator  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3111

John M. Rodgers  
Director  
FAA-Office of Aviation Policy & Plans  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3331

James W. Callison  
Senior V.P. Corp. and External Affairs  
Delta Airlines  
Hartsfield Atlanta Int'l Airport  
Atlanta, GA 30320  
(404) 765-2838

James D. Murphy  
Vice President  
American Eagle, Inc.  
P.O. Box 619616  
Mail Drop 5494  
Dallas/Ft Worth Arpt TX 75261-9616  
(817) 967-2510

R. Lawrence Hughes  
Senior Vice President and Director  
DHL Airways, Inc.  
P.O. Box 75122  
Cincinnati, OH 45275  
(606) 283-2232

Michael Evans  
President  
Evans Economics, Inc.  
1725 I. Street, N.W.  
Suite 310  
Washington, DC 20006  
(202) 467-4900

Kenneth L. Tallman  
President- Lt. Gen. USAF (ret.)  
Embry-Riddle Aeronautical University  
600 Clyde Morris Blvd.  
Daytona Beach, FL 32114  
(904) 239-6200

James P. Muldoon  
Gen.Mgr.-Aviation Tech. Services Div.  
Port Authority of N.Y. and N.J.  
1 World Trade Center  
Room 65 East  
New York, NY 10048  
(212) 466-7474

Dr. Scott Jones  
President  
AUS Consultants  
200 Four Falls Corporate Center  
Suite 308  
West Conshohocken, PA 19428  
(215) 834-0402

Denise Kautzer  
Director of Finance  
Metropolitan Airport Commission  
6040 28th Avenue South  
Minneapolis, MN 55450  
(612) 726-8149

Louis Valerio  
Senior Vice President Finance  
United Airlines  
P.O. Box 66100  
Chicago, IL 60666  
(708) 952-7593

Gene Mercer  
Forecast Branch Manager, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3355/3357

Robert L. Bowles  
Industry Economist, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3359

Thomas F. Henry  
Industry Economist, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3103



## CONFERENCE REGISTRANTS

Douglas Abbey  
Avstat Associates  
2501 k St., N.W.  
#6A  
Washington, DC 20037  
(202) 338-1727

Stan Abrahams  
U.K. Civil Aviation Authority  
45-49 Kings Way  
London, United Kingdom WC 2B6TE  
ENGLAND

Thomas C. Accardi  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-8237

Francoise Adams  
Embassy of France  
4101 Reservoir Road, N.W.  
Washington, DC 20007-2179  
(202) 944-6096

R. Mark Adams  
Federal Aviation Administration, AAM-110  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 366-1048

Dorothy Akindede  
Yield Data Services, Inc.  
1921 Florida Ave.  
Washington, DC 20009  
(202) 483-4833

Dan Akins  
Yield Data Services, Inc.  
1921 Florida Ave.  
Washington, DC 20009  
(202) 483-4833

Margery Al-Chalabi  
The Al-Chalabi Group, Ltd.  
330 W. Diversey Parkway  
#1403  
Chicago, IL 60657  
(312) 871-0900

Suhail Al-Chalabi  
The Al-Chalabi Group, Ltd.  
330 W. Diversey Parkway  
#1403  
Chicago, IL 60657  
(312) 871-0900

Michael S. Allen  
Director Aviation Data Services  
Reuters  
2 First Canadian Place  
Suite 1900  
Toronto, Ontario M5X 1E3  
CANADA  
(416) 364-5361

Terry L. Amerine  
FL Aerospace Corporation  
240 Twain Avenue  
Urbana, OH 43078  
(513) 653-4998

Peder A. Andersen  
International Trade Analyst  
U.S. International Trade Commission  
500 E. Street, S.W.  
Washington, DC 20436  
(202) 252-1388

John Andrew  
US Air Force  
HQ USAF/DPXA Pentagon  
Room 5C360  
Washington, DC 20330  
(703) 697-3208

Norman W. Arnold  
988 Saigon Road  
McLean, VA 22102-2119  
(703) 827-8368

Ken Auperlee  
Sr. Director Technical Services  
Airclaims Information Services, Inc.  
8603 South Dixie Highway  
Miami, FL 33143  
(305) 665-8858

Raymond A. Ausrotas  
MIT Flight Transportation Lab  
33-409, MIT  
Cambridge, MA 02139  
(617) 253-7574

Margaret S. Baker  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-7202

Carl T. Ball  
Federal Aviation Administration, AGL-5B  
2300 East Devon  
Des Plaines, IL 60123  
(FTS) 384-7111

Roger H. Barcus  
DOT- Division of Aeronautics  
Capital Airport  
Springfield, IL 62707-8415  
(217) 785-8514

Margaret-Anne Barnes  
AARO TEC/Airways Engineering Associates  
8316 Arlington Blvd., #218  
Fairfax, VA 22031  
(703) 573-0500

Robert M. Barnett  
Port of Portland  
P.O. Box 3529  
Portland, OR 97208  
(503) 231-5000X210

Richard W. Barsness  
Dean-College of Business and Economics  
Lehigh University  
Rauch Business Center 37  
Bethlehem, PA 18017  
(215) 758-3402

Maria Barts  
SR. Consultant  
Landrum & Brown  
1021 W. Adams Street  
Chicago, IL 60607  
(312) 421-0500

James D. Baumgarner  
(Press)  
Aviation Daily  
1156 15th Street, N.W.  
Washington, DC 20005  
(202) 822-4641

Mark Beisse  
Airport Program Specialist  
Federal Aviation Administration  
Program Guidance Branch  
800 Independence, Ave., S.W.  
Washington, DC 20591  
(202) 267-8826

Hugh Bergeron  
NASA  
Independence Ave.,  
Washington, DC  
(202) 453-2824

Brian Bethers  
Host International  
1 Marriott Drive  
Dept. 928.45  
Washington, DC 20058  
(301) 380-3616

E.J. Bickel  
Haynes International, Inc.  
1020 West Park Avenue  
Kokomo, IN 46904-9013  
(317) 456-6018

Albert W. Blackburn  
Albert W. Blackburn & Associates  
1300 Woodside Drive  
McLean VA 22102  
(703) 734-3843

Mark A. Bobbi  
Forecast International, Inc.  
22 Commerce Road  
Newtown, CT 06470  
(203) 426-0800 EXT.33

Paul P. Bollinger, Jr.  
Airport Consultants, Inc.  
421 King Street  
Suite 220  
Alexandria, VA 22314  
(703) 683-5908

Phillip A. Bolt  
British Aerospace, PLC  
Hatfield, Hertfordshire  
A110 9TL  
ENGLAND  
(01144) 7072-68123

Cassandra Bosco  
National Business Aircraft Association  
1200 18th Street, N.W.  
Washington, DC 20036  
(202) 783-9000

Lt.Gen.M.L. Boswell -USAF (ret)  
Chairman  
Italian Aerospace Industries (USA,Inc.)  
1235 Jefferson Davis HWY.  
Suite 500  
Arlington, VA 22202  
(703) 271-9200

Edmond Boullay  
Embassy of France  
4101 Reservoir Road, N.W.  
Washington, DC 20007-2179  
(202) 944-6054

Marie-Laure Bourgeois  
ITA/ D G A C (SDEEP)  
143 Rue Blomet  
Paris, 75015  
France  
(1) 40 45 8997

Peter Bowen  
Forecasting Manager  
Manchester Airport PLC  
Ringway Road Manchester  
Manchester, M22 5PA  
UNITED KINGDOM  
(061) 489-2049

Perry Bradley  
(press)  
Commuter/Regional Airline News  
1925 N. Lynn St.,  
Suite 304  
Arlington, VA 22207  
(703) 522-2354

Jim Bratton  
RFGoodrich  
P.O. Box 340  
Troy, OH 45373  
(513) 339-3811

Judy Bredemeier  
(press)  
Business Travel News  
National Press Building  
Suite 1222  
Washington, DC 20045  
(202) 383-4788

John Brinkley  
(Press)  
Scripps Howard  
1090 Vermont Ave., N.W.  
Washington, DC 20005  
(202) 408-2726

Jeff Brister  
Federal Aviation Administration, AMS-560  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9887

Geoffrey Brown  
(Press)  
Journal of Commerce  
740 National Press Bldg.  
Washington, DC 20008  
(202) 383-6122

Jim Brown  
Partnership for Improved Air Travel  
1709 New York Ave., N.W.  
Washington, DC 20006  
(202) 626-4201

Linda Bruce  
American Assoc. of Airport Executives  
4212 King Street  
Alexandria, VA 22302  
(703) 824-0504

James D. Buescher  
Market Manager-Aerospace  
Aluminum Company of America  
P.O. Box 8025  
Bettendorf, IA 52722  
(319) 344-3011

Samuel L. Burgess, Jr.  
(press) Freelance Consultant Writer  
Comm-World Southern Aviator Flight Int'l  
P.O. Box 123  
Strasburg VA 22657  
(703) 465-4371

Alain Buttaud  
SNECMA  
104 Boulevard Kennedy  
Paris, 75016  
FRANCE  
33-1-44 14 54 05

Robin A. Caldwell  
D.O.T.-Office of Airline Stats.,RSPA  
400 7th Street, S.W.  
Washington, DC 20590-0001  
(202)366-9059

Jackie M. Calloway  
D.O.T.-Office of Airline Stats.,RSPA  
400 7th Street,S.W.  
Washington, DC 20590-0001  
(202) 366-4383

Joedy W. Cambridge  
Leeper, Cambridge & Campbell, Inc.  
700 N. Fairfax Street  
#502  
Alexandria, VA 22314  
(703) 836-0522

Gus Carbonell  
Southwest Airlines, Co.  
P.O. Box 36611  
Dallas, TX 75235  
(214) 904-4666

Carolynn J. Castellucci  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9028

Dev R. Chaudhari  
Applied Techno-Management Systems, Inc.  
2100 N. Rockingham St.  
McLean, VA 22101-4926  
(703) 533-7250

Robert F. Chomick  
Transportation Economist  
Pratt & Whitney  
400 Main Street  
ms-131-26  
East Hartford, CT 06108  
(203) 565-5370

Martha Chow  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 820  
Washington, DC 20024  
(202) 401-6434

Gary R. Church  
Aviation Management Associates, Inc.  
8752 Center Road  
Springfield, VA 22152  
(703) 644-4465

Jerry Ciasnocha  
Nat'l Transportation Agency of Canada  
15 Eddy St. Hull  
Hull, Quebec K1A 0N9  
CANADA  
953-9781

Brian P. Clancy  
Director of Transport Network Planning  
Global Aviation Associates, Ltd.  
1800 K. Street, N.W.  
Suite 1104  
Washington, DC 20006  
(202) 457-0212

Guinn Clark  
Director- ATC Programs  
THOMSON-CSR, INC.  
Three Crystal Park, Suite 814  
2231 Crystal Drive  
Arlington, VA 22202  
(703) 769-4768

Philip W. Clark  
7361 Springleigh Way  
Alexandria, VA 22310  
(301) 320-7347

Louise B. Cobbs  
(Aerospace)  
Haight, Gardner, Poor & Havens  
1300 I Street, N.W.  
Suite 470-E  
Washington, DC 20005  
(202) 962-3880

Jeff Cochran  
IBM  
9221 Corporate Blvd.  
Rockville, MD 20850  
(301) 640-2833

Peter Coddington  
(press)  
Aviation Daily  
1156 15th Street, N.W.  
Washington, DC 20005  
(202) 822-4697

Kim Coffman  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-5930

Paul Cohan  
Washington Correspondent (press)  
Communication Channels  
4425A Forbes Blvd.  
Lanham, MD 20706  
(301) 731-0157

Barry Cohen  
Dept. of Energy  
1000 Independence Ave.  
Washington, DC 20585  
(202) 586-5359

Linda Colancecco  
Conference Coordinator  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Jeff Cole  
(press)  
St. Paul Pioneer Press  
345 Cedar Street  
St. Paul, MN 55101  
(612) 228-5435

Steve Cole  
ITV Aircraft Products Group  
P.O. box 655907  
Dallas, TX 75265-5907  
(214) 266-2174

Christopher Colligan  
(Press)  
Vertiflite Magazine  
217 N. Washington St.  
Alexandria, VA 22314  
(703) 684-6777

Dave Collogan  
(press)  
Business Aviation  
1156 15th Street, N.W.  
Suite 600  
Washington, DC 20005  
(202) 822-4642

Robert S. Conker  
The Mitre Corporation  
7525 Colshire Drive  
McLean, VA 22102  
(703) 883-6252

Mary Converse  
Association of Flight Attendants  
1625 Massachusetts Avenue, N.W.  
Washington, DC 20036  
(202) 328-5400

Peter Cook  
Medill News Service  
1325 G. St., N.W.  
Washington, DC 20005  
(202) 662-1823

Douglas Corey  
Allied-Signal Aerospace Company  
2525 West 190th Street  
Dept. 2057, m/s T52  
Torrance, CA 90504-6099  
(213) 512-5476

Susan D. Coulter  
International Officer  
Federal Aviation Administration  
P.O. Box 20636  
Atlanta, GA 30320  
(404) 763-7595

Kathryn B. Creedy  
Interovia  
P.O. Box 10180  
Alexandria, VA 22310  
(703) 550-8011

Fred Cuevas  
Manager-Airline Analysis  
Fokker Aircraft U.S.A., Inc.  
1199 N. Fairfax Street  
Alexandria, VA 22314  
(703) 838-0100

J. Cushman  
New York Times  
1627 I. St., N.W.  
Washington, DC 20006

William J. Cyran  
DFW International Airport Board  
3200 East Airfield Drive  
P.O. Drawer DFW  
DFW Airport, TX 75261-9428  
(214) 574-3197

John D'Avanzo  
OMNI Engineering & Technology, Inc.  
7921 Jones Branch Dr.  
Suite 530  
McLean, VA 22102  
(703) 827-8976

Lancet A. Davies  
Federal Aviation Administration, APO-120  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3332

Patrick G. Deasy  
President  
Dynair Services Inc.  
2000 Edmund Halley Drive  
Reston, VA 22091-3436  
(703) 264-9500

Pablo Debergia  
President  
Casa Aircraft  
3810 Concorde Pkwy.  
Suite 1000  
Chantilly, VA 22021  
(703) 802-1000

Jeffrey S. Degler  
Business Development Engineer  
GE Aircraft Control Systems  
P.O. Box 5000  
Binghamton, NY 13902  
(607) 770-2810

Joseph M. Del Balzo  
Exec. Director for System Development  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202)267-7111

Joseph B. Delia  
Airport Engineer  
DOT(FAA)-Wash. Airports Dist. Office  
101 West Broad Street  
Suite 300  
Falls Church, VA 22046  
(703) 285-2307

Chuck Dennis  
Federal Aviation Administration APO-120  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3220

Jim Dermody  
Federal Aviation Administration  
2300 E. Devon Avenue  
AGL  
Des Plaines, IL 60018  
(FTS) 384-7067

Dan Deroner  
Manager Aerospace Marketing  
Teledyne Allvac  
P.O. Box 5030  
Monroe, NC 28110-5030  
(704) 282-1555

William P. Dickens  
Pratt & Whitney  
400 Main Street  
124-30 m/s  
East Hartford, CT 06108  
(203) 565-6317

James L. Diegnan  
Bureau of Labor Statistics  
600 E. Street, N.W.  
Room 3306  
Washington, DC 20212  
(202) 272-5618

Gregory S. Dole  
McDonnell Douglas Corporation  
1735 Jefferson Davis Hwy.  
Suite 1200  
Arlington, VA 22202  
(703) 553-3809

Paul Domanovsky  
Aerospatiale, Inc.  
1101 15th St., N.W.  
Suite 300  
Washington, DC 20005  
(202) 293-0650

Jonathan N. Dorfman  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9020

Eric S. Doten  
Embry-Riddle Aeronautical University  
600 S. Clyde Morris Blvd.  
Daytona, FL 32114  
(904) 239-6620

Sylvia Douglas  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3284

Erin C. Downing  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

John W. Drake  
Transportation Consultants  
1815 Woodland Avenue  
West Lafayette, IN 47906-2273  
(317) 463-5882

Bob Duclos  
Transport Canada  
Tower C  
Place De Ville  
Ottawa, KOA 2Z0  
CANADA,  
(613) 990-3820

Phyllis A. Duncan  
Gen. Aviation Staff, FAA Aviation News  
Federal Aviation Administration, AFS-20  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3827

Richard E. Duncan  
Sr. Engineer  
Boeing  
P.O. Box 3707  
MS 77-02  
Seattle, WA 98124-2207  
(206) 237-0468

Del Dunmire  
Chairman  
Growth Industries, Inc.  
12523 Third St.  
Grandview, MO 64030  
(816) 763-7676

Dr. Frederica Dunn  
Federal Aviation Administration, AHT-30  
400 7th Street, S.W.  
PL-100  
Washington, DC 20590  
(202) 366-7061

William R. Edgar  
Aviation Data Service, Inc.  
3116 N. Nottingham  
Arlington, VA 22207  
(703) 241-2586

Ulf Edlund  
Chief Engineer  
SAAB  
Saab-Scania AB  
Saab Aircraft Division  
Linkoping, S-581 88  
SWEDEN,  
+46 13 18 27 37

Kurt Edwards  
Federal Aviation Administration, APO-120  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3326

Joseph D. Eisenberg  
NASA/Lewis  
21000 Brook Park Rd.  
Cleveland, OH 44135

Greg T. Elliott  
Airline Supplier  
BP Oil Company  
Three Westlake Park,  
550 Westlake Park Blvd., Suite 1800  
Houston, TX 77079  
(713) 589-4231

Frank C. Emerson  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3298

Edward P. Faberman  
American Airlines  
1101 17th Street, N.W.  
Washington, DC 20036  
(202) 857-4226

Brian P. Fairhurst  
TEXTRON Aerostructures  
2 International Drive  
Suite 624  
Nashville, TN 37217

Myra Nan Faison  
Alaris, Inc.  
1811 Cliffe Hill Way  
Rockville, MD 20854  
(301) 762-8966

Walter E. Faison  
Alaris, Inc.  
1811 Cliffe Hill Way  
Rockville, MD 20854  
(301) 762-8966

Anthony Fazio  
Federal Aviation Administration, AEE  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3577

Jack Feir  
Jack B. Feir & Associates  
1 Bronze Court  
Huntington, NY 11743  
(516) 385-1252

Joan Feldman  
(press)  
4312 46th Street, N.W.  
Washington, DC 20016

David Field  
Reporter  
The Washington Times  
3600 New York Ave., N.E.  
Washington, DC 20002  
(202) 636-3000

Richard S. Fisher  
Moncrieff Management Ltd.  
4888 Victoria Avenue  
Montreal, H3W 2N1  
CANADA  
(514) 481-1619

Skip Fisher  
DOD- Policy Board on Federal Aviation  
13387 Brookfield Court  
Chantilly, VA 22021  
(703) 695-9274

Harold K. Fletcher  
Tel-Instrument Electronics, Corp.  
728 Garden Street  
Carlstadt, NJ 07072  
(201) 933-1600

Richard Foster  
British Embassy  
3100 Massachusetts Ave., N.W.  
Washington, DC 20008  
(202) 898-4384

Tima Fouts  
Development Specialist  
Rockwell International  
Collins Division  
Cedar Rapids IA 52498  
(319) 395-2921

Ed Franklin  
Mgr.-Pricing International Marketing  
Federal Express  
2003 Corporate Avenue  
Memphis, TN 38132  
(901) 395-3901

Stephanie B. Fraser  
MITRE  
7525 Colshire Dr.  
M/S W281  
McLean, VA 22102  
(703) 883-7654



John Frederickson  
Regional Airline Association  
1101 Connecticut Avenue, N.W.  
Suite 700  
Washington DC 20036  
(202) 857-1170

E.V. Fretwell  
Mgr.Engineering & Air Safety Dept.  
Air Line Pilots Association, Int'l.  
5353 Herndon Parkway  
P.O. Box 1169  
Herndon, VA 22070  
(703) 689-4199

Bernie Funk  
Aircraft Owners and Pilots Association  
421 Aviation Way  
Frederick, MD 21701  
(301) 695-2215

Dottie K. Gandee  
DK Associates, Inc.  
20 Ridge Drive  
Port Washington, NY 11050  
(516) 365-6272

John L. Gerken  
JPMG Peat Marwick  
P.O. Box 8007  
San Francisco, CA 94030  
(415) 571-7722

Steve Gillespie  
Air Line Pilots Association  
535 Herndon Parkway  
Herndon, VA 22070  
(703) 689-4288

John E. Gillick  
Winthrop, Stimson, Putnam & Roberts  
1133 Connecticut Avenue, N.W.  
Suite 1200  
Washington, DC 20036  
(202) 775-9870

Michael Gilson  
Polaris Aircraft Leasing Corporation  
4 Embarcadero Center  
San Francisco, CA 94111  
(415) 445-7461

Leonard Ginn  
V.P.- of Economic Affairs  
Airport Operators Council International  
1220 19th Street, N.W.  
Suite 200  
Washington, DC 20036  
(202) 293-8500

Richard Golaszewski  
Gellman Research Association Inc.  
115 West Avenue  
Jenkintown, PA 19046  
(215) 884-7500

John F. Gorsuch  
Group Publisher  
Commuter Air Magazine  
4425 A Forbes Blvd.  
Lanham, MD 20706  
(301) 731-0157

Ed Grauvogl  
Canadian Airlines International, Ltd.  
2800-700-2 Street, S.W.  
Calgary, Alberta T2P 2W2  
CANADA  
(403) 294-6171

Diane Green  
Management Assistant, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3352

Ronald D. Green  
U.S. Dept. of Commerce  
Office of Aerospace Policy and Analysis  
Rm H2800A  
Washington, DC 20230  
(202) 377-4222

Maureen Griffin  
Congressional Budget Office  
House Annex #2  
Room 422, 2nd & D. Streets, S.W.  
Washington, DC 20515  
(202) 226-2859

Lisa Griffith  
Greiner, Inc.  
7650 West Vourtney Campbell Cswy.  
Tampa, FL 33630  
(813) 286-1711

William A. Guenon  
Raytheon Company  
1215 Jefferson Davis Highway  
Suite 1500  
Arlington, VA 22202  
(703) 486-5400

Stephanie Gupta  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-6578

Elliot W. Hague  
The CIT Group/Capital Financing, Inc.  
270 Park Avenue  
29th Floor  
New York, NY 10017  
(212) 270-5119

Joseph A. Haik  
Director-Sys. Forecasts & Econ. Research  
USAir  
2345 Crystal Drive  
DCA-H-530  
Arlington, VA 22227  
(703) 418-5443

George Hamlin  
Airbus Industrie of North America, Inc.  
593 Herndon Parkway  
Suite 300  
Herndon, VA 22070  
(703) 834-3400

Peter Hamm  
(press)  
Travel Agent Magazine  
1333 H. Street, N.W.  
Washington, DC 20005  
(202) 682-3220

Matt Hampton  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-6578

A. Patrick Hanes  
Chief Executive Officer  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

John Hanks  
Clark County Dept. of Aviation  
McCarran International Airport  
P.O. Box 11005  
Las Vegas, NV 89111  
(702) 539-5211

Roger W. Hansen  
Account Representative Marketing  
Aeronautical Radio, Inc.  
2551 Riva Road  
Annapolis, MD 21401  
(301) 266-2193

John E. Harman  
DOT- OST-Policy  
801 N. Pitt Street  
Alexandria, VA 22314  
(703) 366-1059

Shung Chai Haung  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9943

Susan Helzer  
Federal Aviation Administration, AMS-560  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9883

Bob Hickey  
Manager-Market Research  
Fokker Aircraft U.S.A., Inc.  
1199 N. Fairfax Street  
Alexandria, VA 22314  
(703) 838-0100

John R. Hokanson  
J.A. Nammack Associates  
10205 Arizona Circle  
Bethesda, MD 20817  
(301) 365-1875

David F. Hoppin  
Director of Special Projects  
Global aviation Associates, Ltd.  
1800 K. Street, N.W.  
Suite 1104  
Washington, DC 20006  
(202) 457-0212

Steven M. Horner  
Bombardier, Canadair Regional Jet Div.  
P.O. Box 6087  
Station A  
Montreal, Quebec H3C 3G9  
CANADA  
(514) 281-7671

Bill Hughes  
Aviation Subcommittee  
Senate Commerce Committee  
554 Dirksen  
Senate Office Building  
Washington, DC 20510  
(202) 224-7535

Weste Husmark  
Vice President-North America Area  
Volvo Flygmotor  
211 N. Union Street  
suite 100  
Alexandria, VA 22314  
(703) 684-4092

Kris E. Hutchison  
ARINC  
2551 Riva Road  
Annapolis MD 21401  
(301) 266-4386

David Hygate  
Rolls-Royce Plc  
P.O. Box 31  
Derby, DE2 8BJ  
ENGLAND  
332 248526

Jane K. Inaba  
Federal Aviation Administration-NM Reg.  
1601 Lind Ave., S.W.  
Renton, WA 98055  
(206) 227-2809

Gary Ives  
Lucas Aerospace  
Brueton House, New Road  
Solihull, B91 3TX  
ENGLAND  
21 704 5171

Joe Jackson  
Landrum & Brown  
11279 Cornell Park Dr.  
Cincinnati, OH 45242  
(513) 530-5333

Kenneth C. Jacobs  
Airport Planner  
DOT(FAA)-Wash. Airports Dist. Office  
101 West Broad Street  
Suite 300  
Falls Church, VA 22046  
(703) 285-2300

Craig Jenks  
Airline/Aircraft Projects  
115 Fourth Avenue  
6th Floor  
New York, NY 10003  
(212) 475-3449

Larry L. Jenney  
Transportation Research Board  
2101 Constitution Avenue, N.W.  
Washington, DC 20418  
(202) 334-3206

Kenneth R. Jernigan  
Director  
Barclays Bank PLC  
222 Broadway  
New York, NY 10038  
(212) 412-3654

Don C. Johnson  
Aircraft Owners and Pilots Association  
421 Aviation Way  
Frederick, MD 21701  
(301) 695-2067

Hiroshi Jojima  
Japan Aircraft Development Corp.  
c/o Boeing Commercial Airplanes  
P.O. Box 3707 m/s 68-19  
Seattle, WA 98124  
(206) 237-7263

Dick Jones  
Baker & Hostetler  
1050 Connecticut, Ave., N.W.  
Suite 1100  
Washington, DC 20036  
(202) 861-1677

Nellie Jones  
Secretary, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3355

Mark Joseph  
The Mitre Corporation  
7525 Colshire Drive  
McLean, VA 22102  
(703) 383-5254

Joanne R. Julius  
(Press)  
Professional Pilot Magazine  
3014 Colvin St.  
Alexandria, VA 22314  
(703) 370-0606

James A. Kalitta  
General Electric Co.  
P.O. Box 4840  
Court St. Plant, 3-12  
Syracuse, NY 13221  
(315) 456-7991

Stanley Kaplan  
Pratt & Whitney  
400 Main Street  
m/s 131-26  
East Hartford, CT 06108  
(203) 565-6947

Howard Kass  
Aviation Economist  
Apogee Research, Inc.  
4350 East West Hwy.,  
Suite 600  
Bethesda, MD 20814  
(301) 652-8444

Patrick J. Kennon  
Economist  
Howard Needles Tammen & Bergendoff  
99 Canal Center Plaza  
Alexandria, VA 22314  
(703) 684-2700

Terry Kenyon  
Westland Helicopters  
Westland Helicopters Limited  
Yeovil, BA20 2YB  
ENGLAND  
0935 703632

Larry Kiernan  
Federal Aviation Administration, APP-400  
800 Independence Ave., S.W.  
Washington, DC 20591

David Kimball  
Clark County Dept. of Aviation  
McCarran International Airport  
P.O. Box 11005  
Las Vegas, NV 89111  
(702) 739-5211

Robert Kimmeth  
Price Waterhouse  
1801 K. St., N.W.  
Washington, DC  
(202) 828-9050

Mark Kipperman  
Systems Control Technology, Inc.  
475 School Street, S.W.  
WDC-V43  
Washington, DC 20024  
(202) 646-5835

Chris Knauer  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-5630

Anne Kohut  
(press)  
Airport Noise Report  
43978 Urban Crest Court  
Ashburn, VA 22011  
(703) 729-4867

Jerry Kolasinski  
Hamilton Standards  
Hamilton Road  
Windsor Locks, CT 06096  
(203) 654-2786

Lila Kraska  
Northwest Airlines  
5101 Northwest Drive  
M.S. A6030  
St. Paul, MN 55111-3034  
(612) 726-7340

Loretta Kulaga  
Mktg. Programs Coordinator  
Casa Aircraft  
3810 Concorde Pkwy.  
Suite 1000  
Chantilly, VA 22021  
(703) 802-1000

Charles B. Kurth  
Kurth & Company, Inc.  
4400 Macarthur Blvd., N.W.  
Suite 303  
Washington, DC 20007  
(202) 342-1691

Jane Kusel  
ATR Marketing, Inc.  
20 Export Drive  
Sterling, VA 22170  
(703) 450-6660

Bruce G. Lane  
International Aero Engines AG  
Corporate Center II  
628 Heborn Avenue  
Glastonbury, CT 06033-2595  
(203) 652-1519

Tulinda Larsen  
SH&E  
90 Park Avenue  
New York, NY 10016  
(212) 682-8455

Gail Lattrell  
FAA- Airports Division  
New England Region ANE-610  
12 New England Executive Park  
Burlington, MA 01803  
(617) 273-7281

Bob Lawless  
Pratt & Whitney Canada  
Longueuil, Quebec  
CANADA  
(514) 442-8225

David S. Lawrence  
Director-Int'l Business & Forecasting  
Sikorsky Aircraft  
S-702A  
6900 Main St.  
Stratford, CT 06601-2010  
(203) 381-6094

Arthur S. Leahy  
Federal Aviation Administration  
800 Independence Ave., S.W.  
APO-210, Room 938  
Washington, DC 20591  
(202) 267-3303

William C. Lebegern  
Metro. Washington Airports Authority  
West Building, MA-33B  
Washington National Airport  
Washington, DC 20001  
(703) 685-8182

J. Peter LeBoff  
Project Manager/Economist  
Applied Systems Institute, Inc.  
1420 K Street, N.W.  
Suite 400  
Washington, DC 20005  
(202) 371-1600

Marlene Lee  
Boeing of Canada, de Havilland Division  
Garratt Blvd.  
Downsview (Toronto), Ontario M3K 1Y5  
CANADA  
(416) 375-4122

Michael L. Lee  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9046

Lori P. Lehnerd  
Airport Planner  
DOT(FAA) Wash. Airports Dist. Office  
101 West Broad Street  
Suite 300  
Falls Church, VA 22046  
(703) 285-2303

Juliette D. Lenoir  
Association of Flight Attendants  
1625 Massachusetts Avenue, N.W.  
Washington, DC 20036  
(202) 328-5400

Rosy Lenza  
Manager of International Forecasting  
Continental Airlines, Inc.  
2929 Allen Parkway  
Houston, TX 77019  
(713) 834-6659

Claude Leon  
Air & Cosmos Magazine  
2511 South Grant Street  
Arlington, VA 22202  
(703) 548-3544

Ruth A. Leverenz  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3751

Bob Levin  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-5344

David H. Lewis  
Director  
Dept. of Transportation, Div. of Aero.  
Capital Airport  
Springfield, IL 62707-8415  
(217) 785-8514

Joseph H. Linnemann  
Director of Planning  
Native American Consultants, Inc.  
725 2nd Street  
Washington, DC 20002  
(202) 547-0576

Pam Linnemann  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Gaetan Lion  
Credit Lyonnais  
4 Embarcadero Center  
Suite 3470  
San Francisco, CA 94111  
(415) 955-3311

Bernard Lisker, Ph.D  
The Mitre Corporation  
7525 Colshire Drive  
Mailstop W291  
McLean, VA 22102  
(703) 883-6970

James Littleton  
Federal Aviation Administration, AEE  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3577

John Longnaker  
Greiner, Inc.  
2219 York Road  
Suite 200  
Timonium, MD 21093  
(301) 561-0100

Suzanne Lubin  
Partnership for Improve Air Travel  
1709 New York Ave, N.W.  
Washington, DC 20006  
(202) 626-4200

Thomas C. Lucas  
Manager  
Carpenter Technology Corporation  
Reading, PA 19612-4662  
(215) 371-3528

Irvin R. Lucas III  
Manager-Airline Economics  
GE Aircraft Engines  
1 Neumann Way  
MD F-86  
Cincinnati, OH 45215-6301  
(512) 243-0167

Mary Lucke  
Economist  
Bureau of Labor Statistics  
600 E. Street  
Room 3306  
Washington, DC 20212  
(202) 272-5618

Maj. Jerry Ludke  
U.S. Air Force  
AF/DPXA Pentagon  
Washington, DC 22191  
(703) 697-3208

Mary A. Lynch  
Manager Corporate Forecasts  
American Airlines  
P.O. Box 619616  
Dallas/Ft.Worth Arpt TX 75261-9616

Fred Macey  
Lockheed Aeronautical Systems Company  
86 South Cobb Drive  
Dept 68-11, Zone 0235  
Marietta, GA 30063-0235  
(404) 971-3281

Harold D. MacLennan  
Associate  
Washington Consulting Group  
11 Dupont Circle, N.W.  
Suite 900  
Washington, DC 20036-1271  
(202) 797-0004

Louise Maillett  
Federal Aviation Administration, AAE  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3577

Matthew E. Mangold  
Assistant Manager, Gov't Affairs  
National Air Transportation Association  
4226 King Street  
Alexandria, VA 22302  
(703) 895-9000

John Mathewson  
Mgr-Planning Analysis Division, APO-100  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-8444

Brian McBride  
Associated Aviation Underwriters  
51 John F. Kennedy Parkway  
Short Hills, NJ 07078  
(201) 379-0813

J. Bruce McClland  
British Aerospace, Inc.  
P.O. Box 17414  
Washington Dulles International Airport  
Washington, DC 20041-0414  
(703) 478-9420

Joseph L. McCormick  
Allied-Signal Aerospace Company  
18 Oakhampton Drive  
Lutherville, MD 21093  
(301) 321-8309

Keith McCrea  
Aviation Planner  
Virginia Department of Aviation  
4508 S. Laburnum Avenue  
Richmond, VA 23231  
(804) 786-1365

Dale E. McDaniel  
Deputy Administrator, API-2  
Federal Aviation Administration  
800 Independence Avenue. S.W.  
Washington, DC 20591  
(202) 267-9105

Karl McDonnell  
Federal Express Corporation  
1501 Eckington Pl., N.E.  
Washington, DC 20002  
(202) 636-0700

Besta McDowell  
Department of Transportation  
400 7th Street, S.W.  
Washington, DC 20590  
(202) 366-1056

Richard A. McVaugh  
SPS Technologies  
Highland Avenue  
Jenkintown, PA 19046  
(215) 572-3303

Joe Meier  
Yeild Data Services, Inc.  
1921 Florida Ave.  
Washington, DC 20009  
(202) 483-4833

Robert B. Mendez  
Manager  
DOT(FAA)-Wash. Airports Dist. Office  
101 West Broad Street  
Suite 300  
Falls Church, VA 22046  
(703) 285-2570

Susan Mertes  
Federal Aviation Administration, APO  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3342

Michael A. Metcalf  
President  
Flightplan International  
309 Coral Way  
Ft. Lauderdale, FL 33301  
(305) 523-0711

Jon H. Meulengrazht  
Bucher Willis & Ratliff  
7920 Ward Parkway  
Kansas City, MO 64114  
(816) 363-2696

Michael Miller  
Ernst & Young  
1200 19th Street, N.W.  
Washington, DC 20036  
(202) 862-9332

James L. Millette  
Technical Director  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Michael C. Moffet  
Assoc. Administrator, API-1  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3033

Charles H. Moles  
Industry Economist, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3358

William G. Moore  
Jr. President  
Metropolitan Nashville Airport Authority  
One Terminal Drive  
Suite 501  
Nashville, TN 37214  
(615) 275-1666

Michael A. Morris  
Dept. of Energy  
1000 Independence Ave., S.W.  
Washington, DC 20585  
(202) 586-1199

L.W. Motzel  
Embry-Riddle University

Julie Mazingo  
Conference Registrar  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Dr. Richard Mudge  
President  
Apogee Research, Inc.  
4350 East West Hwy.,  
Suite 600  
Bethesda, MD 20814  
(301) 652-8444

Kirk Mueller  
Flightplan International  
726 20th Avenue  
Ft. Lauderdale, FL 33304  
(305) 523-0711

Frank Mulvey  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-4643



Kelly Murphy  
(press)  
Commuter/Regional Airline News  
1925 N. Lynn St.  
Suite 304  
Arlington, VA 22207  
(703) 522-2354

David Napier  
Aerospace Industries Association  
1250 Eye St., N.W.  
Washington, DC 20005-3922  
(202) 371-8400

Maj. Doug Nelson  
U.S. Air Force  
AF/DPXA Pentagon  
Washington, DC 22191  
(703) 697-3209

Terry Nelson  
Precision Castparts Corp.  
4600 S.E. Harney Drive  
Portland, OR 97206  
(503) 652-3543

Philippe Nicolas  
French Embassy  
4101 Reservoir Road, N.W.  
Washington, DC 20007  
(202) 944-6342

Andrew Nocella  
Avmark Inc.  
1911 North Ft. Myer Drive  
Arlington, VA 22209  
(703) 528-5610

Conor O'Brien  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-5632

Theresa O'Donnal  
Association of Flight Attendants  
1625 Massachusetts Avenue, N.W.  
Washington, DC 20036  
(202) 328-5400

Jeanne O'Leary  
DOT/OST Policy  
400 7th St., S.W.  
Washington, DC  
(202) 366-4829

Douglas O'Neill  
Federal Aviation Administration, AEE  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3577

Robert E. Oertel  
Atlantic Research Corporation  
600 Maryland Avenue, S.W.  
Suite 700  
Washington, DC 20024  
(202) 863-2917

Nancy Ognanovich  
(press) Reporter  
The Bureau of National Affairs, Inc.  
1231 25th Street, N.W.  
Washington, DC 20037  
(202) 452-4589

Masayoshi Onodera  
International Aero Engines AG  
Corporate Center II  
628 Hebron Avenue  
Glastonbury, CT 06033-2595  
(203) 652-1526

David B. Ortman  
Attorney At Law  
61 G Street, S.W.  
Washington, DC 20024  
(202) 488-7429

John C. Osmond  
Manager, Air Trade  
Cleveland Hopkins Int'l Airport  
Dept. of Port Control  
5300 Riverside Dr.  
Cleveland, OH 44135  
(216) 265-6121

James Ott  
(Press)  
Aviation Week  
1120 Vermont Ave., NW  
Washington, DC 20005  
(202) 833-6004

Sam Owens  
Jack B. Feir & Associates  
125 Bayview Drive  
San Carlos, CA 94070  
(415) 595-4344

Narcelle Panza  
The Mitsubishi Trust and Banking Corp.  
520 Madison Avenue  
25th Floor  
New York, NY 10022  
(212) 891-8418

F.W. Parker  
Associated Aviation Underwriters  
51 John F. Kennedy Parkway  
Short Hills, NJ 07078  
(201) 379-0813

Kenneth I. Parker  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-7637

Linda Paulsen  
Airbus Industrie of North America, Inc.  
593 Herndon Parkway  
Suite 300  
Herndon, VA 22070  
(703) 834-3400

Dana Payne  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Deborah Peisen  
Systems Control Technology, Inc.  
1611 North Kent Street  
Suite #910  
Arlington, VA 22209  
(703) 243-3633

Juan R. Penalver  
GE Aerospace  
1331 Pennsylvania Ave., N.W.  
Washington, DC 20004  
(202) 637-4245

Sheri Petasnick  
(Press)  
Scripps Howard News Service  
1090 Vermont Ave., N.W.  
Washington, DC 20005  
(202) 408-1484

Michael E. Philburn  
AAMS  
59 Oxford St.  
Roslyn Heights, NY 11577  
(516) 621-5275

Lynne Sparks Pickard  
Federal Aviation Administration, APP-600  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 724-0522

David J. Pizzimenti  
Nomura Research Institute America, Inc.  
180 Maiden Lane  
21st Floor  
New York, NY 10038  
(212) 208-5254

Pam Polak  
IBM  
9221 Corporate Blvd.  
Rockville, MD 20850  
(301) 640-3903

Bill Poling  
(press)  
Travel Weekly  
1156 15th St., N.W.  
Suite 302  
Washington, DC 20005  
(202) 293-5478

Virginia Price  
Statistical Assistant, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3351

James H. Rasey  
Niagara Frontier Transportation Auth.  
181 Ellicott Street  
Buffalo, NY 14203  
(716) 855-7412

John W. Rathgeber  
Horizons Technology, Inc.  
400 Virginia Avenue, S.W.  
Suite 800  
Washington, DC 20024  
(202) 863-0605

Mark T. Ratych  
Sr. Financial Analyst  
Caterair International  
7811 Montrose Road  
Potomac, MD 20854  
(301) 309-2930

Crystal L. Revak  
Dir.-Marketing Services  
RMI Titanium Company  
1000 Warren Avenue  
Niles, OH 44410  
(216) 544-7622

Ron Rhodes  
IBM  
6705 Rockledge Drive  
Bethesda, MD 20817  
(301) 564-3851

Amit D. Rikhy  
Economist  
Apogee Research, Inc.  
4350 East West Hwy.,  
Suite 600  
Bethesda, MD 20814  
(301) 652-8444

George Robb  
Landrum and Brown  
11279 Cornell Park Drive  
Cincinnati, OH 45242  
(513) 530-5333

Bruce B. Roberts  
Allison Gas Turbine Div. General Motors  
P.O. Box 420  
Speed Code (P42)  
Indianapolis, IN 46206-0420  
(317) 230-4410

Dennis E. Roberts  
Director-Division of Aviation  
State of Colorado  
6848 S. Revere Parkway  
Suite 101  
Englewood, CO 80112-6703  
(303) 397-3039

Bruce M. Rocholl  
Director, Sales Support  
SAAB Aircraft of America, Inc.  
21300 Ridgetop Circle  
Sterling, VA 22170  
(703) 406-7217

Stefanos Romeos  
Olympic Airways  
Cargo Building  
Hellinikon A/P  
Athens, GR-16604  
GREECE

Peter Rooijmans  
Manager-Airline Analysis  
Fokker Aircraft U.S.A., Inc.  
1199 N. Fairfax Street  
Alexandria, VA 22314  
(703) 838-0100

Irving Roth  
Retired  
UAL  
7810 Karen Forest Drive  
McLean, VA 22102-2424  
(703) 821-1311

Howard A. Rubel  
Sr. Vice President  
C.J. Lawrence Inc.  
1290 Avenue of the Americas  
New York, NY 10104-0101  
(212) 468-5397

Grace Said  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Robert Samis  
RASA  
11706 Smoketree Rd.  
Potomac, MD 20854  
(301) 299-3573

David Samuels  
Host International  
1 Marriott Drive  
Dept. 928.45  
Washington, DC 20058  
(301) 380-3607

George Sarames  
Lockeed Air Terminal  
P.O. Box 7229  
Burbank, CA 91510  
(818) 972-1570

Charles Saunders  
Sr. Economic Analyst  
The Port Authority of N.Y. & N.J.  
One World Trade Center  
Rm 65N  
New York, NY 10048  
(212) 466-7531

Richard P. Scheff, Jr.  
Delta Airlines  
Hartsfield Atlanta Int'l Airport  
Dept. 661  
Atlanta, GA 30320  
(404) 765-2388

Frank R. Scheid, Jr.  
Honeywell, Inc.  
7900 Westpark Drive  
McLean, VA 22102  
(703) 827-3603

Mark H. Schlansky  
McDonnell Douglas Corporation  
1735 Jefferson Davis Hwy.  
Suite 1200  
Arlington, VA 22202  
(703) 553-3838

Rachel Schroeder  
Airbus Industrie of North America, Inc.  
593 Herndon Parkway  
Suite 300  
Herndon, VA 22070  
(703) 834-3400

Colette Semkow  
Native American Consultants, Inc.  
725 2nd Street, N.E.  
Washington, DC 20002  
(202) 547-0576

Susan Sheriff  
Program Analyst  
Federal Aviation Administration, APO-130  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267- 3329

Norman R. Sherlock  
Executive Director  
National Business Travel Association, Inc  
1650 King Street  
Suite 301  
Alexandria, VA 22314  
(703) 684-0836

Bob Shideler  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-5340

Beverly D. Shipka  
Manager Macro Forecasting  
American Airlines  
P.O. Box 619616  
DFW International Airport  
Dallas/Ft. Worth TX 75261-9616  
(817) 967-3577

James Sikora  
Grumman Corporation  
1111 Stewart Ave.  
Bethpage, NY 11714  
(516) 577-8554

Derrick R. Sloan  
Gov't of Canada  
235 Queen St.  
Ottawa, Ontario K1A 0H5  
CANADA  
(613) 954-3397

James R. Smith  
Act. Dep. Director, Ofc.Sys.Cap.& Req.  
Federal Aviation Administration-ASC-2  
800 Independence Ave., S.W.  
Washington DC 20591  
(202) 267-8789

Mochamad Sofjan  
Embassy of Indonesia  
2020 Massachusetts Avenue, N.W.  
Washington, DC 20036  
(202) 775-5222/5211

Mark Solomon  
(Press)  
Knight-Ridder  
741 National Press Building  
Washington, DC 20045  
(202) 383-6141

Ed Somers  
(Press)  
US Economic News  
2100 M Street, N.W.  
Washington, DC 20037  
(202) 293-1655

Ron Sorna  
IBM  
9201 Corporate Blvd.  
Rockville, MD 20850  
(301) 640-2247

William C. Spaeth  
Metro. Washington Airports Authority  
West Building, MA-33B  
Washington National Airport  
Washington DC 20001  
(703) 685-8182

Frank Spencer  
Northwestern University Trans. Ctr.  
1936 Sheridan Road  
Evanston, IL 60208-4040  
(708) 491-5017

Thomas Stalnaker  
Leeper, Cambridge & Campbell, Inc.  
700 N. Fairfax Street  
#502  
Alexandria, VA 22314  
(703) 836-0522

JoAnn Stamper  
GE Aircraft Engines  
1 Neumann Way  
MD-F87  
Cincinnati, OH 45215  
(513) 243-3766

Robert Stanley  
Federal Aviation Administration, APO-130  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3345

James L. Starkey  
Avmark Services, Ltd.  
5805 Blue Lagoon Drive  
Suite 460  
Miami, FL 33126-2083  
(305) 264-7289

Drew Steketee  
Executive Director  
Partnership for Improved Air Travel  
1709 New York Ave., N.W.  
Washington, DC 20006  
(202) 626-4200

David Stempler  
Law Offices of David S. Stempler  
2 Wisconsin Circle  
Suite 700  
Chevy Chase, MD 20815  
(301) 961-1562

John A. Stern  
Palo Alto Aeronautical Consultants  
261 Hamilton Avenue  
Suite 312  
Palo Alto, CA 94301  
(415) 327-6861

Bill Stine  
NBAA  
1200 18th St., N.W.  
Washington, DC 22091-4111  
(202) 783-9000

John Stodden  
Bankers Trust Co.-22W  
280 Park Avenue  
New York, NY 10017  
(212) 454-1656

Nicholas S. Stoer  
Budget Director  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3721

Grady B. Stone  
Mgr. Strategic Market Planning  
Dornier Aviation  
22455 Davis Dr.  
Suite 100  
Sterling, VA 22170  
(703) 444-8329

Ronald L. Swanda  
GAMA  
1400 K. Street  
Suite 801  
Washington, DC 20005  
(202) 393-1500

William S. Swelbar  
V.P. of Economics and Financing  
Global Aviation Associates, Ltd.  
1800 K. Street, N.W.  
Suite 1104  
Washington, DC 20006  
(202) 457-0212

Carl Swerdloff  
U.S. DOT/Office of the Secretary  
400 7th St. S.W.  
Washington, DC 20590  
(202) 366-5427

David A. Swierenga  
Air Transport Association of America  
1709 New York Avenue, N.W.  
Washington, DC 20006  
(202) 626-4178

Yosuke Takigawa  
International Aero Engines AG  
Corporate Center II  
628 Hebron Avenue  
Glastonbury, CT 06033-2595  
(203) 652-1512

Juan Tapia-Videla  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-5928

Dennis D. Taylor  
Nat'l Assoc. of State Aviation Officials  
8401 Colesville Rd.  
Suite 505A  
Silver Spring, MD 20910  
(301) 495-2848

Janice A. Taylor  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-7066

Haluk Taysi  
Manager-Market Analysis  
Deutsche Airbus  
Huenefeldstr.1-5  
2800 Bremen 1  
GERMANY  
(421) 538-2830

Richard Tedrick  
Federal Aviation Administration, AEE  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3577

Ubo Termote  
Manager-Product Engineering  
Fokker Aircraft U.S.A., Inc.  
1199 N. Fairfax Street  
Alexandria, VA 22314  
(703) 838-0100

Robert Teskey  
Dept. of Industry, Science & Technology  
235 Queen  
Ottawa, Ontario K1A0H5  
CANADA  
(613) 954-5603

Leonard Theroux  
International Aero Engines AG  
Corporate Center II  
628 Hebron Avenue  
Glastonbury, CT 06033-2595  
(203) 652-1811

Vernon F. Thomas  
Mgr. Market Analysis & Mgmt. Info.  
GE Aircraft Engines  
One Neumann Way  
MD F87  
Cincinnati, OH 45215-6301  
(513) 243-4032

Marian Thompson  
British Aerospace, Inc.  
P.O. Box 17414  
Washington Dulles International Airport  
Washington, DC 20041-0414  
(703) 478-9420

Frank Thornton  
IBM  
9201 Corporate Blvd.  
Rockville, MD 20850  
(301) 640-2411

Tove Titlow  
Federal Aviation Administration, AAM-110  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 366-6590

Andrea F. Toney  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-7038

Juergen Tooren  
Mgr-Budget and Financial Management  
Federal Aviation Administration, API-18  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9092

Joseph Torchetti  
Pratt & Whitney Canada Inc.  
1000 Blvd. Marie Victorin  
Longueuil, Quebec J4G 1A1  
CANADA  
(514) 647-3926

A. Bernard Tourkin  
Douglas Aircraft Company  
3855 Lakewood Blvd.  
Mail Code 7-82  
Long Beach, CA 90846  
(213) 593-7854

Rawleigh L. Tremain, Jr.  
Vice President  
Aero Maintenance Services  
Norfolk Commerce Park  
5426 Robin Hood Rd.  
Norfolk, VA 23513  
(800) 446-8131

R. Douglas Trezise  
Ricondo & Associates, Inc.  
20 N. Clark Street  
Suite 1250  
Chicago IL 60602  
(312) 606-0611

Barbara Trimmier  
Honeywell  
21111 N. 19th Avenue  
m/s 2H2802  
Phoenix, AZ 85027  
(602) 436-2673

Nicholas Tsongos  
SR. Operations Research Analyst  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-3339

Paul D. Tuck  
Consultant  
Consultant  
5320 S. 5th Street  
Arlington, VA 22204  
(703) 671-4352

Bill Tusaie  
Mgr-Program Management Staff  
Federal Aviation Administration, API-10  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-9106

Dick Van Balen  
Vice President-Market Development  
Fokker Aircraft U.S.A., Inc.  
1199 N. Fairfax Street  
Alexandria, VA 22314  
(703) 838-0100

Regina Van Duzee  
Comsis  
3727 Lyons Lane  
Alexandria, VA 22302  
(703) 845-1960

Kent E. Vandenoever  
Aviation Planning Associates, Inc.  
421 Arch Street  
Cincinnati, OH 45202  
(513) 381-4610

Charles E. Varnell  
E-Systems, Inc., Garland Division  
14503 Faraday Drive  
Rockville, MD 20853  
(301) 871-1173

Howard Veal  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-4125

James F. Veatch  
Industry Economist, APO-110  
Federal Aviation Administration  
800 Independence Avenue, S.W.  
Washington, DC 20591  
(202) 267-3361

nicole verrier  
british aerospace, inc.  
p.o. box 17414  
washington dulles international airport  
Washington DC 20041-0414  
(703) 478-9420

Thomas J. Vild  
Aerospace Management Consultant  
26 Forest Dr.  
Chagrin Falls, OH 44022  
(216) 543-9208

John W. Vitale  
McDonnell Douglas Finance Corp.  
3855 Lakewood Blvd.  
m/c 18A-34  
Long Beach, CA 90846  
(213) 597-6376

Samuel P. Waddle  
Airport Operators Council International  
1220 19th St., N.W.,  
Suite 200  
Washington, DC 20036  
(202) 293-8500

John F. Walsh  
Dir. Market Planning and Proposals  
Rohr Industries, Inc.  
Foot of H Street  
P.O. Box 878  
Chula Vista, CA 92012-0878  
(619) 691-2906

Louise H. Watts  
Federal Aviation Administration  
800 Independence, Ave., S.W.  
Washington, DC 20591  
(202) 584-0032

Les Weal  
Aviation Information Services, Ltd.  
Cardinal Point  
Newall Road  
Hounslow, TW6 2AS  
ENGLAND  
01-897-1066

Jack Wells  
GAO/DOT Audit Site  
370 L'Enfant Promenade, S.W.  
Suite 802  
Washington, DC 20024  
(202) 401-6827

Rick Wells  
Avtas, Inc.  
1835 Alexander Bell Dr.  
Reston, VA 22091  
(703) 476-2300

Joy C. West  
Attorney at Law  
City of Detroit  
1511 K. Street, N.W.  
Suite 1100  
Washington, DC 20005  
(202) 638-2645



Florence Wibaux  
Direction Generale  
143 Rue Blomet  
Paris, 75015  
France  
33 (1) 40458700

Upali K. Wickrama  
Chief, Forecasting & Economic Planning  
Int'l Civil Aviation Organization  
1000 Sherbrooke Street, West  
Suite 400  
Montreal, Quebec H3A 2R2  
CANADA  
(514) 285-8045

Jack P. Wiegand  
Forecast International-Consulting Group  
22 Commerce Road  
Newtown, CT 06470  
(203) 426-0800

Rodney Williams  
Boeing of Canada Ltd., de Havilland Div.  
Garratt Blvd.  
Downsview (Toronto), Ontario M3K 1Y5  
CANADA  
(416) 375-3112

Charles L. Witthoft  
President  
Airline Route Management  
7909 Alverstone Avenue  
Suite #7  
Los Angeles, CA 90045  
(213) 568-9576

Robert R. Woodruff  
Manager, Operation Division (Budget)  
Federal Aviation Administration  
800 Independence Ave., S.W.  
Washington, DC 20591  
(202) 267-7249

Brent Wrasman  
Unison Consulting Group  
1021 W. Adams  
Suite 102  
Chicago, IL 60607  
(312) 421-4200

Dennis Wyrnn  
(press)  
Airline Financial News  
1925 North Lynn Street  
Suite 304  
Arlington, VA 22207  
(703) 522-8333

Richard Xifo  
National Air Transportation Association  
4226 King Street  
Alexandria, VA 22302  
(703) 845-9000

Ellen Yakubik  
McDonnell Douglas Corporation  
Mail Code 100 1430  
P.O. Box 516  
St. Louis, MO 63166  
(314) 233 5642

Robert Yancey  
BFGoodrich Aerospace & Defense Division  
P.O. Box 340  
Troy, OH 45373  
(513) 339-3811

Henry A.F. Young  
Young Environmental Sciences  
1295 Northern Blvd.  
Manhasset, NY 11030

Karl R. Zaeske  
Rockwell International Corporation  
400 Collins Road, N.E.  
Mail Station 107-153  
Cedar Rapids, IA 52498  
(319) 395-1817

Cheryl E. Zando  
U.S. Dept. of Labor/Bur. of Labor Stats.  
600 E. St., N.W.  
Rm 3306  
Washington, DC 20212  
(202) 272-5618

Julie A. Zogg  
Boeing Commercial Airplane Group  
P.O. Box 3707  
Mail Stop 76-15  
Seattle, WA 98124-2207  
(206) 237-5406

Anthony Zukas  
The Mitre Corporation  
7525 Colshire Dr.  
McLean, VA 22102  
(703) 883-6992

